# Research Report

# Performance Comparison between IB School Students and Non-IB School Students on the International Schools' Assessment (ISA) and on the Social and Emotional Wellbeing Questionnaire

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## EXECUTIVE SUMMARY

This report examines the performance of students enrolled in the IB Primary Years Programme (PYP) and the IB Middle Years Programme (MYP) on the ACER International Schools' Assessment (ISA) compared with non-IB students from the same ISA cohorts. The ISA is an assessment created especially for students in international schools in Grades 3 to 10. The assessment asks both multiple-choice and open-ended questions in the areas of writing, reading and mathematics, and provides international normative information about student performance. The Reading and Mathematical Literacy are based on the internationally endorsed frameworks of the OECD's Programme for International Student Assessment (PISA).

The IB – non-IB comparison, based on students who participated in the ISA in 2007/2008 and 2008/2009 (four sittings) was completed in 2009. This stage of the project is hereafter called Phase I. IB has commissioned ACER to undertake a follow-on study of the project, Phase II. Phase II is based on students who participated in ISA assessments in 2009-10 and 2010-11. Phase II has three components: a replication of Phase I using more recent data, a closer examination of particular findings from Phase I and an analysis of a student questionnaire on perceptions, attitudes and wellbeing.

The first component of Phase II replicates Phase I using ISA October 2009/February 2010 and October 2010/February 2011 data. The analysis includes analysis of student performance on four ISA assessment areas (Section 2.1.1), regional analysis of student performance across four ISA domains (Section 2.1.2), country analysis of student performance in Asia (Section 2.1.3), top-performing IB schools analysis (Section 2.2), analysis of strengths and weaknesses within assessment strands (Section 2.4), PISA benchmark analysis (Section 2.6), and multilevel analysis of school variance between IB schools and non-IB schools (Section 2.7).

The second component of Phase II examines more closely particular findings from Phase I that did not demonstrate any clear patterns or where evidence was inconclusive. This includes the analysis of performance in IB continuum schools compared to single or dual program schools (Section 2.3), and the study of the impact of authorization length on student performance (Section 2.5).

The last component of Phase II is analysis of student questionnaire. In ISA 2010/2011, a Student Learning and Wellbeing Questionnaire was included in the ISA test booklets at grades 5, 6, 8 & 9. The questionnaire collected data on students' values and attitudes, perceptions of school life, and their social and emotional wellbeing. This part of analysis reports the findings about IB PYP (Grade 5 and Grade 6) and IB MYP (Grade 8 and Grade 9) students' perceptions of school life, their attitudes, their sense of wellbeing (Section 3.1), compares IB students' perceptions to those of non-IB students (Section 3.2), and investigates the relationship between students' ISA performance and their questionnaire responses (Section 3.3), and compares the results for IB and non-IB students on the relationship between ISA performance and questionnaire responses (Section 3.4).

In 2009-11, 270 of the 290 schools that participated in the administration of the ISA were willing to be identified for the purpose of this study. Of those 270 schools, a total of 117 PYP and 86 MYP schools were designated as authorised programmes. In 2009-11, total 50,714 international students participated ISA assessments, of which 68% were IB students, and 32% were non-IB students. ACER groups international schools into geographical region (or continent) by definition of International Organization for Standardization (ISO). For example, United Arab Emirates is located in Western Asia and it is grouped into Asia. In geographic region, 57% of these students enrolled at schools in Asia, 26% of these students enrolled at schools in Europe, and percentages of students enrolled at schools in Africa, Americas, and Oceania were 11%, 4%, and 2%.

The key findings of this research project were summarised as follows. An analysis of student performance among PYP and MYP students showed evidence that, on a global level, the PYP and the MYP students performed better than students from non-IB schools in the ISA assessment areas at many grade levels. The difference in Reading was significant at all grades except for grade 8 with effect sizes ranging from 0.09 to 0.40, whereas the difference in Mathematical Literacy was significant at grades 6, 9 and 10 with effect sizes of 0.15, 0.18 and 0.46, respectively.

The global analysis of ISA performance was followed by detailed regional analysis in three geographical regions, i.e. Europe and the Americas, Asia and Oceania, and Africa. The IB cohort outperformed the non-IB cohort in all four ISA assessment domains with a relatively large margin in the regions of Europe and the Americas, with effect sizes ranging from 0.12 to 0.75. In Africa, 75% of comparison groups showed IB students significantly outperformed non-IB students in all four assessed domains, with effect sizes ranging between 0.16 and 0.60. In the region of Asia and Oceania, IB students outperformed non-IB students in the following comparisons: at grade 10 Mathematical Literacy; at grades 4, 6-7, 9 and 10 Reading; at grades 4, 9 and 10 Narrative Writing, and at grades 4, 7, 9 and 10 Expository Writing. These differences have small effect sizes, with the exception of grade 10 with medium effect sizes. However, in the Asia and Oceania region, non-IB students were significantly better than IB students in Mathematical Literacy in grades 3-5 and 8, with small to medium effect sizes.

In order to understand the degree to which the IB curriculum promotes particular cognitive and/or academic strengths within assessment areas, this research performed drill-down analysis on sub-strands of ISA assessment areas. This sub-strands analysis found that IB students performed better than non-IB students for ISA Reading in all sub-strands at all grade levels except grade 8. The effect sizes are in the range of 0.07 to 0.38. In addition, IB students demonstrated better performances in Mathematical Literacy in grade 6 (effect sizes 0.09 to 0.14), grade 9 (effect sizes 0.11 to 0.19), and grade 10 (effect sizes 0.36 to 0.49). In expository writing categories, IB students outperformed non-IB students in grades 4, 9 and 10 with effect sizes ranging from very small (0.10) to moderately large (0.53). However, non-IB students outperformed IB students in grade 8 all sub-strands of the ISA assessment areas.

This project assessed how the Grade 9 and Grade 10 ISA scores of IB students aligned with PISA benchmarks. IB students achieved average scores of 551 and 570 in Mathematical Literacy at grades 9 and 10, respectively. This is significantly better than the PISA 2009 OECD mean of 496 in Mathematics for 15 year-olds. In Reading, IB average scores were 533 and 568 in grades 9 and 10, respectively. This is above the PISA 2009 OECD mean of 493 in Reading.

This project examined to what degree type of IB program offered (ie, single/dual/full continuum) was associated with student performance. The comparisons of ISA performance between continuum programme and single or dual programme indicated that IB cohorts with continuum programme were more likely to outperform their counterpart with single (or double) programme where year-level appropriate IB programme was not implemented at the same grade levels. There was evidence to suggest that IB cohorts in schools with both PYP and MYP were more likely to outperform their counterpart with only single programme implemented. Such difference in performance appeared to be larger at grade levels where year-level appropriate IB programme was not implemented.

In addition, this project evaluated to what degree length of IB implementation was associated with student performance. The correlation between the performance in IB MYP schools and the length of IB implementation was moderate or weak in all assessment areas. The correlation indexes were between 0.14 and 0.34 for Mathematical Literacy and between 0.03 and 0.29 for Reading at 95% confidence level. The result indicates that where an MYP school had been authorised for a relatively long time, the authorization length was likely to have a positive effect on ISA performance. However, there was no strong evidence to suggest that a longer period of time in PYP implementation produced better ISA performance at grades 3 to 5.

A multilevel analysis was conducted in order to evaluate performance differences between IB schools and non-IB schools attributable to school variances. The multilevel analysis found that between-school variations across IB schools were smaller than the between-school variations across non-IB schools in all four ISA domains. This means that the differences in cohort performance attributable to school differences were lower among the IB schools than among the non-IB schools. The result implies that IB schools were more similar to each other than the non-IB schools with respect to the four domains of ISA performance.

In ISA 2010/2011, a primary-year student questionnaire was included in the ISA test booklets at grades 5 & 6 and a secondary-year student questionnaire was included in the ISA test booklets at grades 8 & 9. There were four dimensions indentified in the primary-year questionnaire: Student and Teacher Interaction, Social Connectedness, Personal Development Outcome and Study Engagement. Seven dimensions were indentified in the secondary-year questionnaire: Student and Teacher Interaction, Social Connectedness, Deep Learning, Surface Learning, Personal Development Outcome, Academic Outcome Orientation and Learning Goals.

Across all dimensions in both primary-year and secondary-year questionnaires, high proportions of agreement were observed among IB PYP and MYP students. For example, 89% of PYP grade 5 students and 79% of MYP grade 9 students agreed that their schools provided a supportive learning environment, and their school experiences were useful preparation for other aspects of life. About 83% of PYP students at grade 5 indicated that they were engaged well in their study and met the challenges of their schoolwork. About 84% of MYP grade 9 students agreed that they were engaged with their work and challenged to attempt more complex problems. About 80% of MYP grade 9 students agreed that they made connections between the learning in the classroom and applications in other aspects of their life, while 56% of them agreed that they focused on learning for assessment and made few connections on outside applications. About 80% of MYP grade 9 students agreed that they were motivated by achieving successful outcomes of assessment and learning and how their achievements were viewed by and compared with those of others.

The questionnaire result indicates that both IB students and non-IB students had relatively high percentages of agreement in their perceptions, values, attitudes and dispositions pertaining to school, teachers and learning. IB students had slightly higher portions of agreement, in the range of 2% to 5%, across all four dimensions in the primary-year questionnaire. IB students also had slightly higher proportion of agreement in Social Connectedness and Deep Learning at grades 8 and 9, and in Personal Development Outcome and Academic Outcome Orientation at grade 8 in the secondary-year questionnaire.

There were only weak correlations found between students' ISA performance and their perceptions, values, attitudes and dispositions pertaining to school, teacher and learning. Although such correlations were found similar among IB and non-IB students, the IB cohort had relatively stronger positive correlation between Student and Teacher Interaction and ISA Mathematical Literacy and ISA Narrative Writing at grade 8, and the IB cohort also had relatively weaker negative correlation between Surface Learning and all ISA domains except Expository Writing at grade 8, and between Surface Learning and Expository Writing at grade 9.

# 1. Project Overview

The International Baccalaureate (IB) offers a continuum of international education for children between the ages of 3 and 19 years. The Primary Years Programme (PYP) is designed for students aged 3 to 12; the Middle Years Programme (MYP) serves students aged 11 to 16; and the Diploma Programme (DP) is a challenging two-year curriculum, primarily aimed at students aged 16 to 19. It leads to a qualification that is widely recognized by the world's leading universities. The IB curriculum was originally developed to meet the needs of internationally mobile students. Although the IB curriculum is now offered in all types of schools, many international schools continue to offer the IB curriculum.

The International Schools' Assessment (ISA) is an assessment created especially for students in international schools in Grades 3 to 10. The assessment asks both multiple-choice and open-ended questions in the areas of writing, reading and mathematics, and provides international normative information about student performance. The Reading and Mathematical Literacy are based on the internationally endorsed reading and mathematical literacy frameworks of the OECD's Programme for International Student Assessment (PISA), respectively.

As the IB expands – current projections predict 10,000 authorised schools and 2 million IB students by the year 2020 – it is critical to monitor students' learning outcomes. Many of the schools participating in the ISA administration implement the IB curriculum, providing an opportunity to examine the performance of PYP and MYP students in Grades 3 to 10, relative to an international benchmark.

The IB has contracted ACER to analyse ISA data for participating IB schools in 2009 and again in 2010 with additional elements. This report summarises the results of the analysis conducted based on the 2010 contract. There are two sittings of ISA each year; the first is in October and the second sitting is in the following year in February. This analysis is based on students who participated in the ISA in 2009-10 and 2010-11, making a total of four sittings. This means that some students could be represented in the analysis twice (i.e. in grade 3 for 2009-10, and again in grade 4 for 2010-11). This is not a problem as this analysis was performed based on grade level. Such a student will not be grouped in the same grade level twice.

In ISA 2010/2011, a student questionnaire was included in the ISA test booklets at grades 5, 6, 8 & 9. The Student Learning and Wellbeing Questionnaire is a new addition to the ISA. It deals with students' feelings about their school life and will provide new dimensions to current academic testing and reporting. The student surveys to be completed by students in grades 5 - 6 asked for students to make judgments about indicators of their own social and school life well-being (e.g. "If I need extra help, I will receive it from my teachers."). The survey to be completed by students in years 8 - 9 included an additional set of questions that asked students to make judgments about aspects of their learning that influence their learning outcomes, learning goals, and school achievement (e.g. "I think about possible alternative solutions to every problem."). The broad goals of administering these questionnaires were to gain a better understanding of IB students' perceptions, values, attitudes and dispositions pertaining to school, teachers and learning in general; to understand how these perceptions, values, attitudes and dispositions of IB students compare to those of non-IB students; and to understand how these perceptions, values, attitudes and dispositions are related to students' ISA performance.

## 1.1 Information on IB Schools and Students Participating in the ISA

In 2009-11, 270 of the 290 schools that participated in the administration of the ISA were willing to be identified for the purpose of this study. Of those 270 schools, the distribution of authorised IB programmes is shown in Table 1. A total of 117 PYP, 86 MYP and 161 DP schools were designated as authorised programmes. Because the ISA does not assess students in the last two years of schooling (i.e. year level 11 and 12), the current analyses of IB school performances focus on authorised PYP and MYP schools.

Table 1 Schools Programme Status

| Category | Authorised IB Programmes | |
|---|---|---|
| | No of Schools | Percentage |
| No IB Programme | 80 | 29.6 |
| PYP Only | 18 | 6.7 |
| MYP Only | 1 | 0.4 |
| DP Only | 58 | 21.5 |
| PYP + MYP + DP | 61 | 22.6 |
| PYP + MYP | 10 | 3.7 |
| MYP + DP | 14 | 5.2 |
| PYP + DP | 28 | 10.4 |
| Total | 270 | 100.0 |

In this study, the IB cohort is defined at grade level. It consists of authorised PYP schools (or students in schools) in grade 3 to grade 5, and/or authorised MYP schools in grade 6 to grade 10. An IB school is defined as a school belonging to the IB cohort. IB students are students from IB schools.

The non-IB cohort consists of schools (or students in schools) with no authorised IB programme in that year level. For example, students in grade 5 of an authorised MYP-only school are defined as non-IB cohort. In addition, the non-IB cohort excludes schools which are labelled as being interested in IB programmes, IB candidate schools, or schools that had withdrawn from the IB programmes. A non-IB school is defined as a school in the non-IB cohort. Non-IB students are students from non-IB schools.

Table 2 shows the number of schools and number of students in the IB and non-IB programmes by grade used for analysis. Data from the 270 schools of four administrations of the ISA, between October 2009 and February 2011, were included.

Table 2 IB and Non-IB Schools and Students Distribution by Grade

| Grade | Number of Schools | | Number of Students | |
|---|---|---|---|---|
| | IB | non-IB | IB | non-IB |
| 3 | 96 | 90 | 6,647 | 2,927 |
| 4 | 62 | 78 | 3,831 | 2,009 |
| 5 | 99 | 88 | 6,960 | 2,597 |
| 6 | 44 | 79 | 3,201 | 2,039 |
| 7 | 64 | 60 | 4,944 | 2,023 |
| 8 | 48 | 51 | 3,704 | 1,601 |
| 9 | 50 | 49 | 3,411 | 1,717 |
| 10 | 30 | 35 | 1,992 | 1,111 |
| Total | n/a* | n/a* | 34,690 | 16,024 |

* Total number of schools is not applicable here as each school may have more than one grade.

Figure 1 Authorised IB Schools and Non-IB Schools Distribution by Region

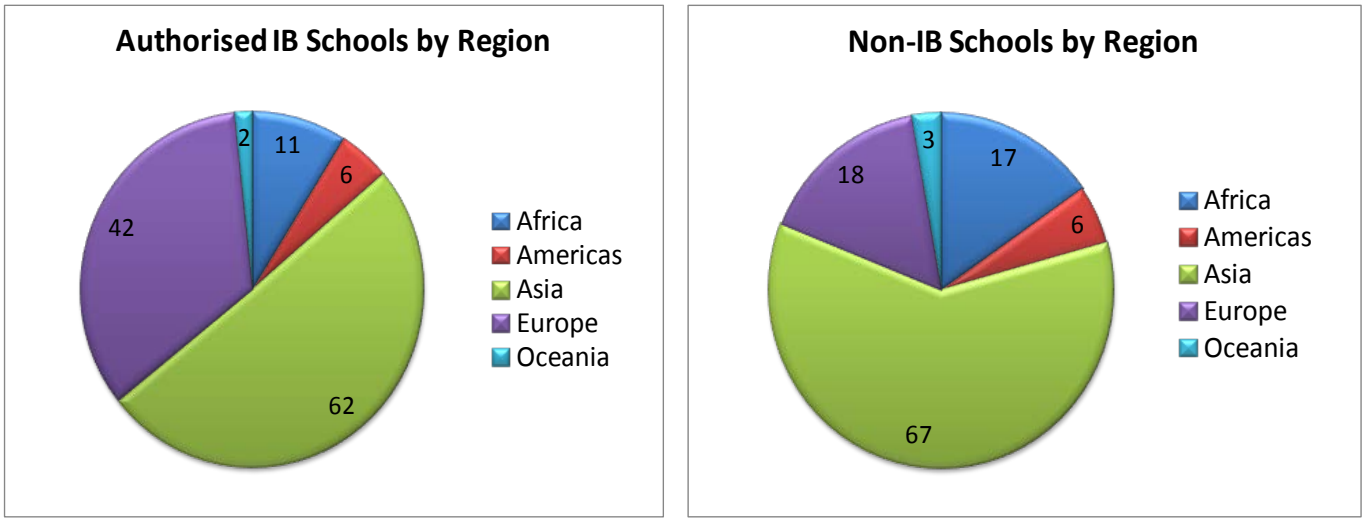



Figure 1 shows the distribution of schools by region. There were a total of five geographic regions, and a list of countries for each geographic region is included in Appendix 1. The pie chart on the left hand side represents IB schools which included both authorised PYP and MYP. The pie chart on the right hand side represents non-IB schools. The number of IB schools and non-IB schools by geographic region by grade are shown in Table 3 and the number of IB students and non-IB students by region by grade in Table 4. Because there was only a small number of schools in the region of Oceania, the data from schools in Oceania were combined with the data from schools in Asia for this study. For the same reason, the data from schools in Americas were combined with the data from the schools in Europe. Hence the results were reported for three geographic regions: Asia and Oceania, Europe and Americas and Africa.

Table 3 Distribution of IB and Non-IB Schools[1] by Geographical Region

| Grade | Asia | | Europe | | Africa | | Americas | | Oceania | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB |
| 3 | 50 | 56 | 31 | 15 | 9 | 13 | 4 | 3 | 2 | 3 | 96 | 90 |
| 4 | 32 | 49 | 19 | 11 | 8 | 14 | 1 | 2 | 2 | 2 | 62 | 78 |
| 5 | 48 | 54 | 34 | 13 | 10 | 15 | 5 | 3 | 2 | 3 | 99 | 88 |
| 6 | 21 | 50 | 13 | 13 | 7 | 12 | 1 | 2 | 2 | 2 | 44 | 79 |
| 7 | 30 | 39 | 25 | 11 | 6 | 6 | 1 | 2 | 2 | 2 | 64 | 60 |
| 8 | 22 | 32 | 16 | 9 | 7 | 8 | 1 | 2 | 2 | 0 | 48 | 51 |
| 9 | 25 | 34 | 18 | 7 | 5 | 6 | 1 | 2 | 1 | 0 | 50 | 49 |
| 10 | 16 | 23 | 9 | 6 | 4 | 5 | 0 | 1 | 1 | 0 | 30 | 35 |

Table 4 Distribution of IB and Non-IB Students by Geographical Region

| Grade | Asia | | Europe | | Africa | | Americas | | Oceania | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB | IB | non-IB |
| 3 | 3,478 | 1,973 | 2,057 | 354 | 587 | 406 | 456 | 59 | 69 | 135 | 6,647 | 2,927 |
| 4 | 2,084 | 1,282 | 1,011 | 262 | 561 | 395 | 109 | 18 | 66 | 52 | 3,831 | 2,009 |
| 5 | 3,528 | 1,717 | 2,201 | 332 | 669 | 386 | 472 | 42 | 90 | 120 | 6,960 | 2,597 |
| 6 | 1,791 | 1,282 | 977 | 424 | 346 | 257 | 12 | 30 | 75 | 46 | 3,201 | 2,039 |
| 7 | 2,446 | 1,455 | 1,791 | 295 | 380 | 180 | 252 | 39 | 75 | 54 | 4,944 | 2,023 |
| 8 | 1,993 | 1,070 | 1,197 | 192 | 400 | 223 | 39 | 116 | 75 | 0 | 3,704 | 1,601 |
| 9 | 1,729 | 1,138 | 1,081 | 179 | 321 | 218 | 256 | 182 | 24 | 0 | 3,411 | 1,717 |
| 10 | 1,198 | 557 | 585 | 285 | 179 | 118 | 0 | 151 | 30 | 0 | 1,992 | 1,111 |
| Total | 18,247 | 10,474 | 10,900 | 2,323 | 3,443 | 2,183 | 1,596 | 637 | 504 | 407 | 34,690 | 16,024 |

[1] IB refers to schools of PYP and MYP.

## 1.2 Methodology

In this study, ISA scale scores from four domains, Mathematical Literacy, Reading, Narrative Writing (Narrative Writing) and Expository Writing (Expository Writing), were used for investigations. The ISA scales were constructed using the Rasch model. The scale for each domain was constructed by using some common tasks (questions) within any year for adjacent grades, and by using some common tasks over time, from one year to the next. In this way all the tests in a particular domain were linked and equated, and could be placed on a common scale. This method allows student performance to be compared across grade levels and over calendar years, (Bibby & Tan, 2008). For instance, the aggregated scale scores were used in comparing subgroup performances, such as IB schools vs. non-IB schools, at each grade level. In order to assess a school's performance in sub-strands of a domain, the percentage correct over all questions within an assessed sub-strand in Mathematical Literacy and Reading, and raw score in components of each writing task were used.

When two groups' performances were compared, both the statistical significance of the t-test and the effect size of the difference were reported. Statistical significance of a test indicates whether there is a difference between group means after taking into account the spread of group distributions. It can be sensitive when the sample group becomes large. In this study, the statistical significance level is set at 0.05 which is associated with a 95% confidence interval. A symbol "+" was used to indicate that the performance of a subgroup from IB schools was statistically significantly higher than the performance of a comparison group. A symbol "–" was used to indicate that the performance of a subgroup from IB schools was statistically significantly lower than the performance of a comparison group.

In order to measure the magnitude of any difference, the effect size (Cohen's *d*) was also calculated as the difference between two means divided by a pooled standard deviation for the data:

$$d = \frac{\mu_1 - \mu_2}{\sigma_{pooled}}$$

where $\sigma_{pooled} = \sqrt{\frac{\sigma_1^2 + \sigma_2^2}{2}}$ refers to pooled standard deviation, which is the root mean square of the two standard deviations. When the two standard deviations are similar, the root mean square will be similar to the simple average of the two variances. Effect size is independent of sample size. This value indicates how likely it is that the IB students are different from the comparable non-IB students. A small value close to zero suggests it is likely that there is little difference in the mean performance of that IB cohort and the ISA cohort. A large value suggests it is likely that the IB cohort and the ISA cohort are performing very differently. The effect size value is categorised as follows: $d < 0.1$ indicates a negligible difference in means, $0.1 \leq d < 0.2$ a small difference in means, $0.2 \leq d < 0.5$ a medium difference in means, and $d \geq 0.5$ a large difference in means. In the tables of this report, estimates with medium to large effect sizes were highlighted in bold. In addition, the following symbols were used to indicate group differences. For example, a symbol "++" was used to indicate that the performance of a subgroup from IB schools was statistically significantly higher than the performance of a comparison group, and the difference had a medium effect size.

| | |
|---|---|
| + | Statistically significant difference (higher), small effect size ($0.1 \leq d < 0.2$) |
| ++ | Statistically significant difference (higher), medium effect size ($0.2 \leq d < 0.5$) |
| +++ | Statistically significant difference (higher), large effect size ($d \geq 0.5$) |
| – | Statistically significant difference (lower), small effect size ($0.1 \leq d < 0.2$) |
| – – | Statistically significant difference (lower), medium effect size ($0.2 \leq d < 0.5$) |
| – – – | Statistically significant difference (lower), large effect size ($d \geq 0.5$) |

Correlation ($r$) is used to measure the strength of association between two variables. The strength of correlation is generally categorised as follows: $0.1 < r < 0.29$ small (or weak), $0.3 < r < 0.69$ medium (or moderate), $0.7 < r < 1$ large (or strong).

A multilevel analysis was used to study the school variances in ISA performance data among IB schools and non-IB schools. The specification of the multilevel model is as follows:

Level 1 or Student level is:

$$Y_{ij} = \beta_{0j} + r_{ij}$$

where: $Y_{ij}$ is the scale score for student i in school j,
$\beta_{0j}$ is the expected average ISA score in a domain for school j.
$r_{ij}$ is deviation from the expected ISA scale score of student i in school j.

Level 2 or School level is:

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

where: $\gamma_{00}$ is the grand mean of scale scores.
$\mu_{0j}$ is deviation of school j from the grand mean.

The proportion of between-school variance is calculated as follows:

$$\text{Proportion of Between School Variance} = \frac{\text{Between School Variance}}{\text{Between School Variance} + \text{Within School Variance}}$$

In ISA 2010/2011, a student questionnaire was included in the ISA test booklets at Year 5, Year 6, Year 8 and Year 9. The questionnaire occupied a double page spread between the two writing tasks. The primary years (Year 5 and Year 6) questionnaire has 33 questions, selected from the PISA 2003 Student Questionnaire (OECD, 2003) (13 questions), the ACER SEWB positive social orientation scale primary version (11 questions) and the SEWB positive work orientation scale primary version (9 questions). The secondary years (Year 8 and Year 9) questionnaire has 52 questions from the PISA 2003 Student Questionnaire (OECD, 2003) (15 questions), the ACER SEWB positive social orientation scale secondary version (12 questions), the ACER SEWB school and community scale (3 questions), questions developed in collaboration with the International Baccalaureate based on the Learning Approaches used in the Biggs Study Process Questionnaire (Biggs, Kember, & Leung, 2001 and Kember, Biggs, & Leung 2004) (10 questions) and questions on Learning Motivation developed in collaboration with the International Baccalaureate based on the work on self-theories by Dweck (Dweck, 2000) (12 questions). For each question, students had a choice of four options: strongly agree, agree, disagree and strongly disagree. The questionnaires are shown in Appendix 4.

The questionnaire instruments have been validated rigorously (OECD, 2005 and Bernard, Stephanou, & Urbach, 2007). The IB-ISA questionnaire instruments were validated again by exploratory factor analysis and confirmatory factor analysis. Four dimensions described the questions in the primary-years questionnaire, i.e. Student and Teacher Interaction, Social Connectedness, Personal Development Outcome, and Study Engagement. Seven dimensions described the questions in the secondary-year questionnaire, i.e. Student and Teacher Interaction, Social Connectedness, Deep Learning, Surface Learning, Personal Development Outcome, Academic Outcome Orientation, and Learning Goals. Rasch analysis was further undertaken on questions of each dimension to validate psychometric properties of these questions. At the end of this construct validation process, four questions were deleted from the primary-year questionnaire, and eight questions were deleted from the secondary-year questionnaire, and these questions were not used in scale score estimation of questionnaire dimensions. These scale scores of questionnaire dimensions were used for the correlation study with ISA performance scores.

# 2 Analysis of Student Performance

This section presents a series of analyses of ISA's 2009-2010 and 2010-2011 data merged with the IB's data on program participation, school authorization status and authorization date. The broad goals of these analyses are to understand student performance on the ISA assessment areas among PYP and MYP students, and to understand the degree to which the IB curriculum promotes particular cognitive and/or academic strengths within assessment areas.

## 2.1 How do PYP and MYP students perform on the ISA assessment areas relative to students at similar non-IB schools?

### 2.1.1 IB and non-IB Student Performance by Domain and Grade

Table 5 to Table 8 show the average performance of IB and non-IB students in ISA Mathematical Literacy, Reading, Narrative Writing and Expository Writing, respectively. In Mathematical Literacy (Table 5) IB students had statistically significant higher mean scores than the non-IB students in grades 6, 9 and 10, and statistically significant lower mean scores in grade 3 and 8. The effect size indexes show small differences at grade 6 and 9, and a medium difference at grade 10.

Table 5 Performance of IB and Non-IB Students in Mathematical Literacy

| Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | N | Mean | S.D. | N | | |
| 3 | 310 | 84 | 6,455 | 322 | 90 | 2,903 | – | -0.13 |
| 4 | 379 | 84 | 3,788 | 376 | 89 | 1,995 | | 0.03 |
| 5 | 425 | 83 | 6,872 | 425 | 89 | 2,577 | | -0.01 |
| 6 | 467 | 84 | 3,167 | 453 | 97 | 2,011 | + | 0.15 |
| 7 | 499 | 88 | 4,767 | 495 | 95 | 2,010 | | 0.04 |
| 8 | 517 | 83 | 3,653 | 526 | 91 | 1,589 | – | -0.10 |
| 9 | 551 | 85 | 3,227 | 535 | 87 | 1,699 | + | 0.18 |
| 10 | 570 | 91 | 1,948 | 529 | 84 | 1,085 | ++ | **0.46** |

In Reading, IB students had statistically higher mean scores than the non-IB students in all grade levels except grade 8 which showed no significant difference between the two groups. As shown in Table 6, the effect size indexes show small differences at grades 3 and 7, and medium differences at grades 4, 6, 9 and 10.

Table 6 Performance of IB and Non-IB Students in Reading

| Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | N | Mean | S.D. | N | | |
| 3 | 253 | 90 | 6,523 | 242 | 100 | 2,888 | + | 0.11 |
| 4 | 323 | 91 | 3,771 | 303 | 101 | 1,981 | ++ | **0.20** |
| 5 | 371 | 87 | 6,844 | 363 | 96 | 2,574 | + | 0.09 |
| 6 | 421 | 97 | 3,148 | 388 | 108 | 2,015 | ++ | **0.31** |
| 7 | 464 | 97 | 4,868 | 446 | 106 | 2,004 | + | 0.18 |
| 8 | 489 | 86 | 3,617 | 489 | 99 | 1,570 | | -0.01 |
| 9 | 533 | 90 | 3,352 | 504 | 94 | 1,694 | ++ | **0.31** |
| 10 | 568 | 94 | 1,924 | 529 | 100 | 1,076 | ++ | **0.40** |

In Narrative Writing, IB students had a statistically significant higher mean score than the non-IB students mean score in grades 4, 6, and 9 to 10, as shown in Table 7. However, the mean score in grade 5 for IB students was statistically significantly lower than the mean score for non-IB students, but the effect size index (-0.07) indicated that the difference was negligible. There was no significant difference found

in grades 3, 7 and 8 between IB students performance and non-IB students performance. The effect size indexes showed small differences at grades 6 and 9, and a medium difference at grade 10.

Table 7 Performance of IB and Non-IB Students in Narrative Writing

| Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | N | Mean | S.D. | N | | |
| 3 | 364 | 59 | 6,540 | 365 | 62 | 2,895 | | 0.00 |
| 4 | 411 | 62 | 3,759 | 406 | 67 | 1,987 | + | 0.08 |
| 5 | 452 | 64 | 6,826 | 456 | 68 | 2,565 | – | -0.07 |
| 6 | 483 | 66 | 3,160 | 472 | 74 | 2,010 | + | 0.16 |
| 7 | 512 | 69 | 4,867 | 510 | 72 | 2,008 | | 0.03 |
| 8 | 535 | 69 | 3,629 | 539 | 73 | 1,586 | | -0.06 |
| 9 | 557 | 74 | 3,337 | 545 | 77 | 1,697 | + | 0.16 |
| 10 | 578 | 74 | 1,934 | 551 | 80 | 1,085 | ++ | **0.35** |

In Expository Writing, IB students achieved significantly higher mean scores than the non-IB students in grades 4, 6 to 7, and 9 to 10, as shown in Table 8. The effect sizes indicated that small differences existed at grades 4, 6 and 7, and medium differences at grades 9 and 10.

Table 8 Performance of IB and Non-IB Students in Expository Writing

| Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | N | Mean | S.D. | N | | |
| 3 | 395 | 50 | 6,506 | 394 | 54 | 2,879 | | 0.02 |
| 4 | 433 | 54 | 3,771 | 426 | 60 | 1,979 | + | 0.11 |
| 5 | 469 | 57 | 6,831 | 471 | 62 | 2,565 | | -0.04 |
| 6 | 493 | 59 | 3,141 | 486 | 65 | 2,019 | + | 0.11 |
| 7 | 524 | 61 | 4,858 | 517 | 66 | 2,002 | + | 0.10 |
| 8 | 548 | 62 | 3,616 | 551 | 68 | 1,570 | | -0.04 |
| 9 | 571 | 69 | 3,341 | 553 | 71 | 1,682 | ++ | **0.26** |
| 10 | 594 | 66 | 1,921 | 563 | 81 | 1,073 | ++ | **0.43** |

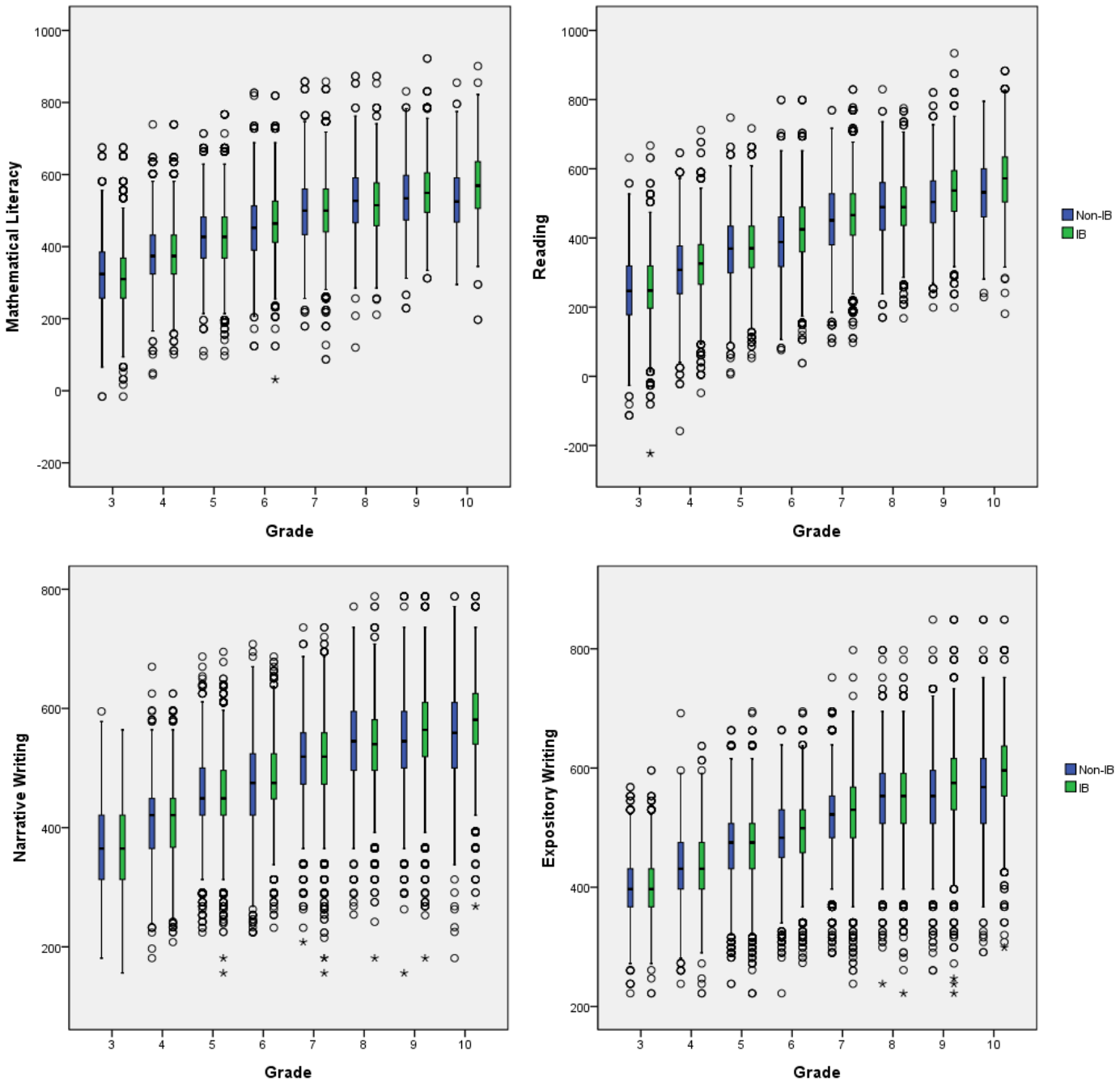
Overall, the results suggested that IB students performed better than the non-IB students in all four ISA assessment domain areas. In Reading and Writing tasks, IB students outperformed non-IB students in grades 4, 6, 9 and 10. In Mathematical Literacy, IB students performed better than non-IB students in grades 6, 9 and 10 and performed equally well with the non-IB students in grades 4, 5, and 7. Note that there was a significantly medium positive effect size in grade 10 in all four ISA assessment areas. For PYP students, there was some evidence that they did not perform well in comparison to the non-IB students, i.e. Mathematical literacy in grade 3 and Narrative Writing in grade 5. In the 32 comparisons (8 grades by 4 domains), only three groups of IB students – grades 3 and 8 Mathematical Literacy and grade 5 Narrative Writing – performed worse than non-IB students. The finding was similar to the results in the previous IB ISA study in 2009 (Tan & Bibby, 2010).

The comparisons between IB students' performance and non-IB students' performance by grade for each domain are also shown as boxplots in Figure 2. IB student performance is represented in a green boxplot, and non-IB student performance is represented in a blue boxplot. The dark line in the middle of the boxes is the median scale score. Unlike the mean, the median is less influenced by students with extremely high or low scale scores (outliers). The bottom of the boxes indicates the 25th percentile, and the top of the boxes represents the 75th percentile. The box length gives an indication of sample variability. The position of a box in its whiskers and the position of the median line in the box indicate if a sample is symmetric or skewed. The circles are outliers and the asterisks are extreme outliers.

As shown in the Figure 2, it appeared that median scores of IB student performance in Reading in grades 4, 6-7, and 9-10 were higher than the medians of non-IB student performance. Furthermore, medians of IB student performance were higher than the medians of non-IB student performance in grades 6, 9 and

10 for Mathematical Literacy, in grades 9 to 10 for Narrative Writing, and in grades 6-7 and 9-10 for Expository Writing. The boxplots in the figure showed a reasonably symmetric distribution of scores. There were obvious outliers in all samples.

Figure 2 Boxplots of IB and Non-IB Student Performance in Mathematical Literacy, Reading, Narrative Writing and Expository Writing



### 2.1.2 IB and non-IB Student Performance by Region

The following section presents comparisons between IB students and non-IB students by geographical regions. As mentioned previously, as there was only a small number of IB schools in Oceania, the data from the schools in Oceania were grouped with the data from the schools in Asia. For the same reason, the data from the schools in the Americas were grouped with the data from the schools in Europe. The ISA performance comparisons were presented in three geographical regions: Asia and Oceania, Europe and the Americas, and Africa.

