Chapter Four

Patterns in Achievement – Science 2012

4.1 Introduction

In 2007, a competency based curriculum was introduced in science as well. The present National Assessment is the first study conducted on the Grade 8 science curriculum since the new curriculum was introduced.

This chapter presents the patterns in achievement of the students in science.

4.2 Patterns of achievement at National Level

National level student achievement would be discussed in relation to student performance pertaining to science.

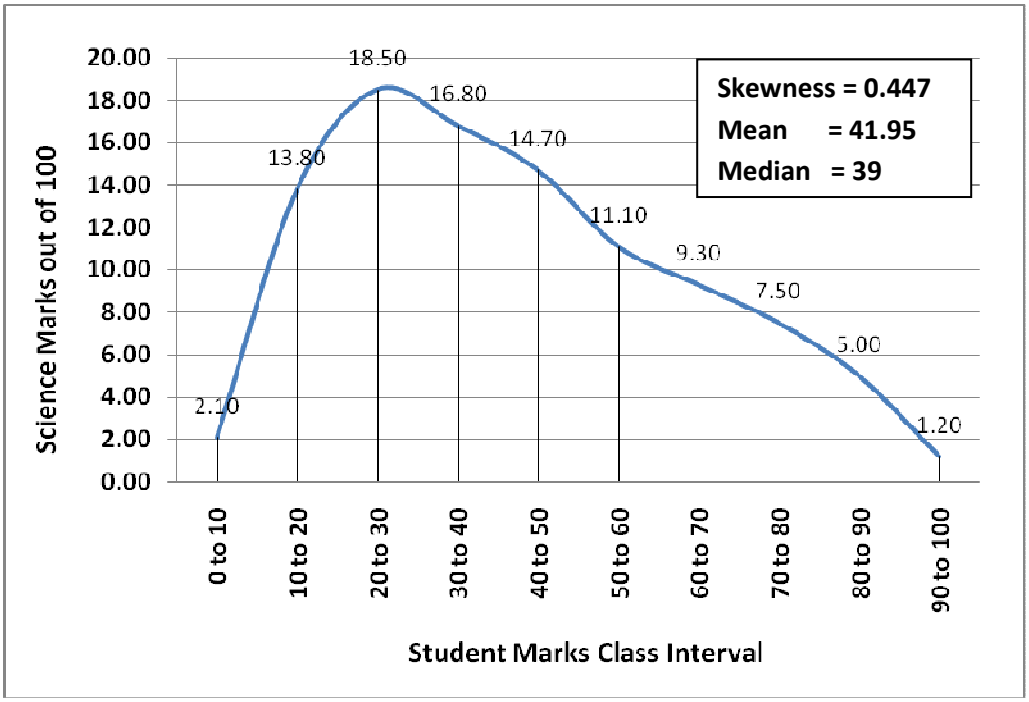


Fig. 4.1: All island achievement in science 2012 – dispersion of marks

The frequency polygon shown in Fig. 4.1 outlines the total picture of the distribution of marks of grade 08 students in science.

Fig. 4.1 depicts a positively skewed distribution of marks. This indicates that there is a higher percentage of students with low marks.

Fig. 4.2 illustrates student achievement patterns further.

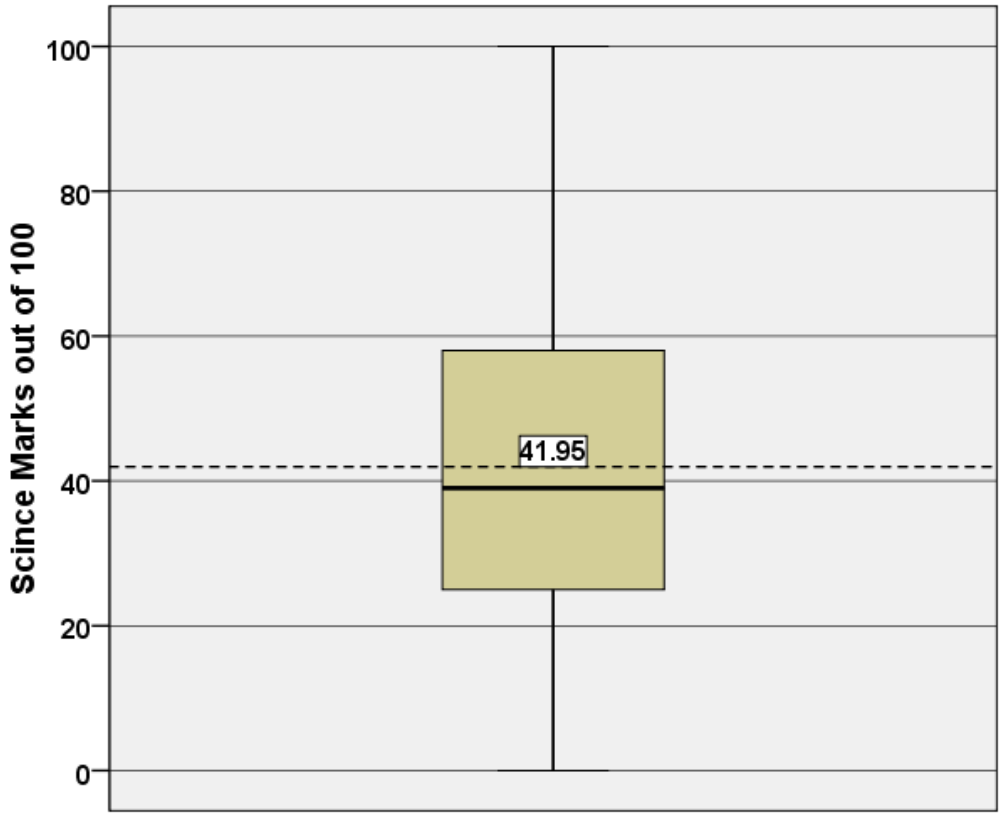


Fig. 4.2: All island achievement in science 2012 – box plot

The all island ***median*** is 39. Hence, 50% of the students in the sample has scored higher than or equal to 39 mark points. On the other hand the **mean** of the distribution which is the arithmetic average of the scores is 41.95.

This situation is further illustrated through the cumulative percentages given in Table 4.1.

Table 4.1: All island achievement in science 2012 – cumulative percentages

Marks Interval	Student Percentage	cumulative Percentage
90 to 100	1.2	100
80 to 89	5	98.8
70 to 79	7.5	93.8
60 to 69	9.3	86.3
50 to 59	11.1	77
40 to 49	14.7	65.9
30 to 39	16.8	51.2
20 to 29	18.5	34.4
10 to 19	13.8	15.9
0 to 9	2.1	2.1

All island science marks corresponding to the class intervals indicate that 51.2 cumulative percentage of students score less than the pass mark (40%). On the other hand, the percentage of students scoring above 70%, is only 13.7%.

The highest percentage of student scores fall between 20-30 class interval.
These differences emphasize the disparity that prevails in achievement of learning outcomes, even though the mean score is relatively satisfactory.

Summary of National Level achievement

- The national level mean score is 41.95, while the median is 39.
- Disparity in achievement prevails with 51.2 of the national sample scoring less than 40 and 9.2% scoring above 70.
  Since the mean is 41.95, it could be said that the majority of the students have scored low marks.

Provincial wise student achievement will be discussed next.

4.3 Provincial wise student achievement

Table 4.2: Provincial achievement in science 2012 – Summary statistics

Province	Mean	Rank	Standard Deviation	Standard Error of Mean	Skewness	Percentile (p25)	Median (p50)	Percentile (p75)
Southern	47.4	1	21.786	0.226	0.233	30	45	65
Western	44.01	2	21.113	0.207	0.348	27	41	59
Sabaragamuwa	42.79	3	21.21	0.233	0.419	26	41	57
North Western	42.37	4	21.309	0.242	0.515	25	38	58
Central	41.39	5	21.542	0.252	0.494	24	37	57
North Central	40.75	6	19.974	0.234	0.540	25	37	55
Eastern	38.15	7	23.21	0.295	0.549	18	33	57
Northern	37.82	8	19.81	0.284	0.612	22	34	53
Uva	37.36	9	20.273	0.269	0.611	21	34	50
All Island	**41.95**		**21.431**	**0.083**	**0.447**	**25**	**39**	**58**

As Table 4.2 indicates, based on provincial wise mean achievements Southern Province ranks first. This ranking is important as in the previous studies it was the Western Province that had ranked first.

Achievement wise the provinces fall into three categories. Southern, Western, Sabaragamuwa and North Western with mean scores above the national mean, fall into the higher category. Central North and Central provinces cluster in the middle, while Eastern, Northern and Uva fall into the lowest category. Between the Western and Uva Provinces there is more than 8 point difference in mean values indicating the disparity in achievement among the provinces.

