Indonesian National Assessment Program (INAP)
Nusa Tenggara Barat 2016

# What NTB students know and how the government, school, teachers and parents support them

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INOVASI
Innovation for Indonesia's School Children
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KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN

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## Nusa Tenggara Barat 2016

# What NTB students know and how the government, school, teachers and parents support them

**Dita Nugroho, Sandra Kurniawati, Daniel Suryadarma**

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# Executive Summary

The Indonesian National Assessment Program (INAP) is a sample-based national assessment program to monitor student learning outcomes in mathematics, reading and science nationally, as well as providing regional and international comparisons. INAP is intended to track student progress across the education system.

INAP Grade 4 was administered nationally in a sample of 236 districts across 34 provinces in August 2016, marking the first nationwide implementation of the assessment program. With the support from INOVASI, additional schools in NTB were visited so that all 10 districts in the province could take part in the survey, with sufficient sample such that the results can be compared between districts.

### What NTB Students Know

Nationally, schools in NTB did not perform as well as most other provinces. It is ranked last in the country across all subjects. The average of scores in reading and science in NTB were 70 to 80 points (0.7 to 0.8 standard deviations) lower than the national average, while in mathematics, students in NTB achieved an average score of around 50 points (0.5 standard deviations) lower than the national average. We also find significant gender differences in performance, where girls on average outperform boys by 40 points in reading and 20 points in science. Boys and girls perform similarly in mathematics.

Kota Mataram was the highest performing district in the province, and was the only district whose students performed better than the national average. Kota Mataram performed well above the national average in reading and mathematics and performed at the same level of the national average in science. Among all districts, Kota Mataram had the largest proportion of top performing students, 32 percent. Compared to other districts, it has the lowest proportion of low performers. Only around one in ten students in Kota Mataram has an average score below 400.

The second top performing district across the province was Sumbawa Barat, followed by Lombok Barat. Students in Sumbawa Barat achieved an average score between 10 to 20 points below the national average. Around 23 percent of students in Sumbawa Barat are top performers, while 15 percent of students in this district scored below 400. In Lombok Barat, students achieved an average score across all subject 40 points lower than the national average. Proportion of low-achieving students in Lombok Barat was around 23 percent, while 16 percent of students in this district scored above 550.

Kota Bima, Sumbawa and the three rural districts in Lombok achieved scores between 50 and 80 points lower than the national average across all subjects. In these districts, around 10 to 20 percent of students performed well in reading, maths, and science. However, there was a sizeable proportion of students who scored below 400 – accounts for 25 to 40 percent of all students in these districts.

Finally, the learning outcomes in Bima and Dompu across all subjects were more than 100 points lower, equivalent to more than one standard deviation below the national average. This is a large difference and suggests that the average fourth grade student in these districts performed at a level that is below approximately 80 percent of their peers in the country. The result also suggests that more than half of students in Bima and Dompu had low performance across all subjects.

### Factors that influence learning outcomes in NTB

The first to note is that the correlation between scores in the three subjects range between 0.52 and 0.65. The highest correlation is between science and reading scores, mainly because at the primary level, students learn science through reading. So those who are more proficient in reading are also more proficient in science. The correlations between these two scores with mathematics, meanwhile, are lower at around 0.52 (science) and 0.58 (reading) respectively. With this condition, it is unsurprising to find that many factors that are significantly correlated with reading performance are also correlated with science performance. In contrast, many factors that are correlated with science and reading are not correlated with mathematics score.

The INAP survey in NTB indicates that many factors are significantly correlated with student performance. Class size of around 27 – 40 students appear to be the optimal size in supporting better performance in all three subjects. Students in smaller or larger classrooms performed worse. Fortunately, classrooms larger than 40 students are rare in NTB. However, the findings call for attention to schools with small classrooms.

The analysis also finds that some school facilities are positively correlated with student performance, although there is heterogeneity in the correlation for different kinds of facilities. Laboratory equipment, which is the least prevalent school facility in NTB, has the largest association with scores in all three subjects. Availability of books in the library and computers for students are also correlated with reading and science performance.

The survey also allows us to compare the correlation between different extracurricular activities and student performance. We find that enrichment programs has a significant and positive correlation with science score and to a lesser extent reading score, but not mathematics score.

Moving onto principal characteristics, we find very little correlation between various characteristics, including experience and attendance in professional development programs, and scores in all three subjects. However, we find that schools with female principals perform better in reading. Given that only one-fifth of school principals are female, there is scope to assign more females as school principals, assuming enough are willing to take up the appointment.

From the teacher survey, we find that disruptive students and, although less prevalent, students with special needs could have an adverse effect on teaching, resulting in significantly lower score for all students in reading (disruptive students) and all three subjects (special needs students). To avoid

disruption and to provide quality teaching for special needs students, there may be a need for further training for the teachers.

Unsurprisingly, teacher's understanding of curriculum and ability to implement the curriculum are associated with much better performance. Across NTB, only around 50 percent of teachers met these two criteria. Therefore, there is much to be done, especially in Lombok Tengah and Lombok Timur, in terms of preparing and supporting teachers to understand and implement the national curriculum. Further teacher training indeed has a positive correlation with student performance, where students whose teachers have recently participated in a professional development program perform better in reading and mathematics.

In terms of practice, our analysis finds that teachers who spend more than 10% of their working hours on preparing for assessments result in better science and mathematics performance of their students. Meanwhile, spending more than 10% of working hours on interacting with students appear to improve reading scores, but not the other scores. Having said that, students whose teachers proactively check their level of understanding of the lessons perform significantly better in reading and science. Similarly, students who are regularly praised by teachers and push themselves to perform highly, indeed perform significantly better in all three subjects.

On assignments, students whose teachers gave them different types of assignments and activities, such as reading other books or clipping information, perform much better in reading and sometimes science – but not mathematics.

In contrast to attending professional development or other teaching practices described above, teacher characteristics such as age, gender, experience, and certification status have no significant correlation with student performance.

Moving to students' perception and conditions, the analysis finds that one-third of students in NTB reported feeling scared at school. And these students perform poorer in all three subjects. In contrast, feeling excited for school has a positive correlation with all three subjects. Therefore, schools need to address sources or conditions at school that result in the students feeling afraid, such as bullying.

We also find student conditions that are significantly correlated with student performance but beyond the authority of the schools. Children who come to school in an undernourished condition perform much worse in mathematics and reading. There are, however, some things that the school can encourage more. We find that parent attention in terms of reminding about homework or asking about health has a positive and sizeable correlation with all three subjects. Students whose parents ask daily about her/his experience with learning in school perform better in reading and science.

Finally, using various studying techniques, that are based on repetition or non-repetition, have similarly substantial and positive correlations with all three subjects. The more techniques used, the higher the scores. A more straightforward message from these findings is that students who

seriously study at home will perform much better in every subject. Although these are largely the purview of parents, schools can still play a role by encouraging these activities, especially given the still low level of parent attention in some areas, such as Lombok Timur.

# Chapter 1: Introduction to INAP

## WHAT IS INAP?

In the 2015-2019 Education Strategic Plan (*Rencana Strategis* or Renstra), Ministry of Education and Culture aims to establish a comprehensive and credible assessment system. They identified a need to periodically and systematically monitor education quality.

A high-quality monitoring system is needed to collect more comprehensive information on the problems faced by schools, students and parents. The information can in turn be used in policymaking, in order to synchronise policies with existing problems, particularly those that are most related to the learning quality issues.

This comprehensive system comprises of classroom and school-led assessments, as well as external assessments. External assessments are set by the government or an independent body. They comprise of the census-based exams (*ujian nasional* or UN for Grades 9 and 12, and *ujian sekolah madrasah* or USM set by provincial governments for Grade 6) and sample-based surveys.

The Indonesian National Assessment Program (INAP) is a sample-based national assessment program to monitor student learning outcomes in mathematics, reading and science nationally, as well as providing regional and international comparisons. INAP is intended to track student progress across the education system.

The aims of the INAP are:

- Pilot study and capacity building process to develop education quality monitoring systems that are institutionalised at the provincial level, particularly in: item writing, data collection, scoring and entry.
- Comparing achievement levels at the provincial level.
- Identifying content and cognitive domains where more support are needed.
- Identifying student, teacher and school background variables that determine student achievement.

MoEC's Education Assessment Centre (*Pusat Penilaian Pendidikan* or Puspendik) designs and manages the INAP, and it is administered by the Directorate General of Basic and Secondary Education (*Direktorat Jenderal Pendidikan Dasar dan Menengah* or Dirjen Dikdasmen) at the central, provincial and district levels.

INAP, also referred to as the *Penilaian Mutu Tingkat Kompetensi* or PMTK, is also designed to prepare for one of the requirements of MoEC Regulation No 66/2013 on Education Assessment Standards: a government-administered measurement to identify the achievement of competency levels.

The first INAP administration nationally took place in 2016. The INOVASI program supported Puspendik to administer INAP in Nusa Tenggara Barat (NTB), which it had selected as the first province it operates in. The support allowed the test to be administered in all 10 districts in the province. This document reports the results and findings of the INAP in NTB.[1]

## ASSESSMENT INSTRUMENTS

INAP assesses student achievement in three subject areas: reading, mathematics and science. The instruments to measure these achievements are expected to provide a mapping of student results that are comparable to international studies. Accordingly, the assessment items were modelled after those in international surveys, specifically the International Association for the Evaluation of Educational Achievement (IEA)'s Trends in Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS).

The TIMSS and PIRLS content domains that were used in the INAP assessment framework were those that were assessed by experts as being relevant to the two curricula currently used in Indonesia: the 2006 *Kurikulum Tingkat Satuan Pendidikan* (KTSP) and Curriculum 2013 (K-13). The INAP framework also contains the cognitive domains in those international assessments:

- **Knowing**: assessing student's knowledge of facts, processes, concepts and procedures
- **Applying**: assessing students' ability to apply knowledge of facts, relationships, processes, concepts, procedures and methods to real situations
- **Reasoning**: assessing students' reasoning ability to analyse data and information, draw conclusions, and develop their understanding of new or unfamiliar situations.

They also receive an introduction to TIMSS and PIRLS-type items which are more varied than the strict multiple-choice design of the national exams. They can utilise constructed response items, such as those requiring students to write short responses, complete tables or draw figures. In the final instruments, approximately half of the items are constructed response items.

Puspendik led the development of these achievement instruments, with assessment items being written by experienced teachers from across the country. These teachers received training on how to write items to assess higher order thinking skills, such as those in the applying and reasoning domains. In groups, they then wrote and reviewed items, which were later further reviewed and trialled by Puspendik.

In addition to the items that are developed by teachers, each instrument contains a cluster of released items from TIMSS and PIRLS. The inclusion of these items allows the results of INAP to be placed on those international scales, so the achievement of students in each province can be compared to Grade 4 students in countries that have participated in the international studies.

[1] Please see an online appendix containing the full results in XXX

The INAP Grade 4 items were piloted in 2011/2012 in two provinces: Yogyakarta and East Kalimantan. Further revised and new items were again piloted in 2015 in Yogyakarta and West Java. Puspendik could then finalise the Grade 4 assessment instruments for this national administration in 2016. Similar development processes are being undertaken to develop Grades 8 and 11 instruments, which will be administered in 2017 and 2018.

INAP uses a rotating booklet design, with 5 types of booklets administered for reading and 10 booklet types for math and science combined. Each booklet contains 40 items and students were given 90 minutes to complete each, or 180 minutes for both.

After completing the assessments, students were also asked to complete a short background questionnaire. Additionally, their Grade 4 teacher and the school principal were asked to complete questionnaires about themselves and their school. Puspendik separately sent an online survey to representatives of participating districts about the characteristics of schools and education policies in their area. All these questionnaires, therefore, were self-completed by the respective respondents.

## METHODOLOGY

### Sampling

INAP Grade 4 was administered nationally in a sample of 236 districts across 34 provinces. With the support of the INOVASI program, additional schools in NTB were visited so that all 10 districts in the province could take part in the survey.

In each district, the number of schools selected is determined by the total number of primary school students in the general education sector (madrasah are not included) in the district. This reflects the same method used by Puspendik in national INAP sampling within districts.

| District | Total Number of Schools | Total Number of Students | Number of Schools Sampled |
|---|---|---|---|
| Kota Mataram | 161 | 7,094 | 21 |
| Kota Bima | 78 | 2,510 | 16 |
| Kab Lombok Barat | 344 | 10,833 | 26 |
| Kab Lombok Utara | 145 | 3,860 | 15 |
| Kab Lombok Tengah | 580 | 14,624 | 26 |
| Kab Lombok Timur | 685 | 20,979 | 25 |
| Kab Sumbawa Barat | 91 | 2,280 | 15 |
| Kab Sumbawa | 348 | 7,927 | 20 |
| Kab Dompu | 210 | 4,995 | 20 |
| Kab Bima | 408 | 9,590 | 20 |
| **Total NTB** | **3,050** | **84,692** | **204** |

Within each school, one class is selected randomly. As the data collection took place at the beginning of the academic year, Grade 5 students were sampled. The selection of class was done by Puspendik based on earlier data collected on the number of classes at each grade in that school. From the selected class, a maximum of 30 students are selected to participate in the survey. In classes with fewer than 30 students, all are selected.

As students were sampled using a complex design, the data analysis utilises an adjustment in the form of sample weights.[2] The purpose of this is to correct for the design and produce estimates as if the data were collected using a simple random sample. This in turn produces more accurate population estimates.

The base weights at the school and student levels are calculated as the inverse of the probability of selection at each level, to the schools participating from the main sample. These weights are then adjusted to account for non-response at the student level (there was a 100% school response rate in NTB).

### Data Collection and Entry

Field data collection were undertaken by Myriad Research, in coordination with the NTB Provincial Education Office and relevant District Education Offices. Puspendik conducted training for test administrators and scorers in Jakarta for provincial representatives, including representatives from Myriad.

These provincial representatives were responsible for training district supervisors, who on turn trained test administrators. To ensure consistency in training content within this cascading model, INOVASI supported Puspendik in producing a training video that detailed the INAP testing procedure and responsibilities of test administrators.

Myriad recruited and directly trained 204 test administrators in NTB. Test administrators were recruited from local education offices, lecturers, teachers and later-year students at education universities in NTB. Data collection in schools took place in the week of 22 August 2016. Out of 204 schools, 200 were public schools and four were private schools.

Puspendik also provided training and guidelines on the scoring of constructed response items. Myriad representatives again attended one of these training sessions, who in turn trained 30 experienced Grade 4 teachers they have recruited in Jakarta. They also organised the scanning of scored items.

### Analysis

Puspendik analysed national student test results to produce Rasch scores. These scores equalise the fact that students received different test booklets. The equalisation allows the comparison between districts in the case of NTB, and between provinces overall.

[2] Details of the calculation of sampling weights are presented in Appendix 1. Weights are applied to the analysis using Stata's 'svyset' function.