#### *2.1.2.1 Asia and Oceania*

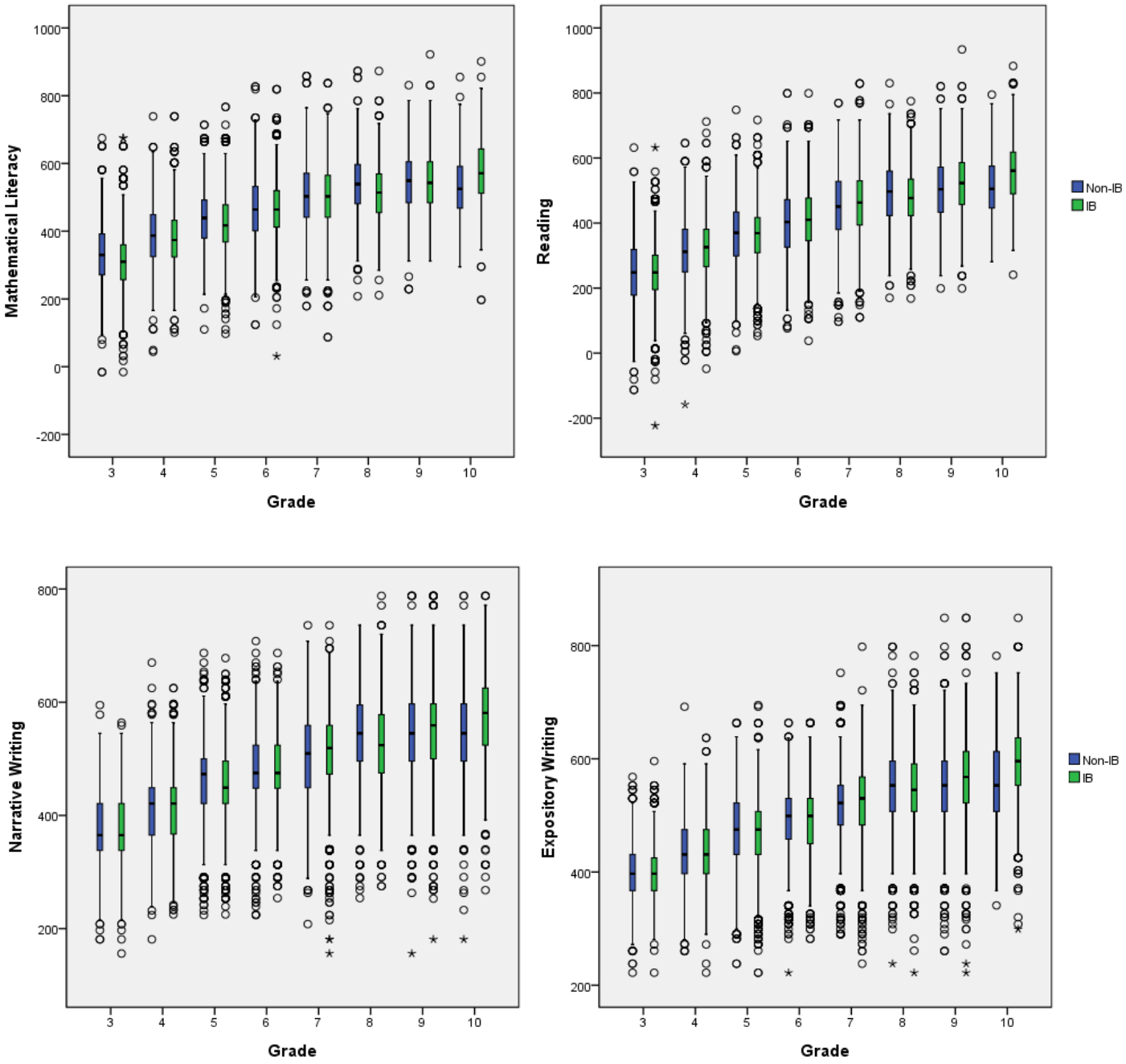
In the Asia and Oceania region (see Table 9), the mean scores of IB students were significantly lower than the mean scores of non-IB students in Mathematical Literacy in grades 3-5 and 8, with differences that were small to medium as indicated by the effect size index. Only grade 10 IB students had a significantly higher mean score than the mean score of non-IB students in Mathematical Literacy, and the effect size index indicated the difference was large.

Table 9 Asia and Oceania IB and non-IB Student Performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 306 | 85 | 3,509 | 328 | 92 | 2,093 | – – | **-0.25** |
| | 4 | 380 | 83 | 2,129 | 387 | 90 | 1,324 | – | -0.09 |
| | 5 | 423 | 84 | 3,580 | 437 | 88 | 1,827 | – | -0.16 |
| | 6 | 464 | 86 | 1,851 | 467 | 99 | 1,316 | | -0.03 |
| | 7 | 500 | 93 | 2,496 | 505 | 97 | 1,502 | | -0.05 |
| | 8 | 510 | 84 | 2,035 | 539 | 92 | 1,061 | – – | **-0.33** |
| | 9 | 546 | 91 | 1,725 | 543 | 92 | 1,125 | | 0.03 |
| | 10 | 577 | 91 | 1,205 | 529 | 88 | 548 | +++ | **0.53** |
| Reading | 3 | 247 | 89 | 3,491 | 249 | 101 | 2,080 | | -0.02 |
| | 4 | 320 | 91 | 2,118 | 309 | 104 | 1,312 | + | 0.11 |
| | 5 | 363 | 89 | 3,570 | 369 | 99 | 1,827 | – | -0.06 |
| | 6 | 412 | 98 | 1,836 | 398 | 108 | 1,316 | + | 0.13 |
| | 7 | 460 | 104 | 2,494 | 449 | 107 | 1,497 | + | 0.10 |
| | 8 | 476 | 89 | 2,033 | 491 | 102 | 1,051 | – | -0.15 |
| | 9 | 518 | 96 | 1,716 | 502 | 100 | 1,122 | + | 0.17 |
| | 10 | 560 | 92 | 1,195 | 516 | 95 | 535 | ++ | **0.47** |
| Narrative Writing | 3 | 366 | 58 | 3,497 | 367 | 62 | 2,086 | | -0.03 |
| | 4 | 413 | 63 | 2,119 | 407 | 68 | 1,319 | + | 0.08 |
| | 5 | 452 | 64 | 3,568 | 459 | 69 | 1,820 | – | -0.12 |
| | 6 | 481 | 64 | 1,850 | 479 | 71 | 1,314 | | 0.02 |
| | 7 | 511 | 72 | 2,489 | 508 | 75 | 1,502 | | 0.04 |
| | 8 | 531 | 69 | 2,034 | 538 | 76 | 1,059 | – | -0.10 |
| | 9 | 550 | 79 | 1,719 | 542 | 83 | 1,123 | + | 0.10 |
| | 10 | 574 | 73 | 1,205 | 541 | 83 | 548 | ++ | **0.42** |
| Expository Writing | 3 | 394 | 50 | 3,489 | 394 | 55 | 2,076 | | 0.00 |
| | 4 | 432 | 55 | 2,119 | 428 | 60 | 1,312 | + | 0.08 |
| | 5 | 467 | 59 | 3,570 | 473 | 63 | 1,822 | – | -0.10 |
| | 6 | 490 | 60 | 1,834 | 490 | 64 | 1,316 | | 0.00 |
| | 7 | 525 | 65 | 2,490 | 517 | 68 | 1,495 | + | 0.12 |
| | 8 | 545 | 63 | 2,034 | 553 | 71 | 1,051 | – | -0.13 |
| | 9 | 566 | 72 | 1,712 | 553 | 75 | 1,111 | + | 0.18 |
| | 10 | 592 | 66 | 1,190 | 560 | 75 | 534 | ++ | **0.46** |

For Reading and the two Writing tasks, Asia and Oceania IB students' performance was equal to or better than the non-IB students at all grades except grades 5 and 8. In this region, comparing the PYP performance with non-IB performance, there were no significant differences in grade 3; IB students performed better than the non-IB students at grade 4 with small effect size and the non-IB students performed better in grade 5 with small effect size. Nine out of fifteen comparisons indicated that MYP (grade 6 or higher) students performed significantly better than non-IB students. However, MYP students in grade 8 had a significantly lower performance than the comparison non-IB group in these three domains. Boxplots of IB and non-IB student performance in the Asia and Oceania region are shown in Figure 3.

Figure 3 Boxplots of IB and non-IB student performance in Asia and Oceania



### 2.1.2.2 *Europe and the Americas*

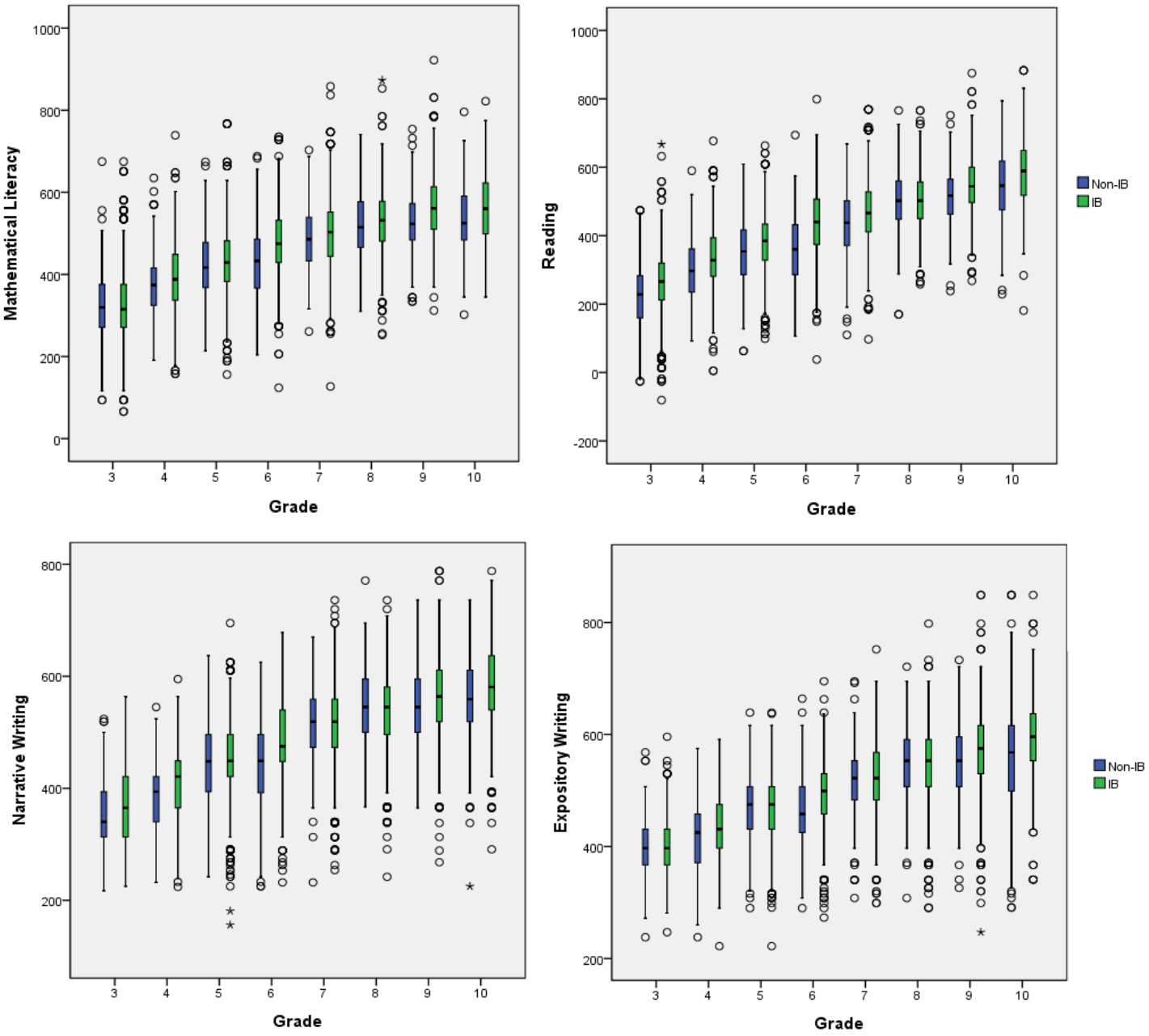
In the Europe and the Americas region, as shown in Table 10, IB student performance was equal to (7 out of 32 comparisons) or better (24 out of 32 comparisons) than the non-IB students in all four ISA assessment domains at all grade levels with only one exception. In Narrative Writing at grade 8 the non-IB students outperformed IB students with a medium effect size. In particular, the IB students performed well in Reading, except at grade 8; with medium effect size in difference; and in the two writing tasks with small to medium differences at grades 3-4 and 9-10 and a large difference at grade 6, in Mathematical Literacy with small to large differences from grades 4 to 10.

In addition, IB students outperformed non-IB students by a relatively large margin at grade 6 and medium margin at grades 9 and 10 in all domains. Boxplots of IB student performance and non-IB student performance in Europe and the Americas are shown in Figure 4. As shown in the boxplots, IB students in Europe and the Americas had a climb in performance in all domains from grades 3 to 10. There is a noticeable exception in the performance of the non-IB students in grade 6.

Table 10 Europe and the Americas IB and non-IB Student Performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 319 | 82 | 2,364 | 322 | 82 | 407 | | -0.04 |
| | 4 | 389 | 82 | 1,101 | 378 | 76 | 276 | + | 0.14 |
| | 5 | 434 | 79 | 2,630 | 421 | 82 | 367 | + | 0.17 |
| | 6 | 478 | 82 | 972 | 432 | 86 | 441 | +++ | **0.55** |
| | 7 | 501 | 83 | 1,891 | 483 | 79 | 329 | ++ | **0.22** |
| | 8 | 529 | 79 | 1,221 | 519 | 75 | 305 | + | 0.13 |
| | 9 | 561 | 75 | 1,183 | 530 | 72 | 357 | ++ | **0.42** |
| | 10 | 559 | 87 | 565 | 531 | 76 | 424 | ++ | **0.34** |
| Reading | 3 | 259 | 91 | 2,457 | 221 | 97 | 406 | ++ | **0.40** |
| | 4 | 336 | 87 | 1,100 | 297 | 88 | 275 | ++ | **0.44** |
| | 5 | 383 | 85 | 2,611 | 350 | 93 | 363 | ++ | **0.37** |
| | 6 | 433 | 91 | 968 | 359 | 105 | 444 | +++ | **0.75** |
| | 7 | 466 | 89 | 1,997 | 436 | 100 | 328 | ++ | **0.31** |
| | 8 | 503 | 80 | 1,188 | 501 | 90 | 298 | | 0.02 |
| | 9 | 545 | 80 | 1,316 | 515 | 80 | 354 | ++ | **0.37** |
| | 10 | 581 | 99 | 550 | 544 | 105 | 425 | ++ | **0.37** |
| Narrative Writing | 3 | 363 | 61 | 2,462 | 352 | 60 | 406 | + | 0.18 |
| | 4 | 409 | 62 | 1,089 | 394 | 64 | 274 | ++ | **0.24** |
| | 5 | 450 | 65 | 2,596 | 445 | 67 | 363 | | 0.07 |
| | 6 | 483 | 69 | 967 | 444 | 79 | 442 | +++ | **0.51** |
| | 7 | 510 | 66 | 1,998 | 512 | 64 | 327 | | -0.02 |
| | 8 | 539 | 69 | 1,198 | 547 | 66 | 304 | – | -0.13 |
| | 9 | 560 | 70 | 1,299 | 549 | 62 | 357 | + | 0.16 |
| | 10 | 581 | 77 | 551 | 560 | 78 | 424 | ++ | **0.28** |
| Expository Writing | 3 | 396 | 49 | 2,442 | 390 | 52 | 402 | + | 0.12 |
| | 4 | 434 | 53 | 1,098 | 420 | 58 | 273 | ++ | **0.24** |
| | 5 | 469 | 54 | 2,597 | 466 | 59 | 359 | | 0.06 |
| | 6 | 494 | 58 | 963 | 463 | 65 | 447 | +++ | **0.51** |
| | 7 | 522 | 58 | 1,991 | 516 | 59 | 328 | | 0.09 |
| | 8 | 550 | 62 | 1,186 | 547 | 63 | 298 | | 0.05 |
| | 9 | 572 | 65 | 1,310 | 550 | 65 | 354 | ++ | **0.34** |
| | 10 | 593 | 68 | 552 | 559 | 91 | 423 | ++ | **0.43** |

Figure 4 Boxplots of IB and Non-IB student performance in Europe and the Americas



### *2.1.2.3 Africa*

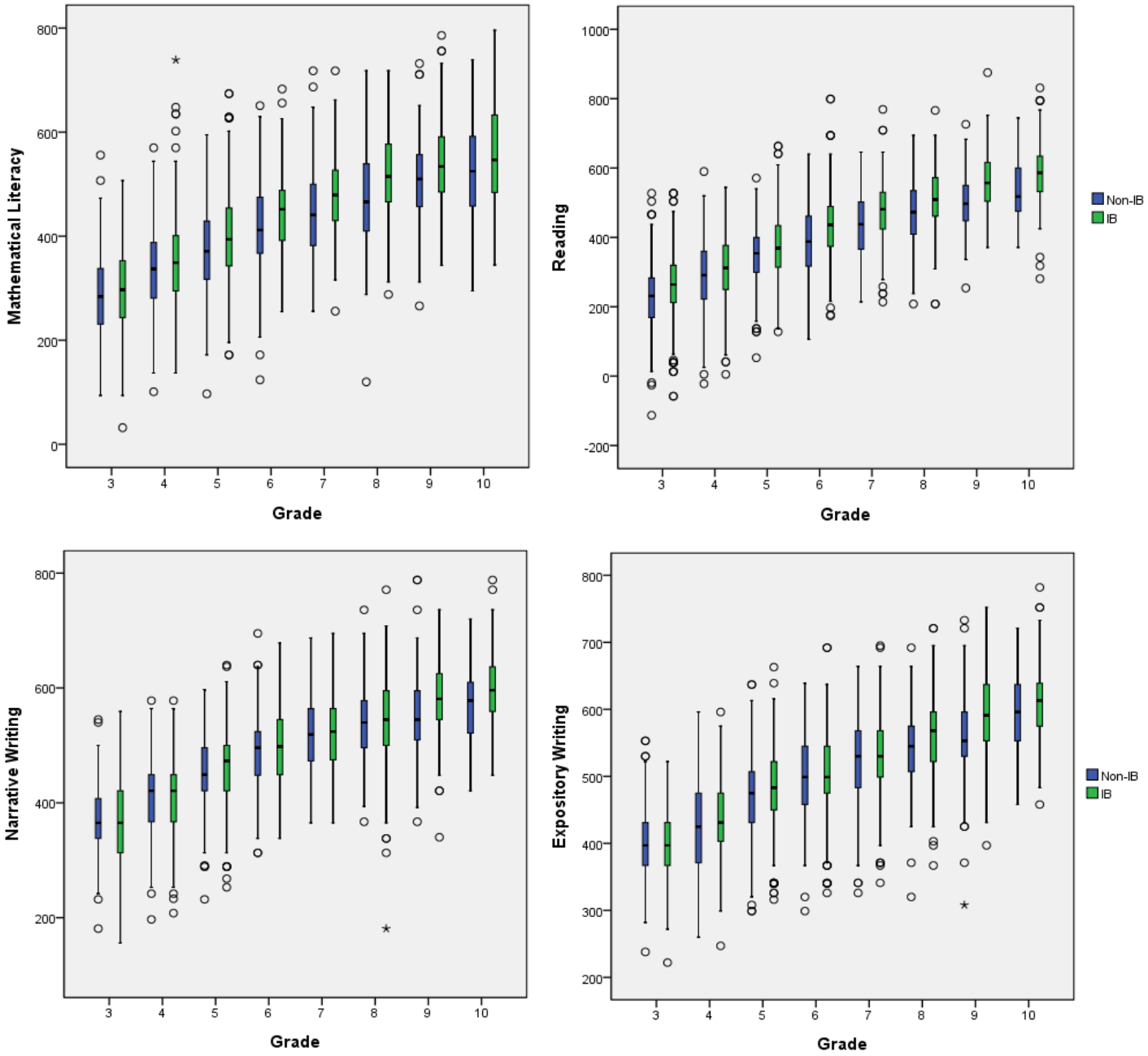
In the region of Africa, as shown in Table 11, IB student performance was as good as (8 out of 32 comparisons) or better (24 out of 32 comparisons) than the non-IB student performance in all four assessed domains at all eight grade levels. In Mathematical Literacy and Reading, the IB students performed statistically significantly better than non-IB students in all grades with a minimum effect size of 0.16. In addition, IB students outperformed non-IB students in all domains with medium to large effect sizes at grades 8-10.

Boxplots of IB student performance and non-IB student performance in Africa are shown in Figure 5. The median scores of IB students in the region of Africa were higher than the median scores of non-IB students in Mathematical Literacy and Reading at all grade levels.

Table 11 Africa IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 298 | 81 | 582 | 285 | 78 | 403 | + | 0.16 |
| | 4 | 354 | 87 | 558 | 338 | 83 | 395 | + | 0.19 |
| | 5 | 400 | 81 | 662 | 376 | 80 | 383 | ++ | **0.29** |
| | 6 | 447 | 73 | 344 | 415 | 82 | 254 | ++ | **0.41** |
| | 7 | 480 | 72 | 380 | 440 | 83 | 179 | +++ | **0.52** |
| | 8 | 517 | 80 | 397 | 473 | 87 | 223 | +++ | **0.53** |
| | 9 | 541 | 81 | 319 | 506 | 75 | 217 | ++ | **0.45** |
| | 10 | 554 | 93 | 178 | 526 | 92 | 113 | ++ | **0.30** |
| Reading | 3 | 263 | 92 | 575 | 229 | 93 | 402 | ++ | **0.36** |
| | 4 | 308 | 95 | 553 | 288 | 101 | 394 | ++ | **0.20** |
| | 5 | 371 | 86 | 663 | 350 | 79 | 384 | ++ | **0.26** |
| | 6 | 435 | 96 | 344 | 391 | 103 | 255 | ++ | **0.44** |
| | 7 | 478 | 84 | 377 | 435 | 98 | 179 | ++ | **0.47** |
| | 8 | 511 | 79 | 396 | 467 | 92 | 221 | +++ | **0.52** |
| | 9 | 562 | 82 | 320 | 499 | 79 | 218 | +++ | **0.79** |
| | 10 | 579 | 90 | 179 | 537 | 90 | 116 | ++ | **0.47** |
| Narrative Writing | 3 | 365 | 60 | 581 | 364 | 58 | 403 | | 0.01 |
| | 4 | 408 | 60 | 551 | 409 | 64 | 394 | | -0.01 |
| | 5 | 457 | 62 | 662 | 453 | 59 | 382 | | 0.07 |
| | 6 | 498 | 62 | 343 | 485 | 66 | 254 | + | 0.19 |
| | 7 | 527 | 61 | 380 | 518 | 67 | 179 | | 0.15 |
| | 8 | 546 | 67 | 397 | 533 | 64 | 223 | ++ | **0.20** |
| | 9 | 582 | 60 | 319 | 552 | 63 | 217 | ++ | **0.48** |
| | 10 | 595 | 62 | 178 | 565 | 67 | 113 | ++ | **0.47** |
| Expository Writing | 3 | 397 | 49 | 575 | 399 | 55 | 401 | | -0.04 |
| | 4 | 434 | 54 | 554 | 427 | 63 | 394 | | 0.12 |
| | 5 | 479 | 57 | 664 | 470 | 57 | 384 | + | 0.16 |
| | 6 | 500 | 57 | 344 | 502 | 55 | 256 | | -0.02 |
| | 7 | 528 | 55 | 377 | 522 | 61 | 179 | | 0.10 |
| | 8 | 563 | 56 | 396 | 545 | 57 | 221 | ++ | **0.33** |
| | 9 | 594 | 58 | 319 | 560 | 58 | 217 | +++ | **0.60** |
| | 10 | 613 | 54 | 179 | 590 | 56 | 116 | ++ | **0.42** |

Figure 5 Boxplots of IB Students Performance vs. Non-IB Students Performance in Africa



### 2.1.3 Country Analysis of Student Performance in Asia

This section presents the results of country analysis of student performance in Asia. Grade levels with sample size less than 10 were not reported. A country with only one school was not reported for confidentiality reason. A total of fourteen countries were included in this analysis, i.e. Cambodia, China. Hong Kong SAR, India, Indonesia, Japan, Oman, Philippines, Republic of Korea, Saudi Arabia, Singapore, Thailand, United Arab Emirates, and Vietnam. The detailed results of each country can be found in Appendix 1.

In Cambodia, 16 of comparisons were made, of which 13 reported no significant differences. IB students outperformed non-IB peers in 3 comparisons, namely in Reading at grade 7, in Narrative Writing at grade 5, and in Expository Writing at grade 3, with effect sizes ranged from medium to large.

In China, 32 of comparisons were made, of which 18 reported no significant differences. IB students outperformed non-IB peers in 9 comparisons, namely in Reading at grades 3 and 4, in Narrative Writing at grades 3, 4, 7 and 10, and in Expository Writing at grades 3, 5 and 7, with small to medium effect sizes. On the other hand, non-IB students outperformed IB students in 5 comparisons, namely in Mathematical Literacy at grades 3, 6, and 8, in Reading at grade 8, and in Narrative Writing at grade 8, with medium effect sizes.

In Hong Kong SAR, 28 of comparisons were made, of which 15 reported no significant differences. IB students outperformed non-IB peers in 3 comparisons, namely in all domains except for Narrative Writing at grade 7. On the other hand, non-IB students outperformed IB students in 10 comparisons, namely in Mathematical Literacy at grades 3, 5, and 9, in Reading at grades 3 and 5, in Narrative Writing at grades 3, 5 and 9, and in Expository Writing at grades 3 and 5, with effect sizes ranged from medium to large..

In India, 24 of comparisons were made, of which 12 reported no significant differences. IB students outperformed non-IB peers in 7 comparisons, namely in Mathematical Literacy at grade 4, in Reading and Expository Writing at grades 3 to 5, with effect sizes ranged from medium to large.. On the other hand, non-IB students outperformed IB students in 5 comparisons, namely in Mathematical Literacy at grades 7 and 8, in Reading at grade 8, and in Narrative Writing at grades 7 and 8, with medium to large effect sizes.

In Indonesia, 32 of comparisons were made, of which 19 reported no significant differences. IB students outperformed non-IB peers in 7 comparisons, namely in Reading and Narrative Writing at grades 7 to 9, and in Expository Writing at grade 8, with effect sizes ranged from medium to large. On the other hand, non-IB students outperformed IB students in 6 comparisons, namely in Mathematical Literacy at grades 3 and 10, in Reading and Expository Writing at grades 3 and 5, with medium to large effect sizes.

In Japan, 28 of comparisons were made, of which 22 reported no significant differences. IB students outperformed non-IB peers in 4 comparisons, namely in all four domains at grade 10, with large effect sizes. On the other hand, non-IB students outperformed IB students in 2 comparisons, namely in Expository Writing at grades 4 and 8, with medium to large effect sizes.

In Oman, 8 of comparisons were made, of which 6 reported no significant differences. IB students outperformed non-IB peers in 2 comparisons, namely in Mathematical Literacy and Reading at grade 3 with large effect sizes.

Results were reported for three grade levels (grades 4, 7 and 9) for Philippines. In Philippines, 12 of comparisons were made, of which 5 reported no significant differences. IB students outperformed non-IB peers in 7 comparisons, namely in grades 4 and 7 for all four tested domains with large effect sizes, except for Writing B at grade 4.

Results were reported only for the PYP for Korea. In Korea, 12 of comparisons were made, of which 9 reported no significant differences. IB students outperformed non-IB peers in 1 comparisons, namely in

Writing B at grade 5 with a large effect size. On the other hand, non-IB students outperformed IB students in 2 comparisons, namely in Reading at grade 4 and in Narrative Writing at grade 5 with medium effect sizes.

Results were reported only for three grade levels (grades 3, 7 and 9) for Saudi Arabia. In Saudi Arabia, 12 of comparisons were made, of which 4 reported no significant differences. Non-IB students outperformed IB students in 8 comparisons, namely in Mathematical Literacy at grade 7, in Reading and Narrative Writing at grades 7 and 9, and in Expository Writing in grades 3, 7 and 9.

For Singapore, results were reported for three grade levels (grades 3, 5 and 6). In Singapore, 12 of comparisons were made, of which 10 reported no significant differences. Non-IB students outperformed IB students in 2 comparisons, namely in Narrative Writing and Expository Writing at grade 3.

In Thailand, 28 of comparisons were made, of which 7 reported no significant differences. IB students outperformed non-IB peers in 21 comparisons, namely in Mathematical Literacy at grade 5, in Reading and Narrative Writing at grades 4 and 5, in Expository Writing at grade 5, and all MYP grades (grades 6 to 9) for all domains except Narrative Writing at grade 6, all with medium to large effect sizes.

Table 12 Summarise Comparison Results by Domain within a Country in Asia

| Country | Grade levels Compared | Mathematical Literature | | | Reading | | |
|---|---|---|---|---|---|---|---|
| | | IB Better | Non-IB Better | No Difference | IB Better | Non-IB Better | No Difference |
| Cambodia | 3, 5, 7 and 9 | 0 | 0 | 4 | 1 | 0 | 3 |
| China | 3 to 10 | 0 | 3 | 5 | 1 | 1 | 6 |
| Hong Kong SAR | 3, 5 to 10 | 1 | 3 | 3 | 1 | 2 | 4 |
| India | 3 to 8 | 1 | 2 | 3 | 3 | 1 | 2 |
| Indonesia | 3 to 10 | 0 | 2 | 6 | 3 | 2 | 3 |
| Japan | 3 to 5, and 7 to10 | 1 | 0 | 6 | 1 | 0 | 6 |
| Oman | 3 and 5 | 1 | 0 | 1 | 1 | 0 | 1 |
| Philippines | 4, 7 and 9 | 2 | 0 | 1 | 2 | 1 | 0 |
| Republic of Korea | 3 to 5 | 0 | 0 | 3 | 0 | 1 | 2 |
| Saudi Arabia | 3, 7 and 9 | 0 | 1 | 2 | 0 | 2 | 1 |
| Singapore | 3, 5 and 6 | 0 | 0 | 3 | 0 | 0 | 3 |
| Thailand | 3 to 9 | 4 | 0 | 3 | 6 | 0 | 1 |
| United Arab Emirates | 3 and 5 | 2 | 0 | 0 | 2 | 0 | 0 |
| Vietnam | 3 to 10 | 5 | 0 | 3 | 6 | 0 | 2 |

| | Grade levels Compared | Narrative Writing | | | Expository Writing | | |
|---|---|---|---|---|---|---|---|
| | | IB Better | Non-IB Better | No Difference | IB Better | Non-IB Better | No Difference |
| Cambodia | 3, 5, 7 and 9 | 1 | 0 | 3 | 1 | 0 | 3 |
| China | 3 to 10 | 4 | 1 | 3 | 1 | 0 | 7 |
| Hong Kong SAR | 3, 5 to 10 | 0 | 3 | 4 | 1 | 2 | 4 |
| India | 3 to 8 | 0 | 2 | 4 | 3 | 0 | 3 |
| Indonesia | 3 to 10 | 3 | 0 | 5 | 1 | 2 | 5 |
| Japan | 3 to 5, and 7 to10 | 1 | 0 | 6 | 1 | 2 | 4 |
| Oman | 3 and 5 | 0 | 0 | 2 | 0 | 0 | 2 |
| Philippines | 4, 7 and 9 | 2 | 0 | 1 | 1 | 0 | 2 |
| Republic of Korea | 3 to 5 | 0 | 1 | 2 | 1 | 0 | 2 |
| Saudi Arabia | 3, 7 and 9 | 0 | 2 | 1 | 0 | 3 | 0 |
| Singapore | 3, 5 and 6 | 0 | 1 | 2 | 0 | 1 | 2 |
| Thailand | 3 to 9 | 5 | 0 | 2 | 5 | 0 | 2 |
| United Arab Emirates | 3 and 5 | 2 | 0 | 0 | 2 | 0 | 0 |
| Vietnam | 3 to 10 | 3 | 0 | 5 | 5 | 0 | 3 |

In United Arab Emirates, 8 of comparisons were made in two grade levels (grades 3 and 5). IB students outperformed non-IB peers in all 8 comparisons, namely in all four domains at grades 3 and 5 with large effect sizes.

In Vietnam, 32 of comparisons were made, of which 13 reported no significant differences. IB students outperformed non-IB peers in 19 comparisons, namely in Mathematical Literacy for all five MYP grade

levels; in Reading at grade 3 and all five MYP grade levels; in Narrative Writing at grades 6, 8 and 9; and in Expository Writing at grade 3, 6, 8, 9 and 10, all with medium to large effect sizes.

Table 12 summarises the comparison results for each of thirteen countries. It shows the number of comparisons where IB schools outperformed non-IB schools, the number of comparisons where non-IB schools outperformed IB schools and the number of non-significant differences.

## 2.2 Does an analysis of school-by-school results of student performance point to any particularly successful IB schools?

In order to analyse school-by-school results, a number of calculations were carried out for IB students:

- School average scores were calculated for each of four domains and the overall score by grade. The overall average score has no meaning; it was only used for ranking purposes.
- Schools were ranked into decile groups according to their average scores by grade for each of the four ISA assessment domains and their average overall scale score. Decile groups of a population were defined by the decile points which divided a distribution of ranked scores into equal intervals where each interval contains one-tenth of the scores. The highest decile group was the ten per cent of the population with the highest ranked scores.
- The schools in the top two decile groups were selected according to average overall score rank by grade. This gave the top 20 percent of schools in overall score at each grade level.

Table 13 lists the scores achieved by top-performing IB schools according to the ranking procedures. Schools with decile rank lower than 5 in any of the domains at any grade level were not shown in Table 13. Also, schools with only one grade level in the top 20 percent were not shown in Table 13. To preserve anonymity, schools are not named in the table. Schools were listed together with average scale scores for each of the four domains and the average overall score, with corresponding decile ranked from 10 (highest) to 1 (lowest).

## Table 13 Top-performing IB schools

| School | Grade | No. of Students | Mathematics | | Reading | | Narrative Writing | | Expository Writing | | Overall Decile Rank | Average Overall Score |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Decile Rank | Mean | Decile Rank | Mean | Decile Rank | Mean | Decile Rank | Mean | | |
| A | 4 | 52 | 8 | 392 | 9 | 354 | 8 | 426 | 7 | 440 | 9 | 403 |
| | 8 | 55 | 8 | 545 | 9 | 530 | 8 | 551 | 9 | 568 | 9 | 549 |
| | 9 | 58 | 8 | 571 | 8 | 559 | 8 | 577 | 8 | 588 | 9 | 574 |
| B | 5 | 74 | 10 | 468 | 8 | 399 | 8 | 472 | 8 | 485 | 9 | 456 |
| | 6 | 72 | 10 | 509 | 9 | 457 | 8 | 494 | 10 | 524 | 10 | 496 |
| | 7 | 83 | 10 | 535 | 10 | 506 | 10 | 545 | 10 | 551 | 10 | 534 |
| | 8 | 74 | 10 | 581 | 10 | 535 | 10 | 566 | 10 | 593 | 10 | 569 |
| | 9 | 78 | 9 | 582 | 10 | 593 | 9 | 587 | 10 | 614 | 10 | 595 |
| C | 4 | 153 | 10 | 412 | 9 | 356 | 5 | 408 | 5 | 433 | 9 | 402 |
| | 5 | 154 | 9 | 453 | 8 | 397 | 8 | 468 | 7 | 480 | 9 | 449 |
| | 6 | 180 | 9 | 494 | 9 | 455 | 9 | 499 | 9 | 507 | 10 | 489 |
| | 7 | 182 | 7 | 513 | 8 | 486 | 8 | 526 | 8 | 541 | 9 | 516 |
| | 8 | 183 | 9 | 557 | 9 | 521 | 9 | 561 | 9 | 578 | 10 | 554 |
| D | 7 | 110 | 10 | 602 | 10 | 585 | 10 | 579 | 10 | 585 | 10 | 588 |
| | 9 | 110 | 10 | 590 | 10 | 639 | 10 | 617 | 10 | 637 | 10 | 621 |
| E | 7 | 182 | 8 | 523 | 10 | 509 | 9 | 533 | 9 | 546 | 10 | 528 |
| | 10 | 262 | 10 | 608 | 9 | 592 | 7 | 591 | 9 | 612 | 10 | 601 |
| F | 7 | 79 | 9 | 526 | 10 | 512 | 8 | 529 | 5 | 525 | 10 | 523 |
| | 8 | 92 | 9 | 553 | 10 | 534 | 8 | 553 | 8 | 560 | 9 | 550 |
| | 9 | 82 | 9 | 585 | 9 | 570 | 10 | 593 | 8 | 589 | 10 | 584 |
| G | 5 | 46 | 10 | 476 | 9 | 404 | 10 | 483 | 8 | 484 | 10 | 462 |
| | 7 | 44 | 9 | 532 | 5 | 466 | 6 | 521 | 10 | 550 | 9 | 517 |
| | 10 | 35 | 9 | 600 | 8 | 589 | 8 | 593 | 5 | 598 | 9 | 595 |
| H | 3 | 135 | 9 | 339 | 9 | 287 | 9 | 383 | 8 | 409 | 9 | 354 |
| | 5 | 151 | 8 | 447 | 9 | 412 | 9 | 477 | 9 | 495 | 10 | 458 |
| I | 8 | 99 | 9 | 553 | 10 | 537 | 9 | 562 | 7 | 557 | 9 | 552 |
| | 9 | 111 | 9 | 583 | 9 | 571 | 8 | 580 | 9 | 589 | 10 | 580 |
| | 10 | 97 | I 9 | 600 | 10 | 613 | 8 | 595 | 7 | 602 | 10 | 602 |
| J | 4 | 53 | 10 | 449 | 10 | 373 | 10 | 440 | 10 | 475 | 10 | 434 |
| | 5 | 71 | 9 | 453 | 10 | 415 | 9 | 475 | 10 | 508 | 10 | 463 |
| | 6 | 71 | 6 | 465 | 9 | 457 | 10 | 508 | 10 | 522 | 10 | 488 |
| | 8 | 73 | 6 | 530 | 9 | 525 | 9 | 565 | 8 | 563 | 9 | 546 |
| | 9 | 74 | 7 | 558 | 8 | 558 | 9 | 583 | 9 | 593 | 9 | 573 |
| K | 3 | 49 | 10 | 364 | 10 | 312 | 9 | 385 | 10 | 423 | 10 | 371 |
| | 5 | 29 | 10 | 488 | 10 | 442 | 10 | 489 | 8 | 481 | 10 | 473 |
| L | 3 | 50 | 9 | 358 | 10 | 330 | 9 | 387 | 10 | 429 | 10 | 376 |
| | 4 | 55 | 10 | 415 | 10 | 397 | 10 | 456 | 9 | 456 | 10 | 431 |
| | 5 | 62 | 9 | 452 | 10 | 431 | 10 | 491 | 10 | 516 | 10 | 472 |
| | 6 | 66 | 6 | 463 | 10 | 468 | 6 | 488 | 9 | 508 | 9 | 482 |
| | 7 | 65 | 10 | 543 | 10 | 531 | 10 | 545 | 10 | 558 | 10 | 544 |
| | 8 | 72 | 10 | 563 | 10 | 565 | 10 | 593 | 10 | 596 | 10 | 579 |
| M | 3 | 114 | 9 | 352 | 10 | 296 | 10 | 388 | 8 | 410 | 10 | 361 |
| | 4 | 134 | 9 | 406 | 9 | 356 | 9 | 435 | 9 | 454 | 9 | 413 |
| N | 3 | 45 | 9 | 350 | 8 | 274 | 9 | 380 | 10 | 428 | 10 | 358 |
| | 5 | 76 | 9 | 455 | 7 | 388 | 7 | 462 | 10 | 498 | 9 | 451 |
| O | 3 | 14 | 9 | 336 | 10 | 299 | 10 | 412 | 9 | 423 | 10 | 366 |
| | 4 | 10 | 9 | 407 | 9 | 358 | 9 | 437 | 10 | 477 | 10 | 420 |
| P | 3 | 78 | 10 | 369 | 8 | 268 | 5 | 362 | 5 | 394 | 9 | 348 |
| | 4 | 89 | 10 | 449 | 7 | 340 | 9 | 432 | 9 | 454 | 9 | 419 |
| | 5 | 80 | 10 | 471 | 7 | 387 | 7 | 459 | 9 | 487 | 9 | 451 |

Table 14 lists an overall comparison of these sixteen top-performing IB schools against the remaining ISA schools. The effect sizes of the differences in means were in the range of 0.22 to 0.43 for Mathematical Literacy. The effect sizes were in the range of 0.32 to 0.56 for Reading. The effect sizes were in the range of 0.22 to 0.50 for Narrative Writing; and the effect sizes were in the range of 0.22 to 0.46 for Expository Writing. Among these top-performing IB schools, nine schools (or 56%) are from Europe, six schools (or 38%) are from Asia, and one school (6%) is from Africa. In terms of country, three of these top-performing IB schools each are located in Germany and in Switzerland, two schools in China, and one school in Hong Kong SAR.