These disparities are further highlighted through the bar chart given in Fig, 4.3

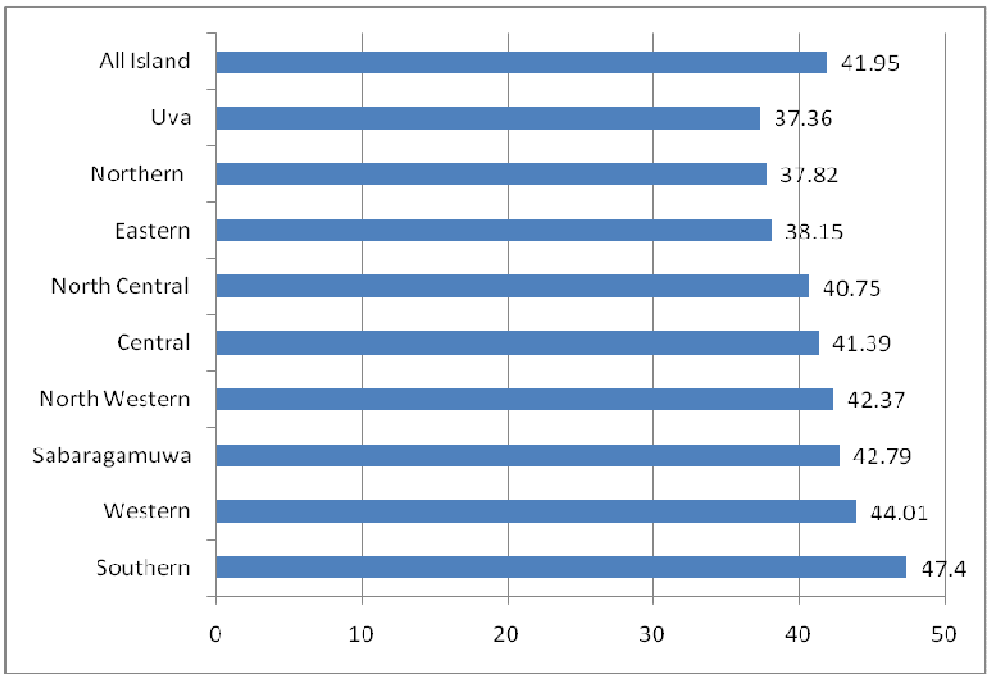


Fig. 4.3: Bar chart to represent mean among the provinces - Science

Another pattern of similarities in achievement among the other provinces can be seen when the median value is analysed. It is interesting to note that three distinct groups can be seen. Western and Sabaragamuwa Provinces fall into category 1 with 50% of the students scoring higher than or equal to 41 marks. Central and North Central fall into category 2 with 50% of the students scoring higher than or equal to 37 marks.

Northern and Uva Provinces fall into category 3 with 50% of the students scoring higher than or equal to 34 marks.

In addition to these three groups, the Southern Province records the highest median while the Uva Province records the lowest with a median value of 33.

4.3.1 Variation among students

According to Table 4.2, all the standard deviation values lie between 19 to 23 ranges. However, in most of the provinces marks deviation from the mean is similar with an SD of 21.

Highest standard deviation is seen in the Eastern Province. This means that student marks deviation from the mean value is higher. This indicates that there is wider variation among student achievement in this province.

Uva, North Central and Northern Provinces obtained lower standard deviations compared to other provinces and below the national standard deviation. Therefore, in these provinces deviation of student achievement from the mean value is less, compared to other provinces. Lower SD value indicates homogeneous performance among these provinces. However, these provinces have obtained lower mean than the other provinces. Therefore, the homogeneity is among low achievers.

Disparity in achievement

In all the provinces skewness values are positive. Skewness values of Southern and Western Provinces are relatively lower than in the other provinces.

On the other hand, in most of the provinces the skewness is higher due to majority of student marks falling among low scores. They are higher than the all island mean as well. The majority of the provinces having low achievers has impacted on making the all island SD higher.

These provincial wise disparities in achievement is further illustrated graphically through the box plot (Fig.4.4).

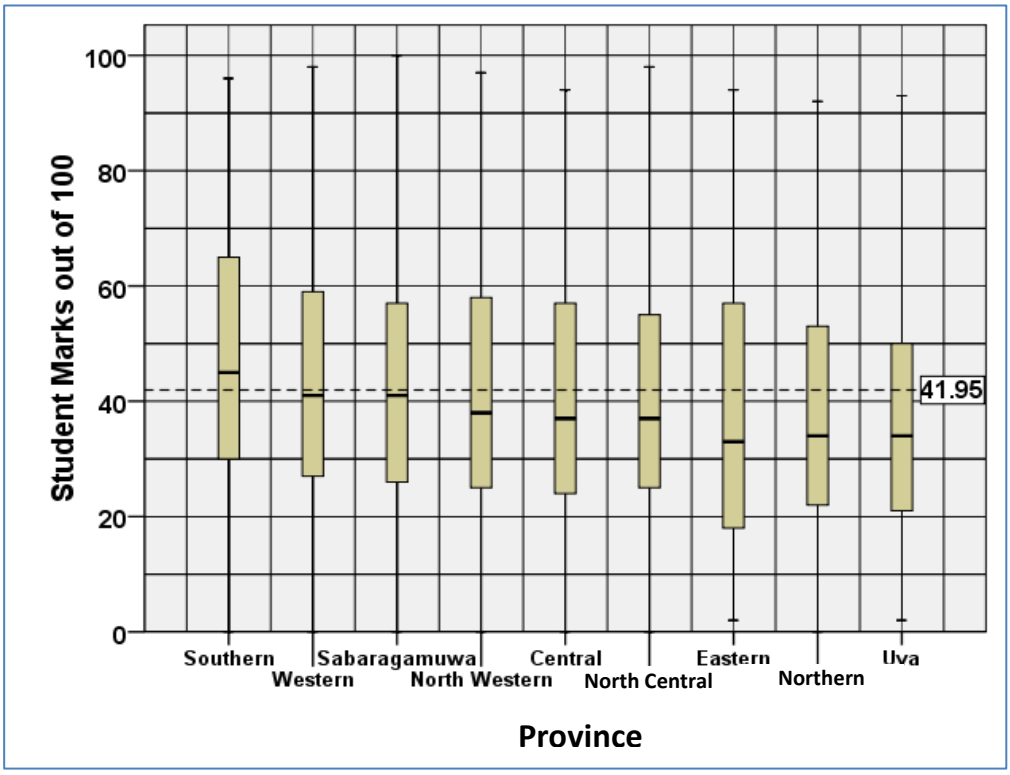


Fig. 4.4: Provincial wise achievement in science 2012 – box plot

Southern Province clearly stands out from the other provinces with a high mark range between P25 and P75. On the other hand, Eastern Province also has a high mark range. However its P25 is lower than the other provinces. Therefore, in the Eastern Province there are many low achievers.

Therefore, the box plot confirms the disparity of achievement that exists among the provinces and especially in the Eastern Province.

Table 4.3: Representation of students scoring below 50 and 50 or above - Science

Province	Gender of the student							
	Female				Male			
	Marks less than 50		Marks equal or above 50		Marks less than 50		Marks equal or above 50	
	No. of students	%	No. of students	%	No. of students	%	No. of students	%
Central	552	68.9%	249	31.1%	485	79.2%	127	20.8%
Eastern	502	75.4%	164	24.6%	493	72.7%	185	27.3%
Northern	481	81.7%	108	18.3%	515	75.7%	165	24.3%
North Western	524	69.7%	228	30.3%	544	75.7%	175	24.3%
North Central	542	76.0%	171	24.0%	546	76.6%	167	23.4%
Sabaragamuwa	557	66.2%	285	33.8%	567	76.0%	179	24.0%
Southern	474	57.9%	344	42.1%	463	66.4%	234	33.6%
Uva	584	78.4%	161	21.6%	504	83.0%	103	17.0%
Western	487	62.1%	297	37.9%	506	71.1%	206	28.9%
All Island	4703	70.1%	2007	29.9%	4623	75.0%	1541	25.0%

Summary of Provincial Level analysis

- Achievement wise the provinces fall into three categories.
  Category 1 –Southern, Western and Sabaragamuwa with mean scores above the national mean (>41.95)
  Category 2 –Central and North Western Provinces cluster in the middle.
  Category 3 – Eastern, North Central and Uva.
- Disparity of marks within a province is highest in the Eastern Province.
- North Central and Uva Provinces the disparity of marks is less, but the marks are low. Therefore, in these provinces achievement is more homogeneous but low.

4.4 Achievement levels by type of school

Table 4.4: Science marks achievement according to the school type

School Type	Mean	Standard Deviation	Standard Error of Mean	Skewness	Percentile (p25)	Median (p50)	Percentile (p75)
1AB	51.15	21.383	0.114	0.012	34	51.00	68
1C	33.07	16.326	0.113	0.734	21	30.00	43
Type 2	29.10	15.623	0.149	0.951	17	26.00	38
All Island	41.95	21.431	0.083	0.447	25	39.00	58

As Table 4.4 indicates there is a considerable gap between the mean scores of 1AB schools and Type 1C and Type 2 schools. While the mean difference between 1AB and 1C is 17.48, the difference between 1AB and Type2 is 22.05. These differences are very high between school types. 1AB students' performance appears to very strongly affect to increase the all island science mean statistics. 1AB schools and all island mean difference is closer to 10 marks, whereas 1C type schools' mean value is 8 marks below that of the all island mean value. Type 2 performance is even worse, but more closer to Type 1C. The gap in achievement among the school types is highlighted in Fig 4.5

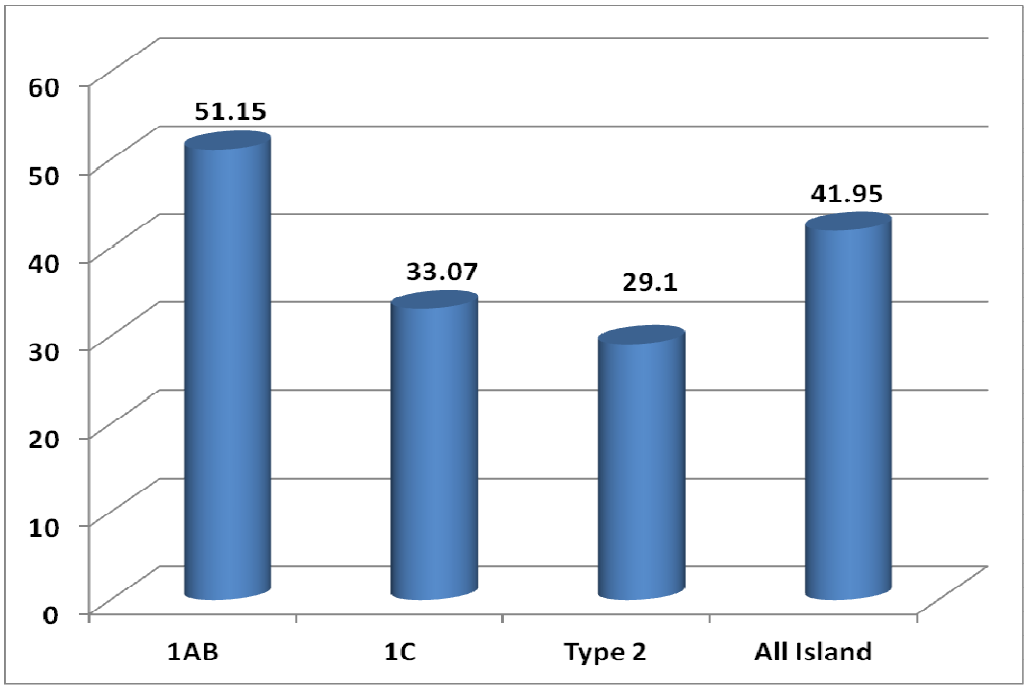


Fig. 4.5: Bar chart representing the mean values according to school types - Science