**Box 1: Interpreting INAP Scores in this Report**

INAP scores are scaled so that the population of student test takers have an average score of 500 with a standard deviation of 100. This means that two-thirds of Indonesian students have a score between 400 and 600.

Much of this report focuses on differences in scores between two groups of students. A couple of benchmarks can be used to interpret these differences. With the use of standardised scores, the size of these score differences also reflect distances in terms of standard deviation. A difference of 25 points, for example, is equivalent to a differences of 0.25 standard deviations. In a seminal study of interpretations of effect sizes in educational research, Cohen (1992) considers an effect size of 0.10 as small, 0.30 as medium and 0.50 as large. Meanwhile, in relation to the overall distribution of students on the INAP scale discussed above, two-thirds of student test takers have scores within 100 points of the mean.

In addition to the size of effects or the extent of difference in scores, this report also discusses differences in terms of their statistical significance. This refers to the probability that the differences is true in the population and not found by chance. The measure used to determine this is the p-value, with statistical significance declared when the value is less than 0.10.

Two types of between-group differences were calculated: (i) mean differences; (ii) mean differences after controlling for home and school conditions, which is called SES. The principal component analysis was used to create the SES indices (one index for home conditions and another index for school conditions). Specifically, the home condition index was constructed using the following variables: type of wall at home; source of electricity at home; whether the home owns a computer; internet connection; car; air conditioner; game consoles; motorcycle; washing machine, and; whether the student has her/his own room.

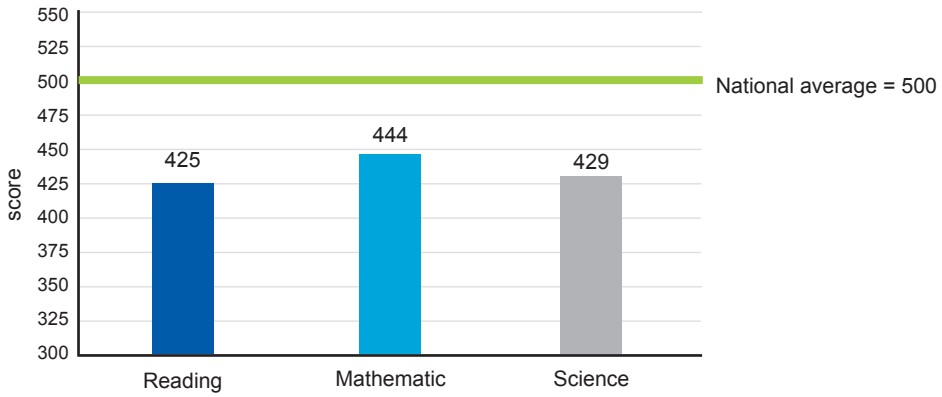
The school facilities index was constructed using: source of electricity; sufficient availability of desk and chair for teachers; room for teachers; administration office; library; sports equipment; playground; counselling room; laboratory equipment; learning and teaching aids; map and globe, and; computers for students.

Both indices are used as control variables in regressions labelled “controlling for SES”, except in the regressions in Chapter 3, Section A. In this section, only the home index was used as control.

# Chapter 2: What NTB Students Know

Nationally, schools in NTB did not perform as well as most other provinces. It is ranked last in the country across all subjects. Figure 1 shows the average scores of NTB students across all subjects. The average of scores in reading and science in NTB were 70 to 80 points lower than the national average, while in mathematics, students in NTB achieved an average score of around 50 points lower than the national average.

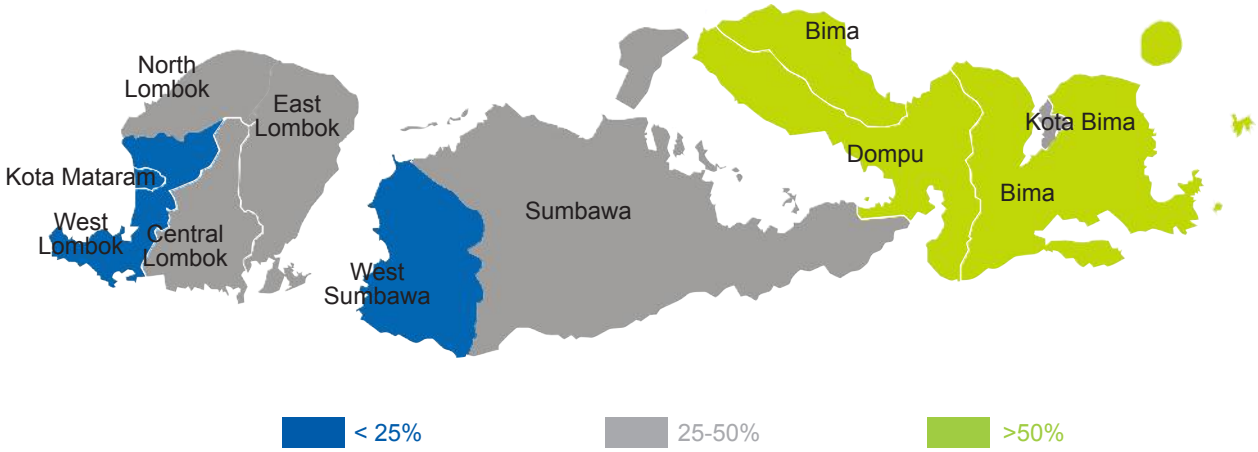
**Figure 1 Average scores of reading, mathematics, and science in NTB**




Although the average scores are below the national average, around 10 to 15 percent of NTB students achieved score above 550 in at least one subject. This group of students can be categorised as top performers as they achieved more than 0.5 standard deviation above the national average. However, there are quite large proportion of low-performing students in NTB who scored below 400, equivalent to more than one standard deviation below the national average. Around one in three students in NTB has low proficiency in mathematics and science, while about 40 percent of students have low performance in reading.

With the larger sample of schools visited, it is also possible to assess the performance of individual districts against the national average. Figure 2 shows the proportion of low-achieving students in each district. These are calculated by taking the proportion of students whose average score across all three subjects are below 400. Kota Mataram, Lombok Barat, and Sumbawa Barat are the districts in where less than 25 percent of students achieved a score lower than 400. Kabupaten Sumbawa, Kota Bima, and the three rural districts in Lombok have larger proportion of low-achieving students ranging between 25 to 50 percent. Meanwhile, on average, more than half students in Dompu and Bima are low-performers who scored below 400.

**Figure 2 Proportion of students scored below 400**




As elaborated in the following sections, Kota Mataram was the highest performing district in the province, and was the only district whose students performed better than the national average. Kota Mataram performed well above the national average in reading and mathematics and performed at the same level of the national average in science. Among all districts, Kota Mataram had the largest proportion of top performing students, 32 percent. Compared to other districts, it has the lowest proportion of low performers. Only around one in ten students in Kota Mataram has an average score below 400.

The second top performing district across the province was Sumbawa Barat, followed by Lombok Barat. Students in Sumbawa Barat achieved an average score between 10 to 20 points below the national average. Around 23 percent of students in Sumbawa Barat are top performers, while 15 percent of students in this district scored below 400. In Lombok Barat, students achieved an average score across all subject 40 points lower than the national average. Proportion of low-achieving students in Lombok Barat was around 23 percent, while 16 percent of students in this district scored above 550.

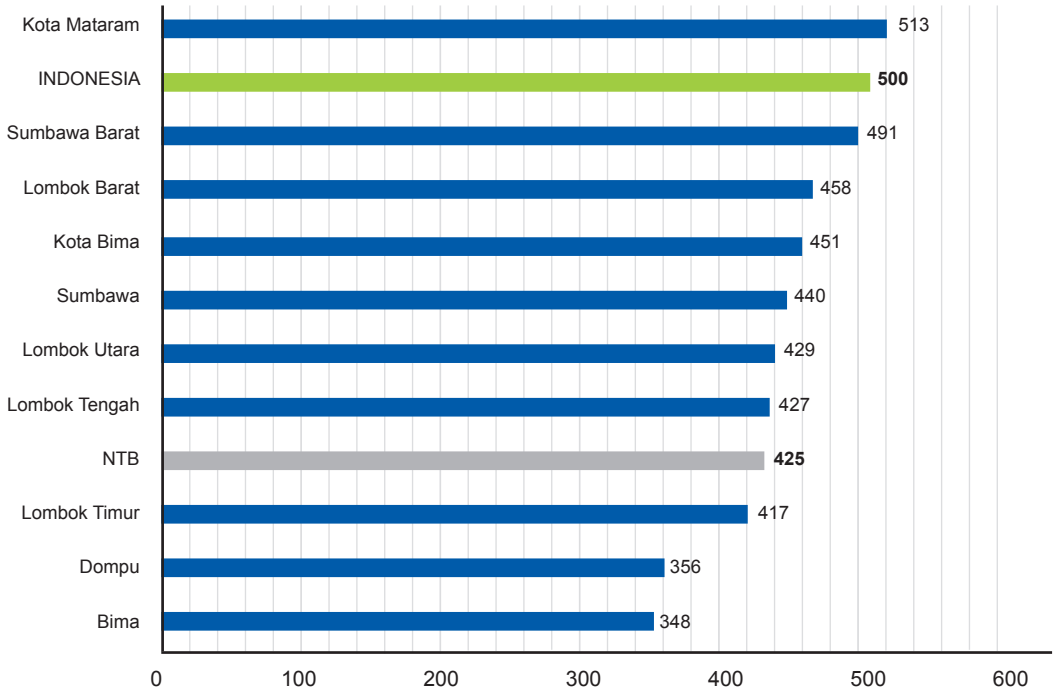
Kota Bima, Sumbawa and the three rural districts in Lombok achieved scores between 50 and 80 points lower than the national average across all subjects. In these districts, around 10 to 20 percent of students performed well in reading, maths, and science. However, there was a sizeable proportion of students who scored below 400 – accounts for 25 to 40 percent of all students in these districts.

Finally, the learning outcomes in Bima and Dompu across all subjects were more than 100 points lower, equivalent to more than one standard deviation below the national average. This is a large difference and suggests that the average fourth grade student in these districts performed at a level that is below approximately 80 percent of their peers in the country. The result also suggests that more than half of students in Bima and Dompu had low performance across all subjects.

## STUDENT PERFORMANCE IN READING

Compared to students in other provinces, NTB students generally have the lowest proficiency level in reading. Students in this province achieved an average reading score about 75 points below the national average. As shown in Figure 3, there are large variations between districts. Kota Mataram was the only district where students achieved an average reading score at 513, higher than the national average. Students in Sumbawa Barat scored around 10 points lower than the national average, while those in Kota Bima, Sumbawa, and four rural districts in Lombok had average reading scores between 50 to 75 points below 500. At the same time, students in Dompu and Bima achieved very low average of reading scores–around 1.5 standard deviation below the national average.

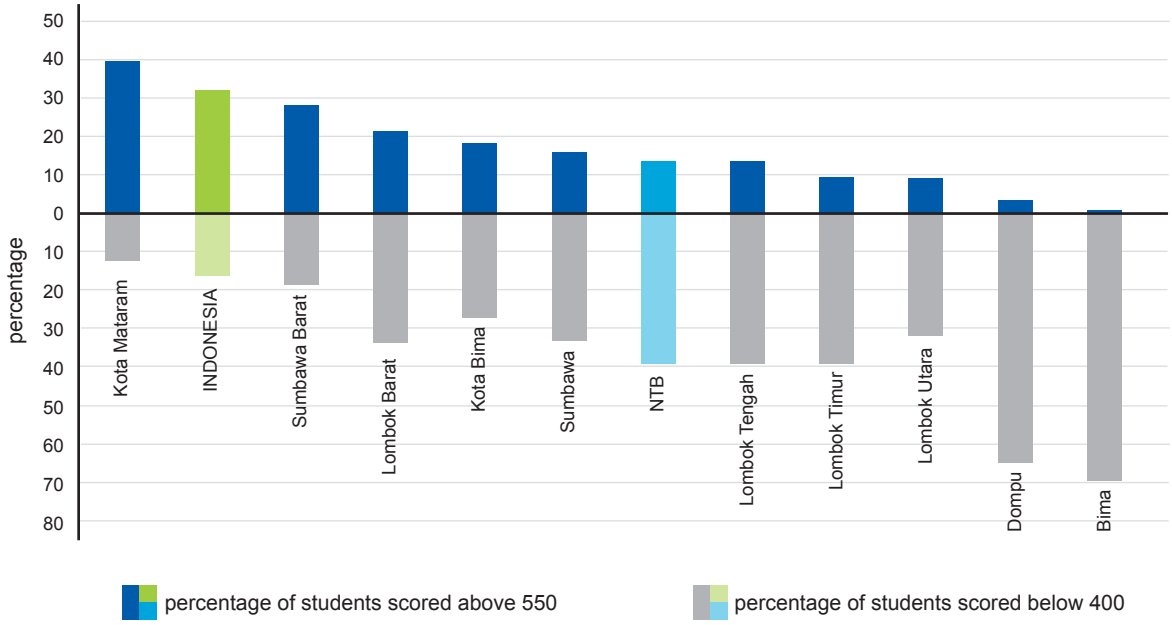
**Figure 3 Student performance in reading by district**




Across all districts in NTB, around 15 percent of students achieved a reading score above 550. Figure 4 shows the proportion of top performers and low performers in reading in each district in NTB. Kota Mataram has the highest share of top performers in reading (41 percent), followed by Sumbawa Barat (29 percent) and Kota Bima (22 percent). By contrast, less than 5 percent of students in Dompu and Bima achieved reading score above 550.

There are a large share of low-performing students in NTB who scored below 400 in reading. Close to 40 percent of students across all districts had reading score more than one standard deviation below the national average. Kota Mataram was the only district that has a share of low-achieving students in reading close to 10 percent. In Kota Bima, Sumbawa, and Lombok Utara, around one in three students have low performance in reading. In addition, Dompu and Bima have the largest proportion of low-performing students across NTB – more than 60 percent of students scored below 400.