Table 14 Performance of Top Fourteen IB Schools and the Remaining ISA Schools

| Domain | Grade | Top Fourteen IB Schools | | | Remaining ISA Schools | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 338 | 84 | 1,370 | 308 | 87 | 12,939 | ++ | **0.35** |
| | 4 | 406 | 86 | 799 | 371 | 87 | 8,302 | ++ | **0.41** |
| | 5 | 456 | 83 | 1,454 | 420 | 86 | 13,405 | ++ | **0.43** |
| | 6 | 478 | 82 | 865 | 458 | 90 | 8,972 | ++ | **0.22** |
| | 7 | 524 | 86 | 1,532 | 492 | 90 | 12,492 | ++ | **0.37** |
| | 8 | 546 | 79 | 880 | 520 | 87 | 9,430 | ++ | **0.31** |
| | 9 | 574 | 83 | 853 | 541 | 85 | 8,963 | ++ | **0.39** |
| | 10 | 597 | 92 | 741 | 568 | 90 | 5,692 | ++ | **0.32** |
| Reading | 3 | 289 | 91 | 1,365 | 244 | 94 | 12,983 | ++ | **0.48** |
| | 4 | 356 | 87 | 803 | 312 | 95 | 8,248 | ++ | **0.48** |
| | 5 | 407 | 84 | 1,447 | 365 | 91 | 13,366 | ++ | **0.48** |
| | 6 | 446 | 92 | 864 | 411 | 101 | 8,931 | ++ | **0.37** |
| | 7 | 502 | 90 | 1,524 | 455 | 97 | 12,558 | +++ | **0.51** |
| | 8 | 519 | 86 | 870 | 491 | 90 | 9,334 | ++ | **0.32** |
| | 9 | 572 | 91 | 854 | 522 | 89 | 9,020 | +++ | **0.56** |
| | 10 | 600 | 90 | 735 | 566 | 94 | 5,666 | ++ | **0.37** |
| Narrative Writing | 3 | 380 | 62 | 1,366 | 362 | 60 | 12,998 | ++ | **0.29** |
| | 4 | 425 | 61 | 799 | 407 | 63 | 8,253 | ++ | **0.29** |
| | 5 | 475 | 62 | 1,449 | 450 | 65 | 13,323 | ++ | **0.38** |
| | 6 | 495 | 65 | 865 | 480 | 68 | 8,951 | ++ | **0.22** |
| | 7 | 537 | 64 | 1,528 | 510 | 69 | 12,559 | ++ | **0.40** |
| | 8 | 559 | 67 | 881 | 537 | 70 | 9,360 | ++ | **0.32** |
| | 9 | 589 | 69 | 852 | 553 | 72 | 9,043 | +++ | **0.50** |
| | 10 | 595 | 68 | 740 | 579 | 74 | 5,676 | ++ | **0.23** |
| Expository Writing | 3 | 406 | 52 | 1,364 | 392 | 51 | 12,949 | ++ | **0.25** |
| | 4 | 445 | 54 | 801 | 429 | 56 | 8,247 | ++ | **0.29** |
| | 5 | 487 | 55 | 1,448 | 467 | 59 | 13,337 | ++ | **0.35** |
| | 6 | 504 | 56 | 864 | 491 | 61 | 8,927 | ++ | **0.22** |
| | 7 | 545 | 57 | 1,524 | 519 | 62 | 12,536 | ++ | **0.43** |
| | 8 | 567 | 61 | 869 | 548 | 64 | 9,330 | ++ | **0.31** |
| | 9 | 595 | 70 | 848 | 563 | 68 | 8,941 | ++ | **0.46** |
| | 10 | 614 | 64 | 733 | 589 | 70 | 5,657 | ++ | **0.37** |

## 2.3 Are there differences in student performance among schools that have all three programmes, versus schools that have only one programme? –versus schools that have two programmes?

A comparison was carried out to determine if there was a significant performance difference between students from IB schools that have continuum programme (or all three programmes, i.e. PYP, MYP and DP) and students from non-IB schools. The results showed that IB students from the schools with continuum programme outperformed the students from the schools with no IB programmes in all domains at grade 10, in Reading at grades 4, and 6 to 10, and in Mathematical Literacy in grades 9 and 10, as shown in Table 15. These results were statistically significant with small to medium effect sizes. The differences in grade 10 are the largest in all domains. In grades 3 to 5, the students with no IB programmes did better than students with continuum programme in Mathematical Literacy at grade 3, Narrative Writing at grade 5, and Expository Writing at grades 3 and 5.

Table 15 Performance of Students from Schools with Three IB Programmes and Students from Schools with no IB Programme

| Domain | Grade | Continuum Programme | | | No IB Programme | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 325 | 86 | 1,186 | – | **-0.20** |
| | 4 | 378 | 86 | 2,450 | 378 | 85 | 689 | | 0.00 |
| | 5 | 425 | 84 | 4,420 | 428 | 83 | 1,026 | | -0.05 |
| | 6 | 469 | 83 | 2,830 | 463 | 87 | 681 | | 0.08 |
| | 7 | 501 | 84 | 3,878 | 503 | 90 | 990 | | -0.02 |
| | 8 | 521 | 82 | 2,964 | 522 | 85 | 566 | | -0.01 |
| | 9 | 553 | 82 | 2,676 | 545 | 85 | 761 | + | 0.10 |
| | 10 | 578 | 92 | 1,424 | 539 | 83 | 228 | ++ | **0.45** |
| Reading | 3 | 249 | 90 | 4,284 | 246 | 100 | 1,174 | | 0.03 |
| | 4 | 320 | 91 | 2,441 | 307 | 96 | 681 | + | 0.14 |
| | 5 | 368 | 88 | 4,404 | 362 | 94 | 1,023 | | 0.07 |
| | 6 | 419 | 96 | 2,813 | 408 | 97 | 680 | + | 0.11 |
| | 7 | 466 | 92 | 3,990 | 451 | 103 | 987 | + | 0.15 |
| | 8 | 490 | 87 | 2,953 | 469 | 97 | 563 | ++ | **0.22** |
| | 9 | 532 | 85 | 2,801 | 517 | 101 | 758 | + | 0.17 |
| | 10 | 573 | 94 | 1,396 | 539 | 91 | 224 | ++ | **0.37** |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 366 | 62 | 1,182 | | -0.05 |
| | 4 | 407 | 63 | 2,423 | 407 | 65 | 684 | | 0.00 |
| | 5 | 450 | 64 | 4,402 | 456 | 69 | 1,015 | – | -0.08 |
| | 6 | 482 | 65 | 2,823 | 483 | 68 | 682 | | -0.02 |
| | 7 | 513 | 66 | 3,995 | 517 | 71 | 988 | | -0.06 |
| | 8 | 535 | 69 | 2,959 | 532 | 72 | 564 | | 0.04 |
| | 9 | 557 | 71 | 2,789 | 561 | 77 | 761 | | -0.05 |
| | 10 | 580 | 72 | 1,423 | 565 | 69 | 230 | ++ | **0.22** |
| Expository Writing | 3 | 393 | 49 | 4,262 | 401 | 54 | 1,170 | – | -0.15 |
| | 4 | 430 | 54 | 2,440 | 427 | 61 | 681 | | 0.04 |
| | 5 | 467 | 56 | 4,404 | 473 | 63 | 1,017 | – | -0.09 |
| | 6 | 492 | 59 | 2,807 | 495 | 63 | 682 | | -0.05 |
| | 7 | 524 | 58 | 3,980 | 526 | 63 | 987 | | -0.03 |
| | 8 | 547 | 63 | 2,951 | 543 | 63 | 564 | | 0.07 |
| | 9 | 571 | 65 | 2,795 | 570 | 68 | 757 | | 0.01 |
| | 10 | 597 | 63 | 1,395 | 579 | 80 | 225 | ++ | **0.25** |

Two groups of analyses were carried out in comparing performance between continuum programme and single (or dual) programme. The first group of comparisons conducted was for comparing students having common IB programme in schools with continuum programme and in schools with single or dual programme. These were comparisons of performance in grades 3 to 5 between schools having continuum programme and schools having PYP, and comparisons of performance in grades 6 to 10 between schools having continuum programme and schools having MYP. The second group of comparisons conducted was to compare students not having common IB programme between schools with continuum programme

and schools with single or dual programme. These comparisons were to investigate differences in performance between schools with missing year-level appropriate IB programme and schools with appropriate IB programme at particular grade levels. These included comparisons of performance in grades 3 to 5 between schools having continuum programme and schools without the PYP, and comparisons of performance in grades 6 to 10 between schools having continuum IB programme and schools without the MYP.

### 2.3.1 Compare performance of students between schools with continuum programme and schools with single or dual programme

Table 16 summarises comparisons of the performance of students from schools with continuum programme with the performance of students from PYP-only schools. Note that there was not sufficient ISA assessment data available for schools with only the MYP and they were not included in the comparisons. No significant differences were found in Mathematical Literacy at all three PYP grade levels. A significant performance difference was found in three comparisons only: grade 4 Reading, grade 5 Reading, and grade 3 Expository Writing. In two out of three cases, students in PYP-only schools had higher mean scores than students in continuum programme schools, with small effect sizes.

Table 16 Performance of Students from Schools with Continuum Programme and Students from PYP-only Schools at Grades 3 to 5

| Domain | Grade | Continuum Programme | | | One Programme | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 306 | 81 | 624 | | 0.03 |
| | 4 | 378 | 86 | 2,450 | 375 | 78 | 295 | | 0.03 |
| | 5 | 425 | 84 | 4,420 | 431 | 76 | 586 | | -0.08 |
| Reading | 3 | 249 | 90 | 4,284 | 253 | 89 | 620 | | -0.05 |
| | 4 | 320 | 91 | 2,441 | 302 | 85 | 292 | + | 0.19 |
| | 5 | 368 | 88 | 4,404 | 376 | 83 | 586 | – | -0.10 |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 364 | 61 | 622 | | -0.03 |
| | 4 | 407 | 63 | 2,423 | 402 | 60 | 294 | | 0.08 |
| | 5 | 450 | 64 | 4,402 | 452 | 64 | 585 | | -0.02 |
| Expository Writing | 3 | 393 | 49 | 4,262 | 399 | 53 | 619 | – | -0.12 |
| | 4 | 430 | 54 | 2,440 | 432 | 56 | 293 | | -0.03 |
| | 5 | 467 | 56 | 4,404 | 468 | 53 | 572 | | -0.02 |

Table 17 summarises comparisons of the performance of students from schools with continuum programme with the performance of students from schools with the dual programme, i.e. PYP and MYP. In this case, schools with continuum programme and schools with dual programme had two shared programmes, i.e. PYP and MYP. Students from schools with PYP and MYP achieved higher scores on the ISA than students from schools with continuum programmes in the following comparisons: grades 3, 4, 7 and 8 Mathematical Literacy; grades 3 to 8 Reading; and grades 4, 6 to 8 Narrative Writing and Expository Writing. Effect sizes were generally in the range of small to medium.

Table 17 Performance of Students from Schools with Continuum Programme and Students from Schools with Dual Programme (PYP & MYP)

| Domain | Grade | Continuum Programme | | | Two Programmes (PYP + MYP) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 336 | 87 | 211 | – – | **-0.32** |
| | 4 | 378 | 86 | 2,450 | 402 | 73 | 112 | – – | **-0.30** |
| | 5 | 425 | 84 | 4,420 | 433 | 80 | 306 | | -0.11 |
| | 6 | 469 | 83 | 2,830 | 462 | 82 | 210 | | 0.09 |
| | 7 | 501 | 84 | 3,878 | 518 | 92 | 184 | – | -0.19 |
| | 8 | 521 | 82 | 2,964 | 555 | 86 | 140 | – – | **-0.40** |
| | 9 | 553 | 82 | 2,676 | 548 | 86 | 249 | | 0.05 |
| | 10 | 578 | 92 | 1,424 | 550 | 108 | 27 | | 0.28 |
| Reading | 3 | 249 | 90 | 4,284 | 276 | 96 | 207 | – – | **-0.29** |
| | 4 | 320 | 91 | 2,441 | 370 | 88 | 112 | – – – | **-0.57** |
| | 5 | 368 | 88 | 4,404 | 380 | 102 | 305 | – | -0.13 |
| | 6 | 419 | 96 | 2,813 | 452 | 102 | 208 | – – | **-0.33** |
| | 7 | 466 | 92 | 3,990 | 489 | 91 | 182 | – – | **-0.25** |
| | 8 | 490 | 87 | 2,953 | 543 | 74 | 134 | – – – | **-0.67** |
| | 9 | 532 | 85 | 2,801 | 536 | 94 | 248 | | -0.04 |
| | 10 | 573 | 94 | 1,396 | 553 | 89 | 26 | | 0.22 |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 367 | 59 | 210 | | -0.07 |
| | 4 | 407 | 63 | 2,423 | 440 | 58 | 113 | – – – | **-0.56** |
| | 5 | 450 | 64 | 4,402 | 457 | 70 | 306 | | -0.10 |
| | 6 | 482 | 65 | 2,823 | 499 | 71 | 210 | – – | **-0.26** |
| | 7 | 513 | 66 | 3,995 | 529 | 71 | 183 | – – | **-0.23** |
| | 8 | 535 | 69 | 2,959 | 571 | 67 | 140 | – – – | **-0.54** |
| | 9 | 557 | 71 | 2,789 | 560 | 76 | 248 | | -0.04 |
| | 10 | 580 | 72 | 1,423 | 554 | 77 | 27 | | 0.34 |
| Expository Writing | 3 | 393 | 49 | 4,262 | 399 | 49 | 208 | | -0.12 |
| | 4 | 430 | 54 | 2,440 | 445 | 58 | 112 | – – | **-0.27** |
| | 5 | 467 | 56 | 4,404 | 472 | 70 | 305 | | -0.07 |
| | 6 | 492 | 59 | 2,807 | 507 | 61 | 208 | – – | **-0.25** |
| | 7 | 524 | 58 | 3,980 | 542 | 57 | 182 | – – | **-0.31** |
| | 8 | 547 | 63 | 2,951 | 583 | 61 | 135 | – – – | **-0.58** |
| | 9 | 571 | 65 | 2,795 | 575 | 73 | 249 | | -0.05 |
| | 10 | 597 | 63 | 1,395 | 588 | 58 | 26 | | 0.15 |

Table 18 summarises results of comparisons between students from schools with continuum programme and students from schools with dual programme, i.e. PYP & DP, or MYP & DP. In this case, schools with continuum programme and schools with dual programme have only one shared programme, either the PYP or the MYP. Students from continuum programme schools outperformed students from the dual programme schools in the following areas: grades 6, 7, 8 and 10 Mathematical Literacy and Reading; grades 7 and 8 Narrative Writing; and grades 7 and 10 Expository Writing. Effect sizes were generally in the range of small to medium. On the other hand, students from the dual programme schools outperformed students from continuum programme schools in the following areas: grade 3 Mathematical Literacy; grades 3, 4 and 5 Reading; grades 3 and 4 Narrative Writing; and grades 3, 4 and 5 Expository Writing. Effect sizes were generally in the range of small to medium.

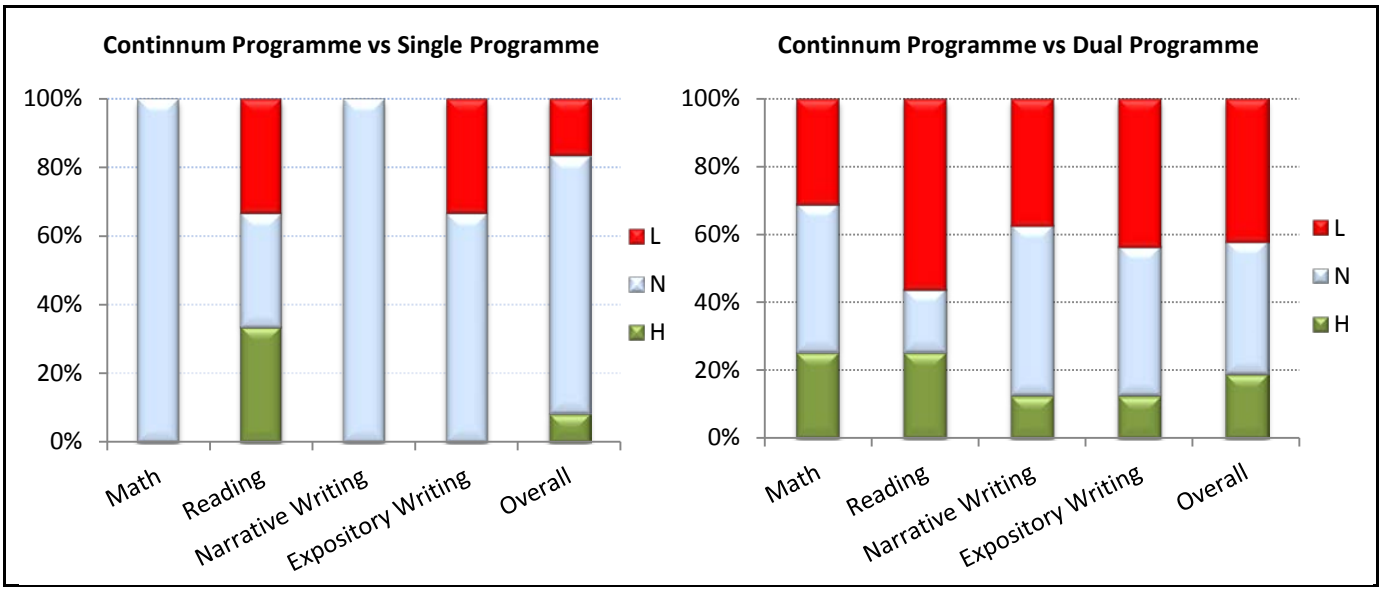
Figure 6 shows the proportion of the three levels of significance of difference (classified as L, N and H) in student performance among IB programmes at grades with shared programme. A letter “H” denotes the proportion of comparisons where the performance of a subgroup from continuum IB schools was statistically significantly higher than the performance of a comparison group. A letter “N” denotes that proportion of comparisons between the performances of subgroups was not statistically significant. A letter “L” denotes the proportion of comparisons where the performance of a subgroup from continuum IB schools was statistically significantly lower than the performance of a comparison group.

The left-hand chart shows the proportions of L, N, and H for comparisons between continuum programme and single programme. The right-hand chart shows the proportions of L, N, and H for comparisons between continuum programme and dual programme. As shown in the left-hand chart, the students from continuum programme were about as likely to outperform students from single programme as the students from single programme to outperform students from continuum programme. The right-hand chart shows that students from dual programme were more likely to outperform students from continuum programme in all domains. Combining the summaries from both charts, it appeared that students in schools with continuum programme were more likely to have equivalent or better performance when comparing to students in schools with single programme, than when comparing to the students in schools with dual programmes.

Table 18 Performance of Students from Schools with Continuum Programme and Students from Dual Programme (PYP & DP, or MYP & DP)

| Domain | Grade | Continuum Programme | | | Dual Programmes (PYP & DP, or MYP & DP) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 314 | 88 | 1,441 | – | -0.06 |
| | 4 | 378 | 86 | 2,450 | 378 | 83 | 931 | | 0.00 |
| | 5 | 425 | 84 | 4,420 | 422 | 83 | 1,560 | | 0.04 |
| | 6 | 469 | 83 | 2,830 | 422 | 95 | 124 | +++ | **0.53** |
| | 7 | 501 | 84 | 3,878 | 482 | 105 | 693 | ++ | **0.21** |
| | 8 | 521 | 82 | 2,964 | 484 | 75 | 546 | ++ | **0.47** |
| | 9 | 553 | 82 | 2,676 | 541 | 105 | 287 | | 0.12 |
| | 10 | 578 | 92 | 1,424 | 547 | 83 | 494 | ++ | **0.36** |
| Reading | 3 | 249 | 90 | 4,284 | 263 | 91 | 1,412 | – | -0.15 |
| | 4 | 320 | 91 | 2,441 | 332 | 88 | 926 | – | -0.14 |
| | 5 | 368 | 88 | 4,404 | 378 | 83 | 1,549 | – | -0.12 |
| | 6 | 419 | 96 | 2,813 | 397 | 100 | 124 | ++ | **0.22** |
| | 7 | 466 | 92 | 3,990 | 447 | 120 | 684 | + | 0.17 |
| | 8 | 490 | 87 | 2,953 | 471 | 80 | 527 | ++ | **0.22** |
| | 9 | 532 | 85 | 2,801 | 536 | 126 | 288 | | -0.04 |
| | 10 | 573 | 94 | 1,396 | 553 | 93 | 499 | ++ | **0.22** |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 368 | 60 | 1,429 | – | -0.09 |
| | 4 | 407 | 63 | 2,423 | 421 | 61 | 929 | – – | **-0.23** |
| | 5 | 450 | 64 | 4,402 | 454 | 64 | 1,533 | | -0.05 |
| | 6 | 482 | 65 | 2,823 | 484 | 62 | 124 | | -0.03 |
| | 7 | 513 | 66 | 3,995 | 503 | 85 | 677 | + | 0.13 |
| | 8 | 535 | 69 | 2,959 | 528 | 66 | 527 | + | 0.10 |
| | 9 | 557 | 71 | 2,789 | 549 | 100 | 285 | | 0.09 |
| | 10 | 580 | 72 | 1,423 | 574 | 77 | 481 | | 0.08 |
| Expository Writing | 3 | 393 | 49 | 4,262 | 399 | 50 | 1,417 | – | -0.13 |
| | 4 | 430 | 54 | 2,440 | 439 | 54 | 926 | – | -0.17 |
| | 5 | 467 | 56 | 4,404 | 473 | 58 | 1,550 | – | -0.10 |
| | 6 | 492 | 59 | 2,807 | 486 | 50 | 123 | | 0.11 |
| | 7 | 524 | 58 | 3,980 | 518 | 77 | 684 | + | 0.10 |
| | 8 | 547 | 63 | 2,951 | 547 | 55 | 527 | | 0.00 |
| | 9 | 571 | 65 | 2,795 | 568 | 93 | 282 | | 0.04 |
| | 10 | 597 | 63 | 1,395 | 588 | 72 | 497 | + | 0.13 |

Figure 6 Significance of Difference in Student Performance among Groups




### 2.3.2 Compare performance of students between schools with continuum programme and schools with single or dual programme without a year-level appropriate programme

The following section reports results in comparing students from schools with continuum programme and students from PYP schools at grades 6 to 10. In this case, schools with continuum programme and schools with the single programme have no shared programme. Students from schools with continuum programme outperformed students from PYP-only programme schools in the following areas: all ISA domains at grades 9 and 10; and grade 7 Mathematical Literacy. The only case where students from the single-programme schools outperformed students from continuum-programme schools was in grade 8 Mathematical Literacy.

Table 19 Performance of Students from Schools with Continuum Programme and Students from PYP Schools at Grades 6 to 10

| Domain | Grade | Continuum Programme | | | PYP | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 6 | 469 | 83 | 2,830 | 459 | 84 | 176 | | 0.12 |
| | 7 | 501 | 84 | 3,878 | 477 | 89 | 226 | ++ | **0.28** |
| | 8 | 521 | 82 | 2,964 | 541 | 83 | 111 | – – | **-0.24** |
| | 9 | 553 | 82 | 2,676 | 534 | 89 | 162 | ++ | **0.22** |
| | 10 | 578 | 92 | 1,424 | 564 | 97 | 46 | | 0.15 |
| Reading | 6 | 419 | 96 | 2,813 | 406 | 90 | 174 | | 0.14 |
| | 7 | 466 | 92 | 3,990 | 454 | 91 | 224 | | 0.12 |
| | 8 | 490 | 87 | 2,953 | 483 | 87 | 111 | | 0.08 |
| | 9 | 532 | 85 | 2,801 | 507 | 85 | 160 | ++ | **0.29** |
| | 10 | 573 | 94 | 1,396 | 508 | 96 | 46 | +++ | **0.68** |
| Narrative Writing | 6 | 482 | 65 | 2,823 | 474 | 63 | 176 | | 0.11 |
| | 7 | 513 | 66 | 3,995 | 507 | 73 | 226 | | 0.09 |
| | 8 | 535 | 69 | 2,959 | 535 | 64 | 111 | | -0.01 |
| | 9 | 557 | 71 | 2,789 | 540 | 69 | 161 | ++ | **0.25** |
| | 10 | 580 | 72 | 1,423 | 549 | 66 | 46 | ++ | **0.45** |
| Expository Writing | 6 | 492 | 59 | 2,807 | 490 | 57 | 174 | | 0.04 |
| | 7 | 524 | 58 | 3,980 | 522 | 58 | 224 | | 0.03 |
| | 8 | 547 | 63 | 2,951 | 540 | 61 | 111 | | 0.12 |
| | 9 | 571 | 65 | 2,795 | 548 | 64 | 160 | ++ | **0.35** |
| | 10 | 597 | 63 | 1,395 | 553 | 56 | 46 | +++ | **0.73** |

Table 20 shows the results for the comparisons between students from schools with continuum programme and students from schools with DP-only. In this case, comparisons were undertaken at grade levels where schools with continuum programme and schools with the single programme have no shared programme, i.e. grades 3 to 10. Students from continuum programme schools outperformed students from schools with DP in the following areas: grades 3, 4, 6, 7 and 9 Mathematical Literacy; grade 3 Reading; grade 3 Narrative Writing; and grades 3, 7 and 9 Expository Writing. Effect sizes are generally small. On the other hand, students from schools with DP outperformed students from schools with continuum programme in the following areas: grade 10 Mathematical Literacy; grades 8 and 10 Reading; grades 6, 8 and 10 Narrative Writing; and grade 10 Expository Writing.

Table 20 Performance of Students from Schools with Continuum Programme and Students from DP Schools

| Domain | Grade | Continuum Programme | | | DP | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 302 | 88 | 4,551 | + | 0.08 |
| | 4 | 378 | 86 | 2,450 | 368 | 90 | 3,225 | + | 0.12 |
| | 5 | 425 | 84 | 4,420 | 422 | 90 | 4,863 | | 0.03 |
| | 6 | 469 | 83 | 2,830 | 462 | 91 | 3,412 | + | 0.09 |
| | 7 | 501 | 84 | 3,878 | 496 | 93 | 5,244 | + | 0.06 |
| | 8 | 521 | 82 | 2,964 | 524 | 89 | 3,723 | | -0.04 |
| | 9 | 553 | 82 | 2,676 | 539 | 86 | 3,184 | + | 0.16 |
| | 10 | 578 | 92 | 1,424 | 588 | 90 | 2,496 | – | -0.11 |
| Reading | 3 | 249 | 90 | 4,284 | 243 | 94 | 4,541 | + | 0.07 |
| | 4 | 320 | 91 | 2,441 | 317 | 96 | 3,205 | | 0.03 |
| | 5 | 368 | 88 | 4,404 | 369 | 92 | 4,845 | | -0.02 |
| | 6 | 419 | 96 | 2,813 | 423 | 99 | 3,381 | | -0.04 |
| | 7 | 466 | 92 | 3,990 | 462 | 94 | 5,219 | | 0.04 |
| | 8 | 490 | 87 | 2,953 | 498 | 90 | 3,675 | – | -0.09 |
| | 9 | 532 | 85 | 2,801 | 528 | 88 | 3,139 | | 0.05 |
| | 10 | 573 | 94 | 1,396 | 589 | 86 | 2,492 | – | -0.17 |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 360 | 60 | 4,531 | + | 0.06 |
| | 4 | 407 | 63 | 2,423 | 408 | 62 | 3,213 | | -0.02 |
| | 5 | 450 | 64 | 4,402 | 452 | 65 | 4,833 | | -0.03 |
| | 6 | 482 | 65 | 2,823 | 486 | 67 | 3,399 | – | -0.06 |
| | 7 | 513 | 66 | 3,995 | 515 | 68 | 5,214 | | -0.03 |
| | 8 | 535 | 69 | 2,959 | 541 | 70 | 3,688 | – | -0.10 |
| | 9 | 557 | 71 | 2,789 | 560 | 71 | 3,167 | | -0.03 |
| | 10 | 580 | 72 | 1,423 | 593 | 68 | 2,498 | – | -0.19 |
| Expository Writing | 3 | 393 | 49 | 4,262 | 390 | 52 | 4,532 | + | 0.06 |
| | 4 | 430 | 54 | 2,440 | 429 | 54 | 3,204 | | 0.01 |
| | 5 | 467 | 56 | 4,404 | 469 | 58 | 4,839 | | -0.02 |
| | 6 | 492 | 59 | 2,807 | 495 | 59 | 3,379 | | -0.04 |
| | 7 | 524 | 58 | 3,980 | 521 | 60 | 5,216 | + | 0.06 |
| | 8 | 547 | 63 | 2,951 | 549 | 64 | 3,672 | | -0.03 |
| | 9 | 571 | 65 | 2,795 | 568 | 68 | 3,090 | + | 0.05 |
| | 10 | 597 | 63 | 1,395 | 602 | 63 | 2,495 | – | -0.08 |

Table 21 shows the results for the comparison between students from schools with continuum programme and students from schools with dual programme, i.e. PYP & DP, or MYP & DP. In this case, comparisons were undertaken at grade levels where schools with continuum programme and schools with dual programme have no shared programme, i.e. continuum programme is compared with MYP & DP at grades 3 to 5; and continuum programme is compared with PYP & DP at grades 6 to 10. Students from continuum programme schools outperformed students from schools with dual programmes in the following areas: grades 4, 5, 6 and 7 Mathematical Literacy and grades 4 and 7 Reading. Effect sizes are generally in the range of small to medium. On the other hand, students from the dual-programme schools outperformed students from continuum programme schools in the following areas: grade 3 Mathematical

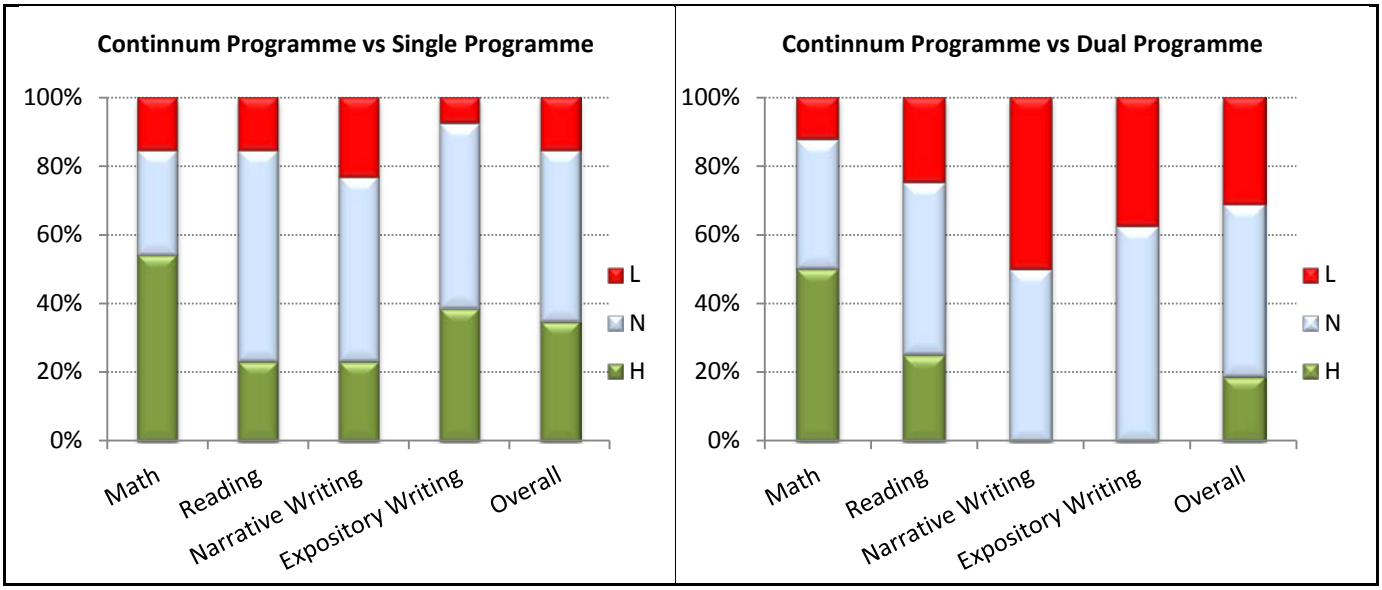
Literacy; grades 3 and 8 Reading; grades 3, 8, 9 and 10 Narrative Writing; and grades 3, 6 and 8 Expository Writing.

Table 21 Performance of Students from Schools with Continuum Programme and Students from Dual Programme (PYP & DP, or MYP & DP)

| Domain | Grade | Continuum Programme | | | Dual Programme (PYP & DP, or MYP & DP) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Maths | 3 | 309 | 82 | 4,179 | 355 | 95 | 385 | – – – | **-0.52** |
| | 4 | 378 | 86 | 2,450 | 340 | 84 | 90 | ++ | **0.45** |
| | 5 | 425 | 84 | 4,420 | 415 | 98 | 538 | + | 0.10 |
| | 6 | 469 | 83 | 2,830 | 450 | 88 | 1,071 | ++ | **0.23** |
| | 7 | 501 | 84 | 3,878 | 487 | 85 | 1,777 | + | 0.16 |
| | 8 | 521 | 82 | 2,964 | 526 | 82 | 1,234 | | -0.06 |
| | 9 | 553 | 82 | 2,676 | 549 | 85 | 1,544 | | 0.04 |
| | 10 | 578 | 92 | 1,424 | 581 | 84 | 858 | | -0.03 |
| Reading | 3 | 249 | 90 | 4,284 | 292 | 107 | 381 | – – | **-0.43** |
| | 4 | 320 | 91 | 2,441 | 266 | 98 | 91 | +++ | **0.57** |
| | 5 | 368 | 88 | 4,404 | 363 | 109 | 542 | | 0.05 |
| | 6 | 419 | 96 | 2,813 | 412 | 101 | 1,077 | | 0.07 |
| | 7 | 466 | 92 | 3,990 | 459 | 95 | 1,767 | + | 0.07 |
| | 8 | 490 | 87 | 2,953 | 498 | 90 | 1,231 | – | -0.09 |
| | 9 | 532 | 85 | 2,801 | 534 | 86 | 1,529 | | -0.02 |
| | 10 | 573 | 94 | 1,396 | 577 | 91 | 863 | | -0.04 |
| Narrative Writing | 3 | 363 | 59 | 4,279 | 404 | 66 | 383 | – – – | **-0.66** |
| | 4 | 407 | 63 | 2,423 | 405 | 53 | 90 | | 0.02 |
| | 5 | 450 | 64 | 4,402 | 456 | 73 | 539 | | -0.08 |
| | 6 | 482 | 65 | 2,823 | 483 | 67 | 1,071 | | -0.02 |
| | 7 | 513 | 66 | 3,995 | 512 | 67 | 1,772 | | 0.01 |
| | 8 | 535 | 69 | 2,959 | 541 | 67 | 1,227 | – | -0.09 |
| | 9 | 557 | 71 | 2,789 | 562 | 67 | 1,533 | – | -0.08 |
| | 10 | 580 | 72 | 1,423 | 587 | 69 | 853 | – | -0.10 |
| Expository Writing | 3 | 393 | 49 | 4,262 | 409 | 55 | 381 | – – | **-0.30** |
| | 4 | 430 | 54 | 2,440 | 437 | 58 | 91 | | -0.12 |
| | 5 | 467 | 56 | 4,404 | 471 | 66 | 542 | | -0.05 |
| | 6 | 492 | 59 | 2,807 | 497 | 59 | 1,078 | – | -0.08 |
| | 7 | 524 | 58 | 3,980 | 523 | 62 | 1,760 | | 0.02 |
| | 8 | 547 | 63 | 2,951 | 551 | 63 | 1,230 | – | -0.07 |
| | 9 | 571 | 65 | 2,795 | 568 | 66 | 1,516 | | 0.05 |
| | 10 | 597 | 63 | 1,395 | 596 | 72 | 855 | | 0.01 |

Figure 7 shows the proportion of the three levels of significance of difference (classified as L, N, H) in student performance among IB programmes at grades without a common programme. The left-hand chart shows the proportions of L, N, and H for comparisons between continuum programme and single programme, and shows that it was more likely for students from continuum programme to outperform students from single programme than it was for students from single programme to outperform students from continuum programme in all domains. The right-hand chart shows the proportions of L, N and H for comparisons between continuum programme and dual programme, and shows that it was more likely for students from continuum programme to outperform students from dual-programme schools in Mathematical Literacy. However, students from dual-programme schools were likely to outperform students from continuum programme in writing tasks.

Figure 7 Significance of Difference in Student Performance among Groups at Grades without Year-Level Appropriate Programme




### 2.3.3 Compare performance of students between schools with PYP & MYP and schools with single programme.

This section compares performance differences between schools with dual programme (i.e. PYP and MYP) and schools with single programme. Due to insufficient data in schools with only MYP, comparisons for single programme were limited to schools with only PYP. Table 22 shows the results for the comparisons between students from schools with both the PYP and MYP and students from schools with PYP-only programme at grades 3 to 5. Students from schools with both PYP and MYP outperformed students from schools with only PYP in the following areas: grades 3 and 4 Mathematical Literacy and Reading; grade 4 Narrative Writing and Expository Writing. Effect sizes are generally in the range of medium to large. Students from schools with only the PYP had not outperformed students from the dual- programme schools in any of the areas.

Table 22 Performance of Students from Schools with PYP & MYP and Students from Schools with PYP at Grades 3 to 5

| Domain | Grade | PYP and MYP | | | PYP | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Maths** | 3 | 336 | 87 | 211 | 306 | 81 | 624 | ++ | **0.35** |
| | 4 | 402 | 73 | 112 | 375 | 78 | 295 | ++ | **0.35** |
| | 5 | 433 | 80 | 306 | 431 | 76 | 586 | | 0.03 |
| **Reading** | 3 | 276 | 96 | 207 | 253 | 89 | 620 | ++ | **0.24** |
| | 4 | 370 | 88 | 112 | 302 | 85 | 292 | +++ | **0.78** |
| | 5 | 380 | 102 | 305 | 376 | 83 | 586 | | 0.04 |
| **Narrative Writing** | 3 | 367 | 59 | 210 | 364 | 61 | 622 | | 0.04 |
| | 4 | 440 | 58 | 113 | 402 | 60 | 294 | +++ | **0.65** |
| | 5 | 457 | 70 | 306 | 452 | 64 | 585 | | 0.08 |
| **Expository Writing** | 3 | 399 | 49 | 208 | 399 | 53 | 619 | | -0.01 |
| | 4 | 445 | 58 | 112 | 432 | 56 | 293 | ++ | **0.23** |
| | 5 | 472 | 70 | 305 | 468 | 53 | 572 | | 0.06 |

Table 23 Performance of Students from Schools with PYP & MYP and Students from Schools with PYP at Grades 6 to 10

| Domain | Grade | PYP and MYP | | | PYP | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 6 | 462 | 82 | 210 | 459 | 84 | 176 | | 0.03 |
| | 7 | 518 | 92 | 184 | 477 | 89 | 226 | ++ | **0.45** |
| | 8 | 555 | 86 | 140 | 541 | 83 | 111 | | 0.17 |
| | 9 | 548 | 86 | 249 | 534 | 89 | 162 | | 0.17 |
| | 10 | 550 | 108 | 27 | 564 | 97 | 46 | | -0.13 |
| **Reading** | 6 | 452 | 102 | 208 | 406 | 90 | 174 | ++ | **0.47** |
| | 7 | 489 | 91 | 182 | 454 | 91 | 224 | ++ | **0.37** |
| | 8 | 543 | 74 | 134 | 483 | 87 | 111 | +++ | **0.75** |
| | 9 | 536 | 94 | 248 | 507 | 85 | 160 | ++ | **0.32** |
| | 10 | 553 | 89 | 26 | 508 | 96 | 46 | | 0.48 |
| **Narrative Writing** | 6 | 499 | 71 | 210 | 474 | 63 | 176 | ++ | **0.37** |
| | 7 | 529 | 71 | 183 | 507 | 73 | 226 | ++ | **0.31** |
| | 8 | 571 | 67 | 140 | 535 | 64 | 111 | +++ | **0.54** |
| | 9 | 560 | 76 | 248 | 540 | 69 | 161 | ++ | **0.28** |
| | 10 | 554 | 77 | 27 | 549 | 66 | 46 | | 0.07 |
| **Expository Writing** | 6 | 507 | 61 | 208 | 490 | 57 | 174 | ++ | **0.28** |
| | 7 | 542 | 57 | 182 | 522 | 58 | 224 | ++ | **0.34** |
| | 8 | 583 | 61 | 135 | 540 | 61 | 111 | +++ | **0.70** |
| | 9 | 575 | 73 | 249 | 548 | 64 | 160 | ++ | **0.38** |
| | 10 | 588 | 58 | 26 | 553 | 56 | 46 | +++ | **0.61** |

Table 23 shows the comparison results between students from schools with both the PYP and MYP and students from schools with PYP-only at grades 6 to 10. The comparisons were undertaken at grade levels where schools with PYP and MYP and schools with PYP have no shared programme. Students from schools with PYP and MYP outperformed students from schools with only the PYP in the following areas: grade 7 Mathematical Literacy; grades 6 to 9 Reading; grades 6 to 9 Narrative Writing; and grades 6 to 10 Expository Writing. Effect sizes were generally in the range of medium to large. Students from PYP schools had not significantly outperformed students from the dual-programme schools in any of the areas.