The gap between the school types is further highlighted when the median scores are considered. The median value of the 1AB schools is considerably higher than the 1C and Type 2 Schools. This reveals that 50% of student achievement is above or equal to 51 mark value in the 1AB schools. On the other hand, in 1C and Type 2 schools 50% of students are scoring below the pass marks. In fact, in 1AB schools even the bottom 25% is scoring more than the 50% in 1C and Type 2 schools.

Variation among students

Variation among student achievement in science is high throughout the island. As shown in Table 4.4 the all island standard deviation is 21.431. The SD of the 1AB schools is quite high and all most equal to the all island value. Therefore, the performance of the1AB schools has largely contributed to the all island SD. The SD of the 1AB schools is more than half of the mean value. On the other hand, the deviation from the mean in the other two school types is less. Therefore, relatively achievement differences among students' in 1AB schools is more than in 1C and Type2 schools.

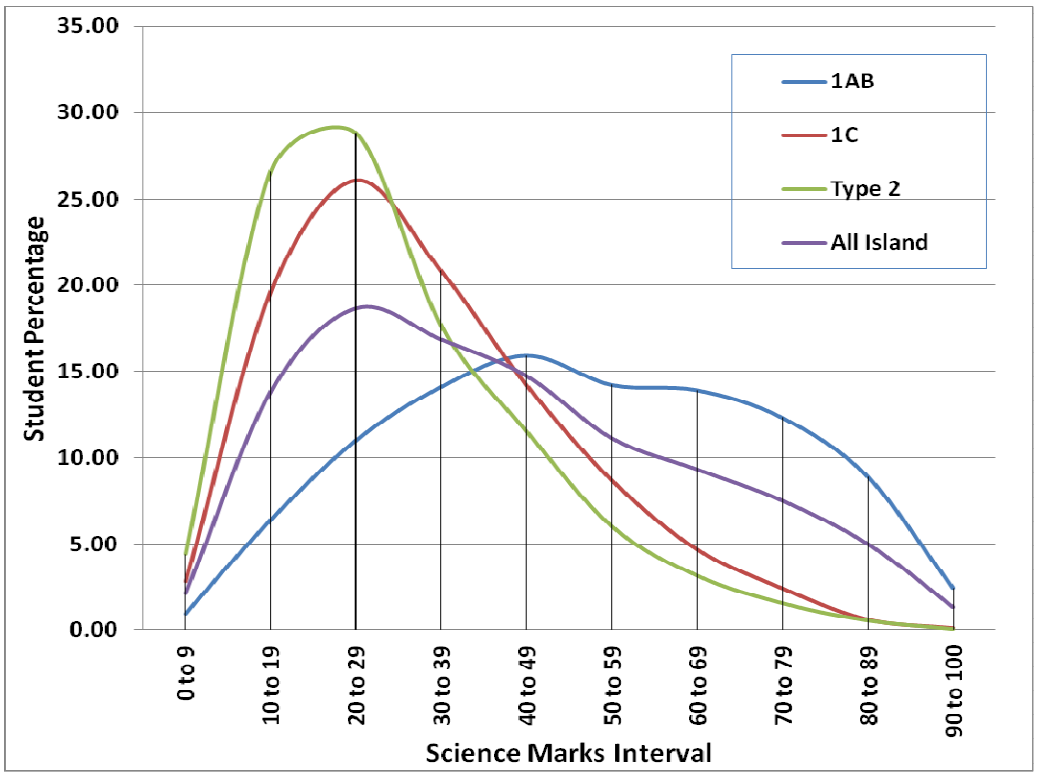


Fig. 4.6: Dispersion of marks by school type - Science

Disparity in achievement

Fig. 4.6 depicts four curves of which two are quite similar. Of these the curves for the Type 1C and Type 2 are quite similar and distinctly positively skewed. As indicated in Table 4.4, the skewness values are .734 and .951 respectively. On the other hand, the curve representing the dispersion of marks for the 1AB school type is more similar to a normal curve with a value of .012. Therefore, while the Type 1C and Type 2 schools have a larger percentage of low achievers in the 1AB schools there appears to be almost equal percentage of low and high achievers. The combination of the impact of Type1C and Type2 schools and the 1AB schools have impacted on the all island curve. Hence, its skewness value is higher than that of the 1AB schools but lower than the other two types of schools.

The shape of the curves are further explained through the Table 4.5.

Table 4.5: Cumulative student percentages according to the school type - Science

Class Interval	1AB Student (%)	Cumulative (%)	1C Student (%)	Cumulative (%)	Type 2 Student (%)	Cumulative (%)
90 to 100	2.4	100	0.1	100	0	100
80 to 89	8.9	97.6	0.6	99.9	0.5	100
70 to 79	12.3	88.7	2.4	99.3	1.5	99.5
60 to 69	13.9	76.4	4.7	96.9	3.1	98
50 to 59	14.2	62.5	8.7	92.2	6	94.9
40 to 49	15.9	48.3	14.2	83.5	11.5	88.9
30 to 39	14.1	32.4	20.8	69.3	17.6	77.4
20 to 29	11	18.3	26.1	48.5	28.8	59.8
10 to 19	6.4	7.3	19.6	22.4	26.6	31
0 to 9	0.9	0.9	2.8	2.8	4.4	4.4

As can be seen from Table 4.5, in 1AB type schools the highest percentage of students' (15.9) scores falls within the class interval 40-49. On other hand, in 1C and Type 2 schools the highest percentage of students' scores (48.5 and 59.8) fall within the class interval 20-29. Further, when considering the 1AB curve it can be seen that 48.3

cumulative percentage of students have scored less than 50% of marks. This means that 51.7 cumulative percentage of students have scored above 50%. Due to this dispersion of marks the curve shown in Fig. 4.6 is almost similar to a normal curve as there is not much difference between the percentage of scores that falls on either side of the mean. This is further explained as according to Table 4.4 in 1AB schools mean and the median values are the same. This is a feature of a normal curve.

On the other hand, in 1C and Type 2 schools, the cumulative percentage of scores below 50 is 83.5 and 88.9. Therefore, the two curves representing the dispersion of marks in these two school types are highly positive with majority of the students scoring low marks.

In the 1AB schools those who have scored less than the pass mark is only 20.8%. On the other hand, in 1C and Type 2 schools cumulative percentage is 69.3 and 77.4 respectively.

The dispersion of marks and the shape of the curves representing the dispersion can be further explained using the box plot in Figure 4.7.

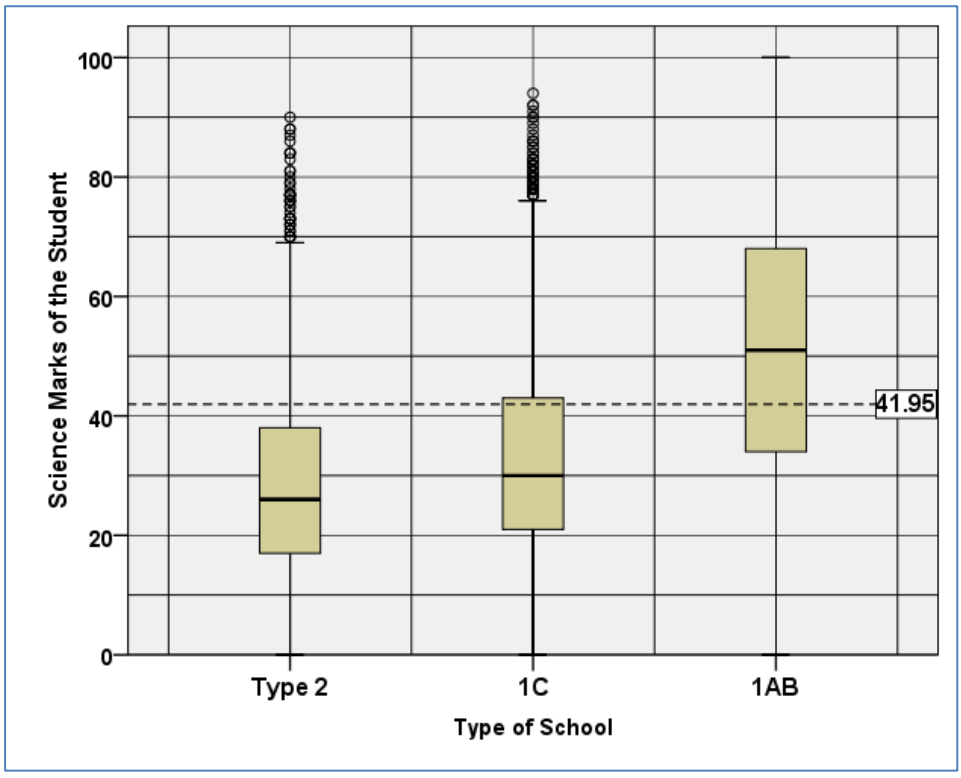


Fig. 4.7: Science marks according to the school types using box plot and whiksper plot

Box plot chart graphically shows that 1C and Type 2 schools achievements are very low compared to 1AB school type. More than 75 percent of the students are below the all island mean statistics indicated by the horizontal line. However, there are also outliers - few students who have scored exceptionally high marks in the 1C and Type 2 schools. 1C schools' achievement indicated by the interquartiles is slightly higher than the Type 2, but the 3rd Quartile is just above the all island mean Value line. There are also students who have done exceptionally well in 1C schools as well. However, the range is slightly higher compared to Type 2 schools. The interquartile range in 1AB schools is also higher than the other two school types. However there are no exceptional cases indicated in the chart.