**Figure 4 Proportion of top-performers and low-achieving students in reading**

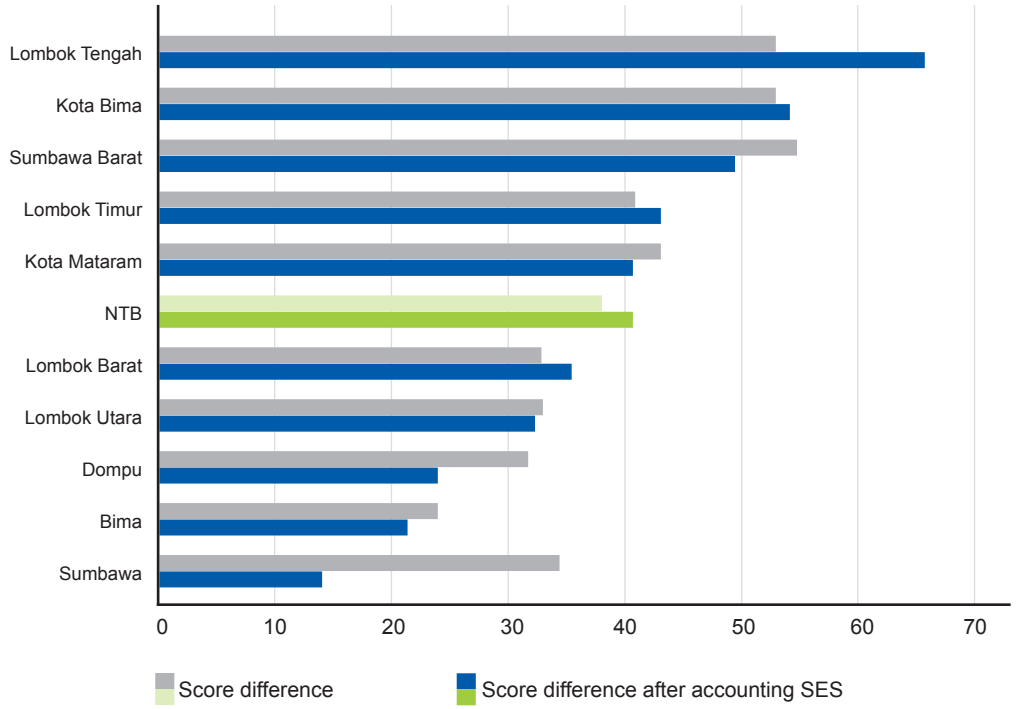



## Gender differences, by district

On average across all districts in NTB, there are sizeable gender differences in reading performance. Figure 5 shows the score differences between girls and boys by district. Female students achieved around 40 points higher reading score than male students. In terms of the top performers in reading, the share of students who scored above 550 is larger among girls than among boys. Around three in four top performers in reading are girls. On average, one in five girls achieved reading score above 550, while only one in ten boys has an average reading score above this level.

The gender gaps in reading performance remain even after controlling for home condition and school facility indices mentioned in the previous chapter. In most districts in NTB, girls outperformed boys in reading by 30 to 60 points. Lombok Tengah has the highest score difference in reading proficiency, followed by Sumbawa Barat, Kota Bima, and Lombok Timur. In Lombok Tengah, girls are more likely to achieve 60 points higher than boys, while in the other three districts, girls outperformed boys in reading by 40 to 50 points. Kota Mataram, Lombok Barat, and Lombok Utara also have large score differences – around 30 to 40 points – between girls and boys.

**Figure 5 Score difference in reading (girls score minus boys score)**

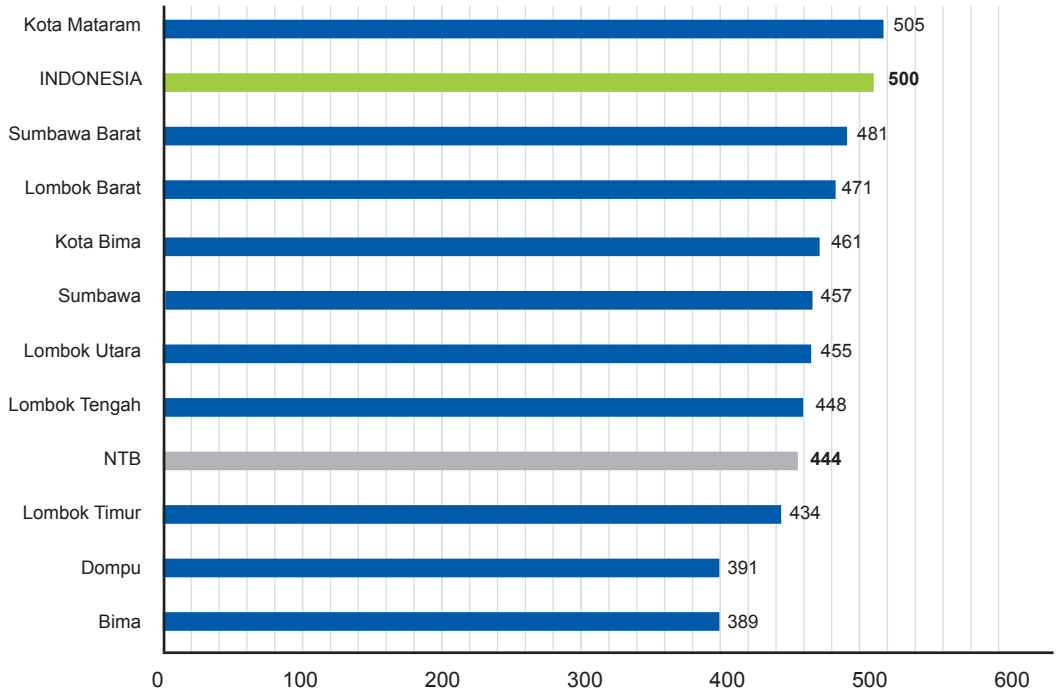



Results in Figure 5 also suggest that, compared to other districts, Dompu, Bima and Sumbawa have relatively smaller gender gaps in reading performance which is between 20 and 35 points. However, after controlling for students' socioeconomic status, the effect of gender were reduced to around 10 to 20 points and these differences were not found to be statistically significant.

## STUDENT PERFORMANCE IN MATHEMATICS

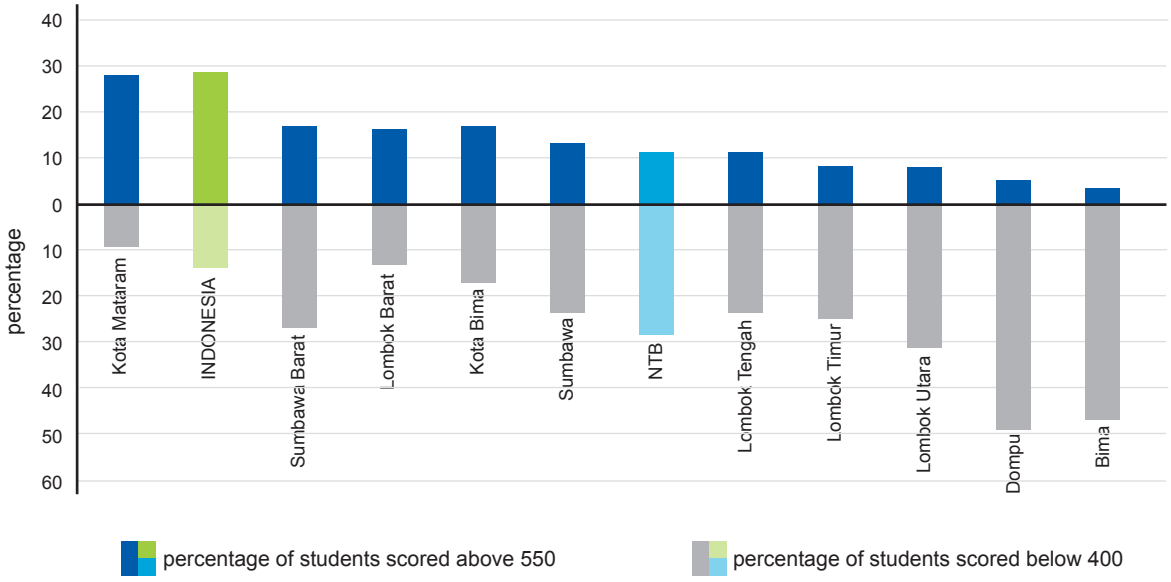
In general, NTB students tend to perform slightly better in mathematics than in reading or science. However, the average maths score in this province is still below the national average. Figure 6 shows student performance in mathematics by district. Kota Mataram was the only district that had a slightly higher average of mathematics score than the national average. The average of mathematics score in Sumbawa Barat and Lombok Barat were lower than the national average by 20 and 30 points. Lastly, Dompu and Bima achieved average scores in mathematics more than 100 points lower than the national average.

**Figure 6 Student performance in mathematics by district**




In mathematics, the share of high achieving students was slightly lower than in reading, yet the proportion of low performers in mathematics was also lower. Figure 7 shows that around 12 percent of students in NTB achieved an average mathematics score above 550, while one-third of students still score below 400. Kota Mataram has the highest proportion of top performers in mathematics which is close to one-third of the students. The shares of high achieving students in most districts in NTB range from 10 to 20 points. However, there were only less than 5 percent of the students in Dompu and Bima who achieved mathematics score above 550. Almost half of the students in these districts have a very low performance in mathematics.

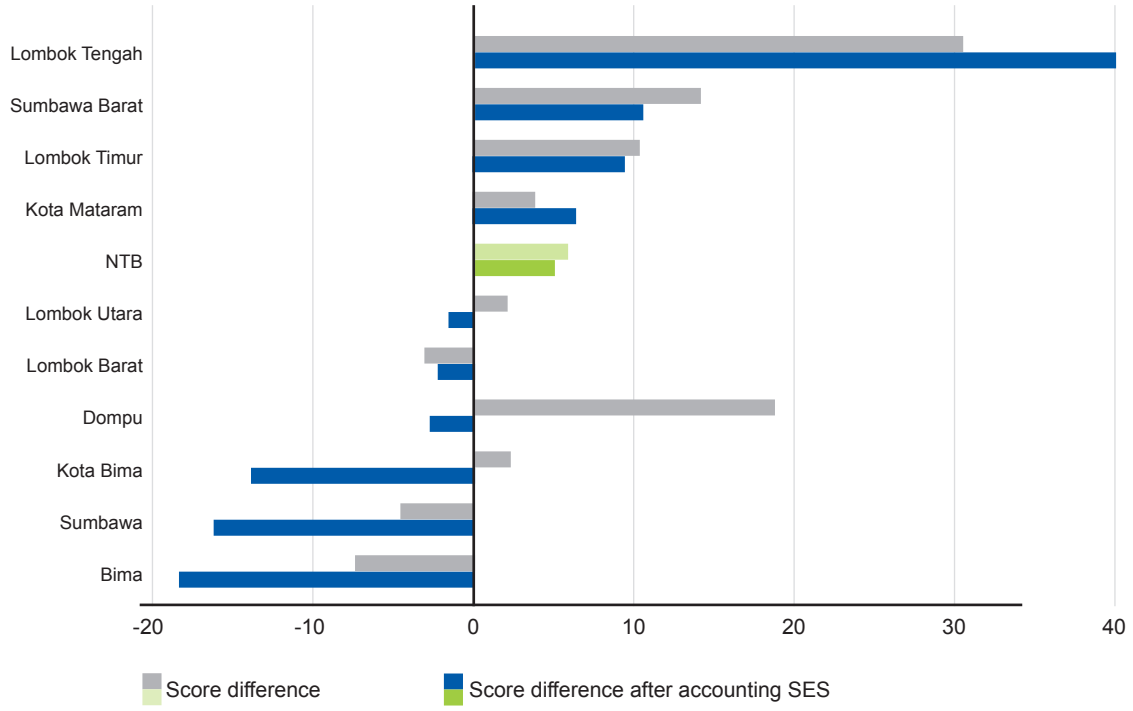
**Figure 7 Proportion of top-performers and low-achieving students in mathematics**



## Gender differences, by district

In general, there were no significant score differences in mathematics between female and male students in NTB. The share of girls who achieved score above 550 was almost the same as the share of boys who achieved above this level. Figure 8 shows that in terms of the magnitude, gender gap in mathematics performance in NTB is relatively small. Girls achieved an average mathematics score only 5 points higher than boys. Even after taking socioeconomic and school-level factors into account, the gender gap in maths performance in NTB remains small and was found to be not statistically significant.

**Figure 8 Score difference in mathematics (girls score minus boys score)**



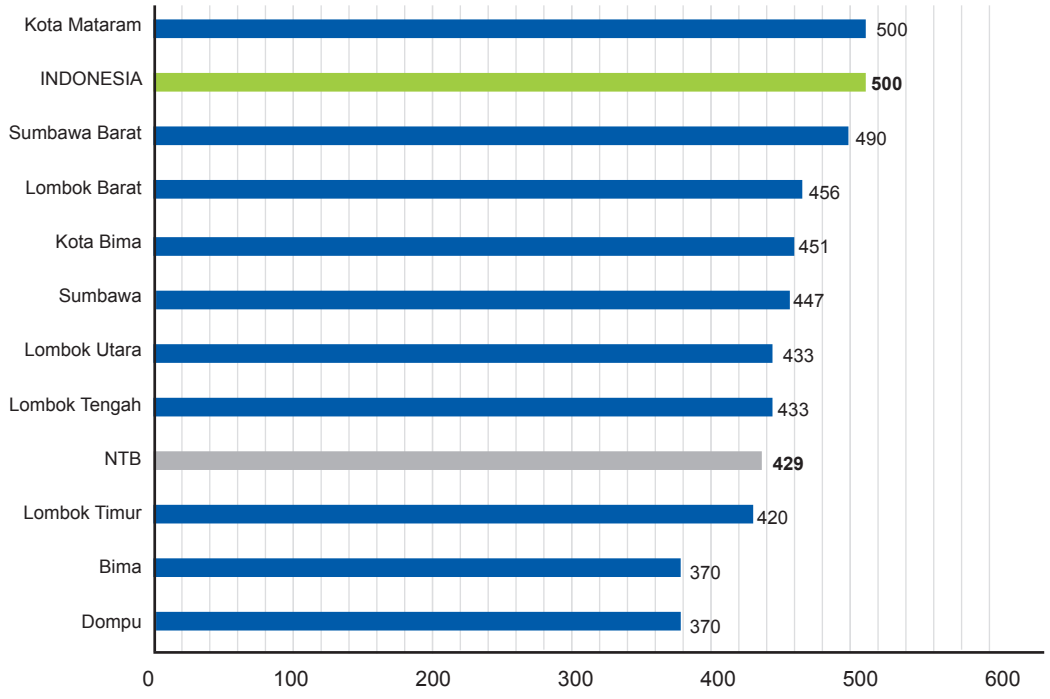

Although there is no significant gender gap in maths in NTB, there were variations between districts. As shown in Figure 8, Lombok Tengah has the highest gender gap in mathematics performance where girls outperformed boys by 30 points. In Dompu, Sumbawa Barat, and Lombok Timur, girls also performed better than boys by 10 to 20 points. In Lombok Barat, Sumbawa, and Bima, by contrast, boys have slightly higher score in maths, although the difference was only less than 10 points.

After taking students' socioeconomic and school-level background into account, only Lombok Tengah, Lombok Timur, Sumbawa Barat, and Kota Mataram whose female students performed significantly better in maths. In contrast, other districts had the opposite pattern, particularly in Kota Bima, Sumbawa, and Bima. However, gender differences in maths performance was found to be statistically significant in Lombok Tengah. In this district, girls outperformed boys in maths by around 40 points.