Table 24 shows the comparison results between students from schools with both the PYP and MYP and students from schools with DP-only programme. Again, the comparisons were undertaken at grade levels where schools with PYP and MYP and schools with DP had no shared programme. Students from PYP & MYP schools outperformed students from DP schools in the following areas: grades 3, 4, 7 and 8 Mathematical Literacy; grades 3, 4, 6, 7 and 8 Reading; grades 4, 6, 7, and 8 Narrative Writing; and grades 3, 4, 6, 7 and 8 Expository Writing. Effect sizes are generally in the range of medium to large. Students from schools with DP outperformed students from schools with PYP and MYP in three comparisons: grade 10 Mathematical Literacy, Reading and Narrative Writing.

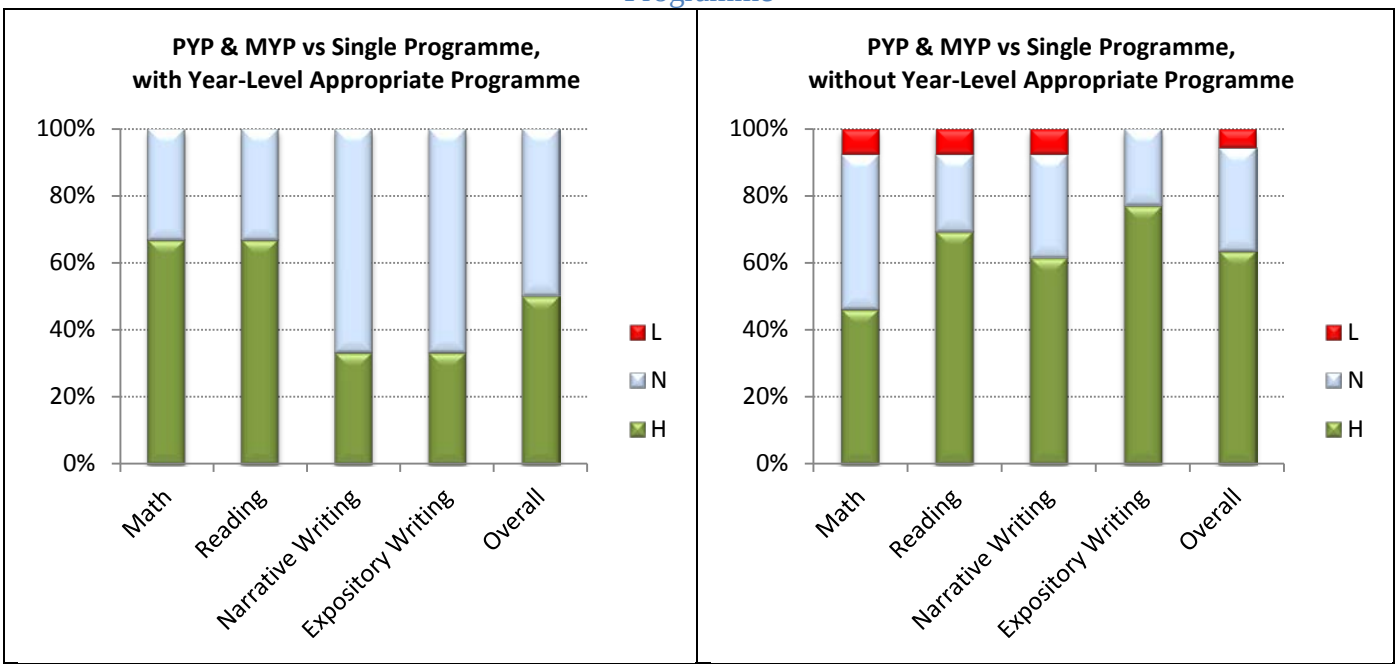
Table 24 Performance of Students from Schools with PYP and MYP and Students from Schools with the DP only

| Domain | Grade | PYP and MYP | | | DP | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Maths** | 3 | 336 | 87 | 211 | 302 | 88 | 4,551 | ++ | **0.39** |
| | 4 | 402 | 73 | 112 | 368 | 90 | 3,225 | ++ | **0.42** |
| | 5 | 433 | 80 | 306 | 422 | 90 | 4,863 | + | 0.13 |
| | 6 | 462 | 82 | 210 | 462 | 91 | 3,412 | | 0.00 |
| | 7 | 518 | 92 | 184 | 496 | 93 | 5,244 | ++ | **0.24** |
| | 8 | 555 | 86 | 140 | 524 | 89 | 3,723 | ++ | **0.35** |
| | 9 | 548 | 86 | 249 | 539 | 86 | 3,184 | | 0.11 |
| | 10 | 550 | 108 | 27 | 588 | 90 | 2,496 | – – | **-0.38** |
| **Reading** | 3 | 276 | 96 | 207 | 243 | 94 | 4,541 | ++ | **0.35** |
| | 4 | 370 | 88 | 112 | 317 | 96 | 3,205 | +++ | **0.58** |
| | 5 | 380 | 102 | 305 | 369 | 92 | 4,845 | | 0.11 |
| | 6 | 452 | 102 | 208 | 423 | 99 | 3,381 | ++ | **0.28** |
| | 7 | 489 | 91 | 182 | 462 | 94 | 5,219 | ++ | **0.29** |
| | 8 | 543 | 74 | 134 | 498 | 90 | 3,675 | +++ | **0.56** |
| | 9 | 536 | 94 | 248 | 528 | 88 | 3,139 | | 0.09 |
| | 10 | 553 | 89 | 26 | 589 | 86 | 2,492 | – – | **-0.41** |
| **Narrative Writing** | 3 | 367 | 59 | 210 | 360 | 60 | 4,531 | | 0.12 |
| | 4 | 440 | 58 | 113 | 408 | 62 | 3,213 | +++ | **0.54** |
| | 5 | 457 | 70 | 306 | 452 | 65 | 4,833 | | 0.07 |
| | 6 | 499 | 71 | 210 | 486 | 67 | 3,399 | ++ | **0.20** |
| | 7 | 529 | 71 | 183 | 515 | 68 | 5,214 | ++ | **0.21** |
| | 8 | 571 | 67 | 140 | 541 | 70 | 3,688 | ++ | **0.44** |
| | 9 | 560 | 76 | 248 | 560 | 71 | 3,167 | | 0.01 |
| | 10 | 554 | 77 | 27 | 593 | 68 | 2,498 | – – – | **-0.54** |
| **Expository Writing** | 3 | 399 | 49 | 208 | 390 | 52 | 4,532 | + | 0.17 |
| | 4 | 445 | 58 | 112 | 429 | 54 | 3,204 | ++ | **0.28** |
| | 5 | 472 | 70 | 305 | 469 | 58 | 4,839 | | 0.05 |
| | 6 | 507 | 61 | 208 | 495 | 59 | 3,379 | ++ | **0.20** |
| | 7 | 542 | 57 | 182 | 521 | 60 | 5,216 | ++ | **0.36** |
| | 8 | 583 | 61 | 135 | 549 | 64 | 3,672 | +++ | **0.54** |
| | 9 | 575 | 73 | 249 | 568 | 68 | 3,090 | | 0.10 |
| | 10 | 588 | 58 | 26 | 602 | 63 | 2,495 | | -0.24 |

Figure 8 shows the proportion of the three levels of significance of difference (classified as L, N, H) in student performance between PYP & MYP and single programme. A letter “H” denotes the proportion of comparisons where the performance of a subgroup from PYP & MYP IB schools was statistically significantly higher than the performance of a comparison group. A letter “N” denotes that proportion of comparisons between the performances of subgroups was not statistically significant. A letter “L” denotes the proportion of comparisons where the performance of a subgroup from PYP & MYP IB schools was statistically significantly lower than the performance of a comparison group.

The left-hand chart shows the proportions of L, N, and H for comparisons between dual PYP and MYP and single programme with shared programme, and the right-hand chart shows the proportions of L, N and H for comparisons between the dual PYP and MYP and single programme without shared programme. The left-hand chart shows that it was more likely for students from dual PYP and MYP to outperform students from single programme than for students from single programme to outperform students from the dual PYP and MYP in all domains. However, it should be noted that the number of comparisons was relatively small, i.e. a total 12. The right-hand chart shows that it was highly likely for students from the dual PYP and MYP to outperform students from single programme in all ISA domains at grades where no year-level appropriate IB programme was implemented.

Figure 8 Significance of Difference in Student Performance between PYP & MYP and Single Programme




In summary, there was evidence to suggest that IB cohort with both PYP and MYP had a higher likelihood of outperforming their counterpart with single programme. Such impact on performance appeared to be larger at grade levels where a year-level appropriate IB programme was not implemented.

## 2.4 Do IB students demonstrate particular strengths and weaknesses within assessment strands, compared to non-IB students?

This section aims to understand the degree to which the IB curriculum promotes particular cognitive and/or academic strengths within assessment areas. ISA Mathematical Literacy and Reading each consists of a number of sub-strands. Mathematical Literacy consists of four sub-strands: Change and Relationships, Quantity, Space and Shape, and Uncertainty. Reading consists of three sub-strands: Interpreting, Reflecting, and Retrieving Information. Each Writing Task consists of three criteria: Content, Language, and Spelling for Task A, and Content, Language, and Structure and Organisation for Task B. Detailed description on each of these sub-strands is presented in Appendix 3. This section compares IB students to non-IB students in performance on each assessment sub-strand and writing criteria.

Performance of Mathematical Literacy and Reading were compared by examining the percentage correct in each sub-strand. Writing Task criteria were compared using the raw score for each criterion. Both percentage correct and raw score are sample-dependent, and therefore only the 2010Oct-2011Feb ISA administration data were used for this analysis. The results are summarised in Table 25.

Table 25 Performance of Students from IB Schools and Students from non-IB Schools, by Mathematical Literacy Sub-strand

| Sub-strand | Grade | IB (% Correct) | | | Non-IB (% Correct) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Change and Relationships | 3 | 51 | 28 | 3,651 | 56 | 28 | 1,424 | – | -0.15 |
| | 4 | 64 | 28 | 2,174 | 64 | 29 | 1,030 | | 0.00 |
| | 5 | 60 | 25 | 3,845 | 61 | 26 | 1,303 | | -0.03 |
| | 6 | 62 | 23 | 1,753 | 60 | 24 | 917 | + | 0.09 |
| | 7 | 66 | 22 | 2,831 | 64 | 23 | 786 | | 0.08 |
| | 8 | 62 | 22 | 2,025 | 66 | 23 | 735 | – – | **-0.21** |
| | 9 | 53 | 24 | 1,880 | 50 | 25 | 703 | + | 0.11 |
| | 10 | 43 | 23 | 1,198 | 35 | 20 | 540 | ++ | **0.36** |
| Quantity | 3 | 56 | 22 | 3,651 | 59 | 23 | 1,424 | – | -0.11 |
| | 4 | 48 | 22 | 2,174 | 48 | 23 | 1,030 | | 0.03 |
| | 5 | 65 | 22 | 3,845 | 64 | 24 | 1,303 | | 0.02 |
| | 6 | 61 | 21 | 1,753 | 57 | 24 | 917 | + | 0.14 |
| | 7 | 57 | 25 | 2,831 | 55 | 26 | 786 | + | 0.08 |
| | 8 | 60 | 28 | 2,025 | 65 | 28 | 735 | – | -0.19 |
| | 9 | 39 | 27 | 1,880 | 33 | 27 | 703 | + | 0.19 |
| | 10 | 42 | 28 | 1,198 | 32 | 25 | 540 | ++ | **0.37** |
| Space and Shape | 3 | 65 | 19 | 3,651 | 65 | 19 | 1,424 | | -0.01 |
| | 4 | 78 | 22 | 2,174 | 77 | 23 | 1,030 | | 0.06 |
| | 5 | 81 | 28 | 3,845 | 79 | 30 | 1,303 | | 0.06 |
| | 6 | 52 | 23 | 1,753 | 50 | 25 | 917 | + | 0.12 |
| | 7 | 54 | 22 | 2,831 | 51 | 23 | 786 | + | 0.13 |
| | 8 | 53 | 22 | 2,025 | 57 | 24 | 735 | – | -0.17 |
| | 9 | 51 | 23 | 1,880 | 47 | 23 | 703 | + | 0.18 |
| | 10 | 46 | 24 | 1,198 | 37 | 22 | 540 | ++ | **0.42** |
| Uncertainty | 3 | 57 | 31 | 3,651 | 60 | 33 | 1,424 | – | -0.07 |
| | 4 | 81 | 23 | 2,174 | 79 | 25 | 1,030 | + | 0.11 |
| | 5 | 59 | 27 | 3,845 | 58 | 29 | 1,303 | | 0.04 |
| | 6 | 59 | 23 | 1,753 | 56 | 25 | 917 | + | 0.12 |
| | 7 | 72 | 32 | 2,831 | 63 | 34 | 786 | ++ | **0.26** |
| | 8 | 39 | 17 | 2,025 | 42 | 17 | 735 | – | -0.19 |
| | 9 | 60 | 23 | 1,880 | 56 | 23 | 703 | + | 0.15 |
| | 10 | 46 | 25 | 1,198 | 33 | 24 | 540 | ++ | **0.49** |

In the sub-strands of Mathematical Literacy, as shown in Table 25, IB students performed as well as or better than non-IB students in all sub-strands in grades 4 to grade 7, and grades 9 and 10. However, non-IB students outperformed IB students in all sub-strands at grades 3 and 8 except in Space and Shape at grade 3.

In Reading, as shown in Table 26, IB students outperformed non-IB students in all sub-strands in all grades, except in grade 8. Effect sizes were small to medium, except for the negligible differences in Reflecting and Retrieving Information in grade 5. Non-IB students outperform IB students in all grade 8 Reading sub-strands.

Table 26 Performance of Students from IB Schools and Students from non-IB Schools, by Reading Sub-strand

| Sub-strand | Grade | IB (% Correct) | | | Non-IB (% Correct) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Interpreting** | 3 | 51 | 21 | 3,615 | 48 | 22 | 1,420 | + | 0.14 |
| | 4 | 50 | 17 | 2,165 | 46 | 20 | 1,023 | + | 0.19 |
| | 5 | 58 | 18 | 3,832 | 55 | 20 | 1,303 | + | 0.16 |
| | 6 | 65 | 19 | 1,741 | 57 | 21 | 922 | ++ | **0.38** |
| | 7 | 60 | 21 | 2,813 | 55 | 22 | 785 | ++ | **0.20** |
| | 8 | 53 | 20 | 2,012 | 58 | 22 | 729 | – – | **-0.22** |
| | 9 | 60 | 20 | 1,877 | 56 | 19 | 702 | ++ | **0.21** |
| | 10 | 59 | 21 | 1,175 | 51 | 23 | 532 | ++ | **0.35** |
| **Reflecting** | 3 | 52 | 23 | 3,615 | 47 | 25 | 1,420 | ++ | **0.20** |
| | 4 | 62 | 22 | 2,165 | 57 | 25 | 1,023 | ++ | **0.21** |
| | 5 | 49 | 23 | 3,832 | 47 | 24 | 1,303 | + | 0.08 |
| | 6 | 53 | 25 | 1,741 | 45 | 28 | 922 | ++ | **0.30** |
| | 7 | 52 | 22 | 2,813 | 48 | 23 | 785 | ++ | **0.20** |
| | 8 | 40 | 20 | 2,012 | 44 | 22 | 729 | – | -0.15 |
| | 9 | 47 | 20 | 1,877 | 41 | 19 | 702 | ++ | **0.28** |
| | 10 | 44 | 21 | 1,175 | 37 | 21 | 532 | ++ | **0.34** |
| **Retrieving Information** | 3 | 69 | 21 | 3,615 | 66 | 23 | 1,420 | + | 0.12 |
| | 4 | 70 | 18 | 2,165 | 67 | 21 | 1,023 | + | 0.18 |
| | 5 | 73 | 20 | 3,832 | 71 | 21 | 1,303 | + | 0.07 |
| | 6 | 73 | 20 | 1,741 | 68 | 23 | 922 | ++ | **0.22** |
| | 7 | 76 | 18 | 2,813 | 74 | 19 | 785 | + | 0.10 |
| | 8 | 57 | 24 | 2,012 | 60 | 25 | 729 | – | -0.12 |
| | 9 | 71 | 21 | 1,877 | 65 | 21 | 702 | ++ | **0.30** |
| | 10 | 67 | 19 | 1,175 | 61 | 22 | 532 | ++ | **0.30** |

## Table 27 Performance of Students from IB Schools and Students from non-IB Schools in Narrative Writing Criteria

| Sub-strand | Grade | IB (Raw Score) | | | Non-IB (Raw Score) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Content | 3 | 4.4 | 0.9 | 3,623 | 4.3 | 1.0 | 1,418 | + | 0.10 |
| | 4 | 5.0 | 0.9 | 2,165 | 4.8 | 1.1 | 1,024 | + | 0.14 |
| | 5 | 5.5 | 1.0 | 3,814 | 5.6 | 1.0 | 1,297 | | -0.04 |
| | 6 | 6.0 | 1.1 | 1,751 | 5.8 | 1.2 | 916 | + | 0.14 |
| | 7 | 6.4 | 1.3 | 2,811 | 6.3 | 1.2 | 787 | + | 0.11 |
| | 8 | 6.8 | 1.3 | 2,010 | 7.1 | 1.5 | 734 | – – | **-0.22** |
| | 9 | 7.3 | 1.5 | 1,869 | 7.0 | 1.4 | 701 | ++ | **0.21** |
| | 10 | 7.7 | 1.6 | 1,185 | 7.2 | 1.7 | 539 | ++ | **0.29** |
| Language | 3 | 4.2 | 0.9 | 3,623 | 4.2 | 1.0 | 1,418 | + | 0.07 |
| | 4 | 4.9 | 0.9 | 2,165 | 4.7 | 1.1 | 1,024 | + | 0.13 |
| | 5 | 5.4 | 1.0 | 3,814 | 5.5 | 1.1 | 1,297 | | -0.04 |
| | 6 | 5.9 | 1.2 | 1,751 | 5.6 | 1.3 | 916 | ++ | **0.22** |
| | 7 | 6.3 | 1.3 | 2,811 | 6.1 | 1.3 | 787 | + | 0.16 |
| | 8 | 6.7 | 1.4 | 2,010 | 6.9 | 1.5 | 734 | – | -0.15 |
| | 9 | 7.1 | 1.6 | 1,869 | 6.7 | 1.5 | 701 | ++ | **0.23** |
| | 10 | 7.6 | 1.6 | 1,185 | 7.0 | 1.7 | 539 | ++ | **0.36** |
| Spelling | 3 | 4.5 | 0.9 | 3,623 | 4.5 | 0.9 | 1,418 | | -0.05 |
| | 4 | 5.0 | 0.8 | 2,165 | 4.9 | 1.0 | 1,024 | + | 0.10 |
| | 5 | 5.4 | 0.9 | 3,814 | 5.5 | 0.9 | 1,297 | – | -0.10 |
| | 6 | 5.7 | 1.0 | 1,751 | 5.6 | 1.1 | 916 | + | 0.09 |
| | 7 | 6.1 | 1.1 | 2,811 | 6.0 | 1.1 | 787 | | 0.03 |
| | 8 | 6.4 | 1.1 | 2,010 | 6.7 | 1.2 | 734 | – – | **-0.24** |
| | 9 | 6.7 | 1.2 | 1,869 | 6.6 | 1.1 | 701 | + | 0.15 |
| | 10 | 7.1 | 1.2 | 1,185 | 6.7 | 1.3 | 539 | ++ | **0.33** |

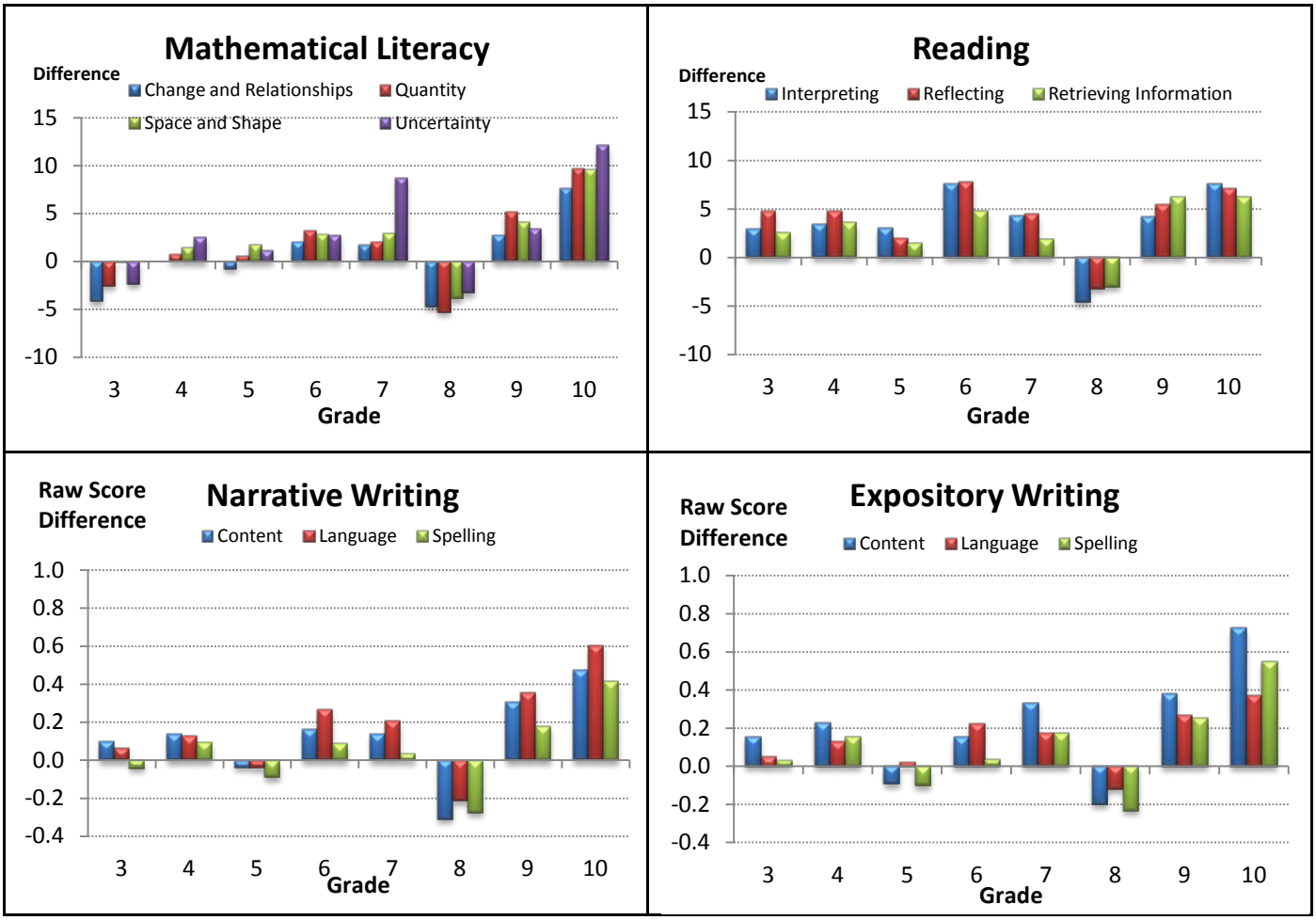
## Table 28 Performance of Students from IB Schools and Students from non-IB Schools in Expository Writing Criteria

| Sub-strand | Grade | IB (Raw Score) | | | Non-IB (Raw Score) | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Content | 3 | 3.8 | 1.0 | 3,607 | 3.6 | 1.2 | 1,416 | + | 0.14 |
| | 4 | 4.5 | 1.1 | 2,164 | 4.2 | 1.3 | 1,022 | + | 0.19 |
| | 5 | 5.1 | 1.1 | 3,819 | 5.2 | 1.2 | 1,298 | – | -0.08 |
| | 6 | 5.5 | 1.2 | 1,740 | 5.4 | 1.3 | 924 | + | 0.12 |
| | 7 | 6.1 | 1.2 | 2,810 | 5.8 | 1.3 | 784 | ++ | **0.26** |
| | 8 | 6.5 | 1.3 | 2,013 | 6.7 | 1.4 | 729 | – | -0.15 |
| | 9 | 7.0 | 1.3 | 1,872 | 6.7 | 1.3 | 700 | ++ | **0.29** |
| | 10 | 7.5 | 1.2 | 1,175 | 6.8 | 1.5 | 530 | +++ | **0.53** |
| Language | 3 | 3.2 | 0.7 | 3,607 | 3.2 | 0.7 | 1,416 | + | 0.07 |
| | 4 | 3.6 | 0.7 | 2,164 | 3.5 | 0.8 | 1,022 | + | 0.17 |
| | 5 | 4.0 | 0.7 | 3,819 | 4.0 | 0.8 | 1,298 | | 0.03 |
| | 6 | 4.3 | 0.8 | 1,740 | 4.1 | 0.8 | 924 | ++ | **0.27** |
| | 7 | 4.6 | 0.8 | 2,810 | 4.4 | 0.9 | 784 | ++ | **0.21** |
| | 8 | 4.9 | 0.8 | 2,013 | 5.0 | 0.9 | 729 | – | -0.14 |
| | 9 | 5.1 | 0.9 | 1,872 | 4.8 | 0.9 | 700 | ++ | **0.30** |
| | 10 | 5.4 | 0.8 | 1,175 | 5.0 | 1.0 | 530 | ++ | **0.41** |
| Structure & Organisation | 3 | 3.9 | 0.8 | 3,607 | 3.9 | 0.9 | 1,416 | | 0.04 |
| | 4 | 4.4 | 0.9 | 2,164 | 4.2 | 1.0 | 1,022 | + | 0.16 |
| | 5 | 4.8 | 0.9 | 3,819 | 4.9 | 0.9 | 1,298 | – | -0.11 |
| | 6 | 5.1 | 0.9 | 1,740 | 5.0 | 1.0 | 924 | | 0.04 |
| | 7 | 5.4 | 1.0 | 2,810 | 5.3 | 1.0 | 784 | + | 0.17 |
| | 8 | 5.8 | 1.0 | 2,013 | 6.0 | 1.1 | 729 | – – | **-0.22** |
| | 9 | 6.1 | 1.1 | 1,872 | 5.8 | 1.1 | 700 | ++ | **0.24** |
| | 10 | 6.5 | 1.0 | 1,175 | 5.9 | 1.2 | 530 | ++ | **0.49** |

In the Writing tasks, as shown in Table 27 and Table 28, IB students outperformed non-IB students in the Content criterion and in Language at grades 3-4, 6-7, 9 and 10; and in Spelling at grades 4, 6, 9 and 10 on Task A. On Task B, IB students outperformed non-IB students in Content and in Language at grades 3-4, 6-7, 9 and 10; and in Structure and Organisation at grades 4, 7, 9 and 10. However, non-IB students outperformed IB students in Spelling at grade 5 and in all criteria at grade 8 on Task A, and in Content and Spelling at grade 5 and in all criteria at grade 8 on Task B. In all other criteria and at all other grades, there were no statistically significant differences.

Figure 9 shows the difference in the percentage correct between IB Students and non-IB students in the Mathematical Literacy and Reading sub-strands, and the difference in average raw scores in Writing Task criteria.

Figure 9 Difference of Percentage Correct between IB Students and Non-IB Students



## 2.5 To assess to what degree is the length of IB implementation associated with student performance, within IB schools? Do schools authorised for a longer period of implementation time produce better student outcomes?

An analysis of the relationship between the ISA mean scores and the length of IB implementation by schools was carried out for all four ISA assessment domains (see Table 29). The length of IB implementation in a school was calculated as the number of years between the date that an IB Programme started in the school and 1st March 2011.

There was a weak to moderate positive correlation (0.14 to 0.34 for Mathematical Literacy and 0.03 to 0.29 for Reading) between the years of MYP implementation and ISA performance in Mathematical Literacy and Reading, and the correlations were statistically significant in Mathematical Literacy at grade 6 and in both domains at grade 7 and 8. A weak correlation (i.e. 0.11 to 0.14) also existed in Narrative Writing in grades 7 to 9, but it was not statistically significant. It appeared that no positive correlation existed between the years of PYP implementation and ISA performance in Mathematical Literacy and Reading.

Table 29 Correlation of Student Performance and Years of IB implementation

| Grade | Domain | IB Implementation Year | | | Domain | IB Implementation Year | | |
|---|---|---|---|---|---|---|---|---|
| | | r | p< | n* | | r | p< | n* |
| 3 | Mathematical Literacy | 0.08 | 0.42 | 96 | Narrative Writing | 0.00 | 0.98 | 96 |
| 4 | | 0.01 | 0.94 | 63 | | -0.16 | 0.22 | 63 |
| 5 | | 0.07 | 0.47 | 99 | | 0.04 | 0.71 | 99 |
| 6 | | **0.34** | **0.02** | 44 | | -0.09 | 0.58 | 44 |
| 7 | | **0.26** | **0.04** | 64 | | 0.11 | 0.39 | 64 |
| 8 | | **0.31** | **0.03** | 48 | | 0.12 | 0.43 | 48 |
| 9 | | 0.14 | 0.34 | 50 | | 0.14 | 0.32 | 50 |
| 10 | | 0.16 | 0.39 | 30 | | 0.04 | 0.82 | 30 |
| 3 | Reading | 0.11 | 0.31 | 96 | Expository Writing | -0.03 | 0.81 | 96 |
| 4 | | -0.08 | 0.55 | 63 | | -0.20 | 0.11 | 63 |
| 5 | | 0.06 | 0.54 | 99 | | 0.00 | 0.98 | 99 |
| 6 | | 0.07 | 0.66 | 44 | | -0.14 | 0.38 | 44 |
| 7 | | **0.25** | **0.05** | 64 | | 0.08 | 0.53 | 64 |
| 8 | | **0.29** | **0.05** | 48 | | 0.01 | 0.96 | 48 |
| 9 | | 0.03 | 0.84 | 50 | | -0.09 | 0.53 | 50 |
| 10 | | 0.28 | 0.14 | 30 | | -0.03 | 0.87 | 30 |

* n is number of schools

The following section examines the effect of authorization length (classified as short, medium, or long) on a school/grade level performance within IB schools. The authorization length was classified based on percentiles for years of authorization. A school's authorization length was classified as 'short' if this school's year of authorization was less than 33th percentile of years of authorization in all schools, as 'medium' if this school's year of authorization was between 33th percentile and 66th percentile of years of authorization in all schools, and as 'long' if this school's year of authorization was more than 66th percentile of years of authorization in all schools. For PYP schools, the 33th percentile of years of authorization is 4 years, and the 66th percentile is 8.5 years. For MYP schools, the 33th percentile of years of authorization is 4 years, and the 66th percentile is 9.5 years.

Figure 17 show performance of IB students by authorization length from grade 3 to grade 10 respectively. It appeared that medians of performance distributions by authorization length were relatively stable at grades 3 to 5. However, positive changes in medians of performance distributions were observed for

schools with authorised MYP from medium to long authorization length in grades 6 to 8 and 10. Specifically, the positive changes were observed in the following areas: in all domains except Expository Writing at grade 6; in Mathematical Literacy and Reading at grade 7; in all domains at grade 8; and in Mathematical Literacy at grade 10. These findings indicate that where an MYP school had been authorised for a relatively long time, the authorization length was likely to have a positive effect on ISA performance.