The reasons for exceptional performance by a few students in the 1C and Type 2 schools need further investigation.

Summary

- The gap between the achievement of students in 1AB schools and 1C and Type 2 is wide.
- In the 1AB schools the percentage of high achievers are only slightly higher than the low achievers.
- In the 1AB schools those who have scored less than the pass mark is only 20.8%. On the other hand, in 1C and Type 2 schools cumulative percentage is 69.3 and 77.4 respectively.

4.5 Achievement levels by gender

Table 4.6: Science Achievement in summary statistics table

Student Gender	Mean	Standard Deviation	Standard Error of Mean	Skewness	Percentile (p25)	Median (p50)	Percentile (p75)
Female	43.56	21.102	0.113	0.413	27	41.00	59
Male	40.19	21.648	0.121	0.503	23	36.00	56
All Island	**41.95**	**21.431**	**0.083**	**0.447**	**25**	**39.00**	**58**

There is a slight difference in the achievement of females over males. As Table 4.6 indicates, male performance is also lower than the all island mean score.

These differences could also be seen in Fig. 4.8

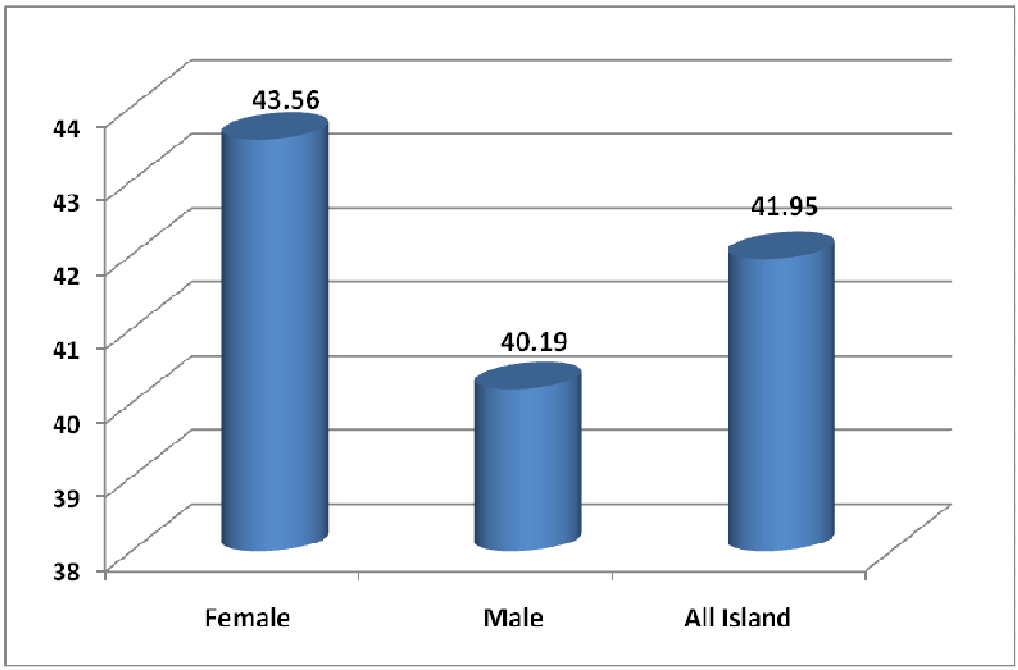


Fig. 4.8: Bar chart representing mean values according to gender

Although the mean score of the male students is below the all island mean, when considering the median, the score for males is equal to the all island score.

Although male students mean achievement is lower than the female students, they have obtained a higher standard deviation value. Therefore, the deviation from the mean is higher among the male students indicating greater variation among their performance.

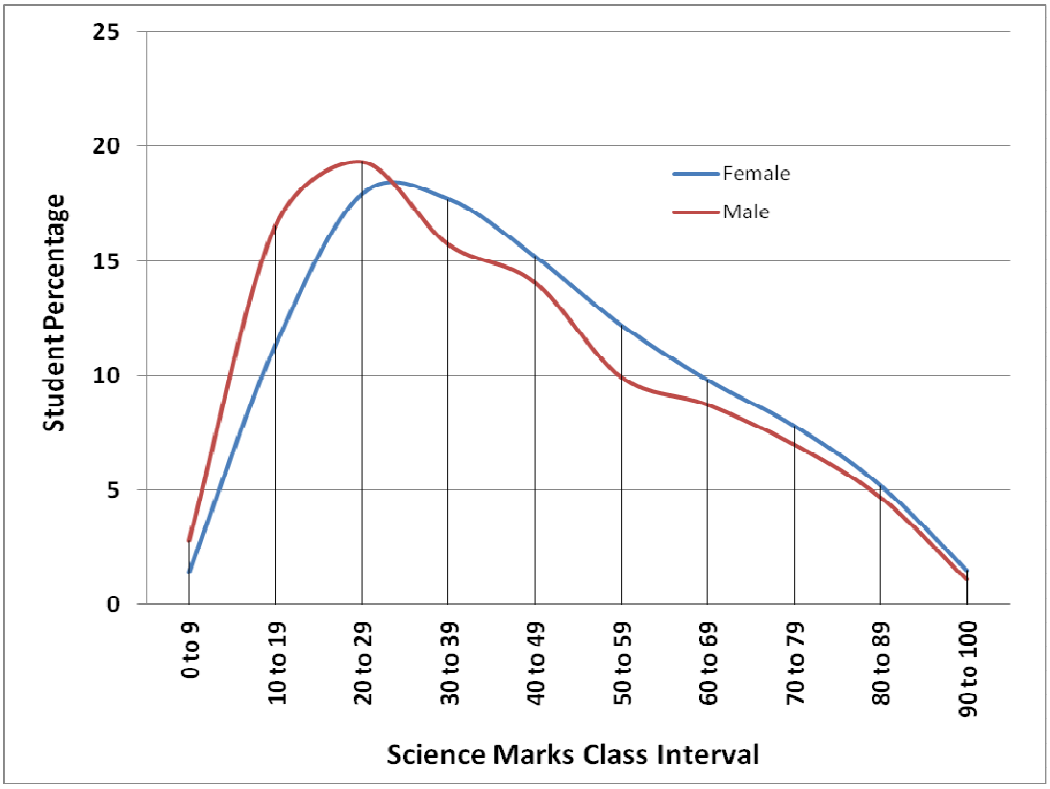


Fig. 4.9: Dispersion of marks by gender

Fig. 4.9 displays two curves which are both positively skewed. However, as Table 4.6 indicates the male curve has a higher positive value than the female, as well as the all island value.

Pattern of the two curves are similar at the beginning, then peaks become different and finally, both curves become similar again.

The disparity in the male students' achievement can be elaborated better through the cumulative percentages. As can be seen in Table 4.7, the highest percentage of student scores falls between the class interval 20-29 both among males and females. However, the percentage is slightly higher among the males. There on the percentages for each class interval decreases among both groups.

Table 4.7: Gender wise Science analysis cumulative table

Class Interval	Female (%)	Cumulative Percentage	Male (%)	Cumulative Percentage
90 to 100	1.50	100.00	1.10	100.00
80 to 89	5.20	98.50	4.70	98.90
70 to 69	7.80	93.30	7.00	94.20
60 to 69	9.80	85.50	8.74	87.20
50 to 59	12.20	75.70	9.95	78.46
40 to 49	15.20	63.50	14.09	68.51
30 to 39	17.70	48.30	15.74	54.42
20 to 29	17.90	30.60	19.34	38.68
10 to 19	11.30	12.70	16.54	19.34
0 to 9	1.40	1.40	2.80	2.80

According to Table 4.7 and Fig. 4.9 it could be concluded that among both females and males, there are high performing students. On the other hand, among both groups there are low performing students. Among females, 48.30 cumulative percentage has scored below the pass mark, while this percentage increases to 54.42% for males.