## STUDENT PERFORMANCE IN SCIENCE

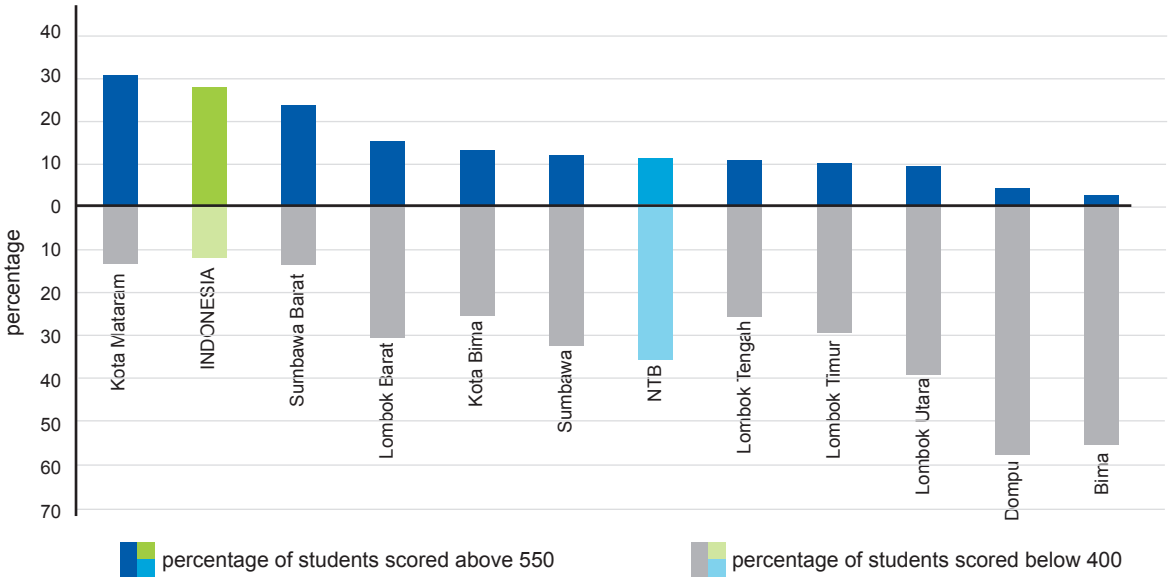
Similar to performance in reading and maths, NTB was also placed the last nationally in science achievement. Across all districts in NTB, students achieved an average science score of around 70 points lower than the national average. Kota Mataram placed the first in the province, followed by Sumbawa Barat at the second. Students in Mataram achieved an average science score at the national average level, while those in Sumbawa Barat scored around 10 points lower than the national average. Kota Bima, Sumbawa, and the other four districts in Lombok have average scores ranging from 420 to 456. Meanwhile, Dompu and Bima ranked below the other districts. Students in these districts achieved average scores in science 30 points lower than the national average.

**Figure 9 Student performance in science by district**




In terms of the top performing and low achieving students, Kota Mataram and Sumbawa Barat have relatively higher proportion of top performers, while most of low achieving students are those who live in Dompu and Bima. Around 11 percent of students in NTB are categorised as top performers in science who achieved score above 550. However, more than a third of students in this province have low proficiency in science. While only around one in ten students in Kota Mataram and Sumbawa achieved science score below 400, by contrast, approximately one in two students in Dompu and Bima achieved score below this level.

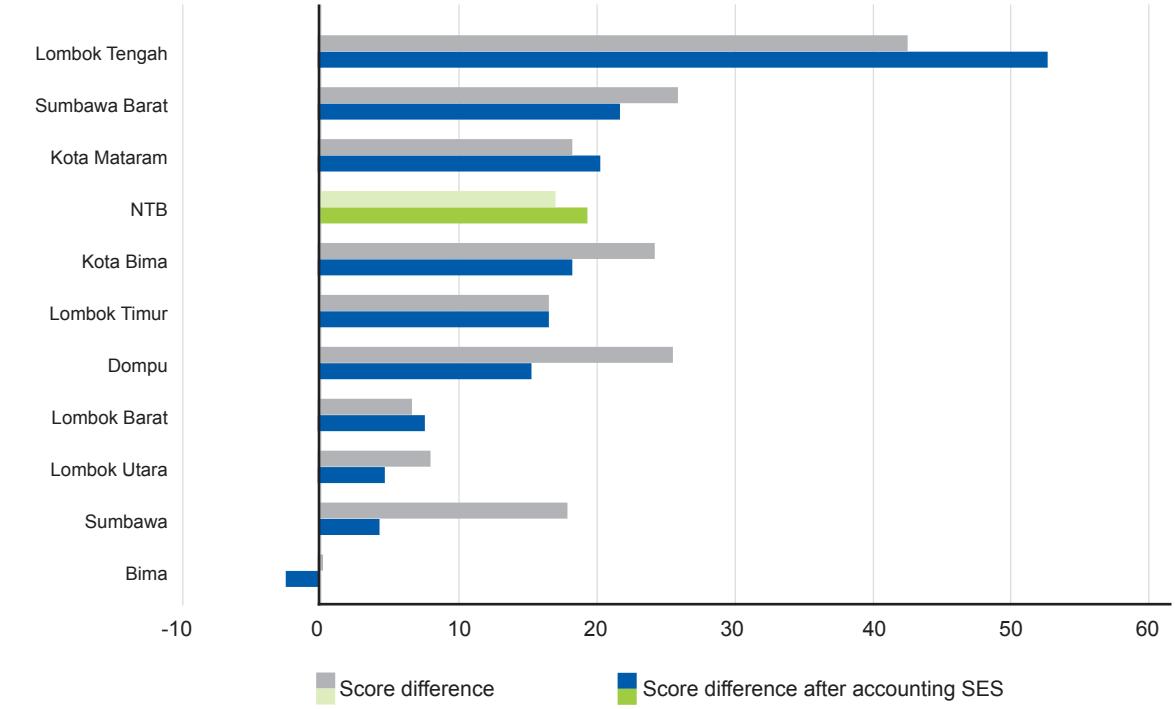
**Figure 10 Proportion of top performers and low achieving students in science**




## Gender differences, by district

In general, there is a significant gender difference in science performance, yet this gap was not as large as the gap in reading performance. Figure 11 shows the score difference in science by district. Across districts in NTB, girls are more likely to outperform boys by 15 to 20 points in science. Among top performers, the proportion is almost balanced between girls and boys. The highest gap was found in Lombok Tengah where girls outperformed boys by 50 points. Meanwhile, in other districts, gender has not been shown to be a strong correlate of science performance.

**Figure 11 Score difference in science (girls score minus boys score)**



Without controlling for students' socioeconomic background, score differences in science varied by gender between 10 to 40 points. Lombok Tengah, Sumbawa Barat, and Dompu have quite large differences – more than 25 point-differences – in science performance. In other districts, female students also performed better in science by 10 to 25 points. Only in Bima, girls and boys have relatively same average of science score.

Considering students' home condition and school facilities, gender difference in science performance remains in NTB, particularly in Lombok Tengah, Sumbawa Barat, and Kota Mataram. This suggests that there are significant gender gaps in science in these districts, although the magnitudes in Sumbawa Barat and Kota Mataram were below 25 point-difference. Lombok Tengah has a sizeable gender gap in science performance where girls tend to outperform boys by around 50 points. It can be concluded that girls in Lombok Tengah were found to perform better than boys, not only in reading and maths, but also in science.

# Chapter 3: The Support of Schools and Their Leaders

This Chapter discusses the role that schools and school leaders play in influencing student outcomes in mathematics, reading and science. The information provided here relies on evidence from the survey of NTB principals as part of the INAP.

## SCHOOL CHARACTERISTICS AND RESOURCES

A number of school characteristics were included in INAP survey such as number of school days, average class size, student-teacher ratio, availability of counsellor, and teachers' qualifications. The results suggest that only class size was significantly associated with student outcomes across all subjects. There is no evidence that higher teachers' qualification are correlated with higher student learning outcomes in any subjects. Only in reading, student-teacher ratio was significantly correlated with student performance.

The effect of class sizes (ratio of students to class groups), and student-teacher ratio, on student learning is a widely studied topic in education research. In NTB, small schools with small class sizes of fewer than 27 students per class, are at a disadvantage. In mathematics and science, students in schools with small class sizes had around 25 points lower than students in schools with larger class sizes. The score difference was even larger in reading performance. Students with larger class sizes are more likely to perform better by around 50 points in reading. Although schools with small class sizes tend to enrol students with lower socioeconomic status, the effect of class size remain even after taking that background into account.

It is important to note that larger classes are not always better – in fact, the effect disappears and after approximately 45 to 50 students per class the effect of class size becomes negative. Fortunately, this type of overcrowding is not commonly reported in NTB. The average class size in the province is 26, with around 40 percent of students in schools with at least 27 students per class. However, among all districts, Lombok Tengah and Kota Bima have the largest proportion of schools with class sizes below 27 students. Approximately three in four students in these districts are in schools with class sizes below 27. Kota Dompu has also quite large proportion of students who are in school with small class sizes which is around 70 percent.

Student-teacher ratio was also found to be correlated with student performance, particularly in reading. However, same as the pattern of relationship between class-size with learning outcomes, schools where student-teacher ratio are higher than 25 performed better than schools with lower ratio. On average, students in schools with student-teacher ratio above 25 achieved reading score 25 points higher than students in schools with lower ratio. Similar relationship pattern was also found in mathematics and science, but the gap was less than 25 points which is considered as a small

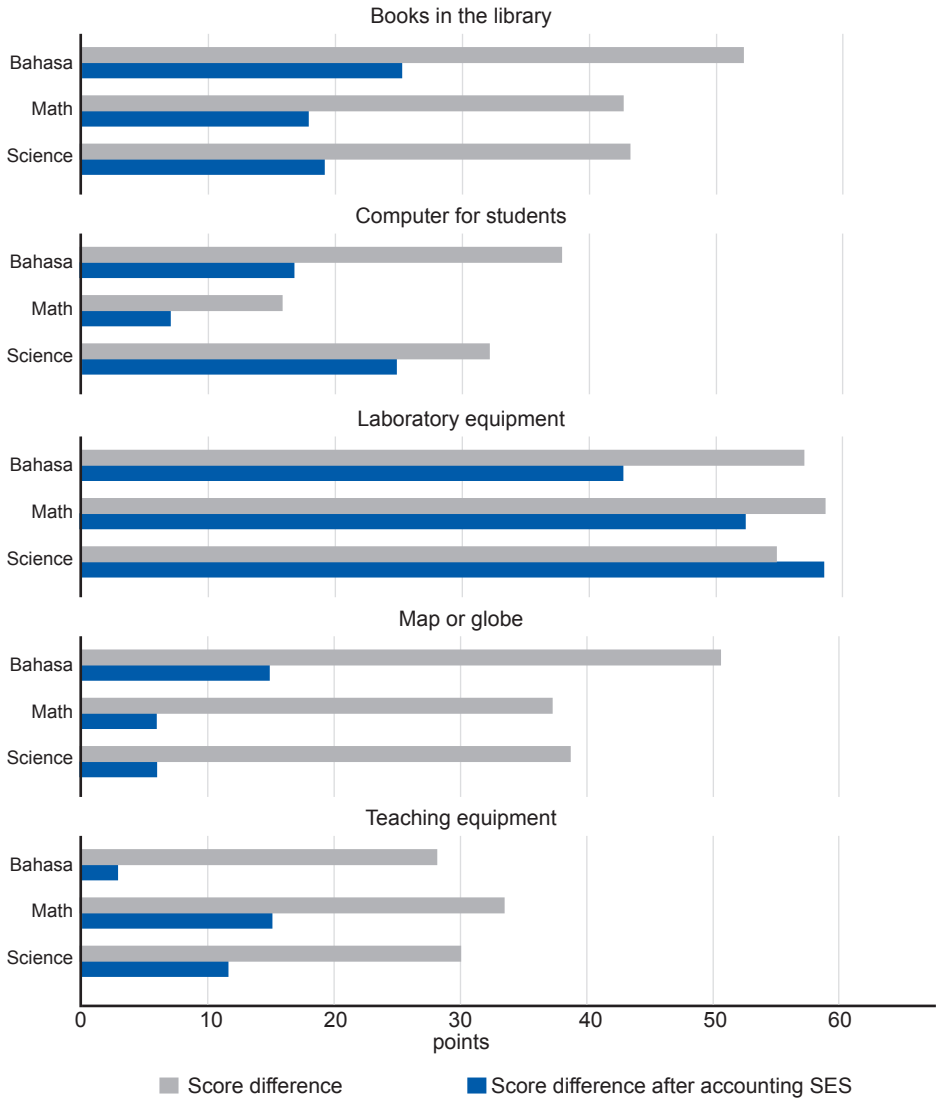
difference. The differences in reading and science were found to be statistically significant after taking students' socioeconomic background into account.

Students in schools that operate five days a week achieved scores that are on average 60 to 90 points higher than students in schools that operate six days a week. These schools that operate five days a week were much more likely to be found in urban districts (Kota Mataram and Kota Bima) and were more likely to be better resourced than those open six days a week. They also enrol more students with higher socioeconomic backgrounds (per the index of home possessions). The effects of days of school operation virtually disappear when these factors, particularly students' home background, are taken into account.

The INAP survey also asked principals to report whether their school has sufficient facilities and equipment. We analyse the relationship between student performance and the availability of the following facilities and equipment: a globe or map of Indonesia, books in the library, laboratory equipment, teaching equipment such as overhead projectors or science kits, and computer for students. To estimate the correlation between these facilities and learning outcomes, students' socioeconomic status and the availability of other facilities are taken into account. Other facilities consist of teacher desk and chair, a separate teacher room, a separate room or office for administrative staff, sporting equipment, sports fields, and a counselling room.

Students in schools whose surveyed principals reported having sufficient laboratory equipment are more likely to achieve higher scores across all subjects. Students in schools that have sufficient laboratories equipment tend to achieve scores 40 to 60 points higher than those in schools that do not. It should be noted that these are correlations. It may or may not necessarily mean that giving laboratory equipment to poor performing schools would improve their performance. Having sufficient lab equipment could be an indicator of good schools where students performed relatively better than others. Having said that, these warrant further investigation that could determine causal relationships.

**Figure 12 Score differences, by school facilities**




Most schools in NTB do not have sufficient laboratories equipment. Only 4.2 percent of schools in NTB whose principals reported having sufficient lab equipment. Compared to other districts, Lombok Utara, Sumbawa, and Kota Mataram have relatively large proportion of schools that have sufficient lab equipment, although it is only around 8 percent. In contrast, almost all principals in Kota Bima, Lombok Barat, Lombok Tengah, and Dompu reported inadequate laboratory equipment in their schools.

The availability of computers for students is also found to be correlated with learning outcomes in science, but not in Bahasa Indonesia and mathematics. Students in schools where computers are sufficiently available for students achieved science score 25 points higher than the ones in schools that lack this facility. On average, based on principals' perception, around 8 percent of schools in NTB have sufficient computers for students. However, there are great variation across districts. Around 16 percent of principals in Kota Bima and Lombok Timur reported having adequate computer for students, while in Lombok Barat and Bima, almost all principals reported lack of this facility.