Figure 10 Performance of IB Students by Authorization Length at Grade 3

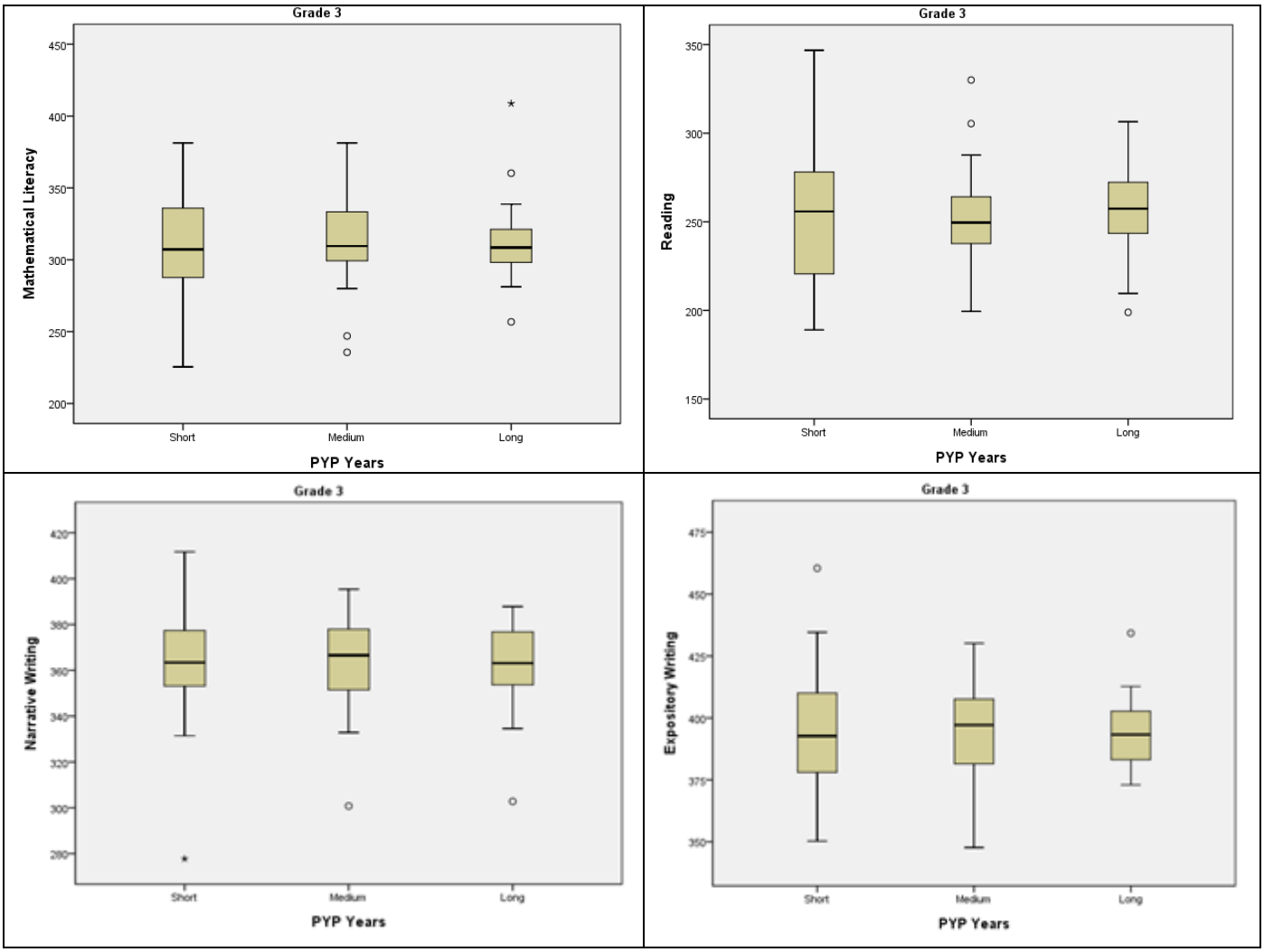


Figure 11 Performance of IB Students by Authorization Length at Grade 4

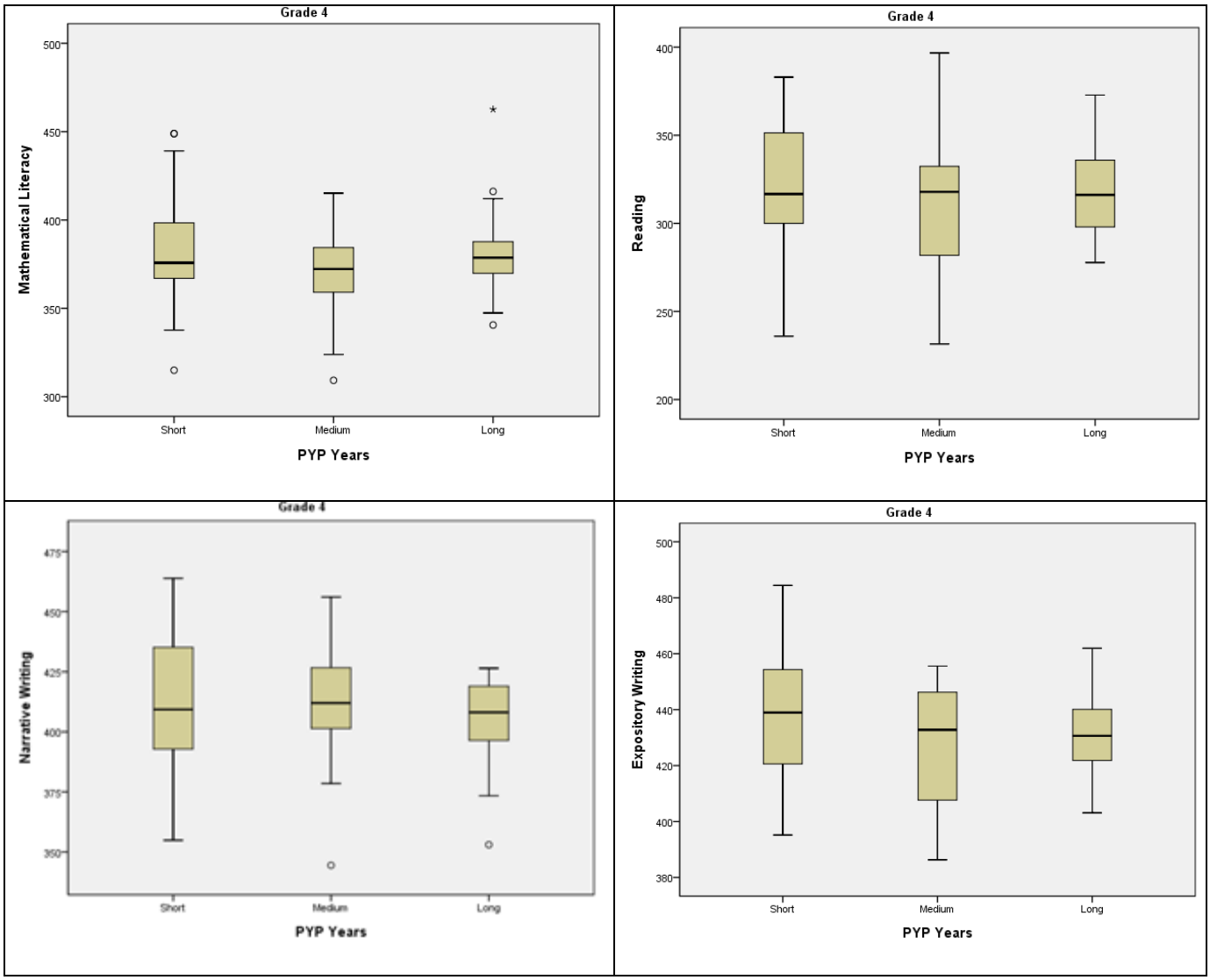


Figure 12 Performance of IB Students by Authorization Length at Grade 5

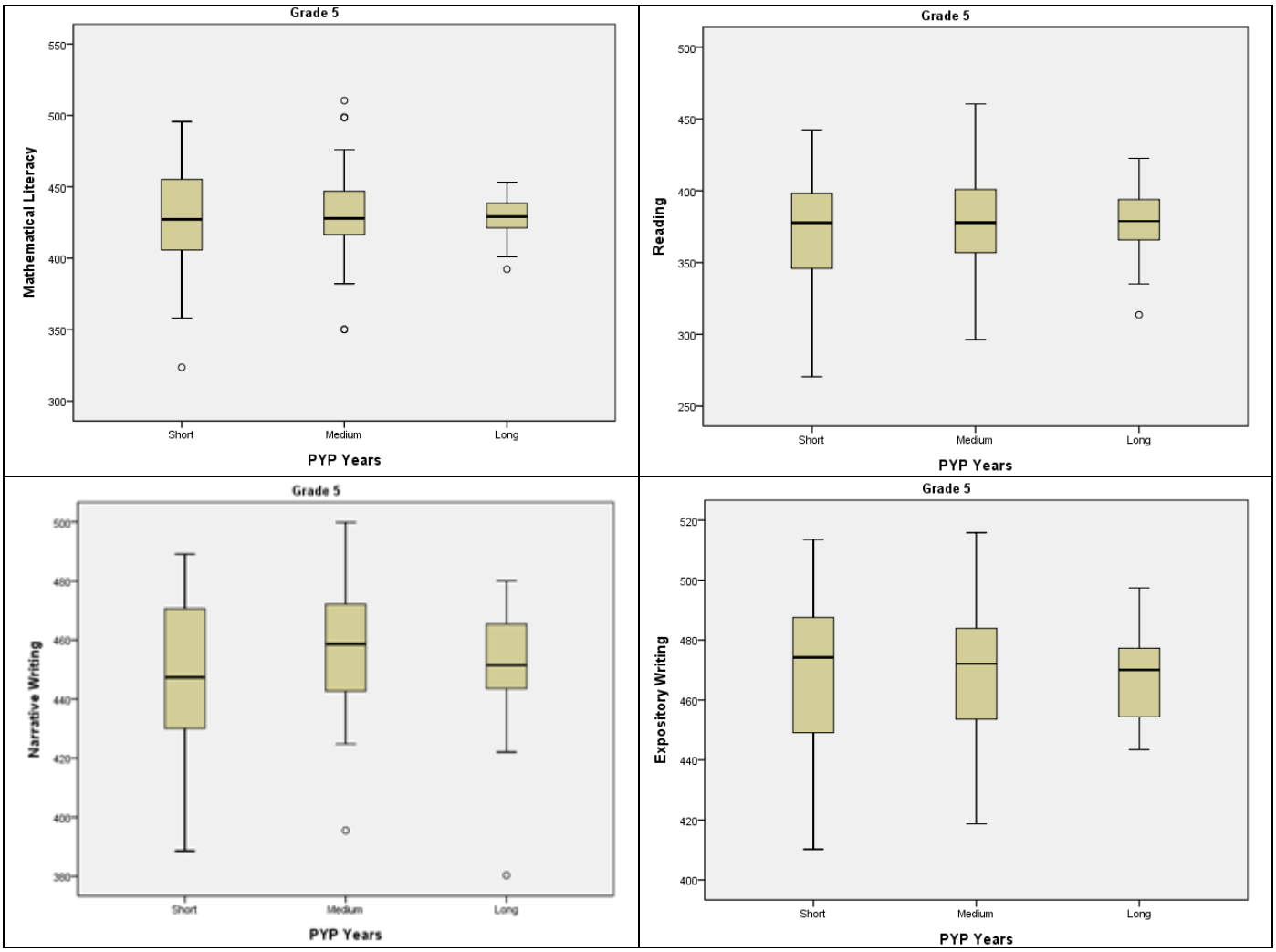


Figure 13 Performance of IB Students by Authorization Length at Grade 6

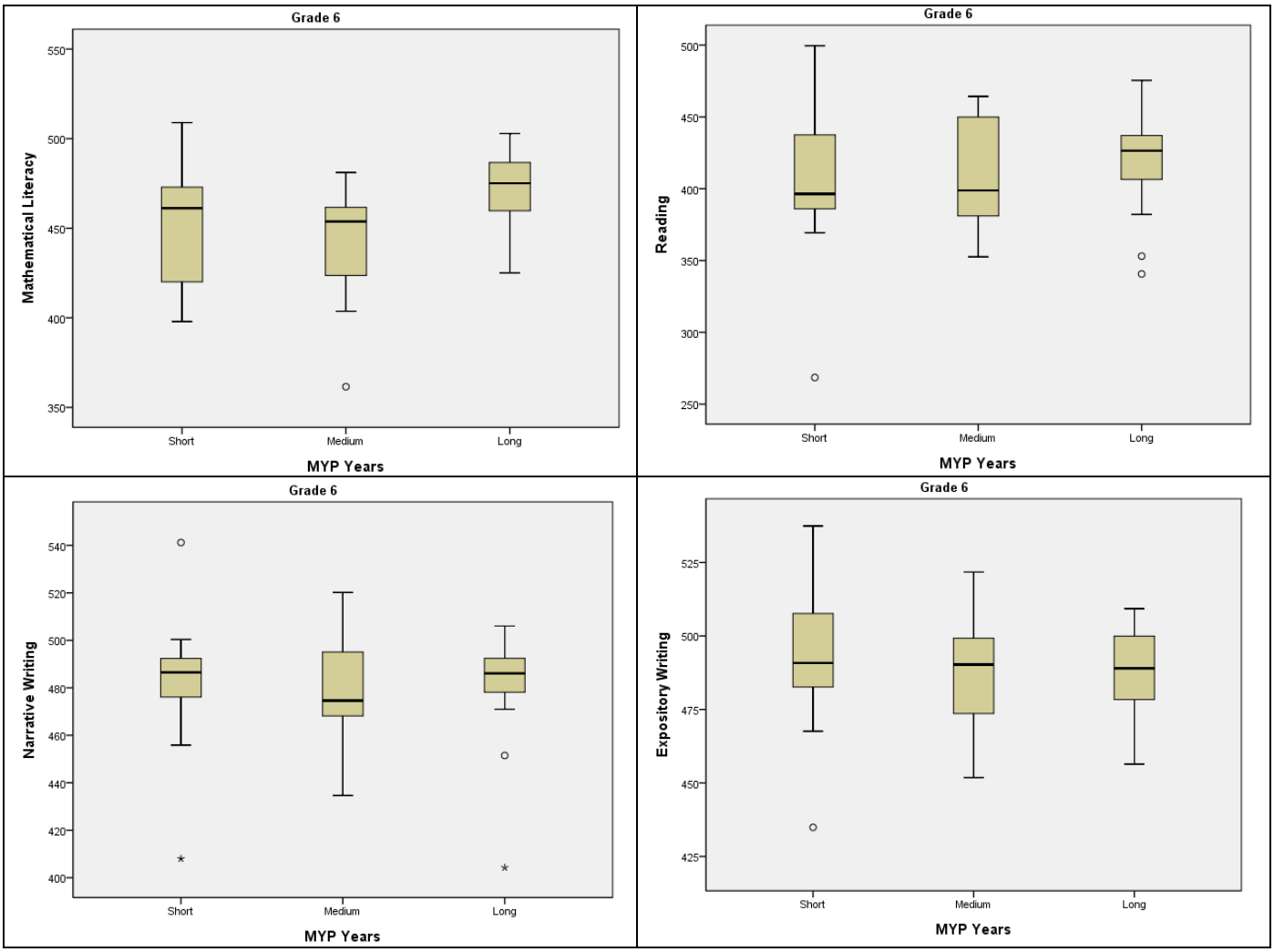


Figure 14 Performance of IB Students by Authorization Length at Grade 7

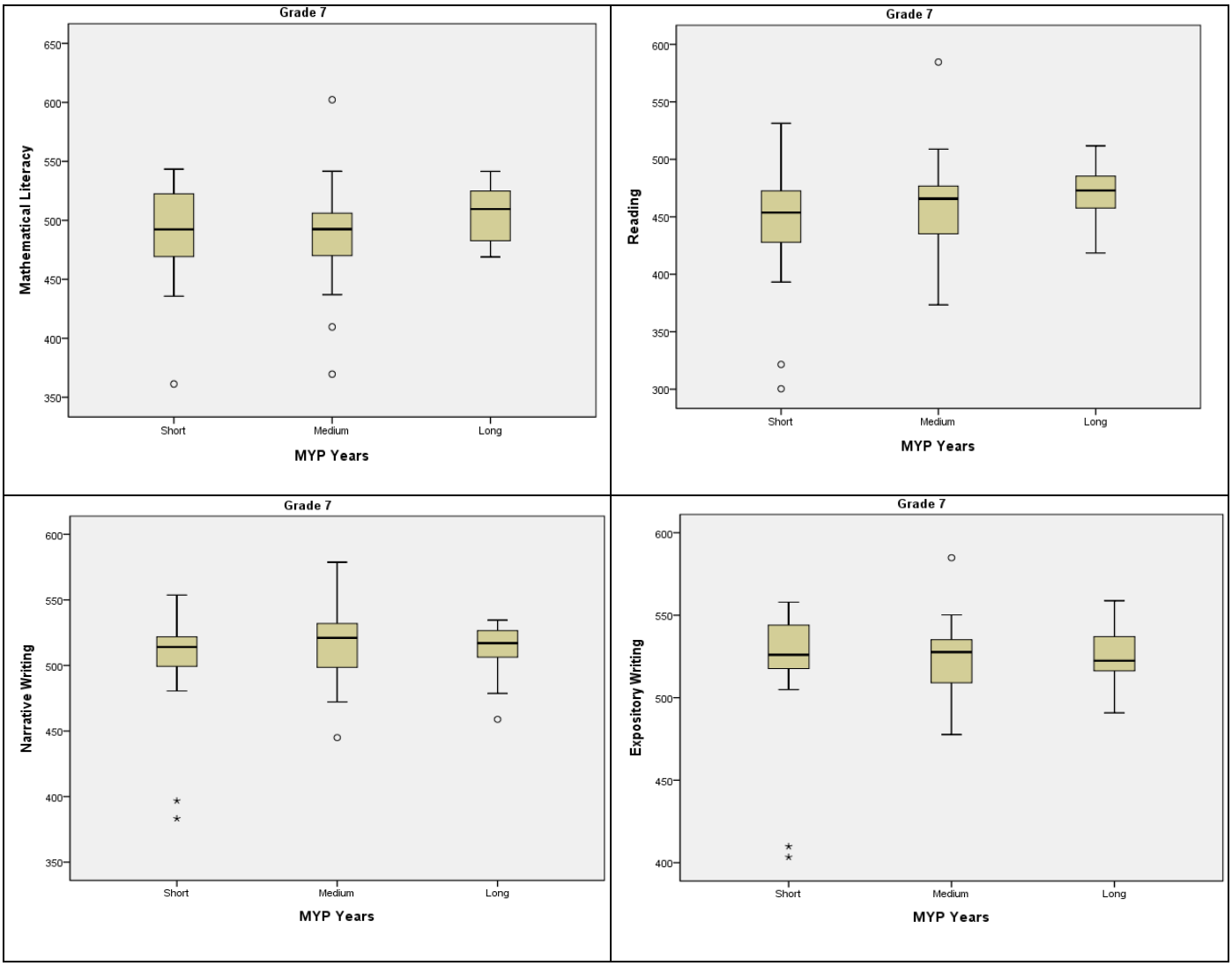


Figure 15 Performance of IB Students by Authorization Length at Grade 8

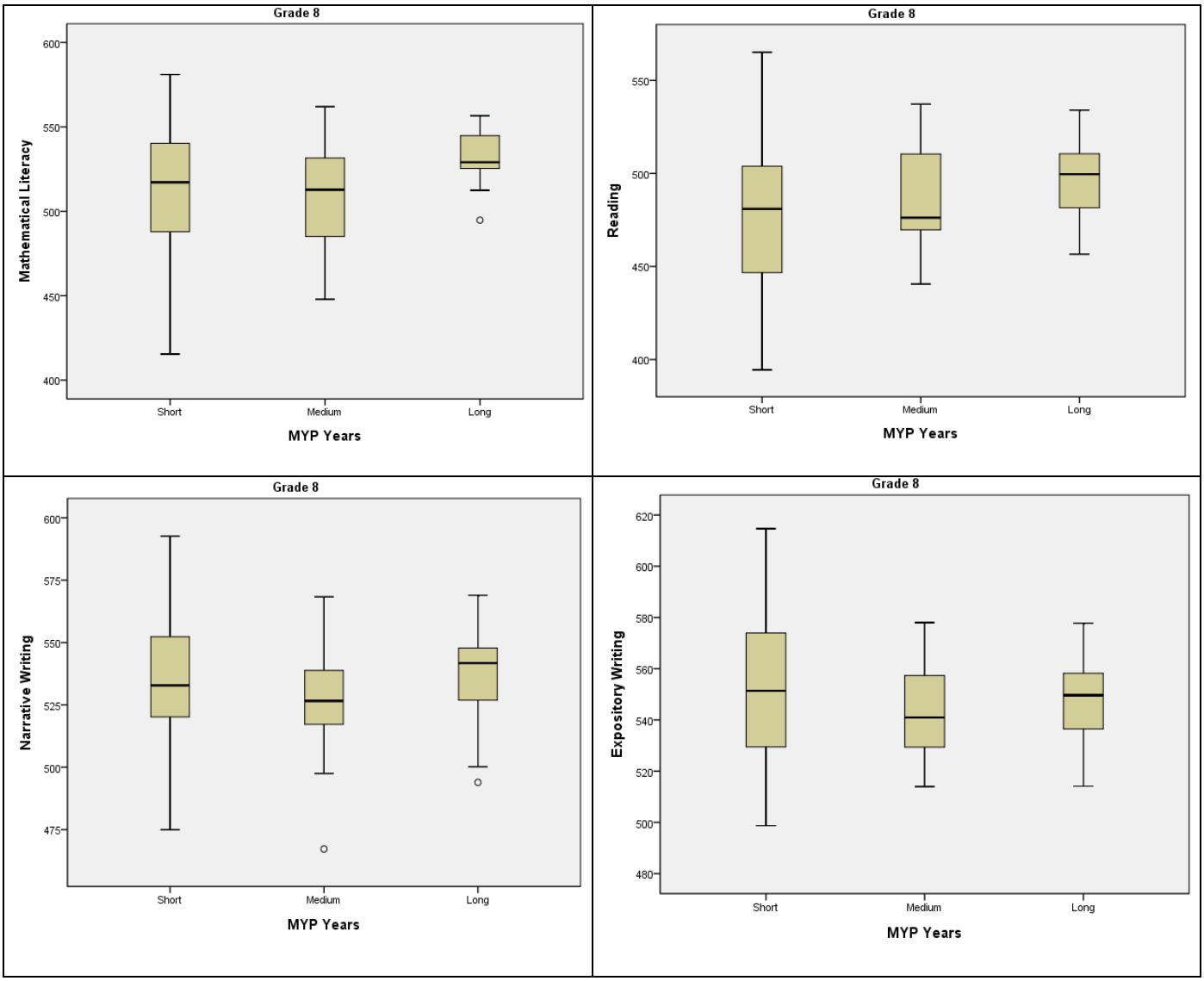


Figure 16 Performance of IB Students by Authorization Length at Grade 9

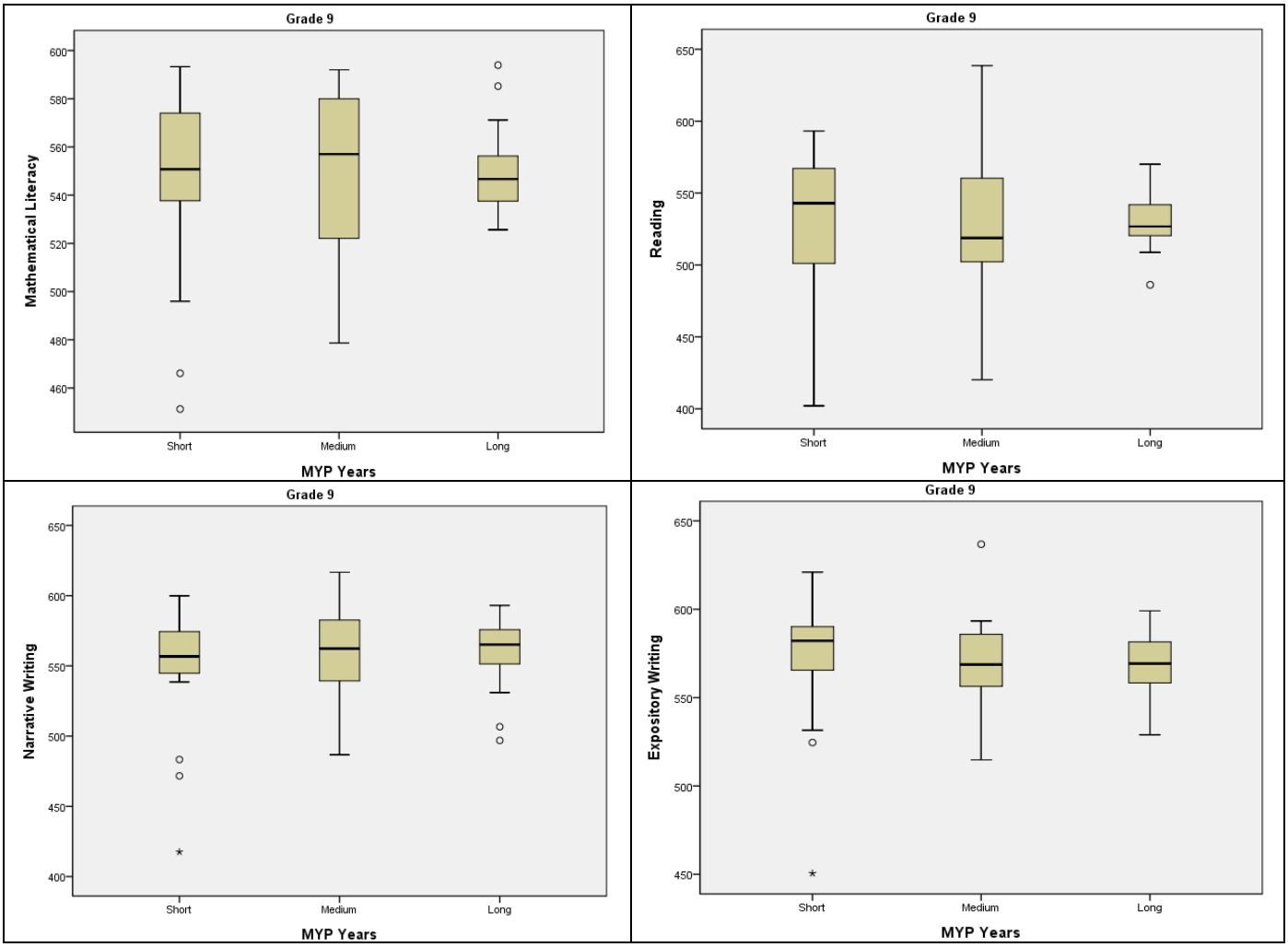
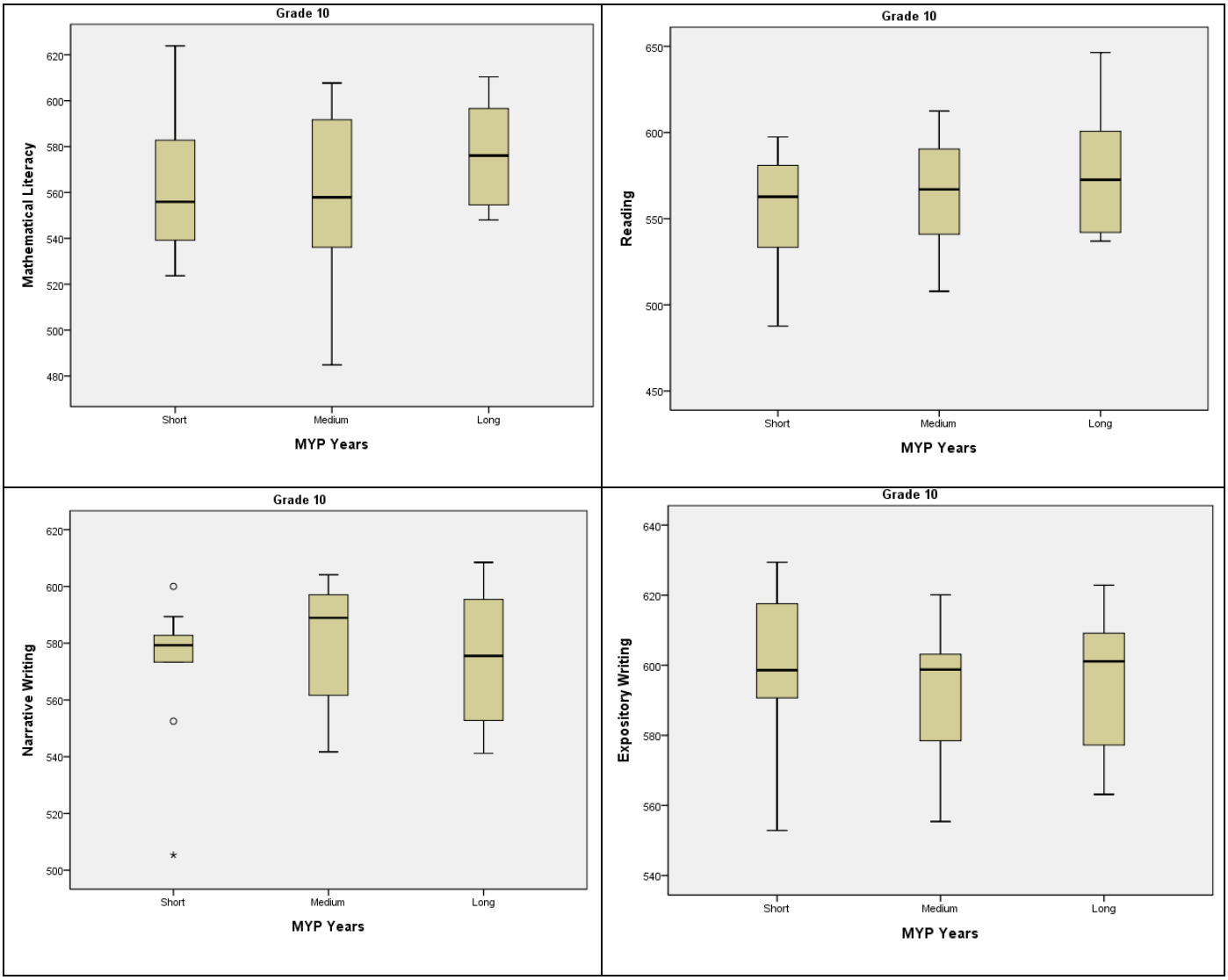


Figure 17 Performance of IB Students by Authorization Length at Grade 10



## 2.6 How do the Grade 10 ISA scores of IB students align with PISA benchmarks?

In order to examine how the grade 10 IB students compared with PISA results, the IB students' ISA results were compared with PISA means. Because all ISA tests were equated, all tests could be compared between grades and across calendar years within a tested domain. Grade 9 student results were also included in this analysis. Only Mathematical Literacy and Reading results were used for this analysis as there was no comparable PISA result for writing tasks.

Table 30 lists the grade 9 and grade 10 IB student performance in Mathematical Literacy and Reading for each of the four sittings between October 2009 and February 2011. An overall performance aggregated across the four sittings is also shown for each grade. The results showed that ISA means were all significantly higher than the PISA means in both Mathematical Literacy and Reading. The effect sizes in Mathematical Literacy were large and were in the range of 0.53 to 0.90. The effect sizes in Reading were slightly smaller on average compared to the effect sizes of Mathematical Literacy. They were in the range of 0.26 to 0.95.

Figure 18 and Figure 19 represent the grade 9 and grade 10 IB student performance distributions together with OECD countries and partner countries' PISA performance for Mathematical Literacy and Reading, respectively. Each bar shows the performance range of between 5th to 95th percentiles. The mean scores are also presented on the graph as a horizontal line.

Table 30 IB Schools Grade 9 and Grade 10 Student Performance in Mathematical Literacy and Reading Relative to OECD PISA Performance

| Domain | Test Sitting | Grade | N | Mean | S.D. | T Statistics | p | Significance of Difference | 5 Percentile | 95 Percentile | Effect Size* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mathematical Literacy | 2009Oct | 9 | 681 | 550 | 71 | 19.9 | **0.00** | +++ | 438 | 662 | **0.66** |
| | 2010Feb | 9 | 666 | 551 | 76 | 18.7 | **0.00** | +++ | 424 | 672 | **0.65** |
| | 2010Oct | 9 | 1076 | 555 | 85 | 22.8 | **0.00** | +++ | 426 | 694 | **0.67** |
| | 2011Feb | 9 | 804 | 547 | 100 | 14.4 | **0.00** | +++ | 391 | 711 | **0.53** |
| | All | 9 | 3227 | 551 | 85 | 37.0 | **0.00** | +++ | 410 | 694 | **0.62** |
| | 2009Oct | 10 | 470 | 575 | 83 | 20.6 | **0.00** | +++ | 443 | 715 | **0.90** |
| | 2010Feb | 10 | 280 | 550 | 83 | 10.9 | **0.00** | +++ | 426 | 694 | **0.62** |
| | 2010Oct | 10 | 674 | 571 | 97 | 20.1 | **0.00** | +++ | 430 | 740 | **0.80** |
| | 2011Feb | 10 | 524 | 573 | 92 | 19.3 | **0.00** | +++ | 430 | 711 | **0.84** |
| | All | 10 | 1948 | 570 | 91 | 35.8 | **0.00** | +++ | 430 | 725 | **0.81** |
| Reading | 2009Oct | 9 | 809 | 532 | 78 | 13.1 | **0.00** | ++ | 401 | 665 | **0.45** |
| | 2010Feb | 9 | 666 | 516 | 86 | 6.0 | **0.00** | ++ | 364 | 647 | **0.26** |
| | 2010Oct | 9 | 1079 | 542 | 89 | 17.2 | **0.00** | +++ | 402 | 682 | **0.54** |
| | 2011Feb | 9 | 798 | 534 | 104 | 10.4 | **0.00** | ++ | 371 | 703 | **0.42** |
| | All | 9 | 3352 | 533 | 90 | 25.5 | **0.00** | ++ | 383 | 682 | **0.43** |
| | 2009Oct | 10 | 466 | 562 | 94 | 15.1 | **0.00** | +++ | 411 | 706 | **0.74** |
| | 2010Feb | 10 | 283 | 547 | 92 | 9.4 | **0.00** | +++ | 392 | 706 | **0.59** |
| | 2010Oct | 10 | 664 | 584 | 98 | 23.0 | **0.00** | +++ | 425 | 741 | **0.95** |
| | 2011Feb | 10 | 511 | 564 | 88 | 17.4 | **0.00** | +++ | 425 | 720 | **0.78** |
| | All | 10 | 1924 | 568 | 94 | 34.7 | **0.00** | +++ | 411 | 720 | **0.80** |

* Effect Size was calculated using OECD PISA 2009 results (mean =496, S.D.=92 for Mathematics, and Mean=493, S.D.=93 for Reading), OECD (2010)

In Mathematics, the average PISA score of OECD countries were in the range 419 to 546, and the average PISA score of partner countries were in the range 331 to 600, OECD (2010). The IB grade 9 and grade 10 average scores were 551 and 570, respectively. Figure 18 shows that IB students in both grade 9 and grade 10 performed better than the OECD mean (i.e. effect size is in the range of 0.53 to 0.90), and better than all the countries that participated in PISA Mathematics.

In Reading, the average scale scores of OECD countries were in the range of 425 to 539, and the average PISA score of partner countries were in the range of 314 to 556. As the average scale scores of IB students were 533 and 568 in grade 9 and 10, respectively, Figure 19 clearly shows that IB students performed better than most of the PISA countries' means.

Figure 18 IB Schools Grade 9 and Grade 10 Performance in Mathematical Literacy

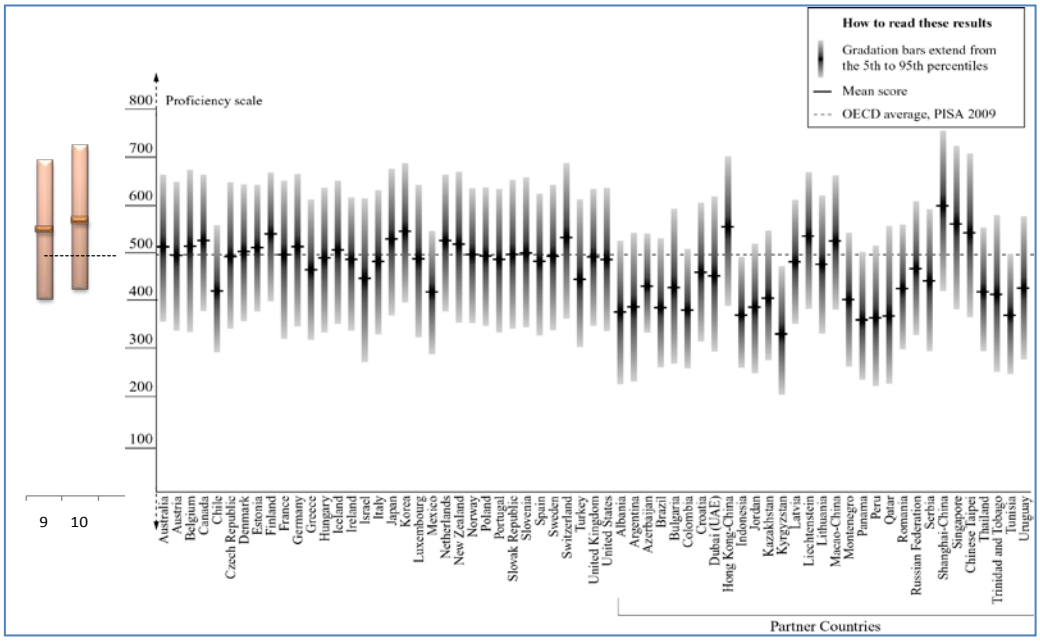
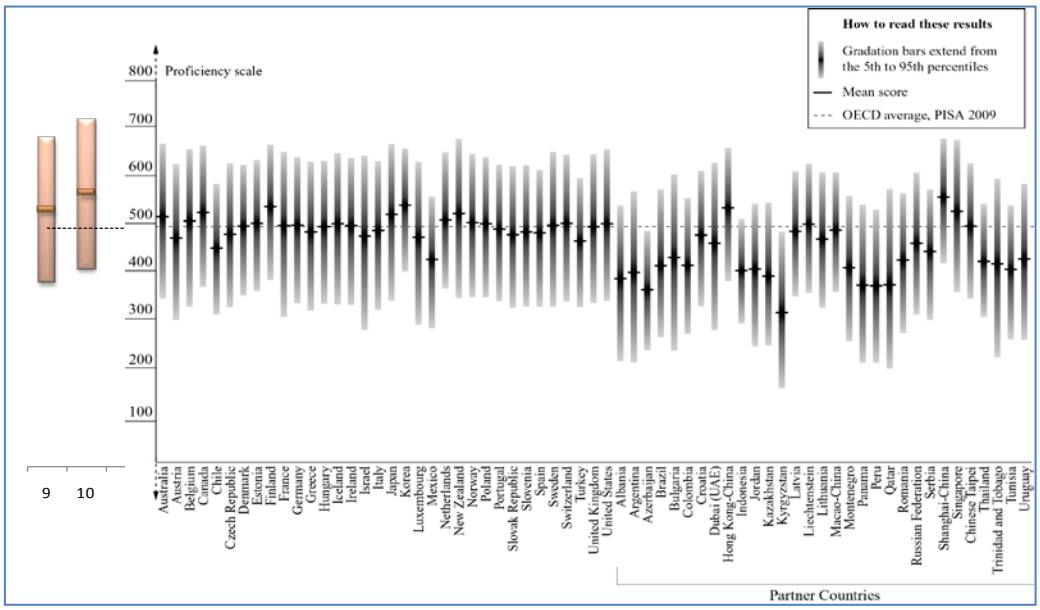



Figure 19 IB Schools Grade 9 and Grade 10 Performance in Reading



## 2.7 Multilevel analysis of school variance between IB schools and non-IB schools.

Given the hierarchical structure of the ISA achievement data, with students located within different schools, multilevel models were fitted to the data to assess between-school and within-school variation. A total of 64 unconditional multilevel models were fitted to the 2010 data for each grade by domain and for IB schools and non-IB schools. These analyses enable apportioning of variance in students' achievement, which is how much of the variance in performance is associated with the student level and how much of the variance in performance is associated with school level. In other words, the purpose of this analysis is to examine if the factor of international curriculum (i.e. PYP and MYP) influences students' achievement in the ISA. Table 31 shows the proportion of between-school variance for IB schools and non-IB schools and Figure 20 displays the proportion of between-school variance among the IB schools.

The proportions of between-school variance in IB schools were in the range of 0.08 - 0.18 in Mathematical Literacy, in the range of 0.09 - 0.21 in Reading, 0.05 - 0.24 in Narrative Writing, and 0.06 - 0.20 in Expository Writing. The proportions of between-school variance in non-IB schools were in the range of 0.27 - 0.40 in Mathematical Literacy, 0.27 - 0.37 in Reading, 0.17 - 0.31 in Narrative Writing, and 0.18 - 0.35 in Expository Writing. The proportions of between-school variance in the IB schools are mostly lower than those in the non-IB schools.

Table 31 The Proportion of Between-School Variance for IB Schools and non-IB Schools

| Grade | Mathematical Literacy | | Reading | | Narrative Writing | | Expository Writing | |
|---|---|---|---|---|---|---|---|---|
| | IB | Non-IB | IB | Non-IB | IB | Non-IB | IB | Non-IB |
| 3 | 0.13 | 0.34 | 0.12 | 0.28 | 0.09 | 0.20 | 0.11 | 0.21 |
| 4 | 0.09 | 0.31 | 0.11 | 0.34 | 0.09 | 0.31 | 0.18 | 0.35 |
| 5 | 0.12 | 0.27 | 0.13 | 0.32 | 0.10 | 0.20 | 0.12 | 0.33 |
| 6 | 0.08 | 0.36 | 0.17 | 0.30 | 0.12 | 0.25 | 0.09 | 0.32 |
| 7 | 0.18 | 0.37 | 0.18 | 0.29 | 0.18 | 0.24 | 0.20 | 0.19 |
| 8 | 0.16 | 0.40 | 0.14 | 0.37 | 0.11 | 0.31 | 0.12 | 0.25 |
| 9 | 0.13 | 0.34 | 0.21 | 0.28 | 0.24 | 0.17 | 0.19 | 0.18 |
| 10 | 0.14 | 0.30 | 0.09 | 0.27 | 0.05 | 0.20 | 0.06 | 0.26 |

Figure 20 Proportions of Between-School Variance among IB Schools by Grade and Domain

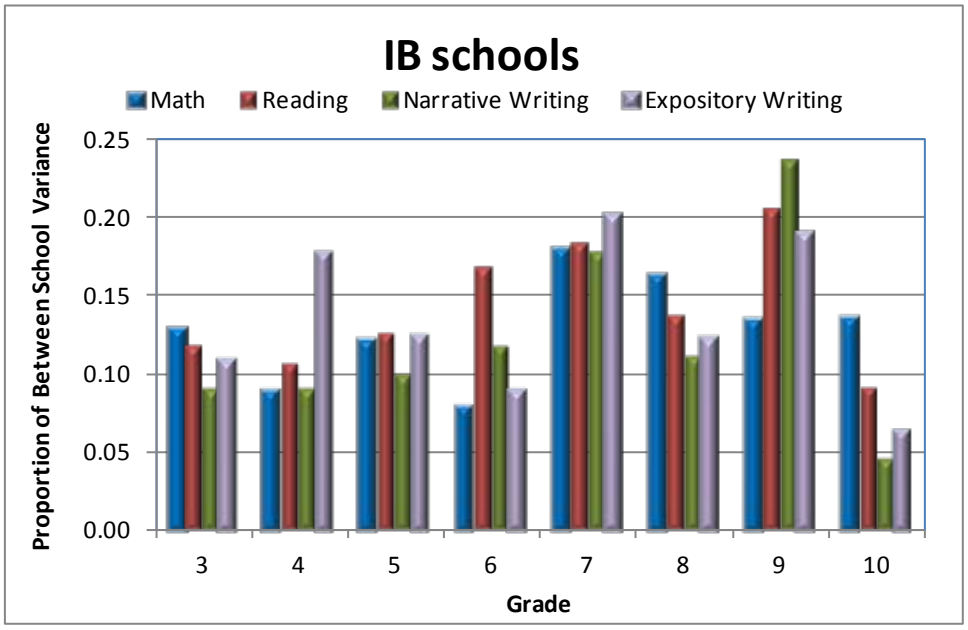


Figure 20 shows that in most instances (22 out of a total of 32 results), the proportions of between-school variance in IB schools were less than 0.15. Only for grade 9 Reading and Narrative Writing, the proportions were greater than 0.20.

Figure 21 Differences in Proportions of Between-School Variance (Non-IB - IB)

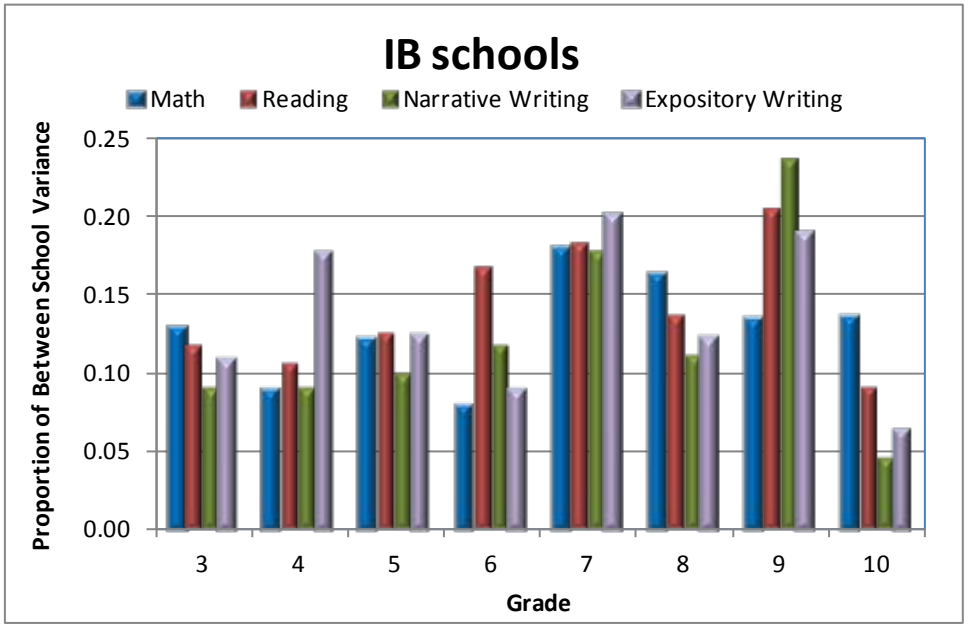



Figure 21 shows the differences in the proportions of between-school variance between the non-IB cohort and the IB cohort by grade and domain. The Figure shows that proportions of between-school variance in the non-IB cohort were in most cases higher than those in the IB cohort. Of the four ISA domains, Mathematical Literacy had the largest difference between non-IB and IB schools in the proportions of between-school variance.