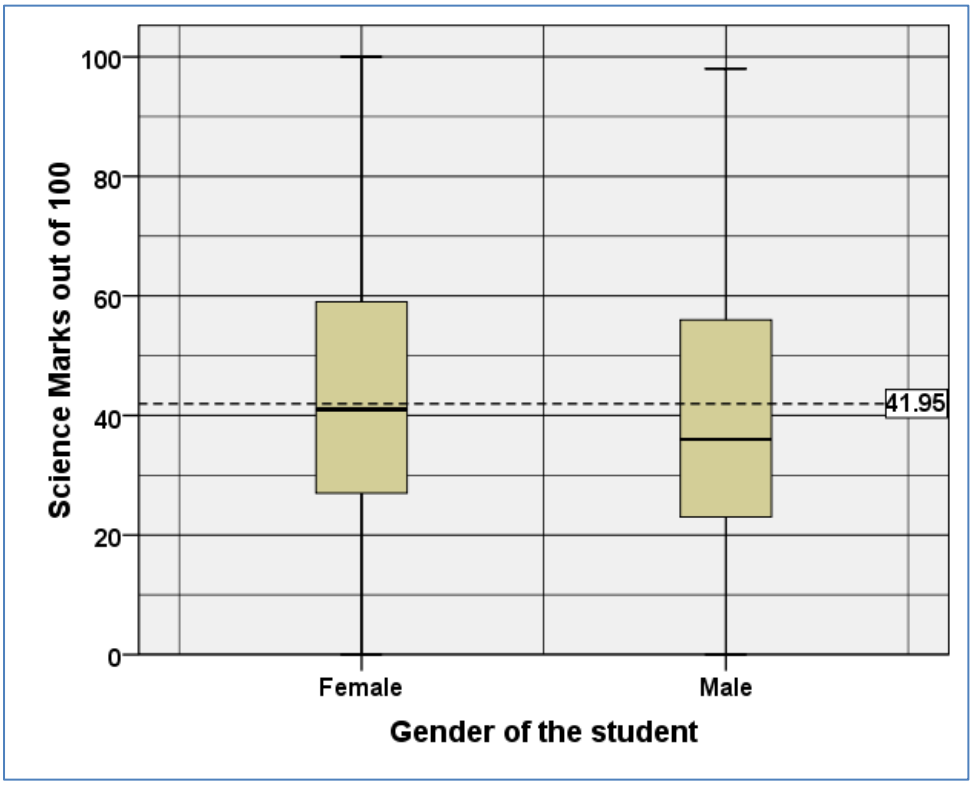


Fig. 4.10: Box plot and whiksper plot representing gender wise Science marks

Box plot for gender wise science achievement graphically shows similarities that has been discussed already. Female student groups start at a slightly higher base and reaches higher mark ranges at a slightly higher mark point. Median of the female students is very close to all island mean achievement, where as the male students median is below the mean indicating that 50% of students are scoring below the all island mean.

Summary

- Female performance is slightly better than all island and male performance.
- While 48.30 of girls have scored below 40, the male percentage is 54.42.

4.6 Achievement levels by medium of instruction

Table 4.8: Achievement level by medium of instruction - science

Medium of the Student	Mean	Standard Deviation	Standard Error of Mean	Skewness	Percentile (p25)	Median (p50)	Percentile (p75)
Sinhala	43.71	21.246	0.096	0.385	27	41	59
Tamil	37.22	21.211	0.157	0.668	20	33	51
All Island	**41.95**	**21.431**	**0.083**	**0.447**	**25**	**39.00**	**58**

There is wide 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, Tamil medium students' mean achievement is below the national mean average.

These disparities are further highlighted through the bar chart given in Fig. 4.11.

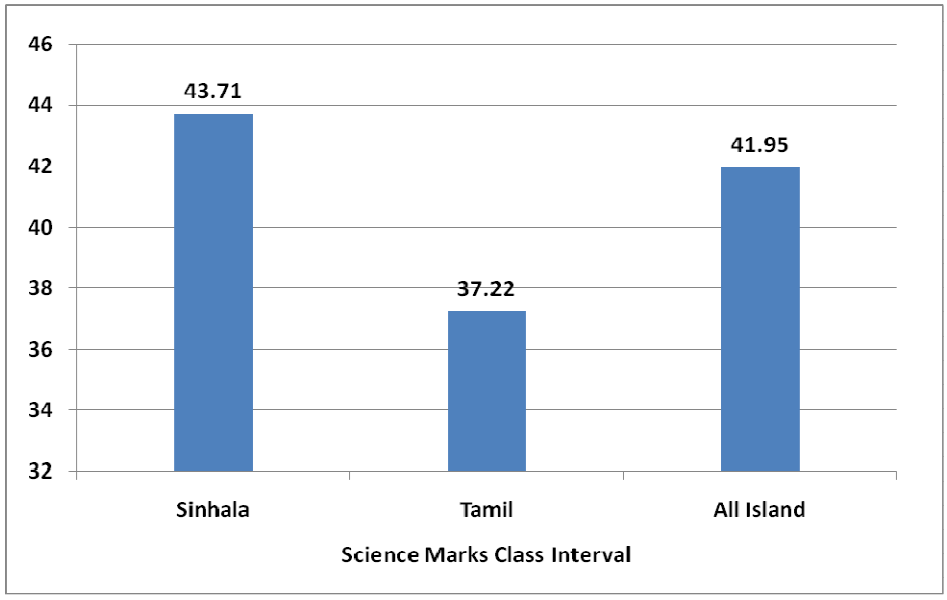


Fig. 4.11: Bar chart representing mean values according to medium of instruction - Science

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

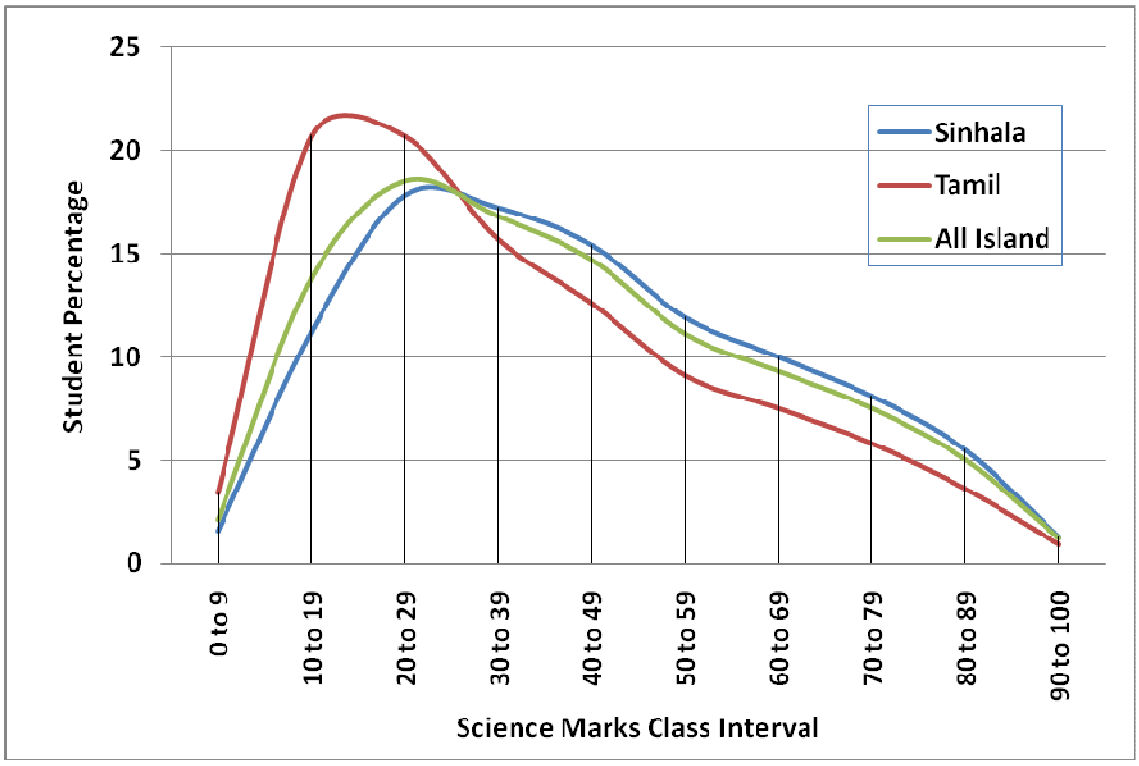


Fig. 4.12: Dispersion of marks by medium of instruction - Science

The disparity discussed using the mean is also visible through the frequency distribution graph. All the other curves are positively skewed.

Comparatively the Tamil medium students' curve peak at the lowest class mark interval while the Sinhala and all island curves peak at a slightly higher marks intervels.

This medium wise disparity in students' achievement can be elaborated better through the cumulative percentages.

Table 4.9: Medium wise cumulative percentage table - Science

Marks Interval	Sinhala	Cumulative Percentage	Tamil	Cumulative Percentage
90 to 100	1.3	100	0.9	100
80 to 89	5.5	98.7	3.6	99.1
70 to 79	8.1	93.2	5.8	95.5
60 to 69	10	85.1	7.5	89.7
50 to 59	11.9	75.1	9.1	82.2
40 to 49	15.4	63.2	12.6	73.1
30 to 39	17.2	47.8	15.7	60.5
20 to 29	17.8	30.6	20.7	44.8
10 to 19	11.2	12.8	20.7	24.1
0 to 9	1.6	1.6	3.4	3.4

Considering the pass mark as 40, 47.8% of Sinhala medium and 60.5% of Tamil medium students have scored below the pass mark.