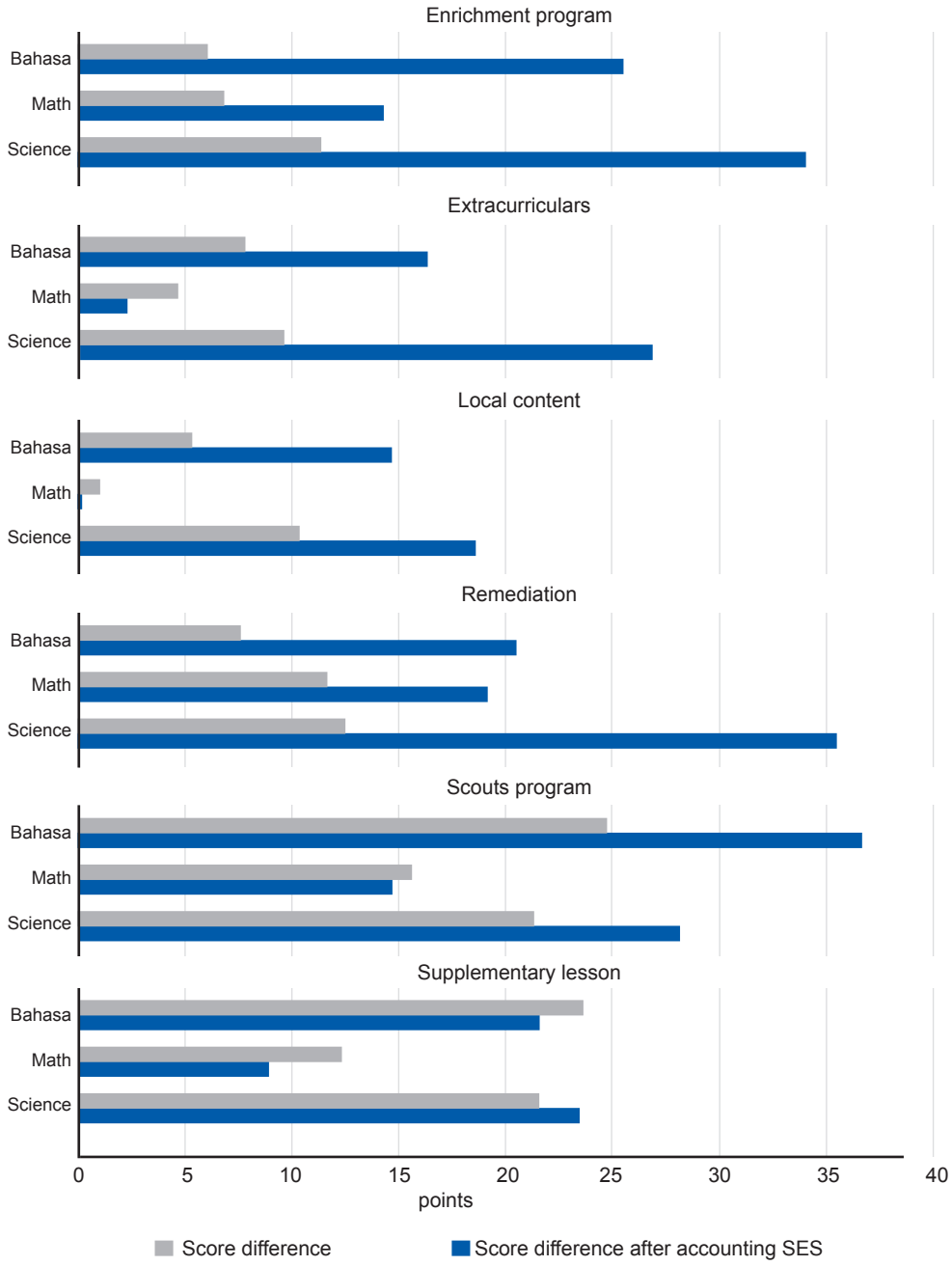
Another finding suggests that having sufficient books in the library is strongly correlated with higher reading performance. Students in schools that have adequate books in the library tend to achieve higher score in Bahasa Indonesia by around 25 points than those in schools that do not. The proportion of schools that have sufficient books in the library varies across districts. Based on principals' perception, more than half schools in Kota Mataram and Kota Bima already had sufficient books in the library. On average, around one in three schools in NTB reported that books were sufficiently available in the library. However, around 80 to 85 percent of schools in Bima and Dompu reported lack of books in the library.

## SCHOOL ACTIVITIES

Most primary school principals in NTB report that their schools offer the following supplementary activities: remediation, extracurricular activities, enrichment, supplementary lessons, scouts, and local content subjects. There are variations between districts in terms of which activities are available in schools. Around 90 percent of schools in Sumbawa Barat, Sumbawa, and Kota Bima offer all of these activities.

Type of activities such as enrichment, remedial, and scouts are most closely linked with student performance in science. Students in schools that offered these activities scored around 25 to 35 points higher in science than those in schools that did not. These differences are statistically significant even after accounting for differences in school resources and students' home possessions. Meanwhile, there were no activities that were found to be associated with student performance in mathematics.

**Figure 13 Score differences, by school activities**




In reading, there are significant differences in student performance between those in schools that offer enrichment and scouts. Students in schools that offered enrichment scored 25 points higher than those in schools that did not. There also 35 points difference in reading performance between students in schools that offered scouts and those in schools that did not. By contrast, remedial and supplementary lessons are not found to be correlated with scores in Bahasa Indonesia.

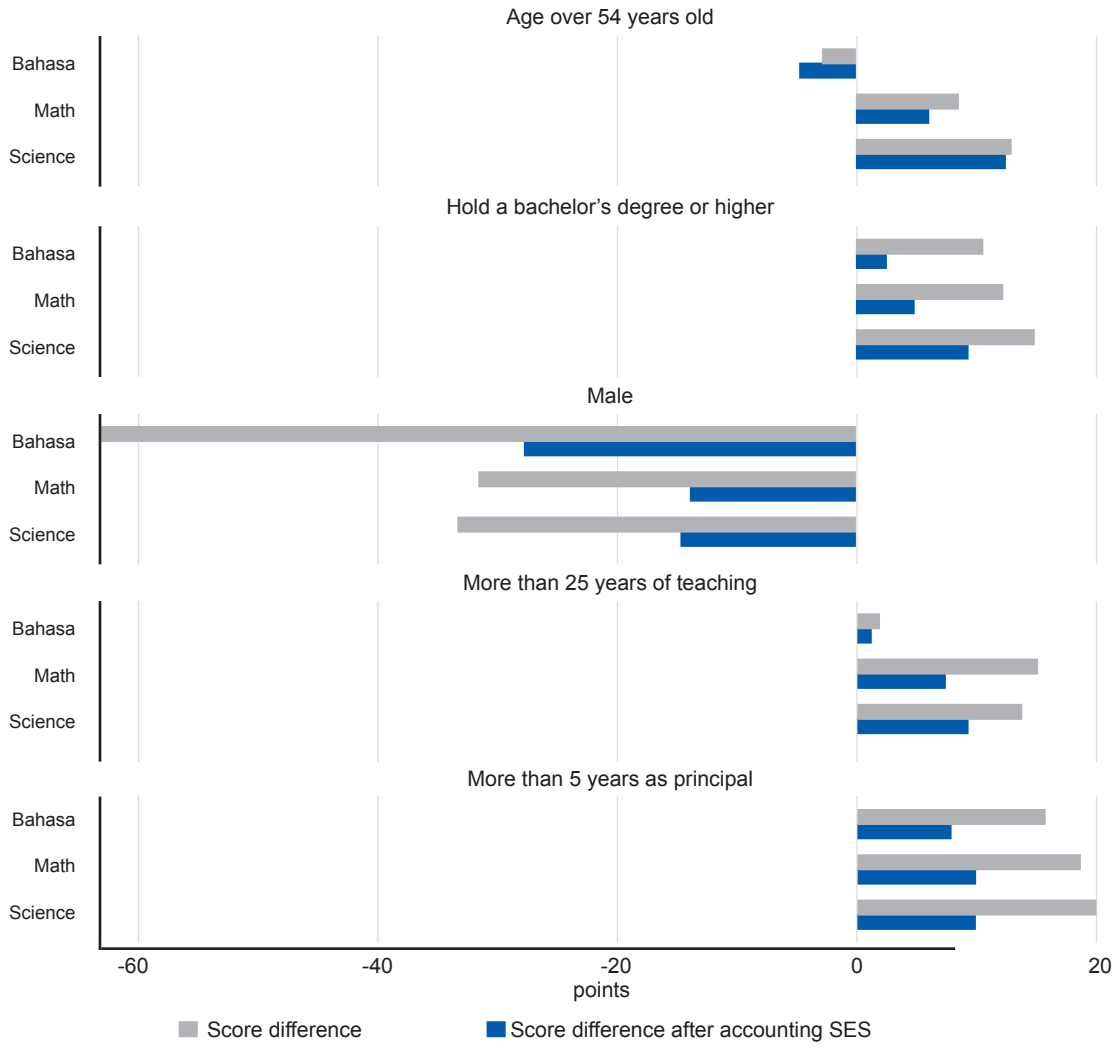
The results suggest that the availability of extracurricular activities, supplementary lessons, and local content subject also do not have any relationship with student learning outcomes across all subjects. There is no significant difference, both in terms of the magnitude and the statistical significance, between schools that offered these activities and those that did not.

## WHO PRINCIPALS ARE

Effective school leadership can influence the efficient allocation of resources, instructional support for teaching-learning practices and, in turn, student learning outcomes. In the INAP survey, much of the information collected were about the characteristics of the schools' principals – such as demographics, qualifications, experience – rather than their leadership. This brief section will, therefore, discuss the principal characteristics that were found to be linked to student outcomes.

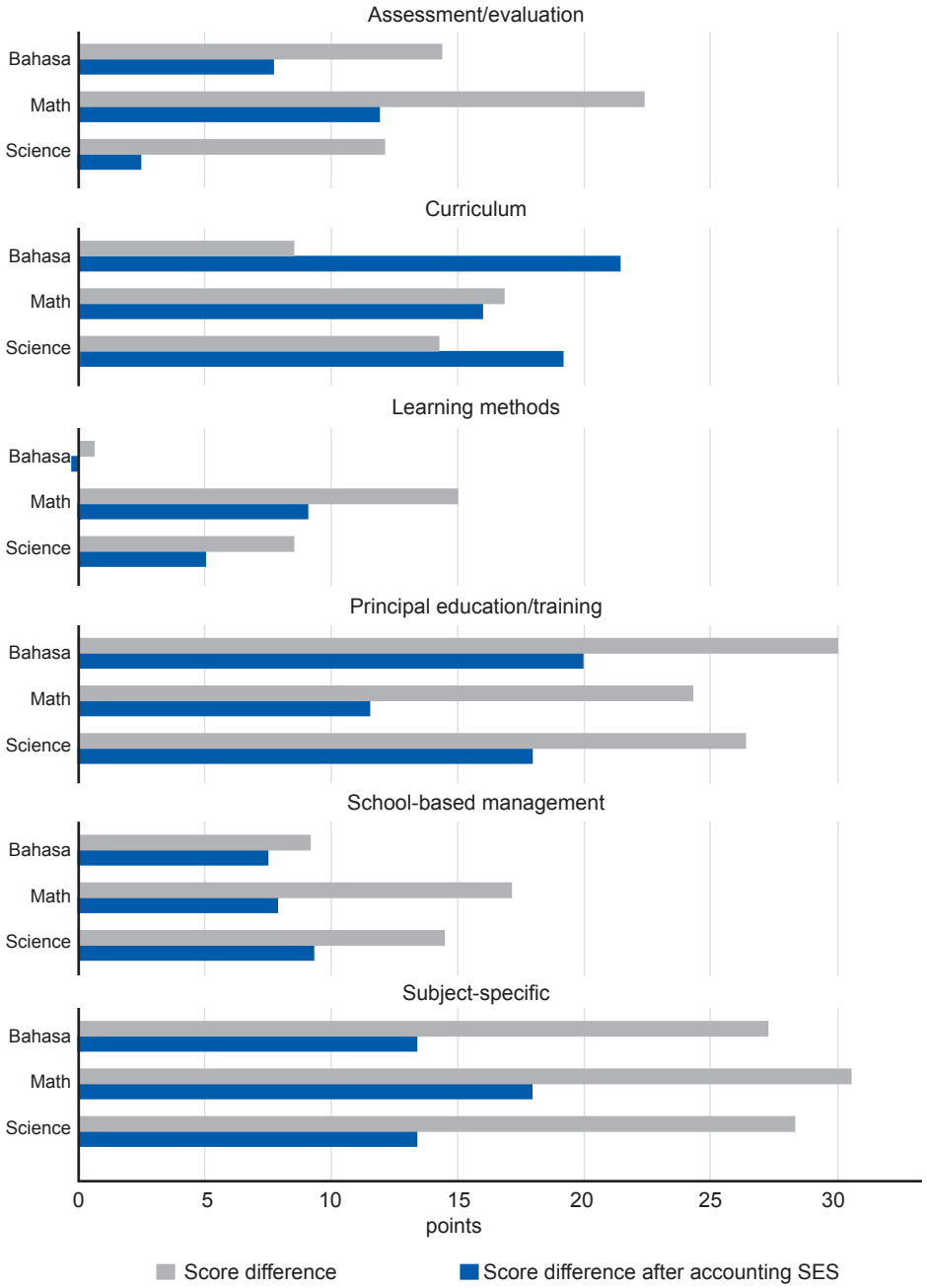
Among the available demographic information collected, only gender were found to have some relationship with student proficiency in reading. Students in schools led by female principals achieved 28 points higher scores, particularly in reading, than those in schools led by male principals. Approximately one in five primary students in NTB are in schools led by a female principals, with some significant differences between districts. Kota Mataram is the only district where more students – approximately 3 in 5 – are in schools with female principals. In nearby Lombok Barat and in Kota Bima the proportion is approximately 1 in 3. In other districts, over 75 percent of students have male principals.

**Figure 14 Score differences, by principals characteristics**



In the INAP survey, principals were also asked about whether they had ever undertaken six types of professional development training. These includes training in assessment or evaluation methods, curriculum, learning methods, principal professional development, school-based management, and subject-specific. Although principals' professional development is expected to improve school performance, we found that there is no significant relationship between these six types of training for principals with student learning outcomes.

**Figure 15 Score differences, by professional development training attended by the principals**




The most common type of professional development training that principals had undertaken were those related to the curriculum, where 81 percent of NTB schools are in schools where the principal has completed this type of training. This is followed by school-based management training (66

percent), principal education and training (62 percent), assessment and evaluation (56 percent), learning methods (51 percent) and subject-specific training (41 percent). There are some differences in the coverage of training by district, with principals in Kota Mataram and Sumbawa Barat being more likely to have attended professional development training. Meanwhile, principals in Lombok Utara and Dompu were less likely to have attended training.