It was clear that the proportions of between-school variances among IB schools were smaller than those among non-IB schools in all four ISA domains. In other words, the differences in cohort performances attributable to differences in schools are lower among the IB schools than among the non-IB schools. This implied that IB schools were more similar to each other than the non-IB schools were similar to each other with respect to four domains of ISA performance.

# 3 Student Questionnaires

Satisfactory response rates were observed in responses for both the primary and secondary questionnaires. Table 32 shows that response rates were typically greater than 80%, and IB students had response rates in the range of 78.9% to 86.9%.

For the primary years questionnaire, a total of 11,632 valid responses were received among grades 5 and 6 students, and response rate was 80.1% for grade 5 and 81.8% for grade 6. In grade 5, IB and non-IB students had response rates of 83.3% and 77.2% respectively. In grade 6, IB and non-IB students had response rates of 78.9% and 84.5% respectively.

For the secondary years questionnaire, a total of 10,058 valid responses were received among grade 8 and grade 9 students, and response rates were 89.1% and 87.4% for grades 8 and 9 respectively. In grade 8, IB and non-IB students had response rates of 86.9% and 90.4% respectively. In grade 9, IB and non-IB students had response rates of 85.3% and 88.5% respectively.

Table 32 Questionnaire Response Rates

| Grade | IB | | | Non-IB | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|
| | Samples (N) | Responses (N) | Response Rate (%) | Samples (N) | Responses (N) | Response Rate (%) | Samples (N) | Responses (N) | Response Rate (%) |
| 5 | 4184 | 3485 | 83.3 | 4544 | 3510 | 77.2 | 8728 | 6995 | 80.1 |
| 6 | 2682 | 2115 | 78.9 | 2984 | 2522 | 84.5 | 5666 | 4637 | 81.8 |
| 8 | 2174 | 1889 | 86.9 | 3690 | 3337 | 90.4 | 5864 | 5226 | 89.1 |
| 9 | 2020 | 1724 | 85.3 | 3511 | 3108 | 88.5 | 5531 | 4832 | 87.4 |

The questionnaire components are described generically by the phrase ‘students’ perceptions, values, attitudes and dispositions’. Each published questionnaire from which the IB-ISA questionnaire was compiled has a specific set of defined components, with each question being an indicator of one of those components: for example, the Biggs SPQ has two defined components, the deep and surface approaches to learning. Any specific components identified in the IB-ISA questionnaire questions were subjected to quantitative validation by exploratory factor analysis and confirmatory factor analysis. Rasch analysis was further applied to check psychometric properties of questions defined in each dimension. At the end of this construct validation process, four questions were deleted from the primary years questionnaire, and eight questions were deleted from the secondary years questionnaire. These questions were not used in subsequent analysis. These questions were deleted due to wording issues or not fitting well on the specified dimension (see Table 33).

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Table 33 Deleted Questions from Preliminary Analysis

| Questionnaire | Question ID | Question | Comments |
|---|---|---|---|
| Primary | 14 | I know how to make friends. | This question is about self belief. |
| | 20 | I think someone who treats me unfairly is a bad person and that it is okay to hurt them back. | Wording issue. |
| | 28 | When I don't understand something, I think "I can't do this." | This question is about understanding of schoolwork. |
| | 32 | I shouldn't have to do schoolwork that is boring. | Does not load well on the dimension. |
| Secondary | 9 | School has done little to prepare me for adult life when I leave school. | Loads on several dimensions. |
| | 10 | School has been a waste of time. | Does not load well on the dimension. |
| | 28 | I believe in every word my teacher says. | This question is about poor learning technique. |
| | 29 | I know how to make friends. | This question is about self belief. |
| | 35 | I can't stand having to behave well and follow rules. | Does not load well on the dimension. |
| | 36 | I think that someone who treats me unfairly is a bad person and that it is okay to hurt them back. | Wording issue. |
| | 47 | I prefer to work on tasks that force me to learn new things. | Wording issue, i.e. force. |
| | 52 | I do my best when I'm working on a fairly difficult task. | Wording issue, i.e. difficult task. |

Four dimensions describe questions in the primary years questionnaire, i.e. Student and Teacher Interaction, Social Connectedness, Personal Development Outcome, and Study Engagement. Seven dimensions describe questions in the secondary years questionnaire, i.e. Student and Teacher Interaction, Social Connectedness, Deep Learning, Surface Learning, Personal Development Outcome, Academic Outcome Orientation, and Learning Goals. Table 34 shows the dimensions and their descriptions for the primary years questionnaire. Table 35 shows question descriptions for each dimension in the primary years questionnaire. Table 36 shows the dimensions and their descriptions for the secondary years questionnaire, and Table 37 shows the question descriptions in the secondary years questionnaire.

Table 34 Primary Years Questionnaire Dimensions and Descriptions

| Dimension | Description |
|---|---|
| Student and Teacher Interaction | The school in general, and teachers in particular, provide a supportive learning environment for students. The school experience is useful preparation for other aspects of life. |
| Social Connectedness | The student feels part of a social and communal environment, has friends, and feels connected with others. |
| Personal Development Outcome | The student maintains an empathetic and ethical outlook towards others and towards their environment. |
| Study Engagement | The student is stimulated by, and well prepared and organised to meet, the challenges of their schoolwork. |

## Table 35 Primary Years Questionnaire Description

| Dimension | Question ID | Question |
|---|---|---|
| Student and Teacher Interaction | 1 | Students get along well with most teachers. |
| | 2 | Most teachers are interested in students' well-being. |
| | 3 | Most of my teachers really listen to what I have to say. |
| | 4 | If I need extra help, I will receive it from my teachers. |
| | 5 | Most of my teachers treat me fairly. |
| | 6 | School has been a waste of time. |
| | 7 | School has helped give me confidence to make decisions. |
| Social Connectedness | 8 | I feel like an outsider (or left out of things) |
| | 9 | I make friends easily |
| | 10 | I feel like I belong |
| | 11 | I feel awkward and out of place. |
| | 12 | Other students seem to like me. |
| | 13 | I feel lonely. |
| Personal Development Outcome | 15 | I think it is important to treat all people with respect. |
| | 16 | I like helping someone with a problem. |
| | 17 | It is important to take care of our parks, rivers, oceans, and animals. |
| | 18 | I can be trusted to do what I say I am going to do. |
| | 19 | I can behave well and follow rules. |
| | 21 | I am good at solving conflicts without fighting. |
| | 22 | I feel bad when other people feel bad. |
| | 23 | I try to make sure that everyone has a fair chance to win, even if it means that I lose. |
| | 24 | I try hard not to say or do things that hurt other people's feelings. |
| Study Engagement | 25 | I can do schoolwork that is hard to understand. |
| | 26 | I try very hard to complete all my work. |
| | 27 | I am disorganised (forget pencil, do not write down homework, have a messy book, bag, papers). |
| | 29 | When I do not understand something, I give up easily. |
| | 30 | I think about planning my time so that I get all my work done. |
| | 31 | I am good at helping others with their class projects or jobs. |
| | 33 | I want to do my very best in my schoolwork. |

## Table 36 Secondary Years Questionnaire Dimensions and Descriptions

| Dimension | Description |
|---|---|
| Student and Teacher Interaction | The school in general, and teachers in particular, provide a supportive learning environment for students. The school experience is useful preparation for other aspects of life. |
| Social Connectedness | The student feels part of a social and communal environment, has friends, and feels connected with others. |
| Deep Learning | The student makes connections between the learning in the classroom and applications in other aspects of their life. |
| Surface Learning | The student is focussed on learning for assessment and makes few connections on outside applications. |
| Personal Development Outcome | The student maintains an empathetic and ethical outlook towards others and towards their environment. |
| Academic Outcome Orientation | The student is motivated by achieving successful outcomes of assessment and learning and how their achievements are viewed by and compared with those of others. |
| Learning Goals | The student is engaged with their work and challenged to attempt more complex problems. |

## Table 37 Secondary Years Questionnaire Description

| Dimension | Question ID | Question |
|---|---|---|
| Student and Teacher Interaction | 1 | Students get along well with most teachers. |
| | 2 | Most teachers are interested in students' well-being. |
| | 3 | Most of my teachers really listen to what I have to say. |
| | 4 | If I need extra help, I will receive it from my teachers. |
| | 5 | Most of my teachers treat me fairly. |
| | 6 | Teachers remind students about the importance of doing their best in their schoolwork. |
| | 7 | Teachers remind students about the importance of acting responsibly. |
| | 8 | When I have worked hard and acted responsibly, there is a teacher who praises me. |
| | 11 | School has helped give me confidence to make decisions. |
| | 12 | School has taught me things which could be useful in a job. |
| Social Connectedness | 13 | I feel like an outsider (or left out of things). |
| | 14 | I make friends easily. |
| | 15 | I feel like I belong. |
| | 16 | I feel awkward and out of place. |
| | 17 | Other students seem to like me. |
| | 18 | I feel lonely. |
| Deep Learning | 19 | I think about possible alternative solutions to every problem. |
| | 20 | I often come up with my own explanation about a topic. |
| | 21 | I am keen to use what I learn to solve real problems. |
| | 22 | I am keen to know how the things we do in class are meaningful to me. |
| | 23 | I ask questions in class in order to make sure I have understood everything correctly. |
| Surface Learning | 24 | I study only what is set for me to study. |
| | 25 | I don't spend time learning things that I know won't be in the exam. |
| | 26 | I repeat everything several times to make sure I pass in tests. |
| | 27 | I learn things by memorizing them by heart. |
| Personal Development Outcome | 30 | I am good at understanding how other people feel. |
| | 31 | I think it is important to treat others, including classmates from different cultural backgrounds, with respect. |
| | 32 | I like helping people with problems. |
| | 33 | I care about the environment (parks, waterways, animals) and want to make my community a better and safer place to live. |
| | 34 | I can be trusted to do what I say I am going to do. |
| | 37 | I am good at solving conflicts without fighting. |
| | 38 | I feel bad when other people feel hurt. |
| | 39 | I try to make sure that everyone has a fair chance to win, even if it means that I lose. |
| | 40 | I try hard not to say or do things that hurt other people's feelings. |
| Academic Outcome Orientation | 41 | I am happiest when I perform tasks on which I know that I won't make any errors. |
| | 42 | I feel smart when I do something without making any mistakes. |
| | 43 | The opinions others have about how well I can do certain things are important to me. |
| | 44 | I feel smart when I can do something better than most other people. |
| | 45 | I like to be fairly confident that I can successfully perform a task before I try it. |
| | 46 | I like to work on tasks that I have done well on in the past. |
| Learning Goals | 48 | The opportunity to learn new things is important to me. |
| | 49 | The opportunity to extend the range of my abilities is important to me. |
| | 50 | When I fail to complete a difficult task, I plan to try harder the next time I work on it. |
| | 51 | When I have difficulty solving a problem, I enjoy trying different approaches to see which one will work. |

## 3.1 IB PYP (Grade 5 and Grade 6) and IB MYP (Grade 8 and Grade 9) students' perceptions of school life, their attitudes, their sense of wellbeing.

High proportions of agreement across all dimensions were observed among IB PYP and MYP students (see Table 38 and Table 39). For example, about 89% of IB grade 5 students and 79% of grade 9 students agreed that 'their schools provide a supportive learning environment', and 'their school experiences are useful preparation for other aspects of life'; about 83% of grade 5 students, and a similar percentage of grade 9 students agreed that 'they feel part of a social and communal environment', 'have friends', and 'feel connected with others'; about 87% of grade 5 students and 83% of grade 9 students agreed that 'they maintain an empathetic and ethical outlook towards others and towards their environment'; and 83% of them felt that 'they are engaged well in their study and meet the challenges of their schoolwork'.

Among IB grade 9 students, about 80% of them agreed that 'they make connections between the learning in the classroom and applications in other aspects of their life', while 56% of them agreed that 'they focus on learning for assessment and make few connections on outside applications'. About 80% of grade 9 students agreed that 'they are motivated by achieving successful outcomes of assessment and learning' and 'how their achievements are viewed by and compared with those of others'. About 84% of grade 9 students agreed that 'they are engaged with their work and challenged to attempt more complex problems'.

The percentages of agreement were similar between grade 5 and grade 6, and between grade 8 and grade 9. It appeared that a small decrement, within 2%, existed in percentage of agreement from lower grade to higher grade, i.e. from grade 8 to 9. A drop in percentage of agreement generally corresponded to a rise in percentage of disagreement in similar proportion. However, this pattern was not observed from grade 5 to grade 6. From grade 5 to 6, the largest decrement in percentages of agreement was Student and Teacher Interaction (i.e. 1%), and this dimension had the largest increment in percentage of disagreement (i.e. 2%). From grade 8 to grade 9, the largest decrement in percentages of agreement was Personal Development Outcome (i.e. 2%).

Table 38 IB students' Agreement on Primary Years Questionnaire

| Dimensions | Agreement (%) | | Disagreement (%) | |
|---|---|---|---|---|
| | Grade 5 | Grade 6 | Grade 5 | Grade 6 |
| Student and Teacher Interaction | 88.6 | 87.3 | 7.5 | 9.8 |
| Social Connectedness | 82.9 | 83.9 | 11.8 | 11.8 |
| Personal Development Outcome | 87.3 | 87.6 | 8.4 | 8.3 |
| Study Engagement | 83.4 | 83.5 | 11.5 | 12.1 |

Table 39 IB students' Agreement on Secondary Years Questionnaire

| Dimensions | Agreement (%) | | Disagreement (%) | |
|---|---|---|---|---|
| | Grade 8 | Grade 9 | Grade 8 | Grade 9 |
| Student and Teacher Interaction | 80.3 | 79.4 | 17.2 | 17.5 |
| Social Connectedness | 83.7 | 82.9 | 11.7 | 12.7 |
| Deep Learning | 80.2 | 79.1 | 16.3 | 16.9 |
| Surface Learning | 56.4 | 55.5 | 39.4 | 39.6 |
| Personal Development Outcome | 85.2 | 83.3 | 10.4 | 11.1 |
| Academic Outcome Orientation | 79.7 | 79.8 | 15.3 | 13.7 |
| Learning Goals | 83.9 | 82.7 | 10.3 | 10.4 |

Three dimensions could be compared for IB students between grades 5, 6, 8, and 9, i.e. Student and Teacher Interaction, Social Connectedness, and Personal Development Outcome. Among these three dimensions, Student and Teacher Interaction had the highest drop, i.e. 10% drop from grade 5 to grade 9. Figure 22 shows percentage of agreement on Student and Teacher Interaction drops from 89% at grade 5 to 79% at grade 9, while the percentage of disagreement rises from 8% to 18% from grade 5 to grade 9.

Figure 23 shows that the percentage of agreement on Social Connectedness is relatively similar at about 83% from grade 5 to grade 9, while the percentage of disagreement on the same dimension is around 12% to 13% from grade 5 to grade 9.

Figure 24 shows that the percentage of agreement on Personal Development Outcome has a relatively small drop from 87% to 83% from grade 5 to grade 9, while the percentages of disagreement range from 10% to 12%.

Figure 22 IB students' Percentage of Agreement on Student and Teacher Interaction

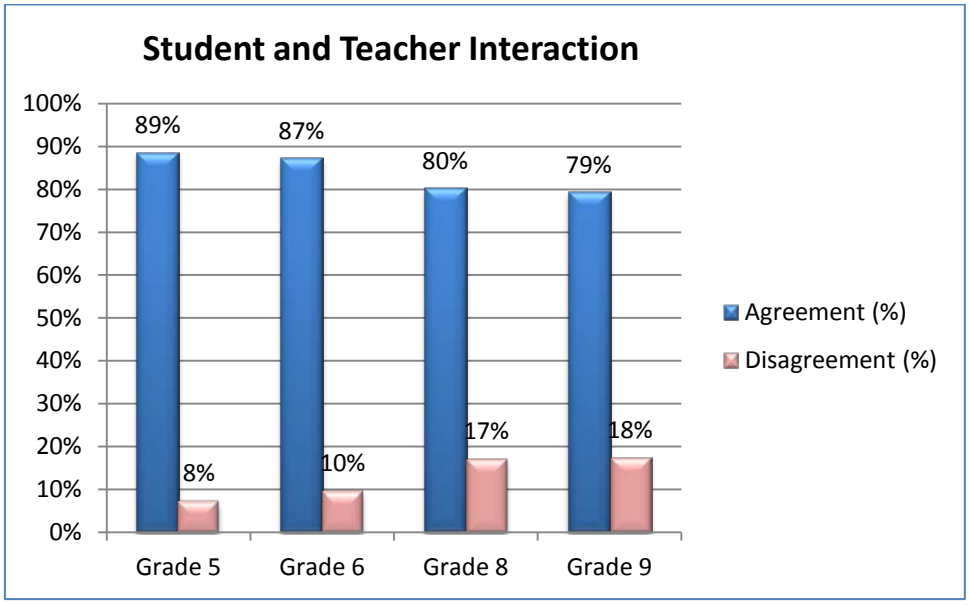



Figure 23 IB students' Percentage of Agreement on Social Connectedness

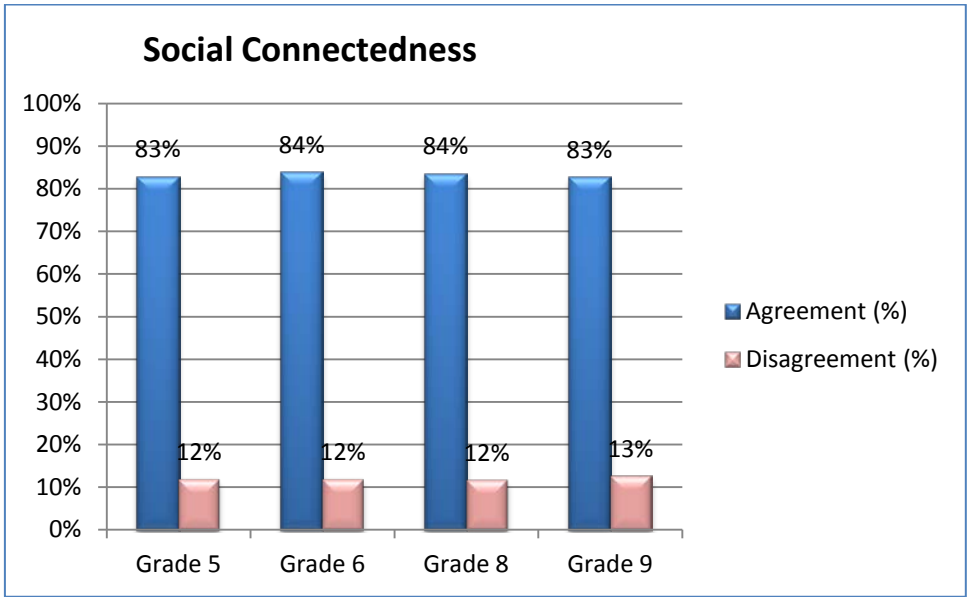


Figure 24 IB students' Percentage of Agreement on Personal Development Outcome

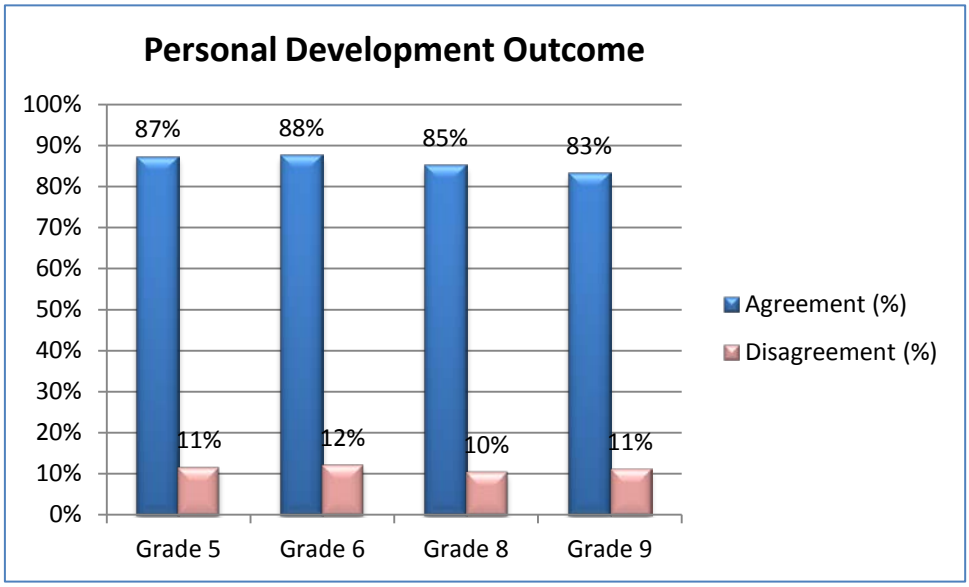



Figure 25 to Figure 35 show the detailed percentage of agreements at question level for each dimension among IB students by grade. A general pattern was that the percentages of agreement at question level were similar among IB students between grades 5 and 6, and between grades 9 and 10. Another pattern was that the percentages of agreements among questions of each dimension were also similar, except for Q21 to Q23 (Personal Development Outcome) in the primary years questionnaire (and Q37 to Q39 in the secondary years questionnaire), Q26 and Q33 (Study Engagement) in the primary years questionnaire, Q8 and Q11 (Student and Teacher Interaction), and Q51 (Learning Goals) in the secondary years questionnaire.