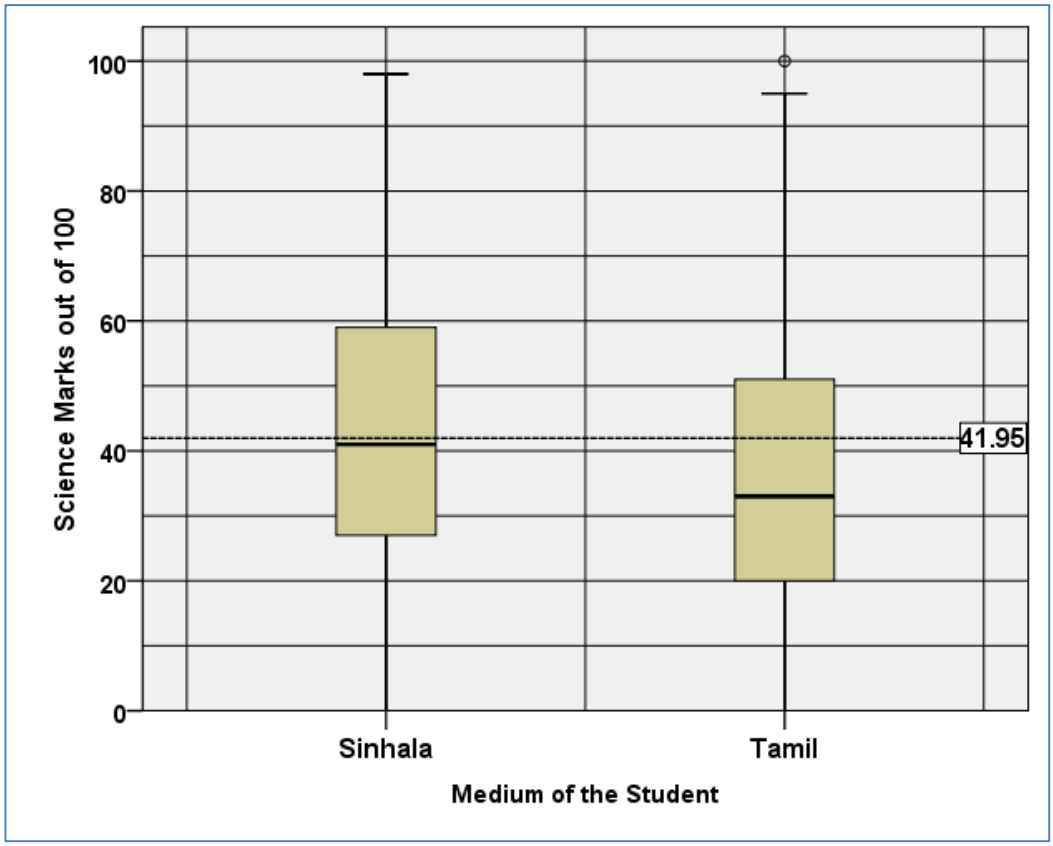


Fig. 4 .13: Box plot for medium wise achievement - Science

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

Sinhala medium students' performance is higher than the all island performance with respect to the median value. While 50% of Sinhala medium students have scored equal or above 41%, 50% of students all island have scored equal or above 39%. On the other hand, the Tamil Medium students performance is low with the median being 33.

A remarkable feature of this box plot is that even though the Tamil medium students' achievement is low there is one outlier.

Summary

- There is 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.

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

Therefore, in order to provide equal opportunities there is a need to identify the gaps and facilitate reducing the gaps.

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

4.7 Analysis of achievement by competency levels

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.

The science paper was based on four main content areas – Biology, Chemistry, Earth science and Physics. The percentage of students who has answered correctly the questions related to each competency level under the content area of Biology is given in Table 4.10.

Table 4.10: Competency levels in relation to Biology

Content	Competency Level	Percentage
Biology	1.1 Discovers the diversity of the natural environments	46.30%
	1.2 Investigates the advantages/disadvantages of the built environments	46.50%
	1.3 Focuses attention on the venomous animals that are harmful to man	46.50%
	1.4 Acquires the ability to use international scientific symbols	66.60%
	3.1 Observes the interactions based on life cycles	38.15%
	3.3 Explains the importance of use of cultivations under specific conditions	70.10%
	3.4 Investigates the biotic factors affecting the perpetuation of the environment.	40.50%
	6.1 Conducts explorations to identify the morphological diversity of leaves	5.40%
	6.3 Investigates the functions related to the diversity of roots.	35.40%
	6.4 Uses plant related products with a scientific attitude	42.40%

As Table 4.10 indicates the highest percentage of students has achieved competency level 3.3. On the other hand, the lowest percentage of students has achieved competency level 6.1.

The achievement of different competency levels is also graphically shown in Fig. 4.14.

Competency levels related to Biology

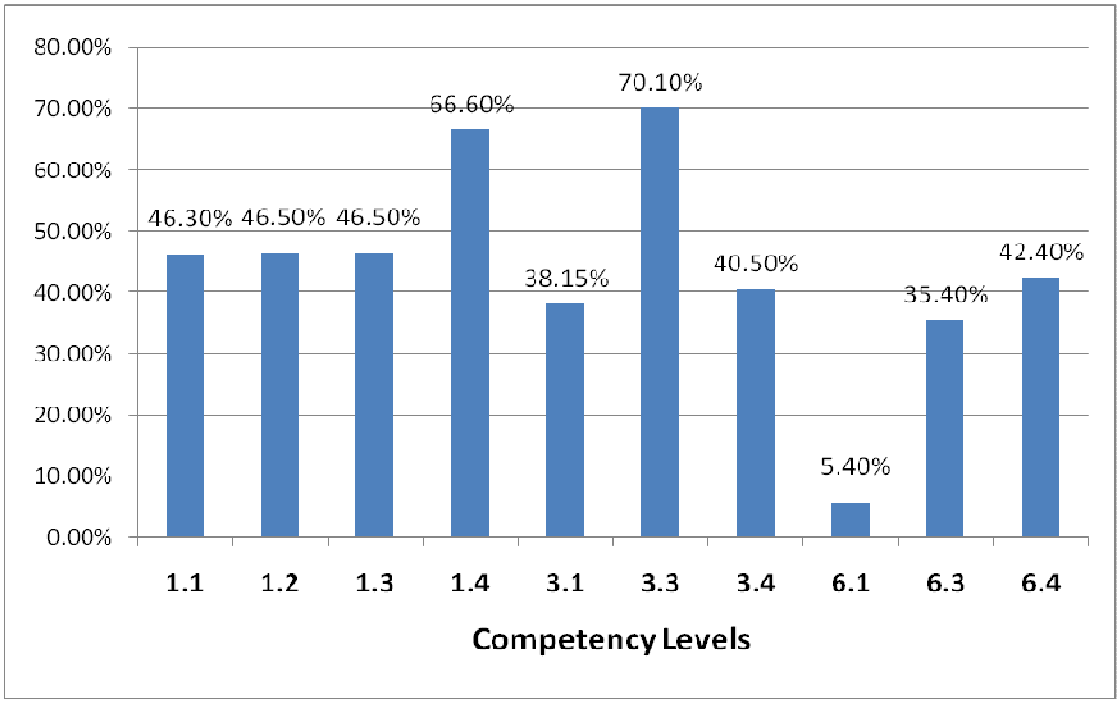


Fig. 4.14: Achievement of competency levels related to Biology

Table 4.11 indicates the achievement of competency levels related to Chemistry

Table 4.11: Achievement of Competency levels related to Chemistry

Content	Competency Level	Percentage
Chemistry	2.1 Inquires into the properties of matter	48.15%
	2.2 Inquires into the standard symbols used for elements	30.80%
	2.3 Display the ability to use the differences in density of substances in day today life.	46.25%
	2.4 Uses the expansion of solids, liquids and gases in day today life effectively.	7.90%
	2.5 Inquires into the usages of compounds according to their properties.	19.90%
	2.6 Inquires into the domestic uses of chemicals	17.90%
	2.7 Uses parallel and serial connections of electrical appliances in human needs.	48.80%
	2.8 Uses magnets in day today life	59%

As Table 4.11 and Figure 4.15 indicates the lowest achievement relates to competency level 2.4. On the other hand, the highest percentage can be seen in relation to competency level 2.8.

When the cognitive level related to these two competency levels are considered the first (2.4) relates to application while 2.8 relates to knowledge. Therefore, it can be inferred that students ability to apply the knowledge is weak.

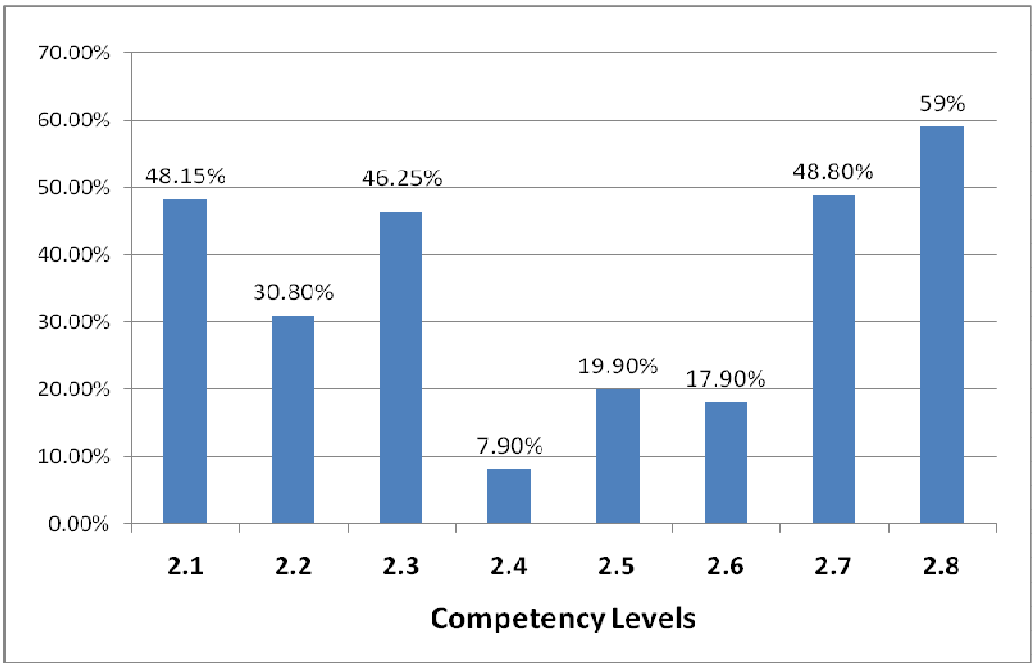


Fig. 4.15: Achievement of competency levels related to chemistry

Next competency levels related to earth science will be analyzed.

Table 4.12: Achievement of competency levels related to earth science

Content	Competency Level	Percentage
Earth science	4.1 Investigates the constituents of the atmosphere	43.55%
	4.2 Acts to maintain optimum composition of the atmosphere	35.20%
	4.3 Uses natural resources obtained form the earth effectively	50.10%

As Table 4.12 and the Figure 4.16 indicate there is more homogeneity in the achievement of these competency levels.