## WHAT PRINCIPALS THINK

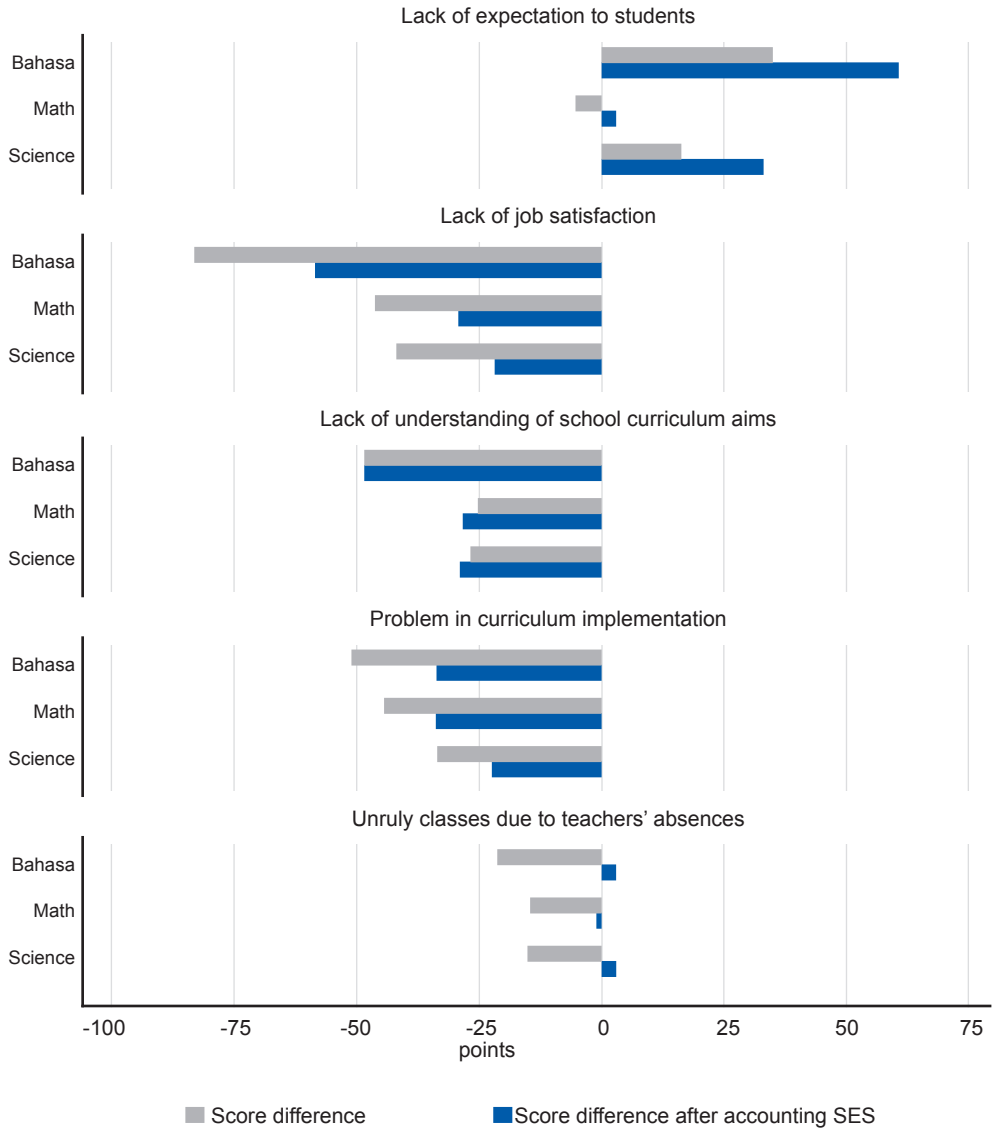
As part of the INAP survey, principals were also asked about their perception of issues and situations facing their school. Almost all of these relate to the schools' teachers and students. Principals were asked about their perception on teachers' job satisfaction, teachers' understanding of school's curriculum aims, problems in curriculum implementation, teachers' expectation to students, and unruly classes due to teachers' absences. We found that problems in curriculum implementation, teachers' lack of job satisfaction, and teachers' lack of understanding of curriculum aims, have significant correlation with student performance, particularly in reading and mathematics.

Across all districts in NTB, 9 percent of students are in schools that where the principal reported that their schools' teachers lack understanding of curriculum aims. There are variations between districts. Lombok Tengah and Lombok Utara have the largest proportion of schools – around 17 percent – whose principals believed that teachers lack understanding of curriculum aims. Meanwhile, all surveyed principals in Kota Mataram, Kota Bima, and Sumbawa Barat reported that teachers' understanding of curriculum aims was not an issue in their schools.

There are significant score differences across all subjects between students in schools where teachers lack of understanding of curriculum aims and those in schools that did not consider this as an issue. In reading, students in schools where teachers have lack of understanding of curriculum aims scored about 58 points below those in schools that do not have this issue. In both maths and science, students in schools that experienced this issue also achieved 30 points below students in schools whose principals reported not having this issue. These are the differences after accounting for variations in school resources and student home possessions.

Teachers' expectation to students has also a significant relationship with student performance in both reading and science. However, the pattern of relationship was negative. Students in schools where teachers lack expectation to students, surprisingly, achieved higher reading and science scores than schools where teachers have sufficient expectation to students. In science, students in schools where teachers have low expectation to students performed 30 points higher than those in schools where this was not an issue, while in reading, the score difference was close to 60 points. Meanwhile, there is no significant relationship between principals' perception on this issue with student achievement in mathematics.

**Fiigure 16 Score differences, by principal's perception on the following issues**




In INAP survey, the principals were also asked whether there are any particular student behaviour that negatively affect the learning environment at schools. These includes unpunctuality, truancy, cheating, bullying, substance abuse, use of weapons, and violence between student and teacher. Only student unpunctuality that was found to be correlated with student learning outcome in reading. However, in general, the finding suggests that there is no significant correlation between student behaviour with student learning outcomes.

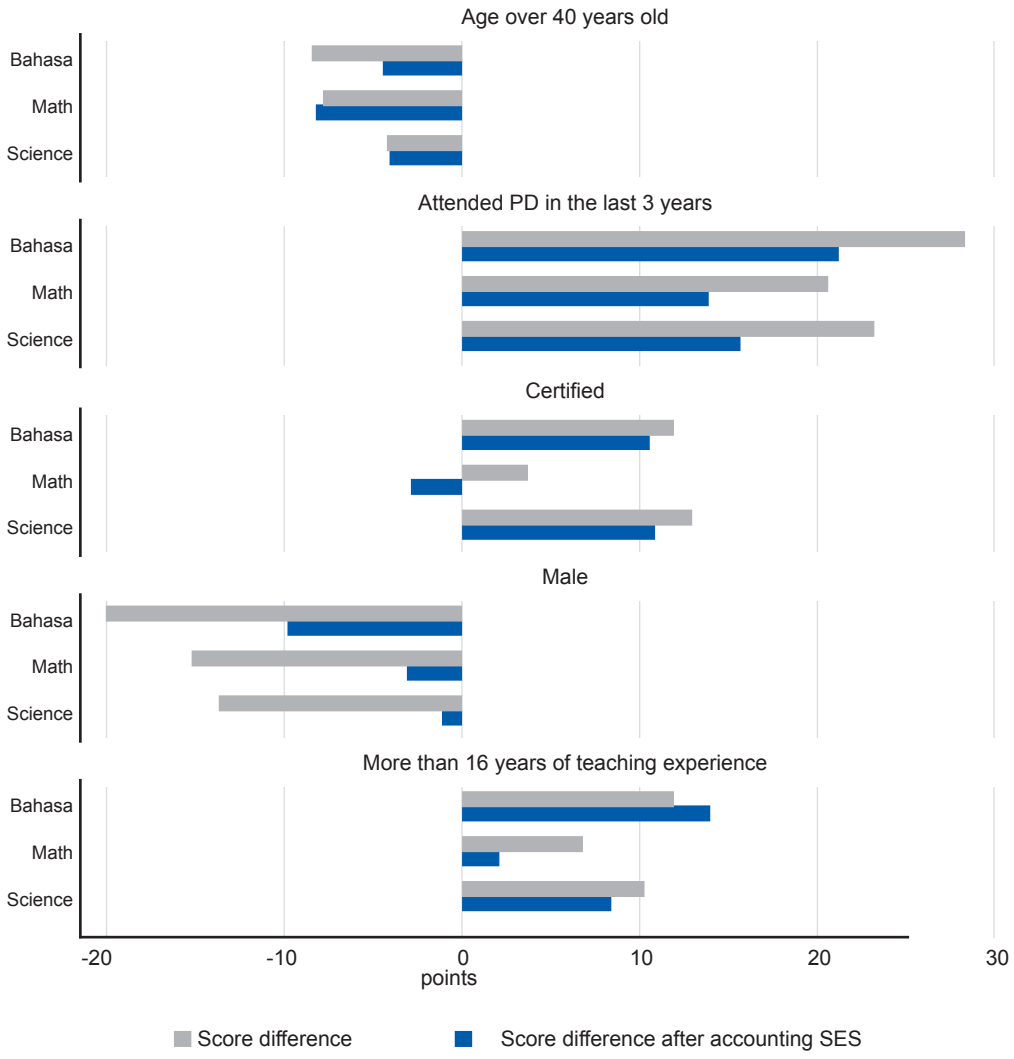
# Chapter 4: Teachers and Teaching Practices

This chapter discusses the role that teachers and teaching practice play in influencing student outcomes in mathematics, reading and science. The information provided here relies on evidence from the survey of NTB teachers, as well as principals' and students' perception of teachers, as part of the INAP.

## WHO TEACHERS ARE

Student performance in NTB were found to vary by some teacher characteristics. The first is teacher age. About half of Grade 4 teachers in NTB are between 35 and 49 years old. Another 13 percent are 50 years old or older, while approximately 35 percent of teachers are younger than 34. Although the students of younger teachers performed slightly better than other students, by approximately 4 to 8 points across all subjects, these differences are small and not statistically significant. The influence of teacher gender is also small and statistically insignificant, ranging from one to ten points, indicating that male and female teachers perform similarly.

**Figure 17 Score differences, by teacher characteristics**



We find that some aspects of teacher qualifications influence student performance. Recent attendance at a professional development training showed a small to medium effect. Students whose teachers have received professional development training in the last three years scored 14 to 21 points higher across all subjects than those whose teachers had not recently attended professional development. Just under 80 percent of students in NTB were taught by teachers who attended training in the last three years. There is a fairly small variation in teachers' experience with training between districts, with fewer than 70 percent of students in Dompu and Lombok Timur being taught by teachers who recently had training.

However, being taught by teachers with extensive experience did not translate to higher performance. Finally, students whose teachers were certified did not perform better than those taught by teachers who are not yet certified, corroborating the finding of other studies in Indonesia that focus on teacher certification.

## WHAT TEACHERS THINK

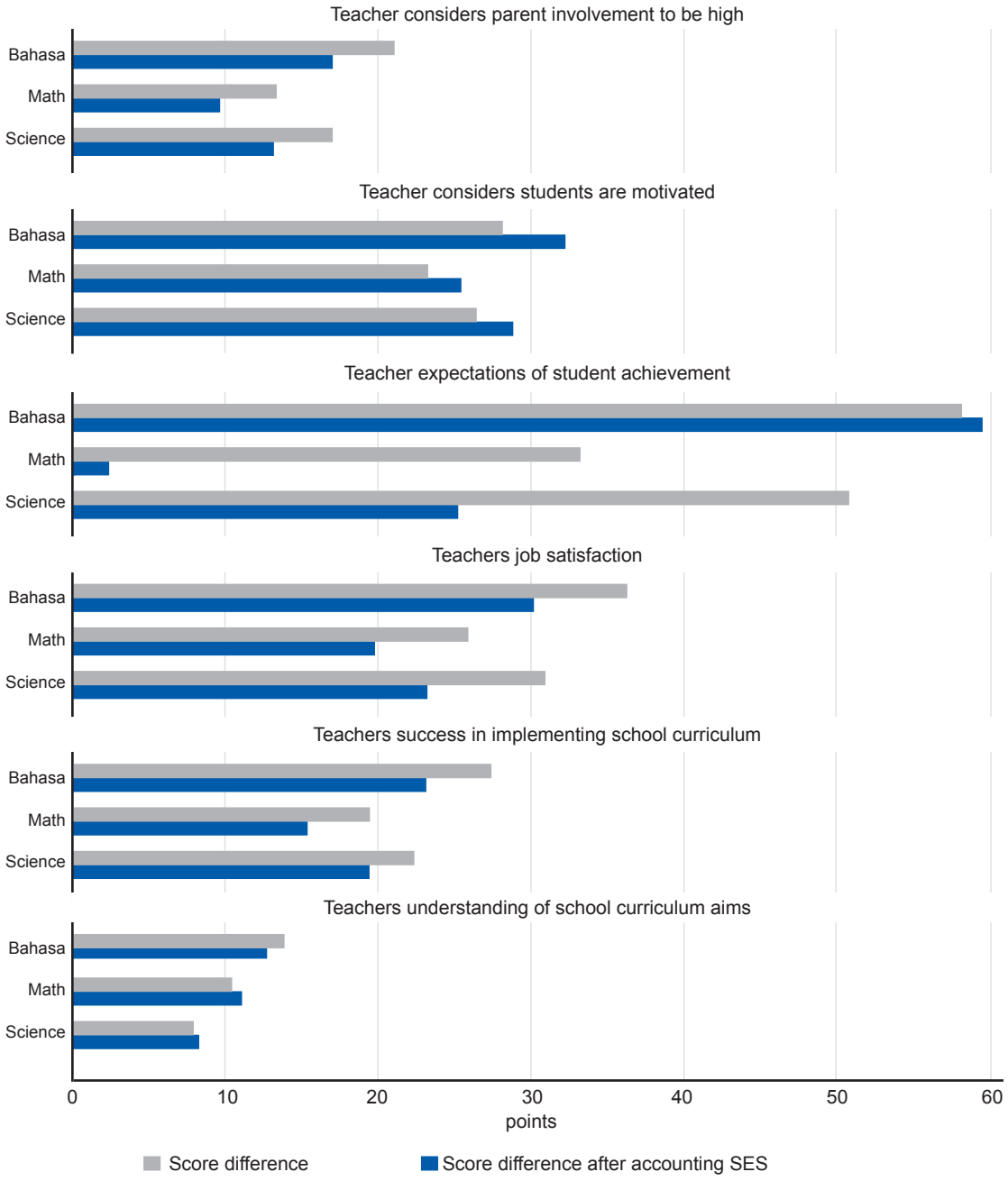
We find that students whose teachers report high job satisfaction and success in implementing school curriculum performed better in all three subjects, where the differences are statistically significant.