Figure 25 Student Teacher Interaction

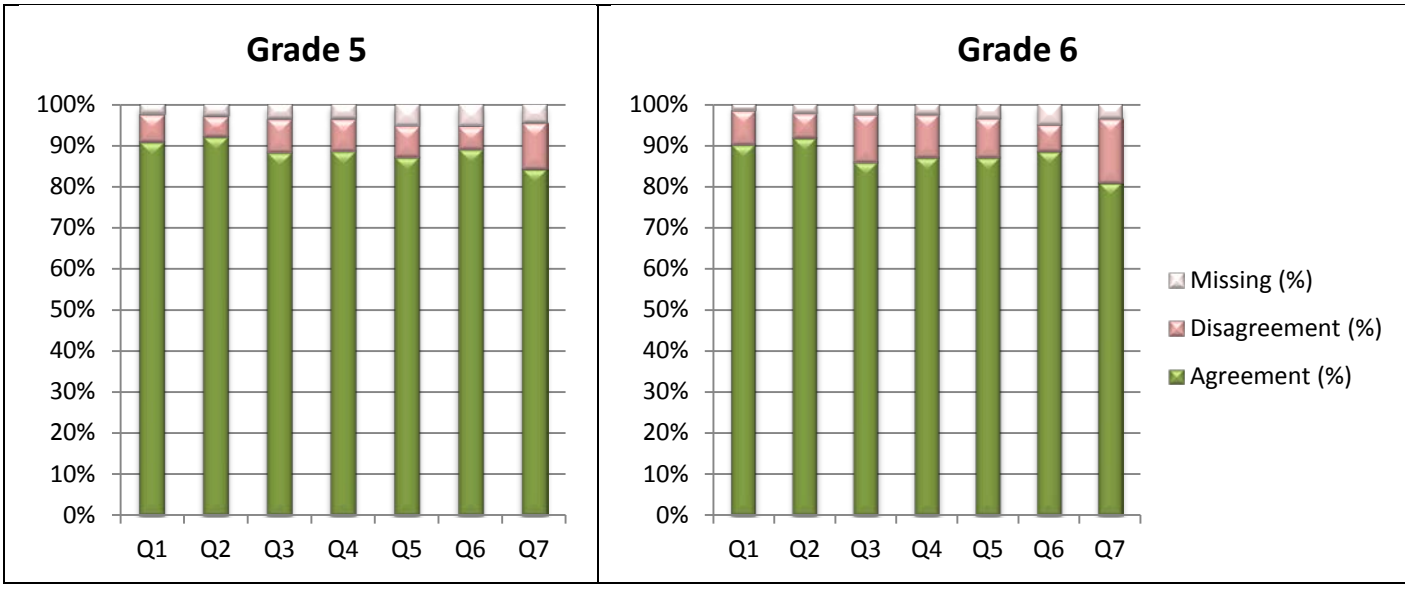


Figure 26 Social Connectedness

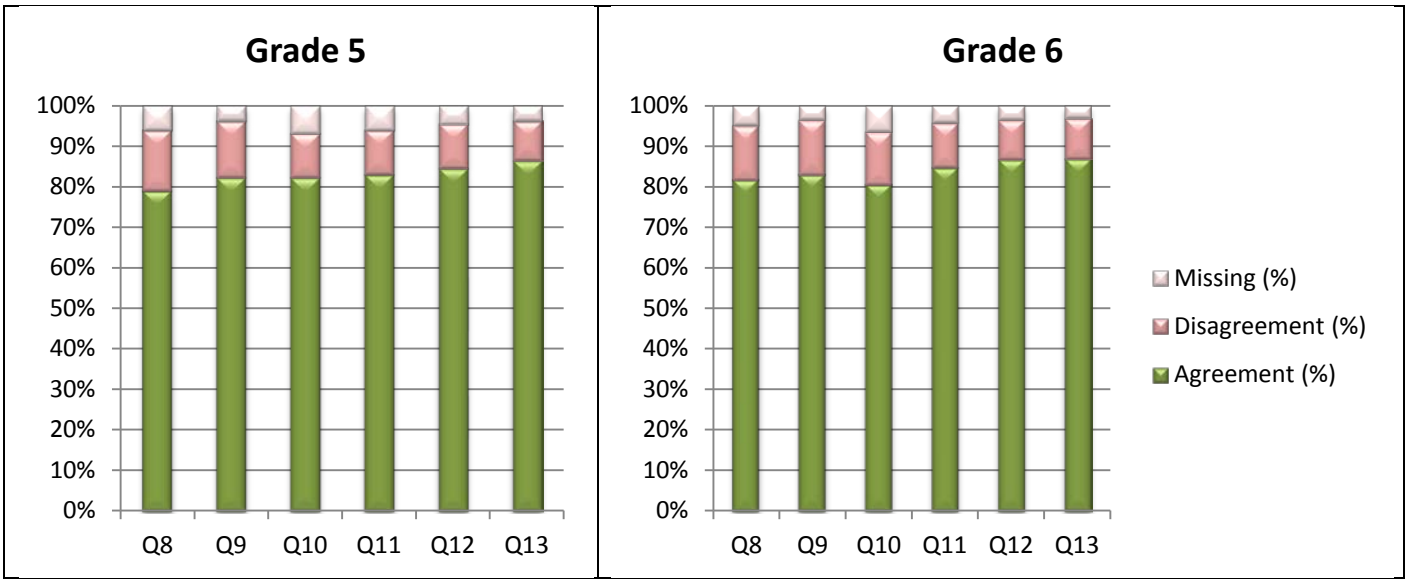



Figure 27 Personal Development Outcome

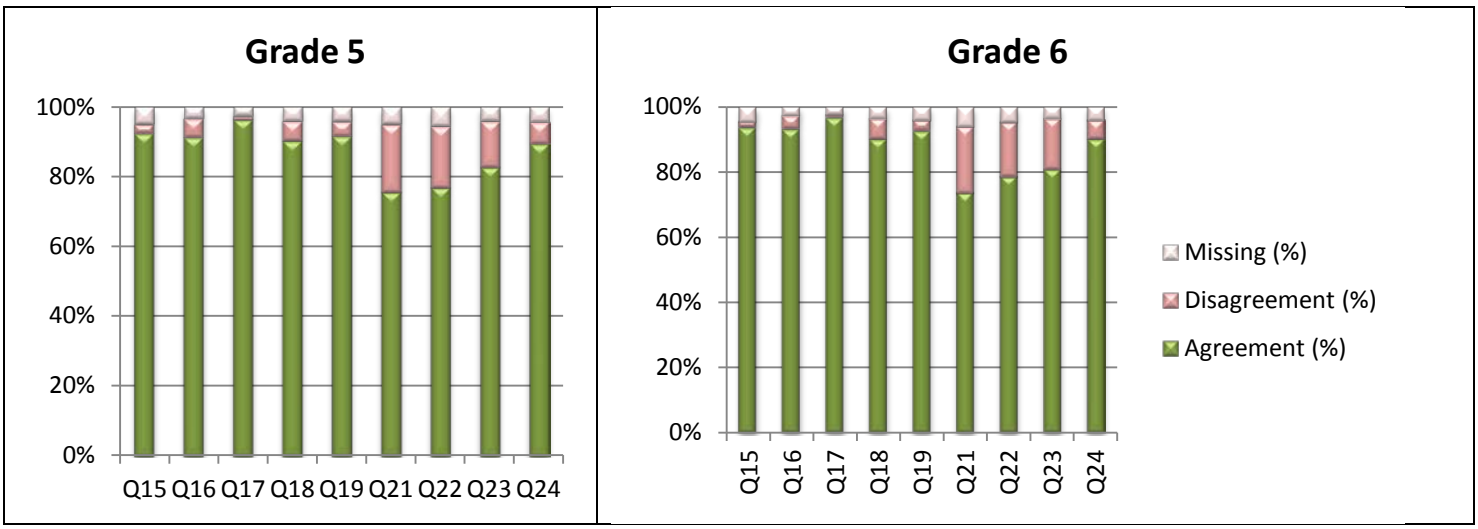



Figure 28 Study Engagement

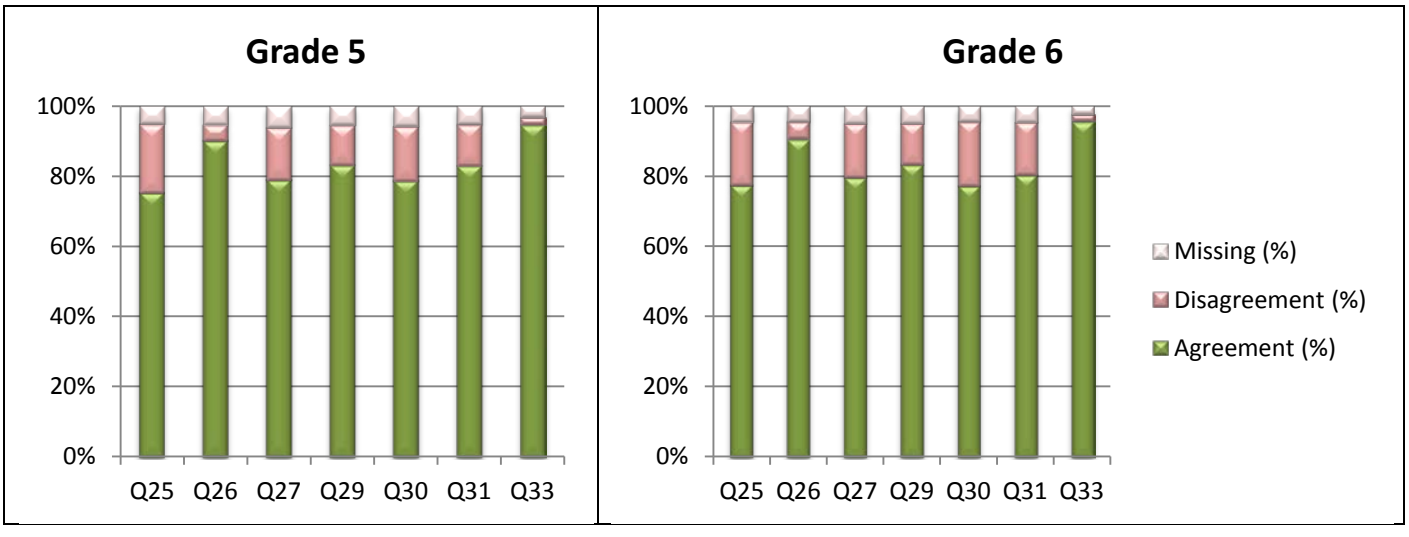


Figure 29 Student and Teacher Interaction

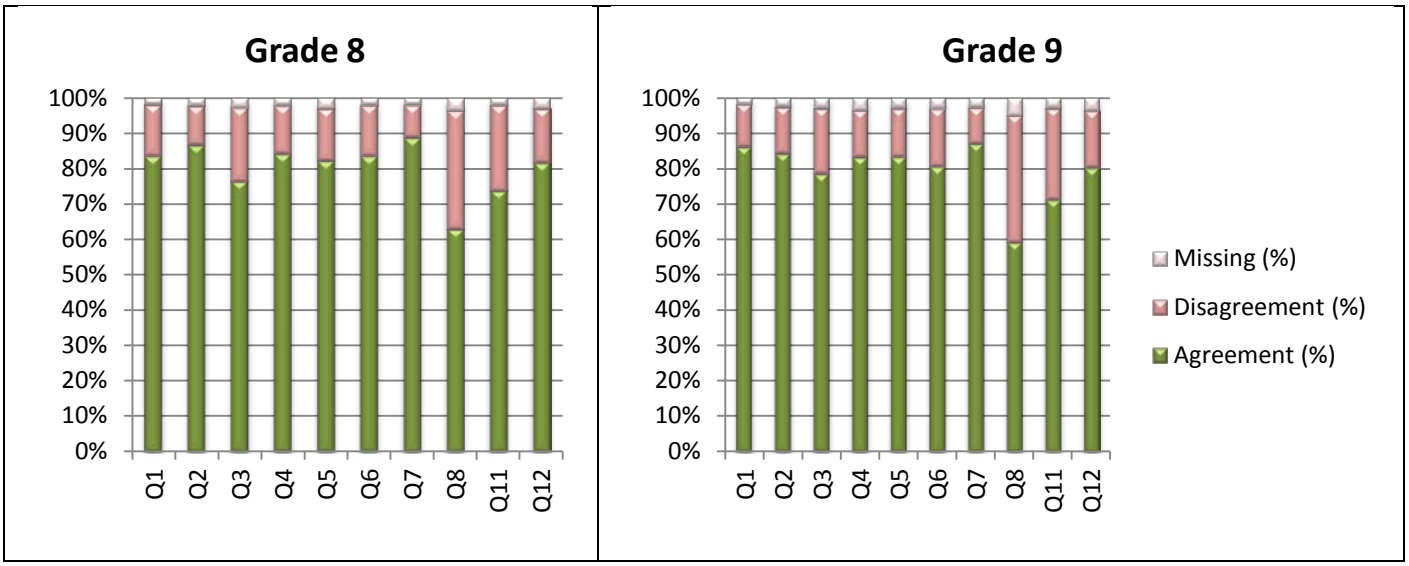



Figure 30 Social Connectedness

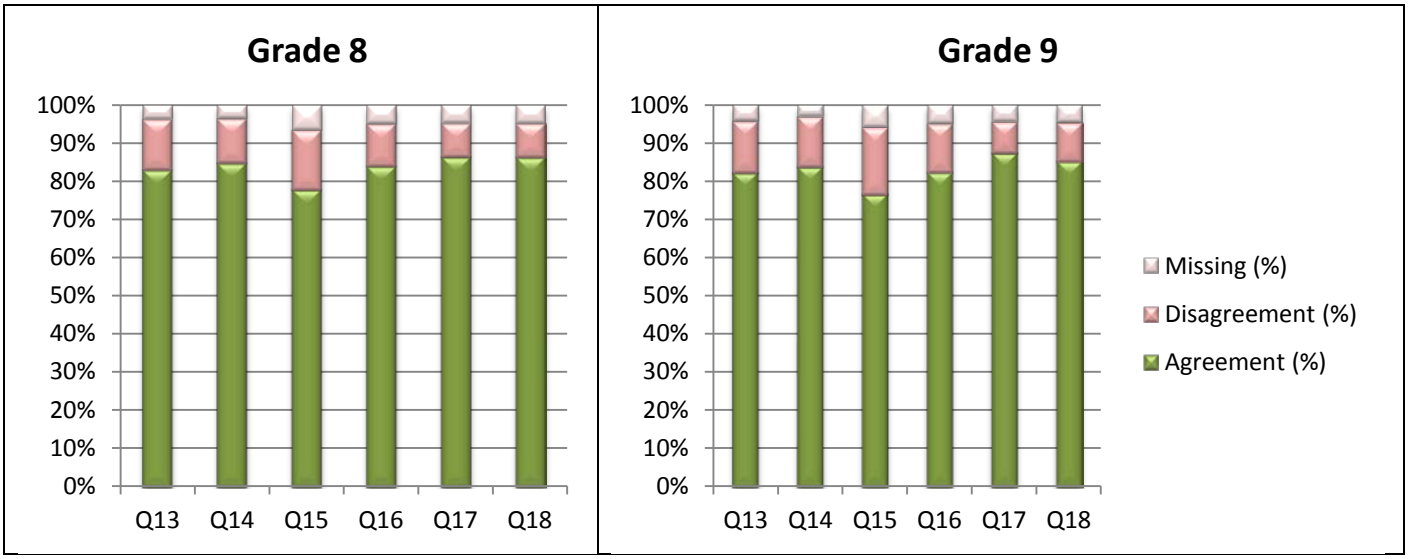



Figure 31 Deep Learning

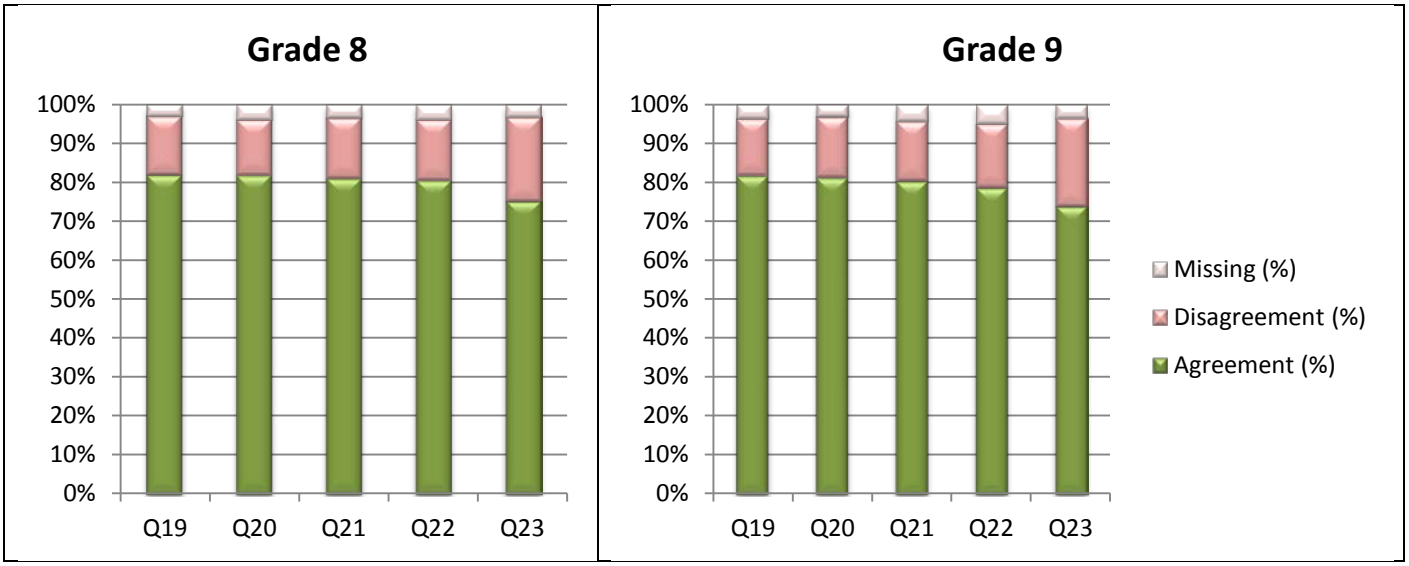


Figure 32 Surface Learning

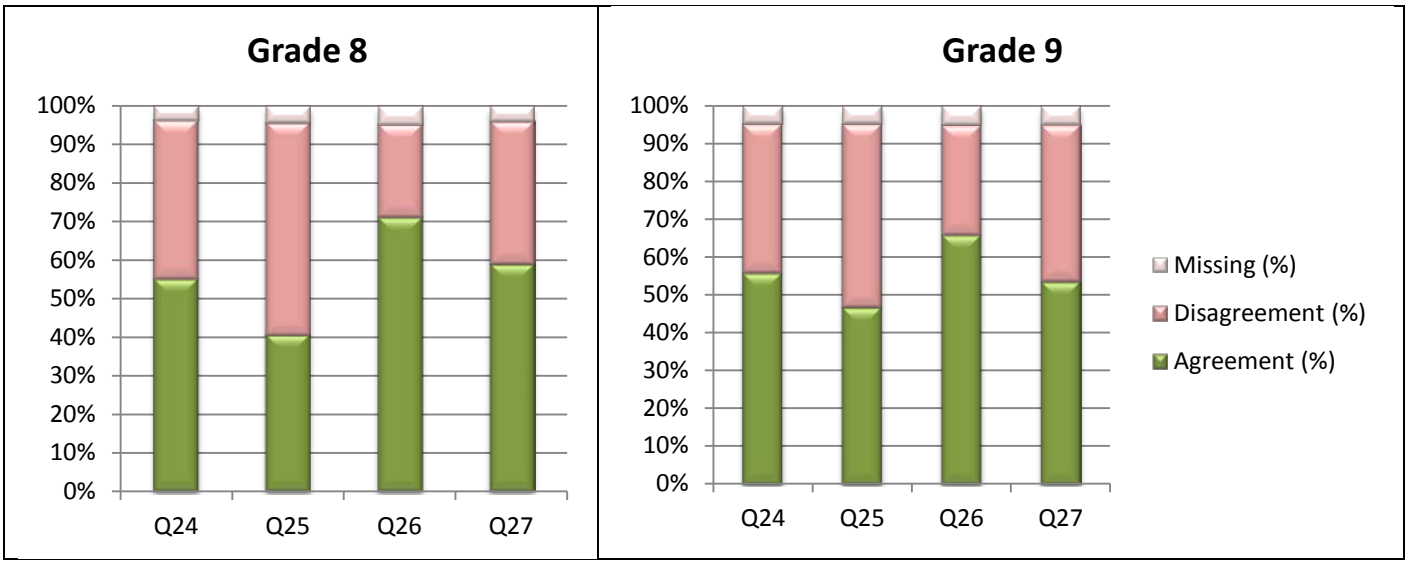



Figure 33 Personal Development Outcome

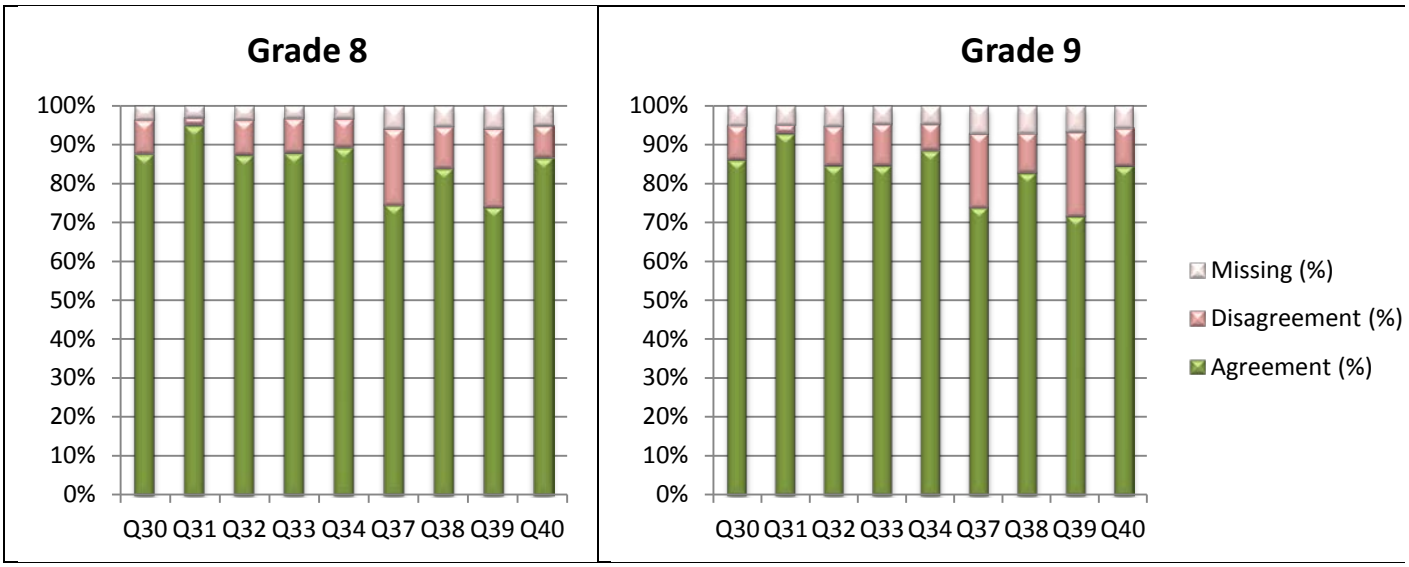



Figure 34 Academic Outcome Orientation

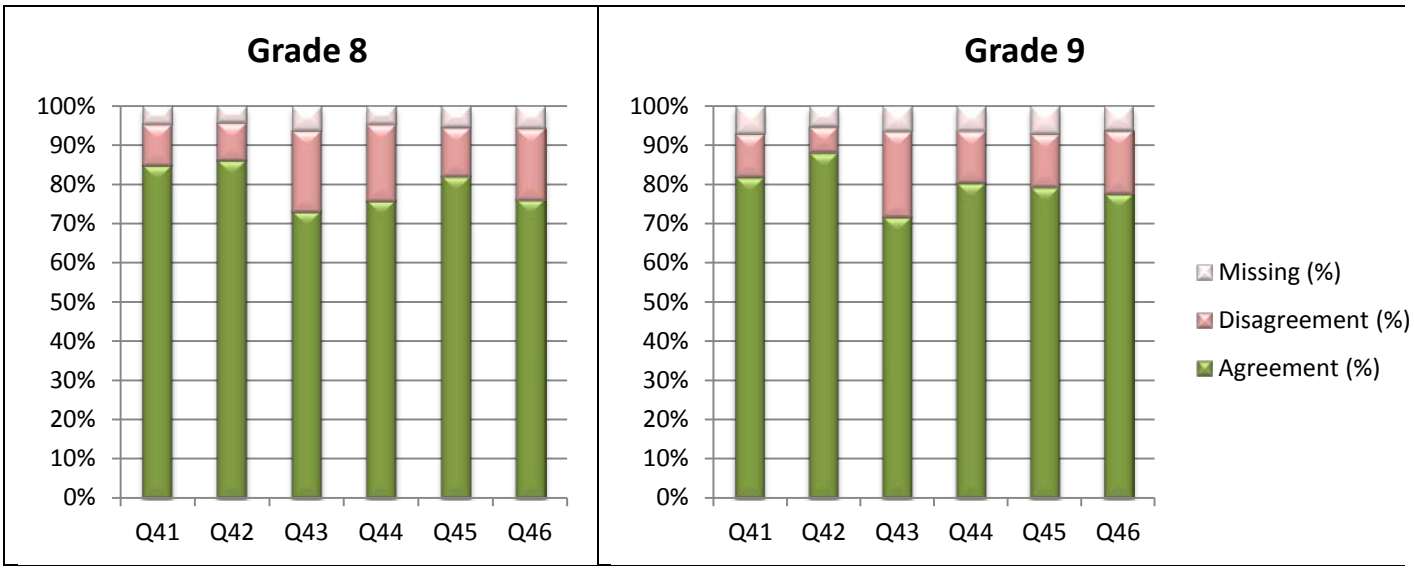
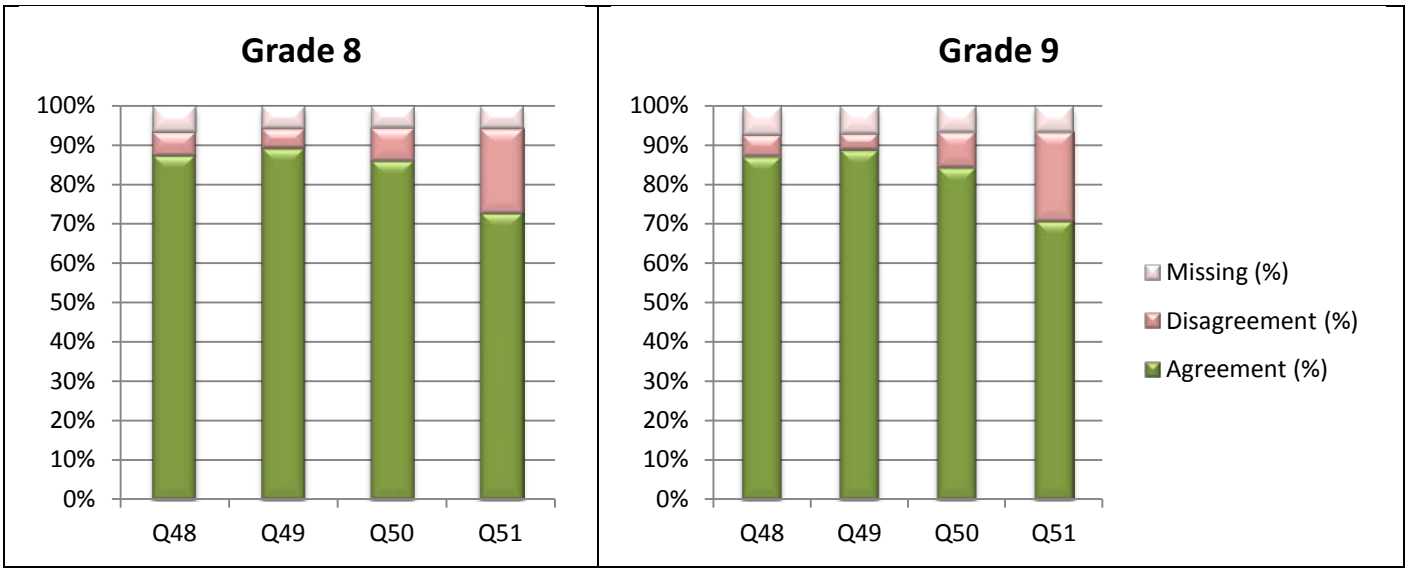


Figure 35 Learning Goals



## 3.2 How do IB students' perceptions of school life, their attitudes, and their sense of wellbeing compare to those of non-IB students?

This analysis indicated that both IB students and non-IB students had relatively high percentages of agreement in their perceptions, values, attitudes and dispositions pertaining to school, teachers and learning.

Table 40 and Table 41 summarise the results of comparison on percentage of agreement between the IB cohort and the non-IB cohort from the primary years questionnaire and the secondary years questionnaire respectively. In the primary years questionnaire, IB students had a moderately higher proportion of agreement, in the range of 2% to 5%, across all four dimensions. In the secondary years questionnaire, IB students had a slightly higher proportion of agreement in Social Connectedness and Deep Learning at grades 8 and 9, and in Personal Development Outcome and Academic Outcome Orientation at grade 8. In addition, IB students had a slightly higher proportion of agreement in Deep Learning in both grade 8 and grade 9, and a lower proportion of agreement in Surface Learning in grade 9.

However, non-IB students had a slightly higher proportion of agreement in Student and Teacher Interaction and Learning Goals at grades 8 and 9, and in Personal Development Outcome and Academic Outcome Orientation at grade 9. The differences in proportion of agreement and disagreement between IB and non-IB students were within 5% among dimensions in the primary years questionnaire and within 4% among dimensions in the secondary years questionnaire.

Table 40 Comparison of Percentage of Agreements between IB and Non-IB in Grades 5 and 6

| Dimensions | Grade | Agreement (%) | | | Disagreement (%) | | |
|---|---|---|---|---|---|---|---|
| | | IB | Non-IB | Difference | IB | Non-IB | Difference |
| Student and Teacher Interaction | 5 | 88.6 | 86.2 | 2.4 | 7.5 | 9.8 | -2.3 |
| | 6 | 87.3 | 85.3 | 2.0 | 9.8 | 10.1 | -0.4 |
| Social Connectedness | 5 | 82.9 | 81.3 | 1.7 | 11.8 | 14.0 | -2.1 |
| | 6 | 83.9 | 81.2 | 2.7 | 11.8 | 14.0 | -2.2 |
| Personal Development Outcome | 5 | 87.3 | 85.3 | 2.0 | 8.4 | 10.7 | -2.3 |
| | 6 | 87.6 | 84.1 | 3.5 | 8.3 | 11.4 | -3.1 |
| Study Engagement | 5 | 83.4 | 80.7 | 2.6 | 11.5 | 14.1 | -2.6 |
| | 6 | 83.5 | 79.0 | 4.5 | 12.1 | 15.6 | -3.5 |

Table 41 Comparison of Percentage of Agreements between IB and Non-IB in Grades 8 and 9

| Dimensions | Grade | Agreement (%) | | | Disagreement (%) | | |
|---|---|---|---|---|---|---|---|
| | | IB | Non-IB | Difference | IB | Non-IB | Difference |
| Student and Teacher Interaction | 8 | 80.3 | 80.4 | -0.1 | 17.2 | 17.1 | 0.1 |
| | 9 | 79.4 | 79.7 | -0.3 | 17.5 | 16.5 | 1.0 |
| Social Connectedness | 8 | 83.7 | 81.5 | 2.2 | 11.7 | 12.8 | -1.1 |
| | 9 | 82.9 | 81.4 | 1.4 | 12.7 | 13.3 | -0.6 |
| Deep Learning | 8 | 80.2 | 79.6 | 0.6 | 16.3 | 16.3 | 0.0 |
| | 9 | 79.1 | 78.7 | 0.5 | 16.9 | 17.3 | -0.4 |
| Surface Learning | 8 | 56.4 | 56.1 | 0.3 | 39.4 | 39.4 | 0.0 |
| | 9 | 55.5 | 57.1 | -1.6 | 39.6 | 37.9 | 1.7 |
| Personal Development Outcome | 8 | 85.2 | 84.0 | 1.2 | 10.4 | 11.2 | -0.8 |
| | 9 | 83.3 | 84.2 | -0.9 | 11.1 | 11.1 | 0.0 |
| Academic Outcome Orientation | 8 | 79.7 | 78.6 | 1.1 | 15.3 | 15.2 | 0.1 |
| | 9 | 79.8 | 81.0 | -1.2 | 13.7 | 14.9 | -1.1 |
| Learning Goals | 8 | 83.9 | 84.6 | -0.7 | 10.3 | 9.4 | 0.9 |
| | 9 | 82.7 | 85.9 | -3.3 | 10.4 | 10.0 | 0.4 |

Figure 36 shows the difference in agreement between the IB cohort and the non-IB cohort at question level on each dimension in the primary years questionnaire. The IB students had a higher proportion of agreements than non-IB students on all questions at grade 5 except for Q7, Q8, and Q17, and IB students had a higher proportion of agreements than non-IB students on all questions at grade 6 except for Q30.

Figure 36 Difference in Agreements between IB and Non-IB students in Primary Years Questionnaire

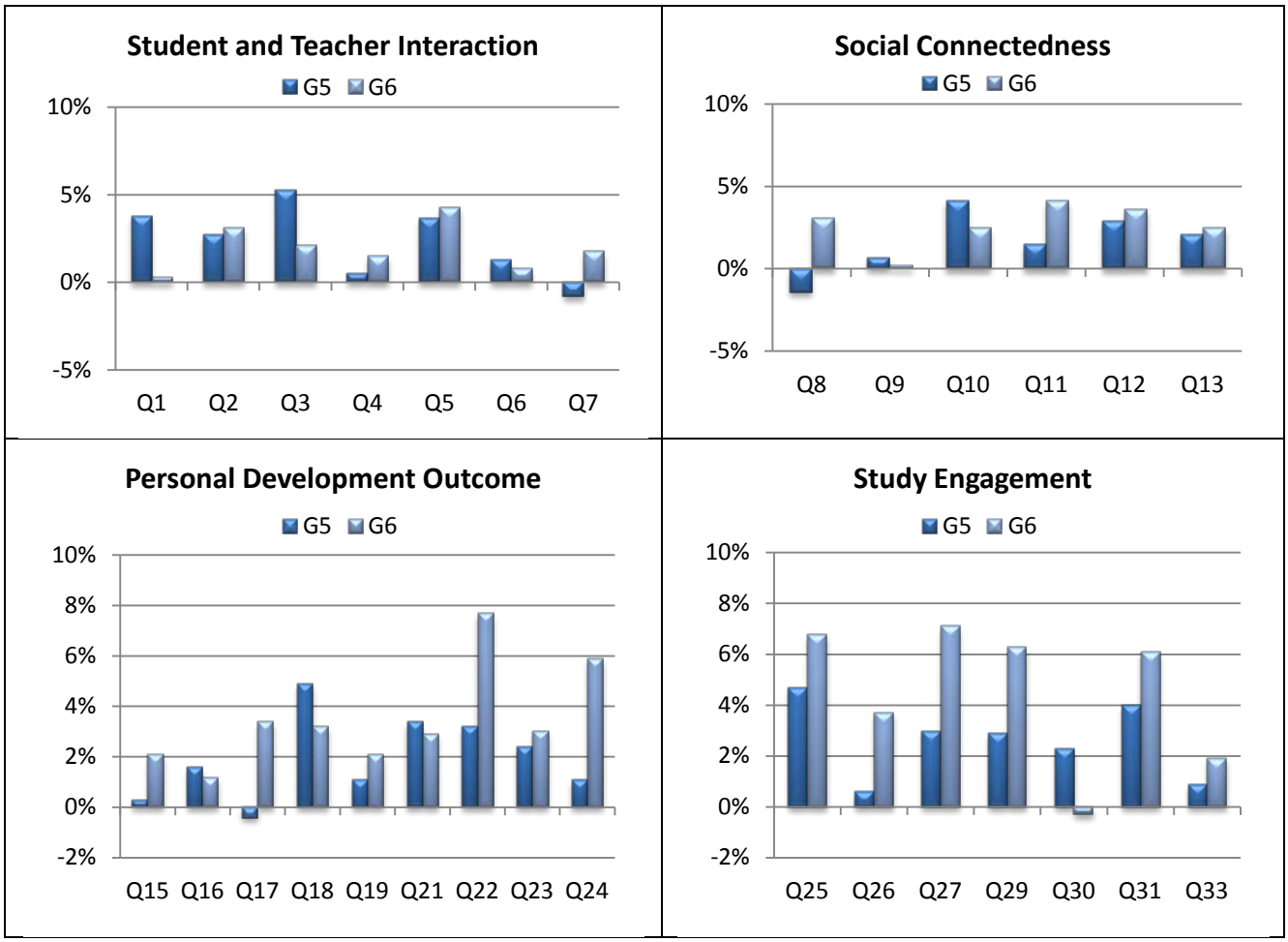
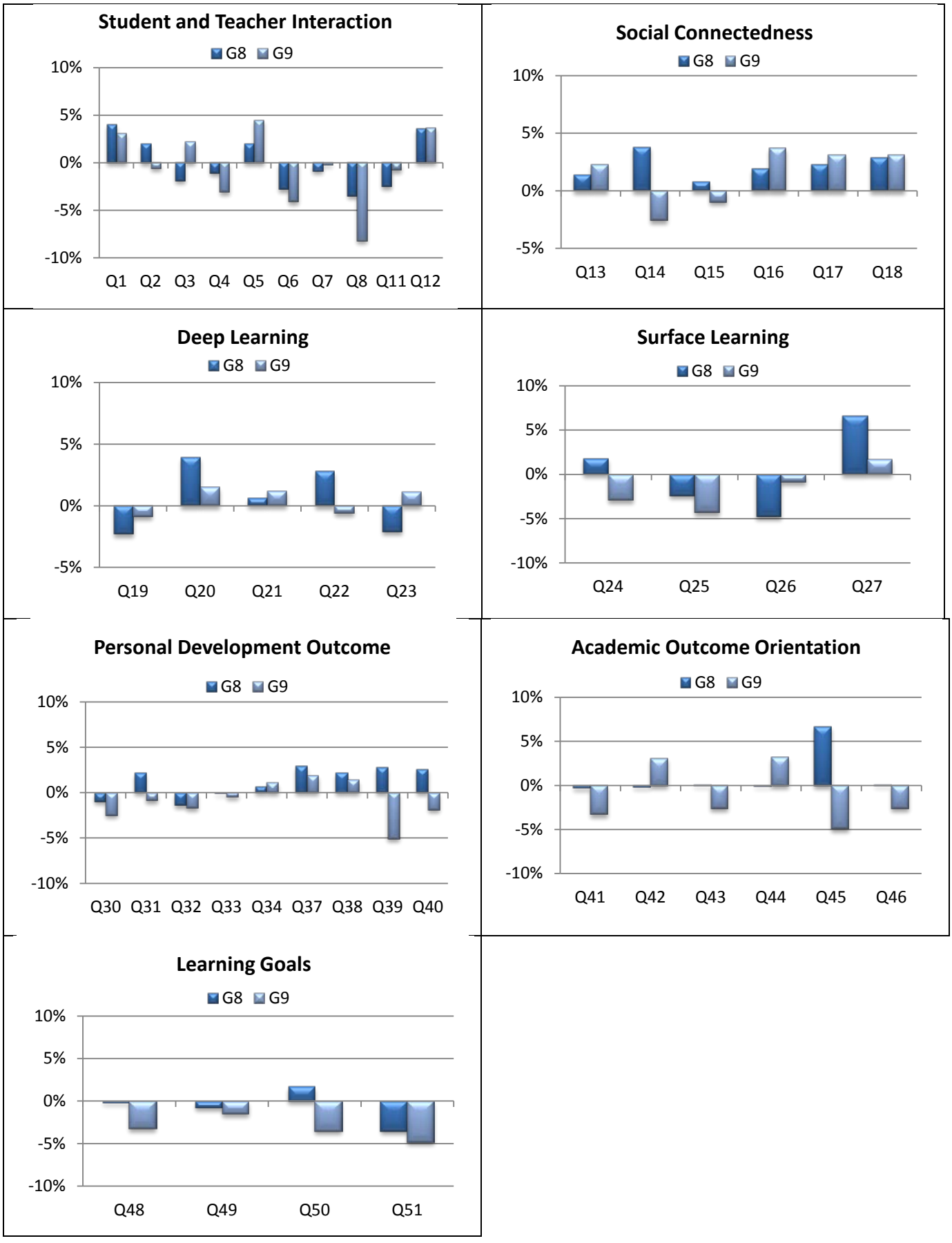



Figure 37 shows the difference in agreements between the IB cohort and the non-IB cohort at question level for each dimension in the secondary years questionnaire. Non-IB students appeared to have higher agreement than IB students in Student and Teacher Interaction and in Learning Goals, except for Q1, Q5 and Q12 in grades 8 and 9, Q2 in grade 8 and Q3 in grade 9, and in Learning Goals except for Q50 at grade 8.

On the other hand, IB students tended to have higher agreement in Social Connectedness at grades 8 and 9 except Q14 and Q15 at grade 9; and have higher agreement in Deep Learning except Q19 on both grades, Q22 at grade 9, and Q23 at grade 8. IB students appeared to have lower agreement on Surface Learning at both grade 8 and grade 9 except Q24 at grade 8 and Q27 for both grades. IB cohort also appeared to be higher in agreement on most questions in Personal Development Outcome. However, the results were mixed for Academic Outcome Orientation, where IB students had higher agreement on Q42 and Q44 in grade 9 and Q45 in grade 8 and non-IB students had higher agreement on Q41, Q43, Q45 and Q46 at grade 9.

Overall, it was observed that the differences in proportion of agreement at question level between IB and non-IB students were within 7% in almost all questions. This indicated that although there were differences in their perceptions, attitude and values in relation to their school and teachers, the magnitude of such differences was relatively small between IB students and non-IB students.

Figure 37 Difference in Agreements between IB and Non-IB students in Secondary Years Questionnaire



## 3.3 What is the relationship, if any, between students' ISA performance and their perceptions, values, attitudes and dispositions? Do these relationships change from grade to grade?

Prior to conducting correlation analyses, Rasch scale scores were computed so that correlation analyses were performed on values from interval scales. Each student with valid questionnaire responses was assigned four scale scores if he/she completed the primary years questionnaire, or seven scale scores if the secondary years questionnaire was completed. Pearson correlation analysis was performed between student questionnaire scale scores and ISA performance scores.

Table 42 shows correlations between student perceptions and ISA performance at grades 5 and 6. The correlations that were statistically significant at the 0.05 level were shown with bold text. Weak positive correlations, i.e. r = 0.1, were found between Social Connectedness and all four ISA performance scales in both grade 5 and 6 except for ISA Mathematical literacy at grade 6, between Student and Teacher Interaction and Expository Writing, between Personal Development Outcome and ISA Reading and the two Writing tasks, and between Study Engagement and Reading and the two Writing tasks.

Table 42 Correlations between Student Perceptions and ISA Performance at Grades 5 and 6

| Dimension | Mathematical Literacy | | Reading | | Narrative Writing | | Expository Writing | |
|---|---|---|---|---|---|---|---|---|
| | Gr 5 | Gr 6 | Gr 5 | Gr 6 | Gr 5 | Gr 6 | Gr 5 | Gr 6 |
| Student and Teacher Interaction | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| Social Connectedness | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Personal Development Outcome | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Study Engagement | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

Table 43 shows correlations between student perceptions and ISA performance at grade 8 and 9. Weak positive correlations (i.e. r = 0.1) were found between Deep Learning and all ISA domains except at grade 8. Weak negative correlations were found between Surface Learning and Mathematical Literacy, i.e. r = -0.2 at grade 9 and r = -0.1 at grade 8, and between Surface Learning and Reading and the two Writing tasks, i.e. r = -0.1.

In addition, weak positive correlations were found between Student and Teacher Interaction and Expository Writing, between Social Connectedness and Reading and Expository Writing, between Personal Development Outcome and the two Writing tasks, and between Learning Goals and all ISA domains except Reading at grade 8. However, weak negative correlation was found between Personal Development Outcome and ISA Mathematical Literacy at grade 9.

Table 43 Correlations between Student Perceptions and ISA Performance at Grades 8 and 9

| Dimension | Mathematical Literacy | | Reading | | Narrative Writing | | Expository Writing | |
|---|---|---|---|---|---|---|---|---|
| | Gr 8 | Gr 9 | Gr 8 | Gr 9 | Gr 8 | Gr 9 | Gr 8 | Gr 9 |
| Student and Teacher Interaction | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.0 | 0.1 | 0.1 |
| Social Connectedness | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 |
| Personal Development Outcome | 0.0 | -0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 |
| Surface Learning | -0.1 | -0.2 | -0.1 | -0.1 | -0.1 | 0.0 | -0.1 | -0.1 |
| Deep Learning | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Learning Goals | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Academic Outcome Orientation | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 |

Table 44 shows the correlations between student perceptions of the three common dimensions and ISA performance at grades 5 to 9. The results showed that there were weak positive correlations in all four grades between Student and Teacher Interaction and Expository Writing, between Social Connectedness and Reading and the two writing tasks except Narrative Writing at grade 9, between Personal

Development Outcome and the two Writing tasks. This indicated that factors such as supportive learning environment and social connectedness correlated with ISA performance scores on writing tasks.

Table 44 Correlations between Student Perceptions and ISA Performance at Grades 5 to 9

| Dimension | ISA Scale | Grade | | | |
|---|---|---|---|---|---|
| | | 5 | 6 | 8 | 9 |
| Student and Teacher Interaction | Mathematical Literacy | 0.0 | 0.0 | 0.0 | 0.0 |
| | Reading | 0.1 | 0.0 | 0.0 | 0.1 |
| | Narrative Writing | 0.0 | 0.0 | 0.0 | 0.0 |
| | Expository Writing | 0.1 | 0.1 | 0.1 | 0.1 |
| Social Connectedness | Mathematical Literacy | 0.1 | 0.0 | 0.0 | 0.0 |
| | Reading | 0.1 | 0.1 | 0.1 | 0.1 |
| | Narrative Writing | 0.1 | 0.1 | 0.1 | 0.0 |
| | Expository Writing | 0.1 | 0.1 | 0.1 | 0.1 |
| Personal Development Outcome | Mathematical Literacy | 0.0 | 0.0 | 0.0 | -0.1 |
| | Reading | 0.1 | 0.1 | 0.0 | 0.0 |
| | Narrative Writing | 0.1 | 0.1 | 0.1 | 0.1 |
| | Expository Writing | 0.1 | 0.1 | 0.1 | 0.1 |

In summary, there were weak correlations between students' ISA performance and their perceptions, values, attitudes and dispositions. In most cases, these correlations appeared similar between grades 5 and 6, and between grades 8 and 9.

## 3.4 How do the relationships between ISA performance and categories defined by the questionnaires differ for IB and non-IB students?

Table 45 shows the comparison of correlations between IB students and non-IB students between student perceptions and ISA scales at grades 5 and 6. Similar weak correlations were found between the IB cohort and the non-IB cohort in the following areas: between Student and Teacher Interaction and Expository Writing at grade 5, between Social Connectedness and ISA Mathematical Literacy and Reading at grade 5, between Personal Development Outcome and Reading at grades 5 and 6 and the two writing tasks at grade 5, and between Study Engagement and Narrative Writing at 5, and Expository Writing at grade 5 and 6. The non-IB cohort showed relatively stronger correlation than the IB cohort in the following areas: between Social Connectedness and the two writing tasks at grade 5, between Social Connectedness and Reading at grade 6.

Table 45 Comparison of IB and Non-IB Correlations between Student Perceptions and ISA Performance at Grades 5 and 6

| Grade | Dimension | Mathematical Literacy | | Reading | | Narrative Writing | | Expository Writing | |
|---|---|---|---|---|---|---|---|---|---|
| | | IB | Non-IB | IB | Non-IB | IB | Non-IB | IB | Non-IB |
| 5 | Student and Teacher Interaction | 0.0 | -0.1 | 0.1 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 |
| | Social Connectedness | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.2 |
| | Personal Development Outcome | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Study Engagement | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 |
| 6 | Student and Teacher Interaction | 0.0 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 |
| | Social Connectedness | 0.0 | 0.0 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Personal Development Outcome | 0.0 | -0.1 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 |
| | Study Engagement | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.0 | 0.1 | 0.1 |

Table 46 shows the comparisons of IB and non-IB correlations between student perceptions and ISA scales at grades 8 and 9. Similar weak positive correlations were found between the IB cohort and the non-IB cohort in the following areas: between Social Connectedness and the two writing tasks at grade 8, between Social Connectedness and Expository Writing at grade 9, between Personal Development Outcome and the two writing tasks at grades 8 and 9, between Deep Learning and Reading and Narrative Writing at grade 9, between Learning Goals and Reading and the two writing tasks at grade 9, and between Academic Outcome Orientation and Expository Writing at grade 9.

Table 46 Comparison of IB and Non-IB Correlations between Student Perceptions and ISA Performance at Grades 8 and 9

| Grade | Dimension | Mathematical Literacy | | Reading | | Narrative Writing | | Expository Writing | |
|---|---|---|---|---|---|---|---|---|---|
| | | IB | Non-IB | IB | Non-IB | IB | Non-IB | IB | Non-IB |
| 8 | Student and Teacher Interaction | 0.1 | -0.1 | 0.0 | -0.1 | 0.1 | -0.1 | 0.1 | 0.0 |
| | Social Connectedness | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Personal Development Outcome | 0.0 | -0.1 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Surface Learning | -0.1 | -0.2 | -0.1 | -0.2 | 0.0 | -0.2 | 0.0 | -0.2 |
| | Deep Learning | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 |
| | Learning Goals | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 |
| | Academic Outcome Orientation | -0.1 | -0.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 9 | Student and Teacher Interaction | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.2 |
| | Social Connectedness | 0.0 | -0.1 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 |
| | Personal Development Outcome | -0.1 | -0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Surface Learning | -0.2 | -0.2 | -0.1 | -0.1 | 0.0 | -0.1 | -0.1 | -0.2 |
| | Deep Learning | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 |
| | Learning Goals | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| | Academic Outcome Orientation | 0.0 | 0.0 | 0.0 | 0.1 | 0.0 | 0.1 | 0.1 | 0.1 |

Similar weak negative correlations were found between the IB cohort and the non-IB cohort in the following areas: between Academic Outcome Orientation and Mathematical Literacy, and between Surface Learning and Mathematical Literacy and Reading at grade 9. The IB cohort showed relatively stronger correlations than the non-IB cohort between Student and Teacher Interaction and Mathematical Literacy and Narrative Writing at grade 8.

On the other hand, the non-IB cohort showed relatively stronger correlations than the IB cohort in the following areas: between Social Connectedness and Reading at grade 8, between Student and Teacher Interaction and Expository Writing at grade 9, between Social Connectedness and Reading at grade 9, and between Deep Learning and Expository Writing at grade 9. However, the non-IB cohort showed relatively stronger negative correlations between Surface Learning and Mathematical Literacy, Reading and Narrative Writing at grade 8, and between Surface Learning and Expository Writing at grade 9.

In summary, although correlations were similar among IB and non-IB students in many cases between student perception scales and ISA performance scales, the IB cohort showed relatively stronger positive correlations than the non-IB cohort between Student and Teacher Interaction and Mathematical Literacy, and between Student and Teacher Interaction and Narrative Writing at grade 8. The IB cohort showed relatively weaker negative correlation between Surface Learning and all ISA domains except Expository Writing at grade 8, and between Surface Learning and Expository Writing at grade 9.

## CONCLUSION

This investigation on ISA assessment data in 2009-10 and 2010-11 indicated that there was evidence that at a global level analysis, PYP and MYP students generally performed better than students from non-IB schools in the ISA assessment areas. The difference in Reading was significant at all grades, except grade 8, with effect sizes of up to 0.40, whereas the difference in Mathematical Literacy was significant at grades 6, 9 and 10. In the 32 comparisons (8 grades by 4 domains), only three groups of non-IB students – grades 3 and 8 Mathematical Literacy and grade 5 Narrative Writing – performed better than IB peers.

The IB cohort outperformed the non-IB cohort with a relatively large margin in the regions of Europe and the Americas for most comparison groups, with effect sizes of up to 0.75. In Africa, 75% of comparisons showed that IB students significantly outperformed non-IB students, with effect sizes of between 0.16 and 0.60. In the region of Asia and Oceania, IB students outperformed non-IB students in the following comparisons: at grade 10 Mathematical Literacy, at grades 4, 6-7, 9 and 10 Reading, at grades 4, 9 and 10 Narrative Writing, and at grades 4, 7, 9 and 10 Expository Writing. The differences were small in effect sizes with the exception of a medium effect size at grade 10. However, in the Asia and Oceania region, non-IB students were significantly better than IB students in Mathematical Literacy in grades 3-5 and 8, with small to medium effect sizes.

The country analysis in Asia found that the IB cohort did better than the non-IB cohort in most comparisons in Philippines, Thailand, Vietnam, and United Arab Emirates. However, the non-IB cohort did better than the IB cohort in all comparisons in Saudi Arabia. No significant differences were found in more than 50% of comparisons in Cambodia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Oman, and Singapore. Among these countries, IB students had outperformed non-IB students in more number of comparisons in Cambodia, China, India, Indonesia, Japan, and Oman, while non-IB students had outperformed IB students in more number of comparisons in Hong Kong SAR, Korea, and Singapore.

The sub-strand analysis results found that IB students exhibited strength in ISA Reading in all sub-strands at all grade levels except at grade 8. The effect sizes were as large as 0.38. In addition, IB students demonstrated better performances in Mathematical Literacy in grade 6 (effect sizes of 0.09 to 0.14), grade 9 (effect sizes of 0.11 to 0.19), and grade 10 (effect sizes of 0.36 to 0.49). In expository writing, IB students outperformed non-IB students in grades 4, 9 and 10 with effect sizes ranging from very small (0.10) to moderately large (0.53). However, non-IB students outperformed IB students in grade 8 all sub-strands of the ISA assessment areas.

IB students had achieved an average score of 551 and 570 in Mathematical Literacy at grades 9 and 10, respectively. This was significantly better than the PISA 2006 OECD mean of 496. In Reading, IB average scores were 533 and 568 in grades 9 and 10, respectively. This was above the PISA 2010 OECD mean of 493.

The comparisons of ISA performance between continuum programme and single (or dual) programme indicated that IB cohorts with continuum programme were more likely to outperform their counterpart with single (or double) programme where a year-level appropriate IB programme was not implemented at the same grade levels. There was evidence to suggest that IB cohorts with PYP and MYP were more likely to outperform their counterpart with only single programme implemented. Such difference in performance appeared to be larger at grade levels where a year-level appropriate IB programme was not implemented.

The correlations of performance in IB MYP schools with the length of IB programme implementation was weak to moderate in all assessment areas. The correlation indexes were between 0.14 and 0.34 for Mathematical Literacy and between 0.03 and 0.29 for Reading. This result was confirmed by observations

of positive changes in medians among MYP schools with medium to long authorization length in grades 6 to 8 and 10. However, the result did not find sufficient support to suggest that a longer period of time in PYP implementation produced better ISA performance at grades 3 to 5.

Multilevel analysis indicated that the proportions of between-school variance among IB schools were smaller than those among non-IB schools in all of the four ISA domains. This showed that the IB schools were more similar to each other than the non-IB schools were similar to each other with respect to the four domains of ISA performance.

IB students responded with a high percentage of agreement on their perceptions of school life, their attitudes, and their sense of wellbeing. For example, 89% PYP grade 5 students and 79% MYP grade 9 students agreed that their schools provided a supportive learning environment, and their school experiences were useful preparation for other aspects of life. 83% of PYP students at grade 5 felt that they were engaged well in their study and met the challenges of their schoolwork, and 84% of MYP grade 9 students agreed that they were engaged with their work and challenged to attempt more complex problems. 80% of MYP grade 9 students agreed that they made connections between the learning in the classroom and applications in other aspects of their life, while 56% of them agreed that they focused on learning for assessment and made few connections on outside applications. 80% of MYP grade 9 students agreed that they were motivated by achieving successful outcomes of assessment and learning and how their achievements were viewed by and compared with those of others.

The results indicated that both IB students and non-IB students had relatively high percentages of agreement in their perceptions, values, attitudes and dispositions pertaining to school, teachers and learning. However, IB students had moderately higher proportions of agreement, in the range of 2% to 5%, across all four dimensions in the primary years questionnaire. They also had slightly higher proportions of agreement in Social Connectedness and Deep Learning at grades 8 and 9, and in Personal Development Outcome and Academic Outcome Orientation at grade 8 in the secondary years questionnaire. Only weak correlations were found between students' ISA performance and their perceptions, values, attitudes and dispositions pertaining to school, teacher and learning. Although such correlations were similar among IB and non-IB students, the IB cohort showed relatively stronger positive correlations than non-IB cohort between Student and Teacher Interaction and Mathematical Literacy and Narrative Writing at grade 8. The IB cohort also showed relatively weaker negative correlations between Surface Learning and all ISA domains except for Expository Writing at grade 8, and between Surface Learning and Expository Writing at grade 9.

This investigation was conducted with limited background information about schools and students. ISA performance data were not census data, and schools participating in each country were not a random sample. Caution must be exercised in drawing conclusions from these results. In the comparison of the outcomes of students, cohort performances or country performances, there were many other factors, such as students' social economic backgrounds, school size, school type, the numbers and qualifications of teachers in a school, sources of funding and any selective enrolment policies among others that may influence student performance to some extent. No data concerning these factors were collected and therefore were not available to this analysis.