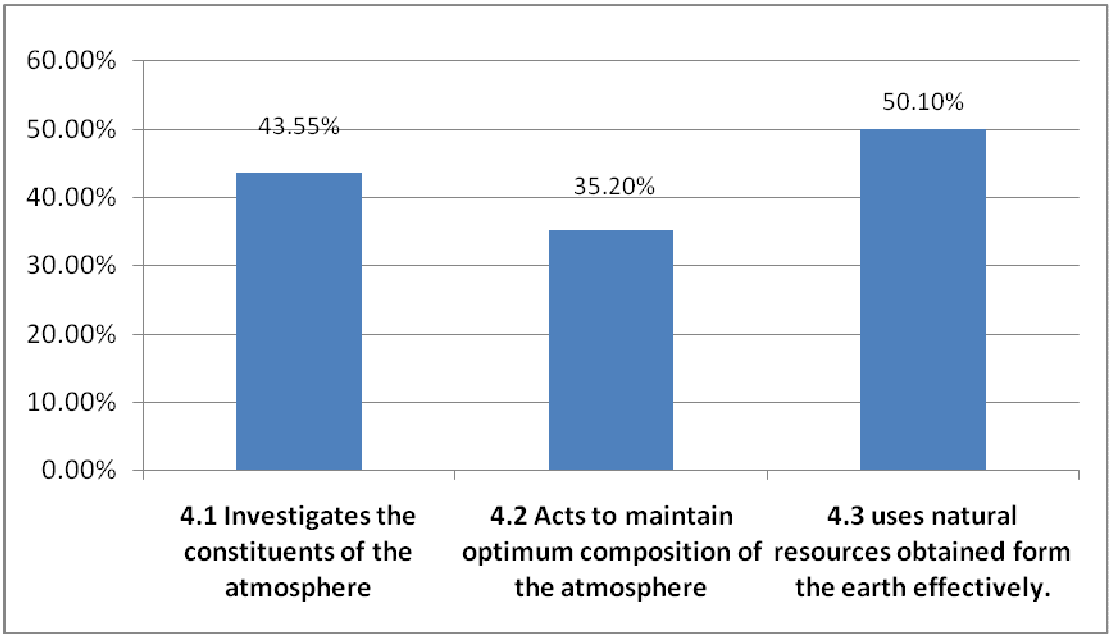


Fig.4.16: Achievement of competency levels related to earth science

Competency levels related to physics would be analyzed next.

Table 4.13: Achievement of competency levels related to physics

Content	Competency Level	Percentage
Physics	5.1 Inquires into the application of the concept "pressure" in day today needs	37.40%
	5.2 Inquires into the effect of Center of Gravity on the equilibrium of an object in relation to life experiences	45.70%
	5.3 Uses work, energy and power in human concerns/needs	35.60%
	7.1 Uses properties of light in human needs	19.20%
	7.2 Uses generation and propagation of sound in musical instruments	45.20%
	7.3 Explores the scientific basis of modern communication equipments	39%
	8.1 Contribute to minimize the risks associated with cyclones	51%
	8.2 Contribute to minimize the risks associated with lightning and thunder	52.30%

The lowest achievement in physics relates to competency level 7.1. On the other hand, the highest percentage of students has achieved competency level 8.2

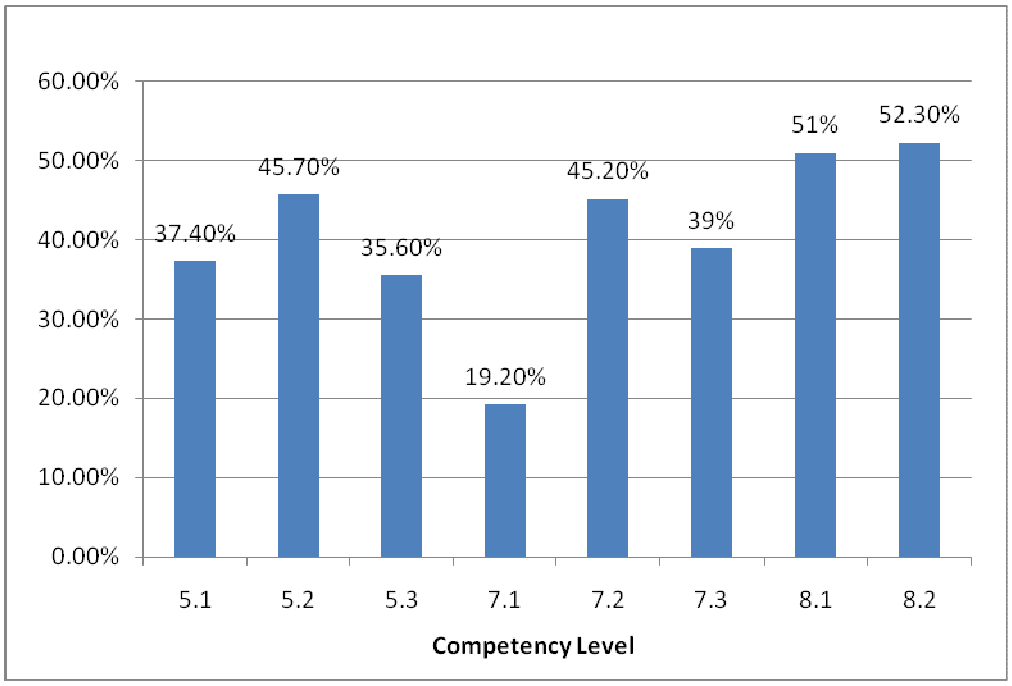


Fig.4.17: Achievement of competency levels related to physics

Facility index values for the science paper

The science paper consisted of three sections. The part 1 contained 20 questions of selection type.

Fig. 4.18 displays the facility values for questions 1-20

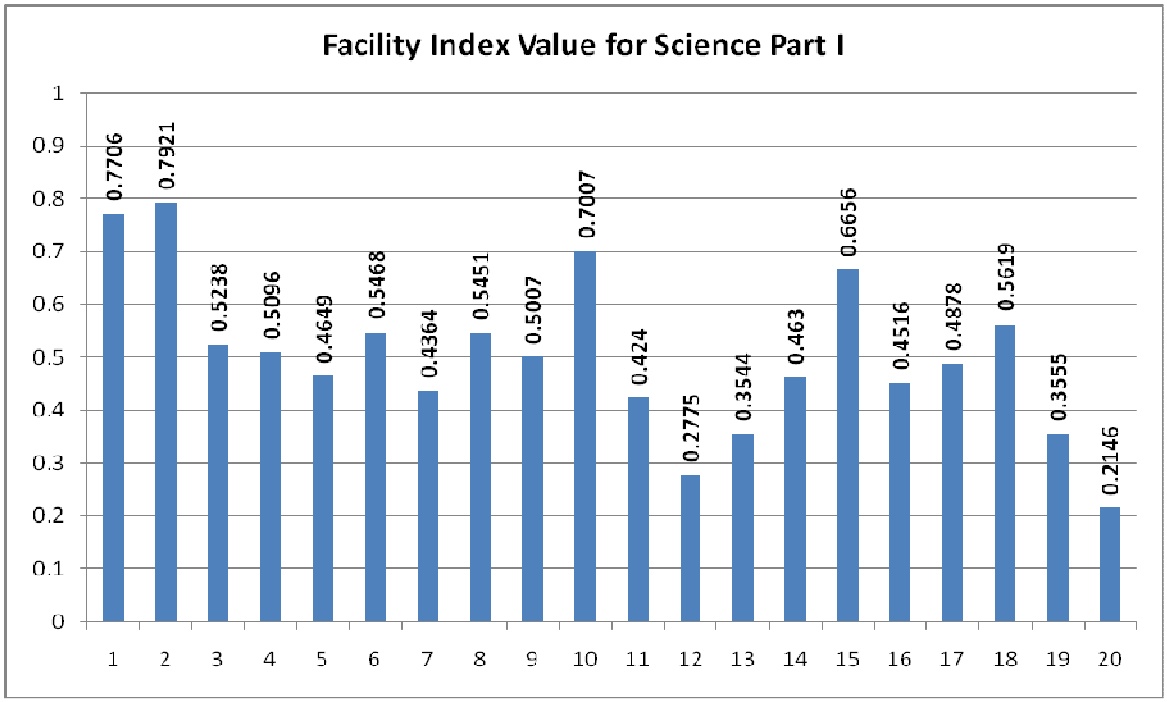


Fig. 4.18: Facility index value for science part I

According to Fig. 4.18 the facility values ranges from 0.2146 to .7921.

Part 2 of the question paper contained 10 questions of supply type. The analysis of section 2 is displayed in Fig 4.19.