Although students whose teachers expected high achievement from them appear to perform much better, especially in reading, none of these estimates are statistically significant. In contrast, student motivation has a significant and medium-sized correlation with performance in all three subjects. Therefore, it appears that students' intrinsic motivation, rather than one that is externally driven by teachers, was more influential to their performance.

Finally, teachers' view of parental involvement has no statistically significant correlation with student performance. However, students whose parents support their achievement performed around 14 to 18 points higher. These findings show that support to their children, as opposed to direct involvement in school, may be a better role for parents.

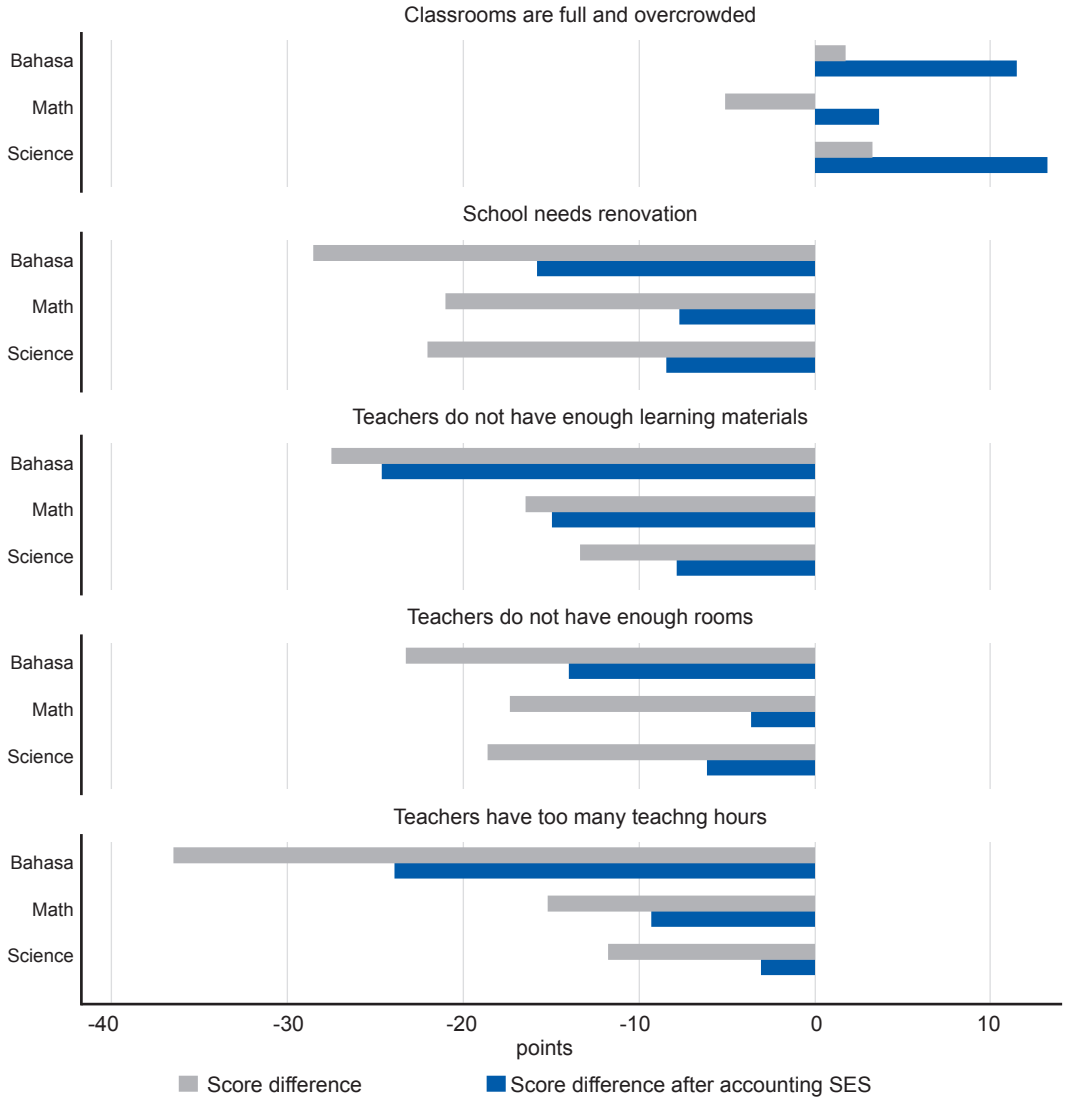
Across NTB, only around 49 percent of teachers considered parents to be fully supporting their children. The proportion was lowest in Kota Mataram and Lombok Barat, at around mid-30 percent, and highest in Sumbawa and Dompu, between 67 and 69 percent.

**Figure 18 Score differences, by teacher perception**




Despite some quite large correlations, the scores of students whose teachers consider significant issues exist in schools are not statistically different from those whose teachers view that there were no significant issues in schools.

**Figure 19 Score differences, by teacher report of issues**

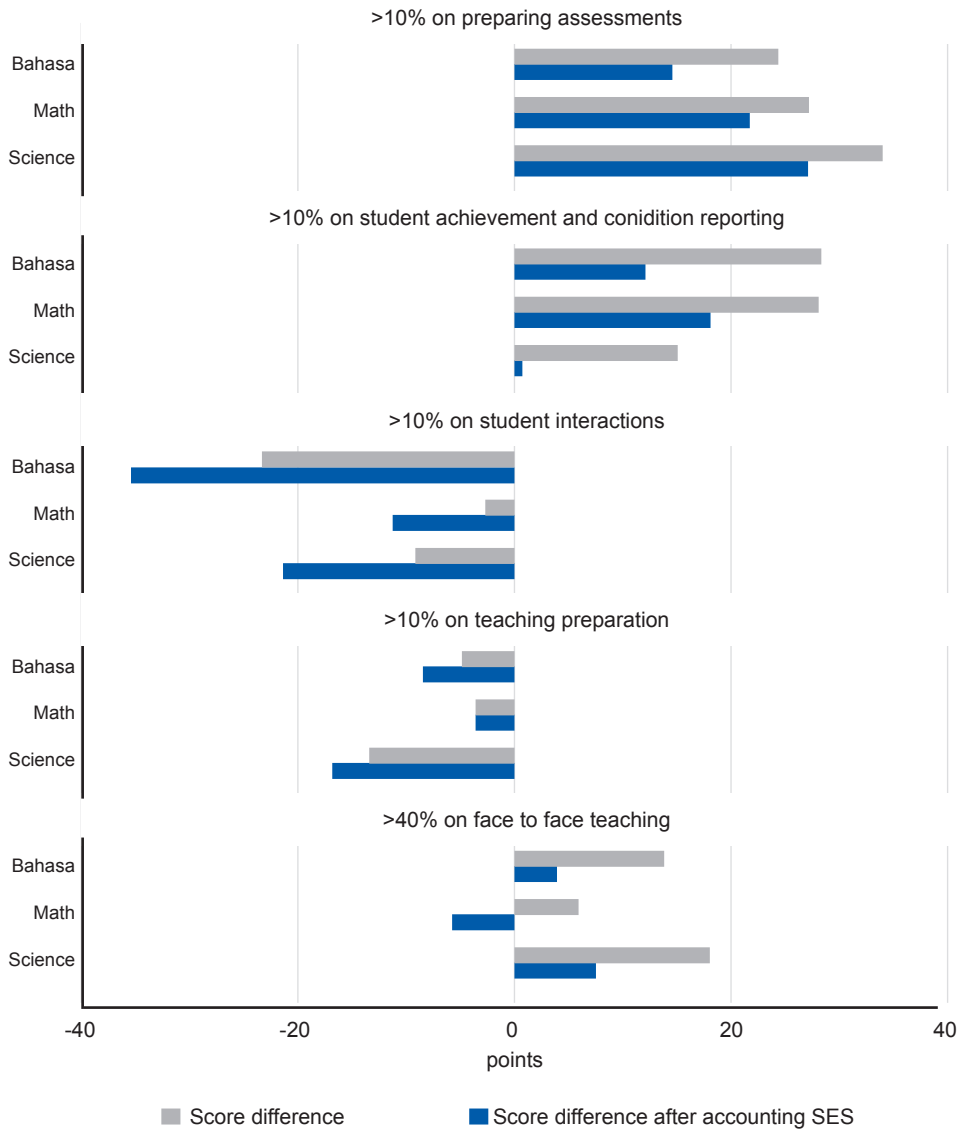



## TEACHING MATERIALS AND STRATEGIES

Teacher time use had different effects on student performance, depending on the subject. Students whose teachers spent more than 10% of their time interacting with students scored 35 points lower in the reading test than those whose teachers spent less than 10% on interacting with students. Teachers who spent more than 10% of their time preparing assessments had students whose math scores were 22 points higher. For science scores, it appears that spending more than 10% of time on teaching preparation had a negative correlation of about 17 points, while spending more than 10% of time preparing assessments resulted in 27 extra points.

Examining the proportion of teachers in the different districts implementing the above strategies, the districts with the highest proportion of teachers spending more than 10% of their time on preparing assessments were Sumbawa (31 percent) and Sumbawa Barat (25 percent). At the other end of the spectrum, no teachers in Lombok Utara, Bima, or Lombok Timur spent more than 10% of their time on preparing for assessments.

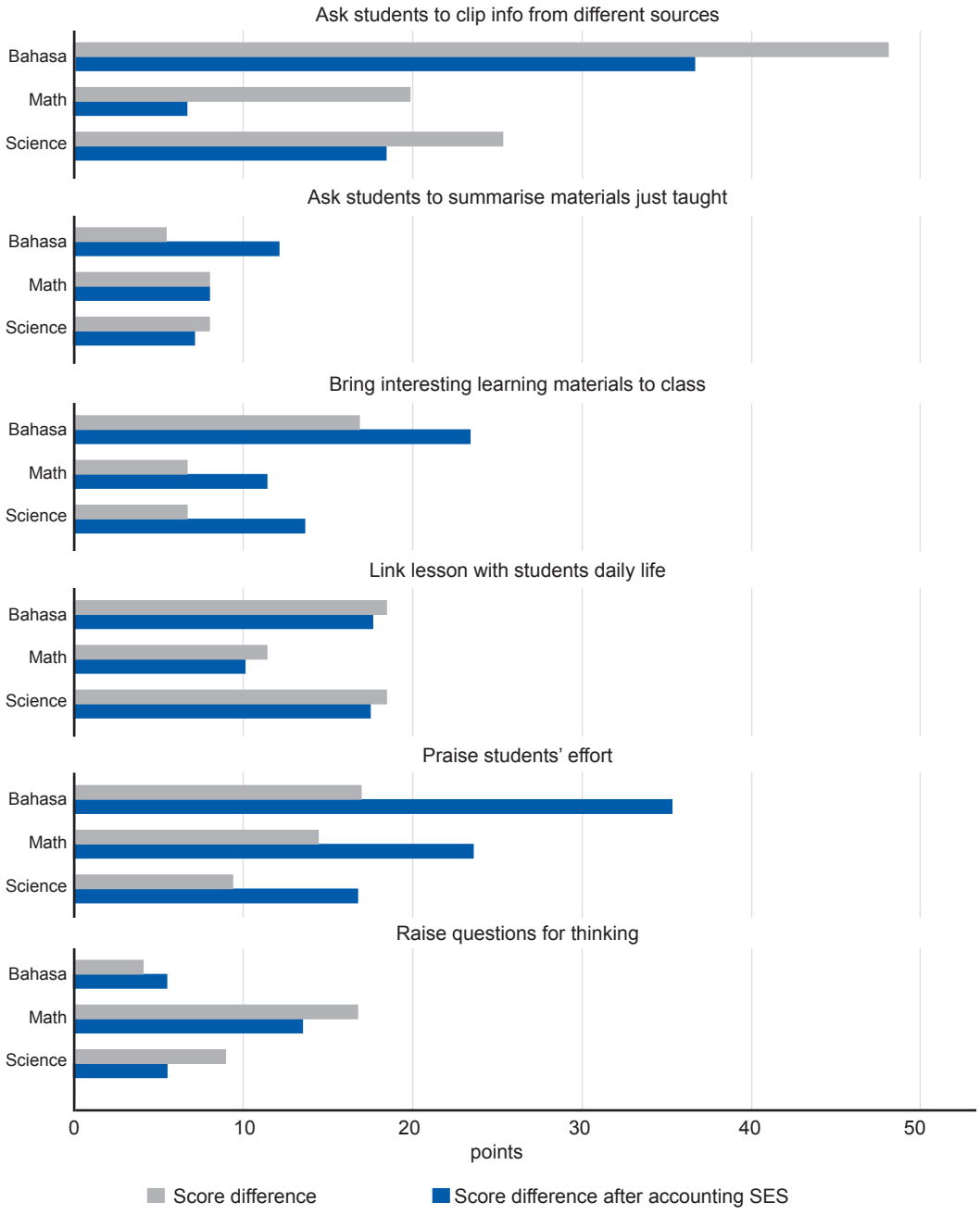
**Figure 20 Score differences, by teacher time-use**




Considering different types of activities and assignments given to students, students whose teachers often ask them to clip information from other sources or read other books perform 37 and 22 points higher in reading respectively, compared to students who were rarely or never asked to do these things. Asking students to read other books also appear to provide an additional 19 points higher science score. For mathematics, students whose teachers often ask them to conduct observations outside the classroom performed worse, by about 15 points.

Across districts in NTB, 69 percent of teachers reported that they often ask their students to read other books. The proportion was the lowest in Dompu, with 49 percent, and the highest was in Kota Bima with 83 percent. In contrast, the practice of asking students to clip information from other sources was rare. On average, only 16 percent of teachers often do this activity. There appears to be potential significant gain through these additional activities and types of assignments.

**Figure 21 Score differences, by teaching activities**




On other activities, it appears that praising students' effort and asking them to bring interesting materials had a positive correlation with reading score. In addition, linking the lessons to daily life seems to have benefited science score. There is no evidence that raising questions for students to think about had any positive correlation with student performance.

Across the province, most teachers regularly praise their students' effort. The proportion of teachers that do this at every lesson hovers around 84 to 100 percent, except in Sumbawa, where only 74 percent of teachers regularly praise students' effort.