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## Appendix 1: List of Countries by Geographic Regions

| Asia | Europe | Africa | Americas | Oceania |
|---|---|---|---|---|
| Bahrain | Austria | Botswana | Bahamas | Fiji |
| Bangladesh | Belgium | Congo | Chile | Papua New Guinea |
| Brunei | Czech Republic | Egypt | Mexico | |
| Cambodia | Denmark | Ethiopia | Netherlands Antilles | |
| China | Finland | Ghana | Us Virgin Islands | |
| Cyprus | France | Kenya | USA | |
| Hong Kong SAR | Germany | Malawi | Venezuela | |
| India | Greece | Morocco | | |
| Indonesia | Italy | Mozambique | | |
| Japan | Latvia | Nigeria | | |
| Jordan | Luxembourg | South Africa | | |
| Kuwait | Netherlands | Sudan | | |
| Malaysia | Norway | Tanzania | | |
| Myanmar | Romania | Uganda | | |
| Oman | Russian Federation | Zimbabwe | | |
| Pakistan | Spain | | | |
| Philippines | Sweden | | | |
| Qatar | Switzerland | | | |
| Republic of Korea | Ukraine | | | |
| Saudi Arabia | United Kingdom | | | |
| Singapore | | | | |
| Sri Lanka | | | | |
| Thailand | | | | |
| Turkey | | | | |
| United Arab Emirates | | | | |
| Uzbekistan | | | | |
| Vietnam | | | | |

# Appendix 2: Performance Comparison between IB-Schools and non-IB Schools by Country in Asia

## Cambodia IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 329 | 83 | 91 | 339 | 79 | 70 | | -0.12 |
| | 5 | 428 | 79 | 77 | 439 | 81 | 76 | | -0.14 |
| | 7 | 506 | 73 | 77 | 483 | 87 | 81 | | 0.29 |
| | 9 | 526 | 83 | 70 | 553 | 86 | 74 | | -0.32 |
| Reading | 3 | 255 | 94 | 90 | 253 | 97 | 68 | | 0.02 |
| | 5 | 372 | 80 | 77 | 346 | 84 | 76 | | 0.32 |
| | 7 | 472 | 88 | 76 | 438 | 97 | 81 | ++ | **0.36** |
| | 9 | 521 | 84 | 70 | 515 | 105 | 75 | | 0.07 |
| Narrative Writing | 3 | 365 | 54 | 91 | 361 | 63 | 70 | | 0.08 |
| | 5 | 475 | 63 | 77 | 446 | 66 | 76 | ++ | **0.45** |
| | 7 | 523 | 64 | 77 | 507 | 70 | 81 | | 0.24 |
| | 9 | 565 | 61 | 70 | 552 | 63 | 74 | | 0.22 |
| Expository Writing | 3 | 414 | 46 | 90 | 382 | 41 | 69 | +++ | **0.73** |
| | 5 | 476 | 47 | 77 | 462 | 53 | 76 | | 0.28 |
| | 7 | 528 | 49 | 76 | 510 | 77 | 81 | | 0.28 |
| | 9 | 575 | 55 | 70 | 559 | 60 | 74 | | 0.29 |

## China IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 328 | 87 | 522 | 368 | 94 | 346 | – – | **-0.44** |
| | 4 | 400 | 88 | 318 | 410 | 85 | 259 | | -0.11 |
| | 5 | 448 | 84 | 533 | 459 | 76 | 207 | | -0.13 |
| | 6 | 481 | 92 | 276 | 510 | 94 | 227 | – – | **-0.31** |
| | 7 | 521 | 83 | 561 | 536 | 83 | 136 | | -0.18 |
| | 8 | 535 | 79 | 317 | 564 | 77 | 102 | – – | **-0.37** |
| | 9 | 575 | 93 | 317 | 580 | 78 | 136 | | -0.06 |
| | 10 | 608 | 94 | 474 | 600 | 96 | 49 | | 0.08 |
| Reading | 3 | 253 | 92 | 519 | 232 | 99 | 341 | ++ | **0.23** |
| | 4 | 308 | 95 | 317 | 290 | 103 | 254 | + | 0.18 |
| | 5 | 361 | 91 | 537 | 347 | 95 | 204 | | 0.15 |
| | 6 | 367 | 111 | 268 | 385 | 105 | 227 | | -0.16 |
| | 7 | 455 | 107 | 557 | 445 | 96 | 136 | | 0.09 |
| | 8 | 464 | 103 | 316 | 501 | 85 | 100 | – – | **-0.39** |
| | 9 | 494 | 98 | 306 | 499 | 95 | 136 | | -0.05 |
| | 10 | 571 | 105 | 466 | 545 | 111 | 49 | | 0.24 |
| Narrative Writing | 3 | 367 | 58 | 520 | 354 | 63 | 344 | ++ | **0.21** |
| | 4 | 404 | 67 | 315 | 391 | 67 | 256 | ++ | **0.20** |
| | 5 | 450 | 65 | 528 | 444 | 67 | 204 | | 0.10 |
| | 6 | 465 | 72 | 275 | 469 | 74 | 226 | | -0.05 |
| | 7 | 507 | 68 | 559 | 494 | 62 | 136 | ++ | **0.20** |
| | 8 | 515 | 79 | 316 | 543 | 69 | 102 | – – | **-0.39** |
| | 9 | 531 | 81 | 314 | 528 | 82 | 136 | | 0.04 |
| | 10 | 574 | 78 | 472 | 539 | 75 | 49 | ++ | **0.46** |
| Expository Writing | 3 | 394 | 51 | 519 | 386 | 55 | 341 | + | 0.15 |
| | 4 | 422 | 59 | 317 | 418 | 61 | 254 | | 0.06 |
| | 5 | 462 | 59 | 536 | 451 | 62 | 202 | + | 0.17 |
| | 6 | 474 | 66 | 267 | 477 | 65 | 227 | | -0.04 |
| | 7 | 526 | 61 | 556 | 510 | 64 | 136 | ++ | **0.26** |
| | 8 | 533 | 70 | 316 | 539 | 53 | 100 | | -0.10 |
| | 9 | 552 | 72 | 307 | 555 | 60 | 136 | | -0.04 |
| | 10 | 597 | 71 | 465 | 577 | 65 | 49 | | 0.30 |

## Hong Kong SAR IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 312 | 69 | 119 | 378 | 77 | 167 | – – – | **-0.91** |
| | 5 | 436 | 71 | 95 | 487 | 77 | 117 | – – – | **-0.69** |
| | 6 | 477 | 81 | 368 | 472 | 75 | 93 | | 0.06 |
| | 7 | 583 | 78 | 158 | 544 | 83 | 216 | ++ | **0.48** |
| | 8 | 534 | 77 | 305 | 524 | 71 | 46 | | 0.13 |
| | 9 | 579 | 93 | 196 | 601 | 62 | 151 | – – | **-0.27** |
| | 10 | 605 | 87 | 37 | 576 | 81 | 30 | | 0.34 |
| Reading | 3 | 255 | 87 | 118 | 313 | 83 | 167 | – – – | **-0.67** |
| | 5 | 380 | 80 | 94 | 433 | 76 | 117 | – – – | **-0.68** |
| | 6 | 439 | 85 | 361 | 455 | 80 | 94 | | -0.19 |
| | 7 | 550 | 99 | 158 | 517 | 75 | 217 | ++ | **0.37** |
| | 8 | 494 | 78 | 305 | 514 | 77 | 48 | | -0.26 |
| | 9 | 605 | 93 | 197 | 589 | 91 | 150 | | 0.17 |
| | 10 | 569 | 76 | 38 | 553 | 69 | 30 | | 0.22 |
| Narrative Writing | 3 | 364 | 59 | 119 | 407 | 56 | 166 | – – – | **-0.73** |
| | 5 | 456 | 69 | 95 | 506 | 65 | 116 | – – – | **-0.75** |
| | 6 | 494 | 62 | 368 | 501 | 54 | 93 | | -0.13 |
| | 7 | 559 | 64 | 158 | 566 | 61 | 216 | | -0.11 |
| | 8 | 544 | 65 | 305 | 565 | 78 | 45 | | -0.29 |
| | 9 | 594 | 70 | 195 | 612 | 70 | 151 | – – | **-0.25** |
| | 10 | 583 | 77 | 37 | 574 | 50 | 30 | | 0.14 |
| Expository Writing | 3 | 390 | 56 | 118 | 433 | 48 | 167 | – – – | **-0.82** |
| | 5 | 464 | 56 | 94 | 509 | 57 | 117 | – – – | **-0.79** |
| | 6 | 504 | 57 | 361 | 509 | 58 | 94 | | -0.08 |
| | 7 | 575 | 47 | 158 | 561 | 53 | 217 | ++ | **0.27** |
| | 8 | 552 | 56 | 305 | 561 | 59 | 48 | | -0.15 |
| | 9 | 615 | 68 | 197 | 620 | 58 | 150 | | -0.07 |
| | 10 | 618 | 60 | 37 | 597 | 49 | 30 | | 0.38 |

## India IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 343 | 86 | 160 | 310 | 115 | 26 | | 0.33 |
| | 4 | 395 | 81 | 164 | 348 | 82 | 39 | +++ | **0.58** |
| | 5 | 422 | 86 | 143 | 390 | 69 | 29 | | 0.41 |
| | 6 | 424 | 78 | 50 | 431 | 60 | 18 | | -0.09 |
| | 7 | 410 | 86 | 27 | 529 | 86 | 13 | – – – | **-1.39** |
| | 8 | 466 | 81 | 45 | 551 | 46 | 16 | – – – | **-1.29** |
| Reading | 3 | 275 | 96 | 154 | 221 | 109 | 26 | +++ | **0.53** |
| | 4 | 335 | 94 | 162 | 300 | 103 | 38 | ++ | **0.35** |
| | 5 | 369 | 89 | 140 | 331 | 83 | 29 | ++ | **0.44** |
| | 6 | 389 | 96 | 50 | 409 | 97 | 18 | | -0.21 |
| | 7 | 395 | 82 | 27 | 452 | 110 | 12 | | -0.59 |
| | 8 | 459 | 75 | 45 | 516 | 66 | 16 | – – – | **-0.80** |
| Narrative Writing | 3 | 378 | 63 | 159 | 356 | 70 | 25 | | 0.33 |
| | 4 | 429 | 59 | 163 | 418 | 65 | 39 | | 0.17 |
| | 5 | 466 | 65 | 143 | 453 | 53 | 29 | | 0.22 |
| | 6 | 473 | 62 | 50 | 495 | 43 | 18 | | -0.42 |
| | 7 | 472 | 82 | 27 | 550 | 88 | 13 | – – – | **-0.92** |
| | 8 | 517 | 56 | 45 | 555 | 72 | 16 | – – – | **-0.60** |
| Expository Writing | 3 | 402 | 50 | 154 | 370 | 64 | 26 | +++ | **0.57** |
| | 4 | 450 | 58 | 161 | 403 | 54 | 38 | +++ | **0.85** |
| | 5 | 471 | 61 | 140 | 439 | 69 | 29 | +++ | **0.50** |
| | 6 | 485 | 46 | 50 | 474 | 56 | 18 | | 0.22 |
| | 7 | 506 | 42 | 27 | 484 | 76 | 12 | | 0.36 |
| | 8 | 536 | 55 | 45 | 566 | 91 | 14 | | -0.40 |

## Indonesia IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 307 | 74 | 371 | 341 | 78 | 261 | – – | **-0.45** |
| | 4 | 370 | 77 | 68 | 374 | 73 | 127 | | -0.05 |
| | 5 | 414 | 75 | 382 | 422 | 73 | 143 | | -0.11 |
| | 6 | 439 | 80 | 35 | 464 | 85 | 74 | | -0.30 |
| | 7 | 489 | 83 | 179 | 467 | 107 | 89 | | 0.23 |
| | 8 | 537 | 72 | 26 | 519 | 71 | 37 | | 0.25 |
| | 9 | 544 | 67 | 42 | 517 | 82 | 48 | | 0.36 |
| | 10 | 544 | 79 | 193 | 592 | 88 | 16 | – – – | **-0.57** |
| Reading | 3 | 234 | 84 | 368 | 276 | 93 | 263 | – – | **-0.47** |
| | 4 | 292 | 87 | 68 | 290 | 87 | 127 | | 0.03 |
| | 5 | 350 | 80 | 377 | 369 | 93 | 144 | – – | **-0.22** |
| | 6 | 384 | 85 | 36 | 384 | 113 | 74 | | 0.00 |
| | 7 | 453 | 91 | 177 | 422 | 120 | 89 | ++ | **0.29** |
| | 8 | 514 | 93 | 26 | 461 | 77 | 37 | +++ | **0.62** |
| | 9 | 530 | 75 | 43 | 478 | 96 | 47 | +++ | **0.61** |
| | 10 | 543 | 87 | 187 | 545 | 80 | 16 | | -0.03 |
| Narrative Writing | 3 | 370 | 56 | 367 | 375 | 55 | 261 | | -0.10 |
| | 4 | 405 | 60 | 68 | 401 | 61 | 127 | | 0.07 |
| | 5 | 449 | 59 | 378 | 454 | 62 | 143 | | -0.07 |
| | 6 | 475 | 58 | 35 | 477 | 51 | 74 | | -0.04 |
| | 7 | 501 | 61 | 178 | 481 | 71 | 89 | ++ | **0.30** |
| | 8 | 569 | 77 | 26 | 527 | 64 | 37 | +++ | **0.60** |
| | 9 | 590 | 64 | 42 | 542 | 60 | 48 | +++ | **0.78** |
| | 10 | 570 | 70 | 193 | 548 | 58 | 16 | | 0.33 |
| Expository Writing | 3 | 392 | 53 | 367 | 407 | 52 | 261 | – – | **-0.28** |
| | 4 | 434 | 56 | 68 | 422 | 53 | 127 | | 0.20 |
| | 5 | 458 | 59 | 377 | 470 | 55 | 144 | – – | **-0.21** |
| | 6 | 473 | 67 | 36 | 488 | 61 | 74 | | -0.24 |
| | 7 | 512 | 54 | 177 | 507 | 66 | 89 | | 0.07 |
| | 8 | 553 | 45 | 26 | 528 | 51 | 37 | +++ | **0.54** |
| | 9 | 560 | 62 | 43 | 552 | 54 | 47 | | 0.14 |
| | 10 | 578 | 63 | 186 | 590 | 68 | 16 | | -0.18 |

## Japan IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 336 | 96 | 315 | 332 | 82 | 247 | | 0.04 |
| | 4 | 384 | 86 | 118 | 400 | 86 | 208 | | -0.18 |
| | 5 | 446 | 85 | 337 | 432 | 86 | 209 | | 0.16 |
| | 7 | 523 | 92 | 197 | 510 | 94 | 153 | | 0.14 |
| | 8 | 519 | 100 | 16 | 542 | 93 | 163 | | -0.24 |
| | 9 | 578 | 87 | 92 | 572 | 89 | 122 | | 0.07 |
| | 10 | 597 | 71 | 42 | 524 | 80 | 19 | +++ | **0.96** |
| Reading | 3 | 254 | 94 | 309 | 263 | 109 | 245 | | -0.09 |
| | 4 | 315 | 82 | 115 | 335 | 114 | 205 | | -0.20 |
| | 5 | 370 | 90 | 337 | 353 | 105 | 209 | | 0.17 |
| | 7 | 454 | 95 | 196 | 442 | 109 | 151 | | 0.11 |
| | 8 | 428 | 126 | 16 | 473 | 102 | 163 | | -0.39 |
| | 9 | 510 | 101 | 92 | 523 | 102 | 124 | | -0.13 |
| | 10 | 574 | 78 | 43 | 496 | 98 | 19 | +++ | **0.88** |
| Narrative Writing | 3 | 373 | 60 | 313 | 378 | 58 | 247 | | -0.08 |
| | 4 | 409 | 66 | 117 | 425 | 74 | 208 | | -0.22 |
| | 5 | 458 | 65 | 337 | 463 | 69 | 209 | | -0.08 |
| | 7 | 512 | 74 | 196 | 506 | 83 | 153 | | 0.08 |
| | 8 | 504 | 70 | 16 | 523 | 78 | 163 | | -0.26 |
| | 9 | 541 | 84 | 93 | 563 | 78 | 122 | | -0.27 |
| | 10 | 585 | 74 | 43 | 535 | 61 | 19 | +++ | **0.74** |
| Expository Writing | 3 | 404 | 48 | 311 | 404 | 53 | 245 | | -0.01 |
| | 4 | 429 | 50 | 117 | 443 | 60 | 205 | – – | **-0.25** |
| | 5 | 470 | 64 | 337 | 480 | 68 | 209 | | -0.15 |
| | 7 | 529 | 70 | 196 | 523 | 71 | 151 | | 0.08 |
| | 8 | 507 | 70 | 16 | 545 | 70 | 163 | – – – | **-0.53** |
| | 9 | 574 | 71 | 91 | 573 | 66 | 124 | | 0.02 |
| | 10 | 593 | 69 | 42 | 547 | 61 | 19 | +++ | **0.70** |

## Oman IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 3 | 320 | 70 | 136 | 249 | 76 | 26 | +++ | **0.97** |
| | 5 | 429 | 80 | 138 | 416 | 104 | 16 | | 0.13 |
| **Reading** | 3 | 283 | 74 | 136 | 236 | 103 | 26 | +++ | **0.52** |
| | 5 | 389 | 73 | 137 | 360 | 96 | 16 | | 0.34 |
| **Narrative Writing** | 3 | 390 | 55 | 136 | 376 | 60 | 25 | | 0.23 |
| | 5 | 471 | 61 | 137 | 449 | 74 | 16 | | 0.31 |
| **Expository Writing** | 3 | 415 | 51 | 136 | 400 | 58 | 26 | | 0.29 |
| | 5 | 477 | 49 | 136 | 495 | 59 | 16 | | -0.33 |

## Philippines IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 4 | 415 | 62 | 55 | 379 | 83 | 39 | +++ | **0.50** |
| | 7 | 543 | 92 | 65 | 471 | 94 | 81 | +++ | **0.78** |
| | 9 | 538 | 71 | 24 | 524 | 72 | 26 | | 0.19 |
| **Reading** | 4 | 397 | 85 | 55 | 320 | 88 | 39 | +++ | **0.89** |
| | 7 | 531 | 81 | 65 | 436 | 120 | 80 | +++ | **0.93** |
| | 9 | 555 | 68 | 24 | 597 | 87 | 26 | | -0.53 |
| **Narrative Writing** | 4 | 456 | 57 | 55 | 421 | 52 | 39 | +++ | **0.65** |
| | 7 | 545 | 85 | 65 | 502 | 73 | 81 | +++ | **0.55** |
| | 9 | 600 | 54 | 24 | 579 | 55 | 26 | | 0.38 |
| **Expository Writing** | 4 | 456 | 54 | 55 | 435 | 52 | 39 | | 0.39 |
| | 7 | 558 | 61 | 65 | 510 | 70 | 79 | +++ | **0.73** |
| | 9 | 600 | 72 | 24 | 622 | 68 | 26 | | -0.32 |

## Republic of Korea IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 3 | 368 | 92 | 33 | 350 | 89 | 227 | | 0.19 |
| | 4 | 412 | 91 | 33 | 420 | 85 | 218 | | -0.09 |
| | 5 | 458 | 84 | 34 | 472 | 84 | 228 | | -0.16 |
| **Reading** | 3 | 284 | 91 | 33 | 282 | 89 | 225 | | 0.03 |
| | 4 | 323 | 80 | 32 | 355 | 85 | 217 | – – | **-0.38** |
| | 5 | 377 | 84 | 34 | 400 | 85 | 226 | | -0.27 |
| **Narrative Writing** | 3 | 367 | 68 | 33 | 375 | 60 | 225 | | -0.12 |
| | 4 | 417 | 46 | 33 | 429 | 64 | 217 | | -0.22 |
| | 5 | 446 | 57 | 34 | 474 | 59 | 228 | – – | **-0.48** |
| **Expository Writing** | 3 | 404 | 46 | 33 | 398 | 56 | 225 | | 0.13 |
| | 4 | 453 | 54 | 32 | 449 | 54 | 217 | | 0.08 |
| | 5 | 511 | 45 | 34 | 478 | 57 | 227 | +++ | **0.63** |

## Saudi Arabia IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 3 | 268 | 70 | 36 | 271 | 68 | 91 | | -0.05 |
| | 7 | 361 | 99 | 68 | 426 | 83 | 46 | – – – | **-0.71** |
| | 9 | 451 | 77 | 51 | 458 | 78 | 59 | | -0.09 |
| **Reading** | 3 | 230 | 69 | 36 | 227 | 78 | 90 | | 0.05 |
| | 7 | 300 | 103 | 69 | 410 | 89 | 46 | – – – | **-1.14** |
| | 9 | 402 | 87 | 52 | 457 | 75 | 56 | – – – | **-0.67** |
| **Narrative Writing** | 3 | 352 | 57 | 36 | 347 | 56 | 91 | | 0.09 |
| | 7 | 383 | 75 | 67 | 494 | 60 | 46 | – – – | **-1.63** |
| | 9 | 418 | 86 | 50 | 524 | 94 | 59 | – – – | **-1.17** |
| **Expository Writing** | 3 | 365 | 41 | 36 | 384 | 46 | 90 | – – | **-0.44** |
| | 7 | 410 | 69 | 69 | 501 | 45 | 46 | – – – | **-1.55** |
| | 9 | 451 | 77 | 48 | 539 | 62 | 56 | – – – | **-1.27** |

## Singapore IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| **Mathematical Literacy** | 3 | 307 | 66 | 99 | 324 | 105 | 16 | | -0.19 |
| | 5 | 433 | 65 | 64 | 456 | 73 | 22 | | -0.33 |
| | 6 | 455 | 82 | 63 | 449 | 90 | 12 | | 0.07 |
| **Reading** | 3 | 253 | 68 | 98 | 277 | 112 | 17 | | -0.26 |
| | 5 | 397 | 80 | 62 | 430 | 70 | 22 | | -0.44 |
| | 6 | 422 | 92 | 63 | 441 | 122 | 12 | | -0.18 |
| **Narrative Writing** | 3 | 344 | 53 | 99 | 385 | 54 | 17 | – – – | **-0.77** |
| | 5 | 455 | 67 | 64 | 474 | 65 | 22 | | -0.28 |
| | 6 | 500 | 71 | 63 | 487 | 55 | 12 | | 0.21 |
| **Expository Writing** | 3 | 384 | 44 | 98 | 409 | 48 | 17 | – – – | **-0.54** |
| | 5 | 488 | 42 | 62 | 495 | 55 | 22 | | -0.15 |
| | 6 | 491 | 66 | 63 | 487 | 55 | 12 | | 0.06 |

## Thailand IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 298 | 74 | 291 | 309 | 80 | 147 | | -0.15 |
| | 4 | 365 | 80 | 358 | 336 | 117 | 50 | | 0.28 |
| | 5 | 440 | 75 | 374 | 409 | 90 | 176 | ++ | **0.38** |
| | 6 | 475 | 84 | 342 | 399 | 88 | 41 | +++ | **0.88** |
| | 7 | 501 | 81 | 303 | 447 | 79 | 103 | +++ | **0.67** |
| | 8 | 514 | 80 | 126 | 436 | 69 | 28 | +++ | **1.05** |
| | 9 | 557 | 82 | 189 | 537 | 100 | 183 | ++ | **0.22** |
| Reading | 3 | 238 | 86 | 290 | 230 | 101 | 147 | | 0.09 |
| | 4 | 319 | 79 | 359 | 232 | 96 | 50 | +++ | **0.98** |
| | 5 | 372 | 81 | 377 | 341 | 114 | 176 | ++ | **0.32** |
| | 6 | 418 | 95 | 341 | 351 | 77 | 41 | +++ | **0.78** |
| | 7 | 468 | 93 | 306 | 359 | 91 | 104 | +++ | **1.19** |
| | 8 | 461 | 74 | 124 | 367 | 88 | 28 | +++ | **1.15** |
| | 9 | 517 | 84 | 189 | 451 | 82 | 184 | +++ | **0.80** |
| Narrative Writing | 3 | 362 | 55 | 290 | 367 | 62 | 147 | | -0.08 |
| | 4 | 410 | 60 | 357 | 378 | 55 | 50 | +++ | **0.55** |
| | 5 | 455 | 62 | 374 | 437 | 71 | 176 | ++ | **0.27** |
| | 6 | 477 | 57 | 342 | 456 | 76 | 41 | | 0.32 |
| | 7 | 510 | 63 | 303 | 443 | 71 | 103 | +++ | **1.00** |
| | 8 | 523 | 63 | 126 | 472 | 79 | 28 | +++ | **0.71** |
| | 9 | 552 | 74 | 188 | 482 | 78 | 181 | +++ | **0.91** |
| Expository Writing | 3 | 392 | 47 | 288 | 389 | 53 | 146 | | 0.06 |
| | 4 | 433 | 51 | 358 | 421 | 50 | 50 | | 0.23 |
| | 5 | 472 | 59 | 378 | 457 | 68 | 176 | ++ | **0.25** |
| | 6 | 500 | 59 | 341 | 464 | 53 | 41 | +++ | **0.66** |
| | 7 | 532 | 58 | 306 | 449 | 61 | 103 | +++ | **1.40** |
| | 8 | 565 | 55 | 124 | 496 | 64 | 28 | +++ | **1.16** |
| | 9 | 577 | 64 | 189 | 483 | 79 | 175 | +++ | **1.31** |

## United Arab Emirates IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 272 | 78 | 175 | 222 | 91 | 36 | +++ | **0.60** |
| | 5 | 407 | 81 | 168 | 327 | 62 | 28 | +++ | **1.11** |
| Reading | 3 | 244 | 80 | 172 | 170 | 107 | 35 | +++ | **0.79** |
| | 5 | 374 | 76 | 167 | 252 | 78 | 28 | +++ | **1.58** |
| Narrative Writing | 3 | 374 | 58 | 175 | 337 | 60 | 36 | +++ | **0.64** |
| | 5 | 447 | 56 | 168 | 377 | 75 | 28 | +++ | **1.06** |
| Expository Writing | 3 | 404 | 50 | 172 | 350 | 39 | 35 | +++ | **1.20** |
| | 5 | 469 | 53 | 167 | 407 | 71 | 28 | +++ | **0.98** |

## Vietnam IB and non-IB student performance

| Domain | Grade | IB | | | Non-IB | | | Significance of Difference | Effect Size |
|---|---|---|---|---|---|---|---|---|---|
| | | Mean | S.D. | N | Mean | S.D. | N | | |
| Mathematical Literacy | 3 | 308 | 81 | 261 | 289 | 92 | 30 | | 0.22 |
| | 4 | 380 | 85 | 277 | 405 | 78 | 24 | | -0.31 |
| | 5 | 426 | 86 | 276 | 423 | 63 | 20 | | 0.04 |
| | 6 | 478 | 82 | 251 | 445 | 61 | 41 | ++ | **0.46** |
| | 7 | 497 | 83 | 244 | 450 | 88 | 33 | +++ | **0.55** |
| | 8 | 540 | 80 | 254 | 493 | 78 | 45 | +++ | **0.60** |
| | 9 | 557 | 88 | 255 | 489 | 96 | 46 | +++ | **0.75** |
| | 10 | 584 | 92 | 125 | 507 | 88 | 37 | +++ | **0.85** |
| Reading | 3 | 255 | 86 | 261 | 197 | 92 | 29 | +++ | **0.65** |
| | 4 | 308 | 91 | 273 | 312 | 84 | 24 | | -0.04 |
| | 5 | 362 | 86 | 277 | 356 | 90 | 20 | | 0.07 |
| | 6 | 417 | 96 | 252 | 350 | 72 | 39 | +++ | **0.80** |
| | 7 | 448 | 93 | 244 | 335 | 81 | 33 | +++ | **1.30** |
| | 8 | 481 | 85 | 252 | 393 | 85 | 42 | +++ | **1.04** |
| | 9 | 522 | 77 | 255 | 450 | 87 | 45 | +++ | **0.88** |
| | 10 | 543 | 89 | 122 | 465 | 78 | 33 | +++ | **0.93** |
| Narrative Writing | 3 | 361 | 57 | 260 | 342 | 65 | 30 | | 0.30 |
| | 4 | 398 | 58 | 273 | 417 | 68 | 24 | | -0.30 |
| | 5 | 449 | 61 | 276 | 458 | 42 | 20 | | -0.16 |
| | 6 | 484 | 66 | 251 | 462 | 54 | 41 | ++ | **0.35** |
| | 7 | 506 | 71 | 243 | 481 | 68 | 33 | | 0.36 |
| | 8 | 533 | 66 | 253 | 499 | 78 | 45 | ++ | **0.48** |
| | 9 | 544 | 72 | 255 | 520 | 68 | 46 | ++ | **0.35** |
| | 10 | 557 | 77 | 125 | 532 | 71 | 38 | | 0.34 |
| Expository Writing | 3 | 393 | 48 | 261 | 367 | 48 | 29 | +++ | **0.55** |
| | 4 | 423 | 55 | 274 | 434 | 53 | 24 | | -0.19 |
| | 5 | 469 | 55 | 277 | 463 | 45 | 20 | | 0.13 |
| | 6 | 491 | 59 | 251 | 465 | 60 | 39 | ++ | **0.42** |
| | 7 | 518 | 60 | 243 | 498 | 68 | 33 | | 0.31 |
| | 8 | 541 | 57 | 251 | 515 | 54 | 44 | ++ | **0.47** |
| | 9 | 559 | 61 | 254 | 537 | 48 | 44 | ++ | **0.40** |
| | 10 | 576 | 55 | 122 | 522 | 81 | 34 | +++ | **0.78** |

## Appendix 3: ISA Sub-strand Description

This Appendix provides detailed descriptions of ISA sub-strands in Mathematical Literacy, Reading, and Writing Tasks A and B. The sub-strands are used for comparing IB students to non-IB students in performance on each assessment sub-strand/writing criterion in the Analysis section. The following information is extracted from *Guide to ISA Reports for October 2008 Administration*, (ACER, 2008).

### *Mathematical Literacy Sub-strands*

**Uncertainty** This content area reflects how in real life data is commonly collected, organised, analysed and displayed with a view to making interpretations and forming conclusions. Many decisions are made based upon statistical analysis of data. Real life also contains elements of chance where outcomes are not certain but based upon probabilities. Increasingly decision-making is qualified with a statement of risk and society is presented with more and more information to make sense of.

**Quantity** This overarching content area also features in the three other domains to varying degrees. It focuses on the need for quantification in order to organise the world. It is not hard to find examples of quantification in our day-to-day living. We use money, make measurements, estimate and calculate. Increasingly we make use of technology to assist us but we also still perform many calculations mentally and approximately. Quantitative reasoning requires number sense: that is, having a feel for the magnitude of numbers, using strategies and tools appropriately, and being able to check solutions for reasonableness.

**Space and Shape** Shapes and constructions are all around us physically as real objects but also as representations in the form of photographs, maps and diagrams. Constructing and interpreting such representations is an important skill. Using known geometric shapes whose mathematical properties are known to model more complex shapes is an important problem-solving tool. Knowledge and appreciation of the beauty and function of geometric shapes and spaces has applications reaching from art to advertising.

**Change and Relationships** Noticing and using patterns in number and shapes, and finding and describing relationships between variables lies at the heart of mathematics. As organisms or populations grow and as stock markets ebb and flow, we describe the patterns in words, in tables and sometimes in algebraic notation. Commonly we chart the changes in graphical form. These descriptions can be linear, non-linear, cyclic and exponential to name but a few. Being able to link between these various representations and use the language, notation and algorithms of change and relationships is critical to making sense of the patterns in our world.

### *Reading Sub-strands*

**Retrieving Information** is defined as locating one or more pieces of information in a text.

**Interpreting** texts is defined as constructing meaning and drawing inferences from one or more parts of a text.

**Reflecting** is defined as relating a text to one's experience, knowledge and ideas.

### *Criteria for Narrative Writing (Narrative)*

**Narrative – Content** criterion is about the quality and range of ideas presented, the development of plot, characters and setting, and the writer's sense of audience and purpose. It also encompasses the overall shaping of the piece.

**Narrative – Language** criterion deals with sentence and paragraph structure, vocabulary and punctuation, and the writer's voice.

**Narrative – Spelling** criterion takes into account students' knowledge of phonetic and visual spelling patterns and the range of words attempted, as well as correctness of spelling.

### *Criteria for Expository Writing (Exposition or Argument)*

**Exposition/Argument – Content** criterion looks at the depth and range of ideas presented, and at the quality of reasoning demonstrated in the ability to provide evidence and logical argumentation in support of a position.

**Exposition/Argument – ESOL Language** (English for Speakers of Other Languages) criterion is applied to all students' writing regardless of their language background, but focuses on the grammatical correctness and command of English syntax, as well as sentence fluency and variation, and vocabulary.

**Exposition/Argument – Structure and Organisation** criterion deals with the overall structure of the writing, for example the presence of a clear introduction, development and conclusion; and its internal coherence, such as linking between and within paragraphs.

# Appendix 4: Student Questionnaire

ISA-IB Research - Year 5 & 6 Questionnaire

| | | *(Mark one box in each line)* | | | |
|---|---|---|---|---|---|
| **ID** | **STATEMENTS** | **Strongly Agree** | **Agree** | **Disagree** | **Strongly Disagree** |
| *1* | Students get along well with most teachers. | □ | □ | □ | □ |
| *2* | Most teachers are interested in students' well-being. | □ | □ | □ | □ |
| *3* | Most of my teachers really listen to what I have to say. | □ | □ | □ | □ |
| *4* | If I need extra help, I will receive it from my teachers. | □ | □ | □ | □ |
| *5* | Most of my teachers treat me fairly. | □ | □ | □ | □ |
| *6* | School has been a waste of time. | □ | □ | □ | □ |
| *7* | School has helped give me confidence to make decisions. | □ | □ | □ | □ |
| *8* | I feel like an outsider (or left out of things) | □ | □ | □ | □ |
| *9* | I make friends easily | □ | □ | □ | □ |
| *10* | I feel like I belong | □ | □ | □ | □ |
| *11* | I feel awkward and out of place. | □ | □ | □ | □ |
| *12* | Other students seem to like me. | □ | □ | □ | □ |
| *13* | I feel lonely. | □ | □ | □ | □ |
| *14* | I know how to make friends. | □ | □ | □ | □ |
| *15* | I think it is important to treat all people with respect. | □ | □ | □ | □ |
| *16* | I like helping someone with a problem. | □ | □ | □ | □ |
| *17* | It is important to take care of our parks, rivers, oceans, and animals. | □ | □ | □ | □ |
| *18* | I can be trusted to do what I say I am going to do. | □ | □ | □ | □ |
| *19* | I can behave well and follow rules. | □ | □ | □ | □ |
| *20* | I think someone who treats me unfairly is a bad person and that it is okay to hurt them back. | □ | □ | □ | □ |
| *21* | I am good at solving conflicts without fighting. | □ | □ | □ | □ |
| *22* | I feel bad when other people feel bad. | □ | □ | □ | □ |
| *23* | I try to make sure that everyone has a fair chance to win, even if it means that I lose. | □ | □ | □ | □ |
| *24* | I try hard not to say or do things that hurt other people's feelings. | □ | □ | □ | □ |
| *25* | I can do schoolwork that is hard to understand. | □ | □ | □ | □ |
| *26* | I try very hard to complete all my work. | □ | □ | □ | □ |
| *27* | I am disorganised (forget pencil, do not write down homework, have a messy book, bag, papers). | □ | □ | □ | □ |
| *28* | When I don't understand something, I think "I can't do this." | □ | □ | □ | □ |
| *29* | When I do not understand something, I give up easily. | □ | □ | □ | □ |
| *30* | I think about planning my time so that I get all my work done. | □ | □ | □ | □ |
| *31* | I am good at helping others with their class projects or jobs. | □ | □ | □ | □ |
| *32* | I shouldn't have to do schoolwork that is boring. | □ | □ | □ | □ |
| *33* | I want to do my very best in my schoolwork. | □ | □ | □ | □ |

ISA-IB Research - Year 8 & 9 Questionnaire

| | | *(Fill one box in each line)* | | | |
|---|---|---|---|---|---|
| ID | **STATEMENTS** | **Strongly Agree** | **Agree** | **Disagree** | **Strongly Disagree** |
| ***1*** | Students get along well with most teachers. | □ | □ | □ | □ |
| ***2*** | Most teachers are interested in students' well-being. | □ | □ | □ | □ |
| ***3*** | Most of my teachers really listen to what I have to say. | □ | □ | □ | □ |
| ***4*** | If I need extra help, I will receive it from my teachers. | □ | □ | □ | □ |
| ***5*** | Most of my teachers treat me fairly. | □ | □ | □ | □ |
| ***6*** | Teachers remind students about the importance of doing their best in their schoolwork. | □ | □ | □ | □ |
| ***7*** | Teachers remind students about the importance of acting responsibly. | □ | □ | □ | □ |
| ***8*** | When I have worked hard and acted responsibly, there is a teacher who praises me. | □ | □ | □ | □ |
| ***9*** | School has done little to prepare me for adult life when I leave school. | □ | □ | □ | □ |
| ***10*** | School has been a waste of time. | □ | □ | □ | □ |
| ***11*** | School has helped give me confidence to make decisions. | □ | □ | □ | □ |
| ***12*** | School has taught me things which could be useful in a job. | □ | □ | □ | □ |
| ***13*** | I feel like an outsider (or left out of things). | □ | □ | □ | □ |
| ***14*** | I make friends easily. | □ | □ | □ | □ |
| ***15*** | I feel like I belong. | □ | □ | □ | □ |
| ***16*** | I feel awkward and out of place. | □ | □ | □ | □ |
| ***17*** | Other students seem to like me. | □ | □ | □ | □ |
| ***18*** | I feel lonely. | □ | □ | □ | □ |
| ***19*** | I think about possible alternative solutions to every problem. | □ | □ | □ | □ |
| ***20*** | I often come up with my own explanation about a topic. | □ | □ | □ | □ |
| ***21*** | I am keen to use what I learn to solve real problems. | □ | □ | □ | □ |
| ***22*** | I am keen to know how the things we do in class are meaningful to me. | □ | □ | □ | □ |
| ***23*** | I ask questions in class in order to make sure I have understood everything correctly. | □ | □ | □ | □ |
| ***24*** | I study only what is set for me to study. | □ | □ | □ | □ |
| ***25*** | I don't spend time learning things that I know won't be in the exam. | □ | □ | □ | □ |
| ***26*** | I repeat everything several times to make sure I pass in tests. | □ | □ | □ | □ |
| ***27*** | I learn things by memorizing them by heart. | □ | □ | □ | □ |
| ***28*** | I believe in every word my teacher says. | □ | □ | □ | □ |
| ***29*** | I know how to make friends. | □ | □ | □ | □ |
| ***30*** | I am good at understanding how other people feel. | □ | □ | □ | □ |
| ***31*** | I think it is important to treat others, including classmates from different cultural backgrounds, with respect. | □ | □ | □ | □ |
| ***32*** | I like helping people with problems. | □ | □ | □ | □ |
| ***33*** | I care about the environment (parks, waterways, animals) and want to make my community a better and safer place to live. | □ | □ | □ | □ |
| ***34*** | I can be trusted to do what I say I am going to do. | □ | □ | □ | □ |
| ***35*** | I can't stand having to behave well and follow rules. | □ | □ | □ | □ |
| ***36*** | I think that someone who treats me unfairly is a bad person and that it is okay to hurt them back. | □ | □ | □ | □ |
| ***37*** | I am good at solving conflicts without fighting. | □ | □ | □ | □ |
| ***38*** | I feel bad when other people feel hurt. | □ | □ | □ | □ |
| ***39*** | I try to make sure that everyone has a fair chance to win, even if it means that I lose. | □ | □ | □ | □ |
| ***40*** | I try hard not to say or do things that hurt other people's feelings. | □ | □ | □ | □ |
| ***41*** | I am happiest when I perform tasks on which I know that I won't make any errors. | □ | □ | □ | □ |
| ***42*** | I feel smart when I do something without making any mistakes. | □ | □ | □ | □ |
| ***43*** | The opinions others have about how well I can do certain things are important to me. | □ | □ | □ | □ |
| ***44*** | I feel smart when I can do something better than most other people. | □ | □ | □ | □ |
| ***45*** | I like to be fairly confident that I can successfully perform a task before I try it. | □ | □ | □ | □ |
| ***46*** | I like to work on tasks that I have done well on in the past. | □ | □ | □ | □ |
| ***47*** | I prefer to work on tasks that force me to learn new things. | □ | □ | □ | □ |
| ***48*** | The opportunity to learn new things is important to me. | □ | □ | □ | □ |
| ***49*** | The opportunity to extend the range of my abilities is important to me. | □ | □ | □ | □ |
| ***50*** | When I fail to complete a difficult task, I plan to try harder the next time I work on it. | □ | □ | □ | □ |
| ***51*** | When I have difficulty solving a problem, I enjoy trying different approaches to see which one will work. | □ | □ | □ | □ |
| ***52*** | I do my best when I'm working on a fairly difficult task. | □ | □ | □ | □ |