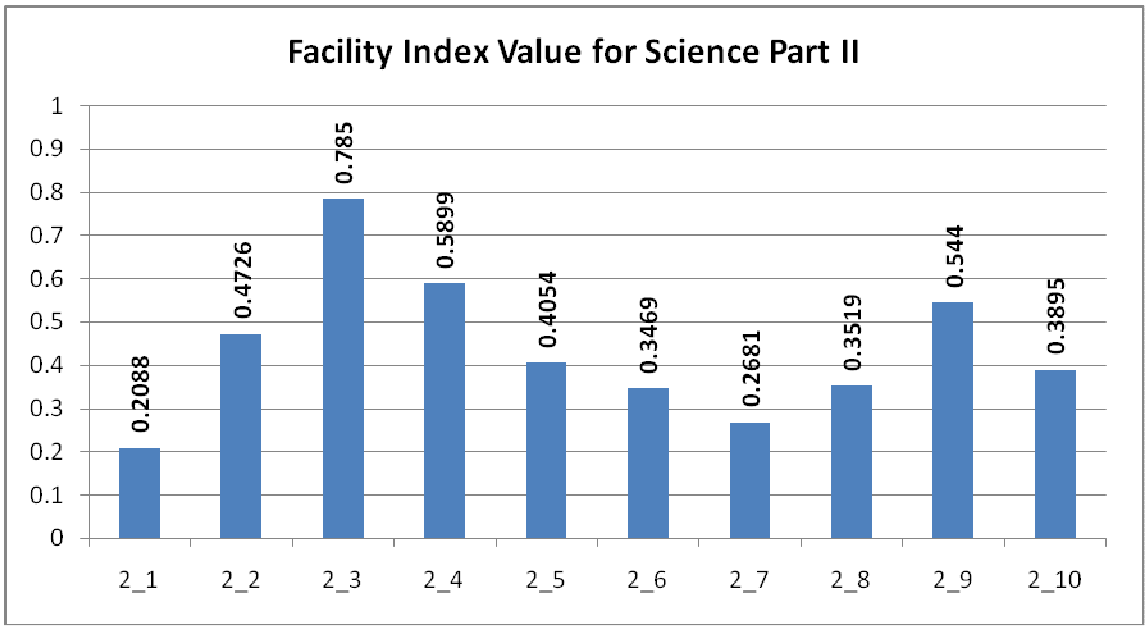


Fig. 4.19: Facility index value for science part II

As Fig. 4.19 indicates the performance is relatively low in part II.

The part III of the question paper contained four questions with six sub parts for each main question.

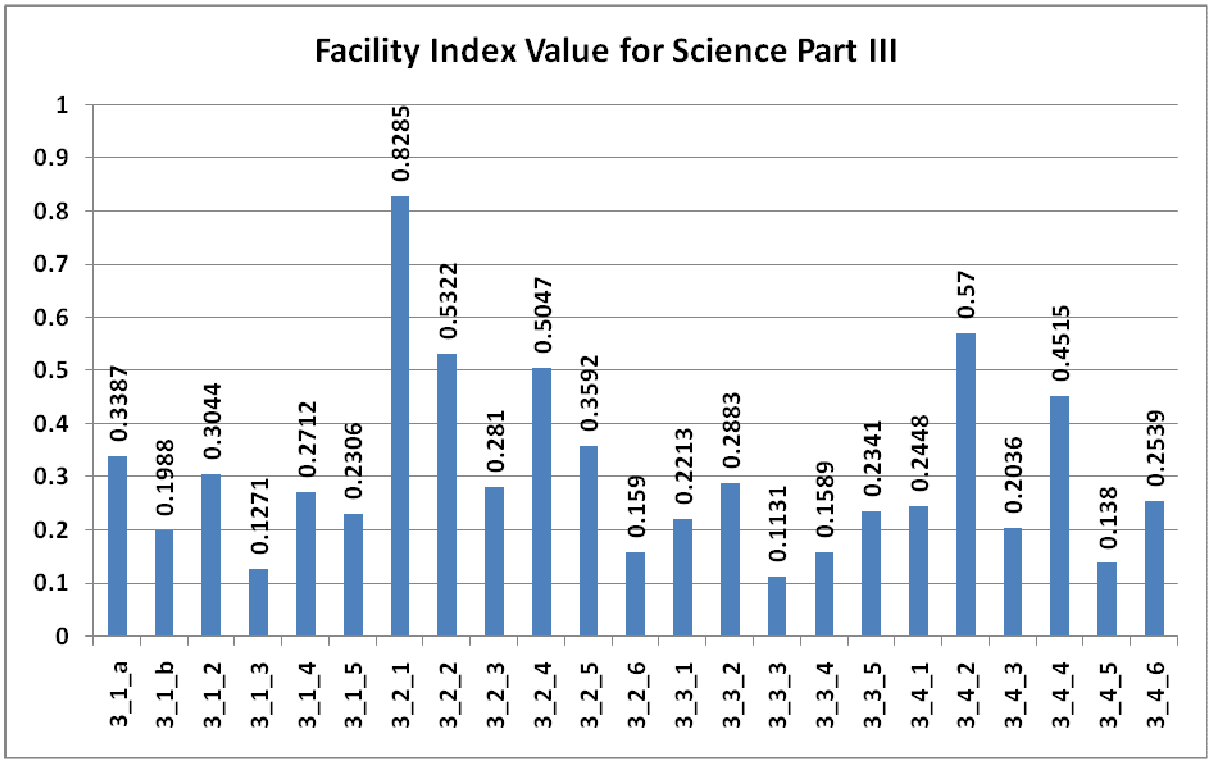
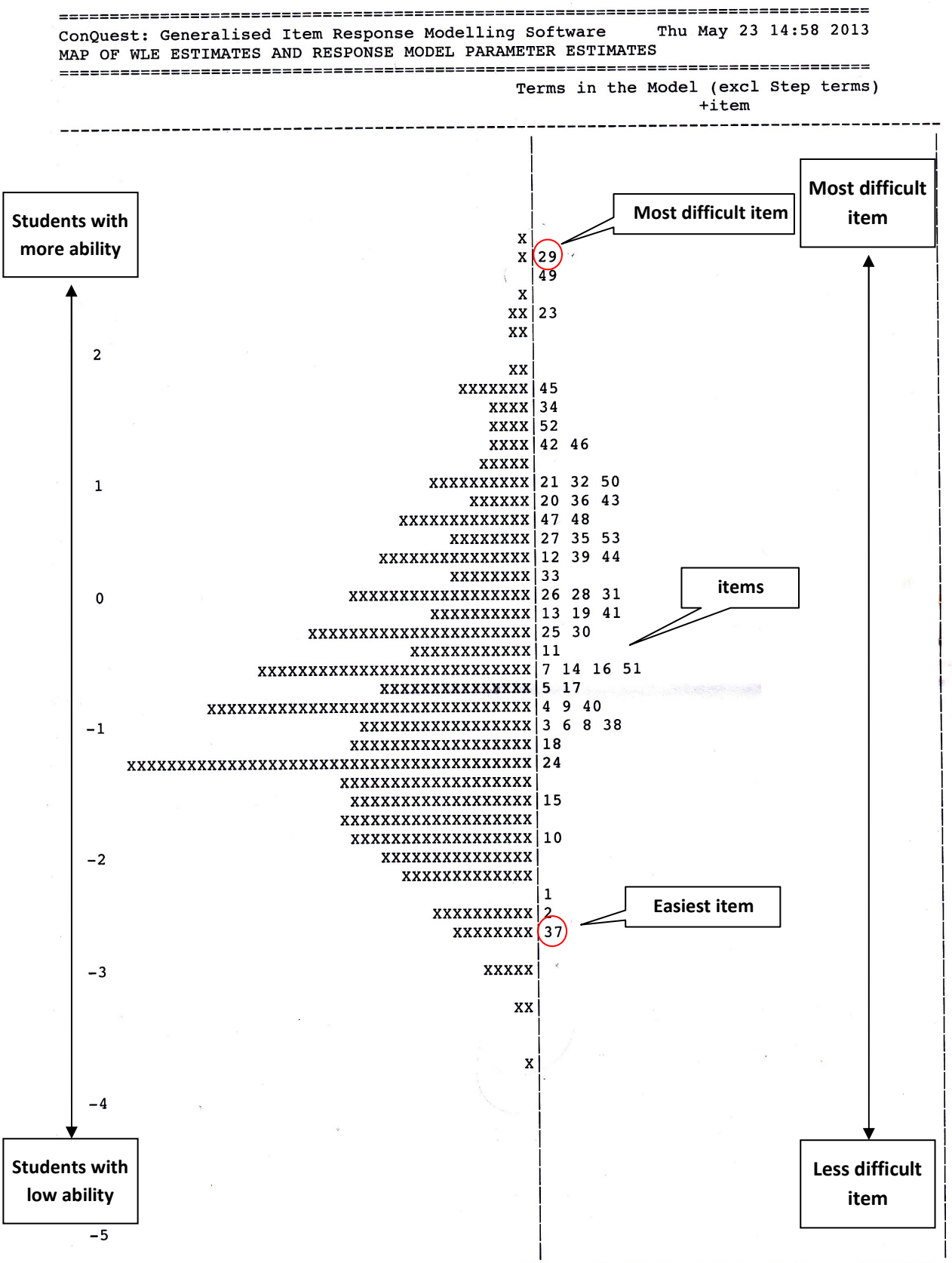


Fig. 4.20: Facility index value for science part III

The performance in part III is relatively better than in part II

Disparity in achievement seen through item analysis

The Item Person Map (IRT) given on pg. 78 displays the range of difficulty of the test items as well as the range in student ability. According to the map there are approximately thirty students whose abilities are higher than the most difficult item. On the other hand there is much greater number of students whose abilities are lower than the easiest item. Therefore, this analysis confirms, the disparity in achievement which has been already discussed.


ConQuest: Generalised Item Response Modelling Software Thu May 23 14:58 2013
MAP OF WLE ESTIMATES AND RESPONSE MODEL PARAMETER ESTIMATES
Terms in the Model (excl Step terms)
+item
Students with more ability
Most difficult item
Most difficult item
items
Easiest item
Students with low ability
Less difficult item
2
1
0
-1
-2
-3
-4
-5
29
49
23
45
34
52
42 46
21 32 50
20 36 43
47 48
27 35 53
12 39 44
33
26 28 31
13 19 41
25 30
11
7 14 16 51
5 17
4 9 40
3 6 8 38
18
24
15
10
1
2
37
Each 'X' represents 29.5 cases

4.8 Summary

This chapter discussed students' performance in science both at national and provincial level, according to school type, gender and medium of instruction.

Further, test items used to assess students' performance were analyzed to assess how far they have been successful in achieving the competency levels identified for grade 8. It could be concluded that there is disparity in achievement of learning outcomes in the learning of the science.