# Chapter 5: Student Aspirations, Activities and Support

## ATTITUDE, ASPIRATION, AND CONDITION

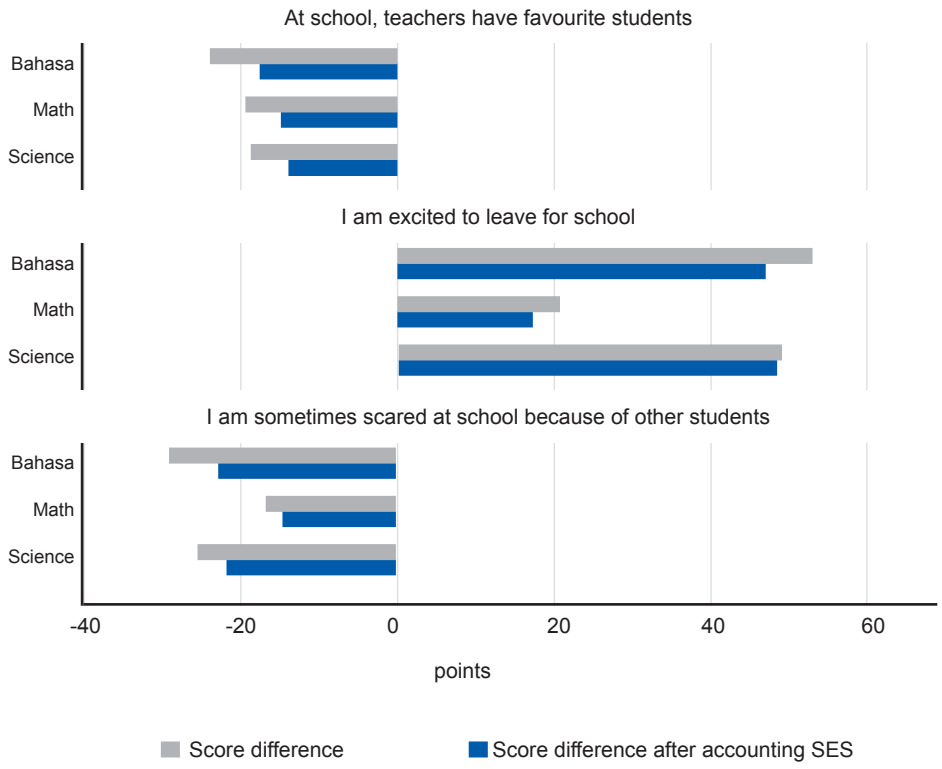
Students who are excited to leave for school had significantly higher scores than those who do not: 48 points differences in reading, 45 in science and 18 points for math, after accounting for resource differences. In contrast, students who reported feeling scared at school scored between 15 to 23 points lower. These two findings provide the evidence that a school environment where students feel safe and eager to learn is very important.

Across the province, only around 5 percent of students reported not feeling excited to leave for school. However, 32 percent reported sometimes feeling scared at school. More than four out of ten students in Dompu reported feeling scared, while the lowest is in Kota Mataram, with 24 percent. These show that school stakeholders still need to do more to ensure students feel safe in school, such as tackling bullying.

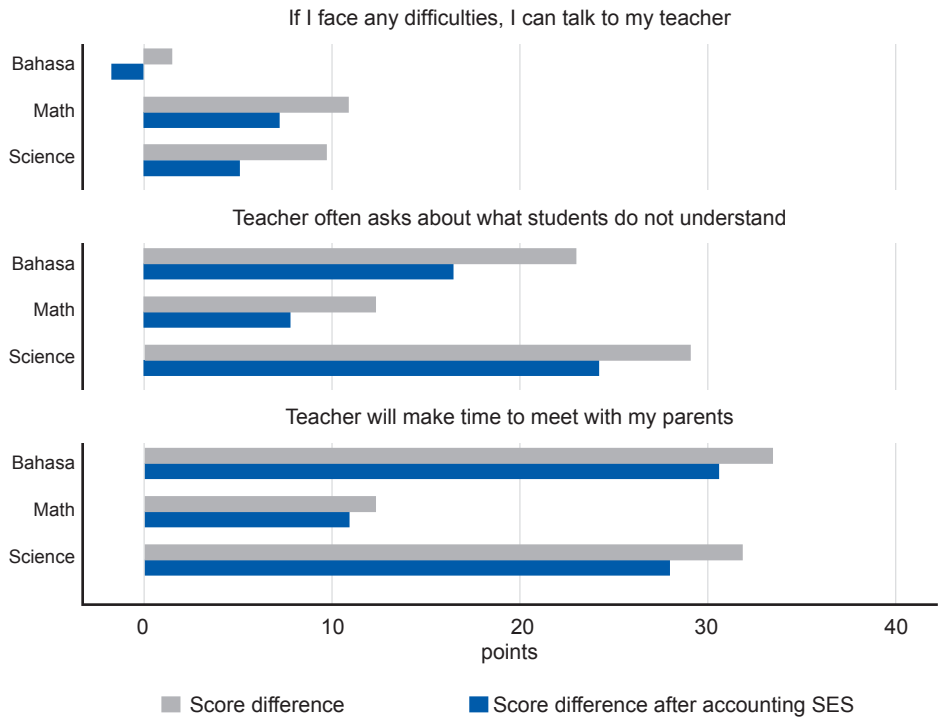
Students who feel that teachers have favourites scored significantly lower in all three subjects, although the magnitude is relatively small.

**Figure 22 Score differences, by student beliefs**

**A.**



B.



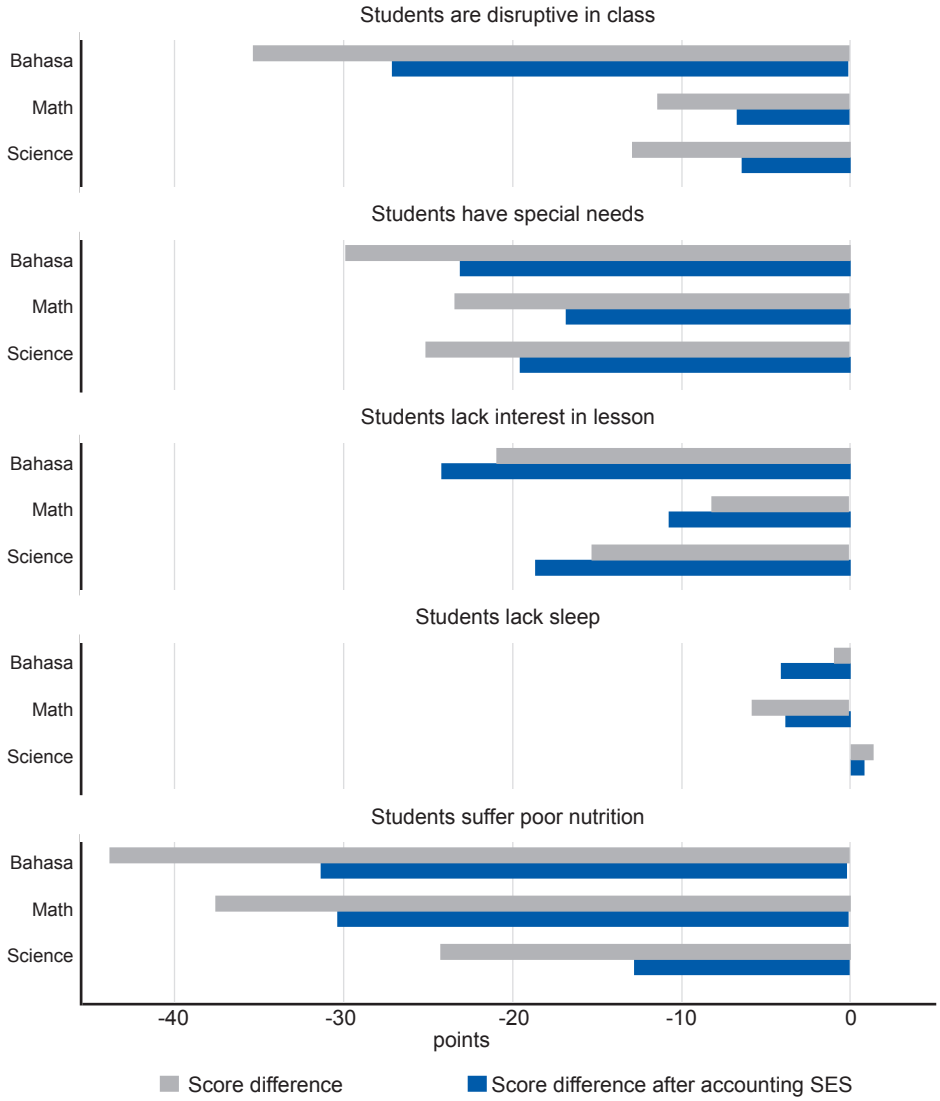

Surprisingly, the ability to talk to teachers when students face problems has no significant correlation with test scores. However, a proactive approach by teachers to check whether students understand the lesson has a medium and positive correlation with science and reading scores, by 22 and 16 points respectively. Similarly, teachers making time to meet with parents is correlated with better scores in all three subjects. Across the province, the vast majority of teachers, around 90 percent, have regularly implemented these two practices.

The teacher survey contained questions on teacher perception on student behaviour and conditions that may significantly affect classroom teaching. Students in classrooms with disruptive students perform significantly lower in reading, by around 27 points, but not in other subjects. Having classmates with special needs lowers student performance by around 20 points across all three subjects.

The survey shows that disruptive students are common in NTB classrooms. Close to nine out of ten teachers admitted that their teaching is affected by disruptive students, and one out of three were affected by children with special needs in their classroom. Virtually all teachers in Lombok Barat, Lombok Tengah, and Bima have to deal with disruptive students. Close to five out of ten teachers in Lombok Barat reported to be affected by special needs students, while only 16 percent of teachers in Sumbawa Barat were affected. These two findings show that teachers may benefit from specific classroom management training to address disruptive students, and differentiated teaching or inclusive education to provide for special needs students.

Poor nutrition appears to have a significant correlation with reading and mathematics test scores, by as high as 31 points even after home and school conditions are controlled for. On average, 48 percent of teachers reported that their teaching is affected by students' poor nutrition. The range was from 26 percent in Kota Mataram to 68 percent in Lombok Timur, indicating that poor nutrition is still prevalent in NTB.

**Figure 23 Score differences, by student conditions**



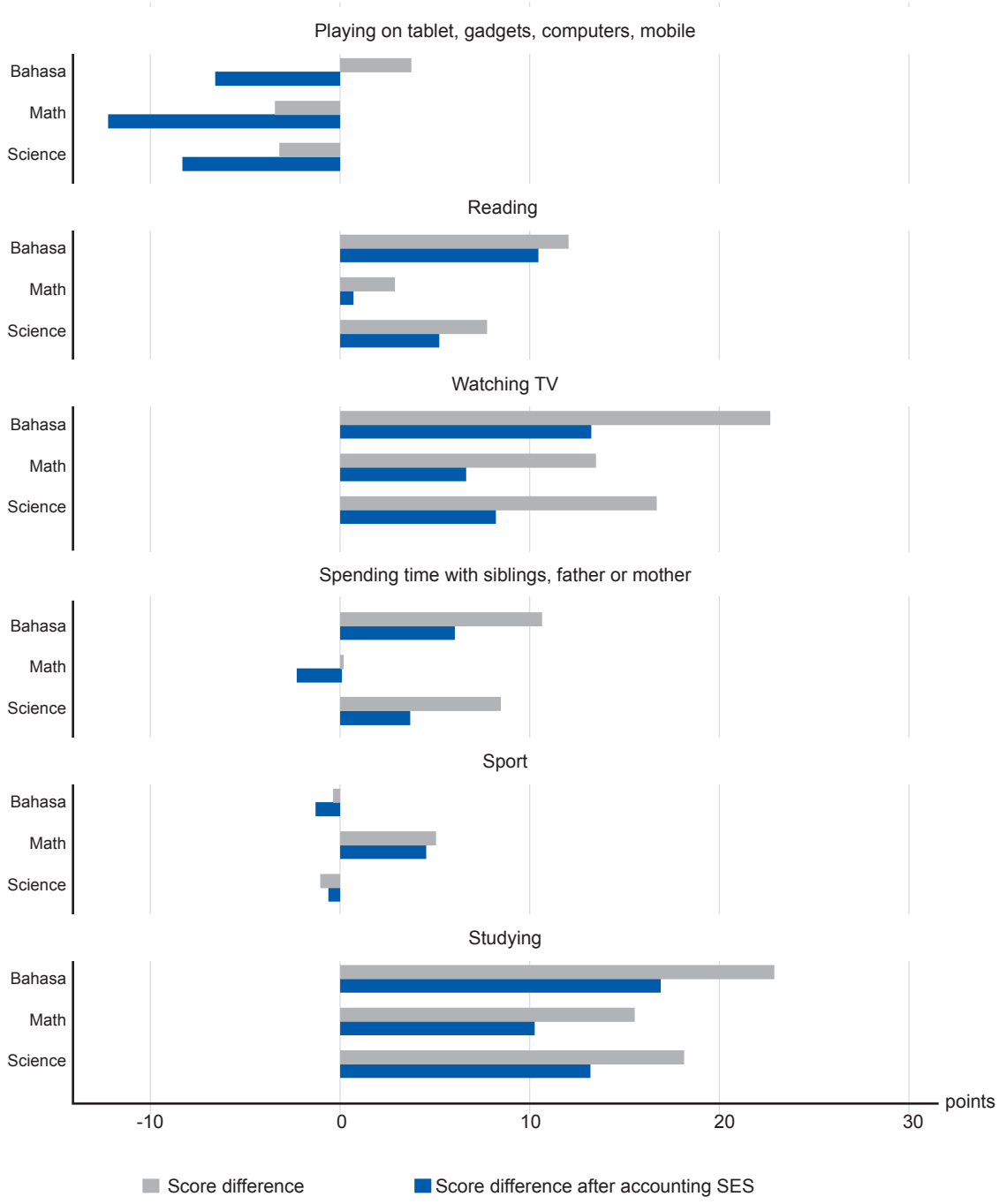

## WHAT STUDENTS DO

Examining the score differences between students who spend their time on different activities, we find that reading score is positively correlated with watching television, where students who watch television for more than two hours per day score 13 points higher than those who watch less television. Unsurprisingly, we find that spending time on reading and studying are positively correlated with reading score.

For mathematics score, playing gadgets or other devices for more than two hours per day is associated with 13 points lower performance, while studying for more than two hours per day provides a benefit of 10 higher points. For science, meanwhile, only time spent on studying has a positive correlation with science performance.

Overall, the results show that for fourth grade students, spending time on different activities have a small correlation with school performance. We find evidence of positive correlation between television and reading performance, and negative correlation between playing on gadgets on mathematics performance.

**Figure 24 Score differences, by student activities outside of school**



Looking at the various study techniques, we categorise them into two groups: techniques that are mainly repetition, and other techniques. The first to note is that all these techniques have a positive and statistically significant correlation with scores in all three subjects. Secondly, comparing the different techniques, it appears that different repetition techniques are equally effective – all of them have small-to-medium correlation with scores. There is more variation in the non-repetition techniques, where material from other sources or reading other books is more effective than trying new ways to solve a problem. Thirdly, comparing the repetition and non-repetition techniques, their effects are largely similar. The least effective repetition technique is creating summaries in short notes, and the least effective non-repetition technique is trying new ways to solve a problem. Finally, using five or more techniques is correlated with medium to large gains in performance across all three subjects. The findings indicate that the best strategy is to use various study techniques, rather than focusing on repetitive or non-repetitive strategies.

**Figure 25 Score differences, by students study techniques (repetition)**

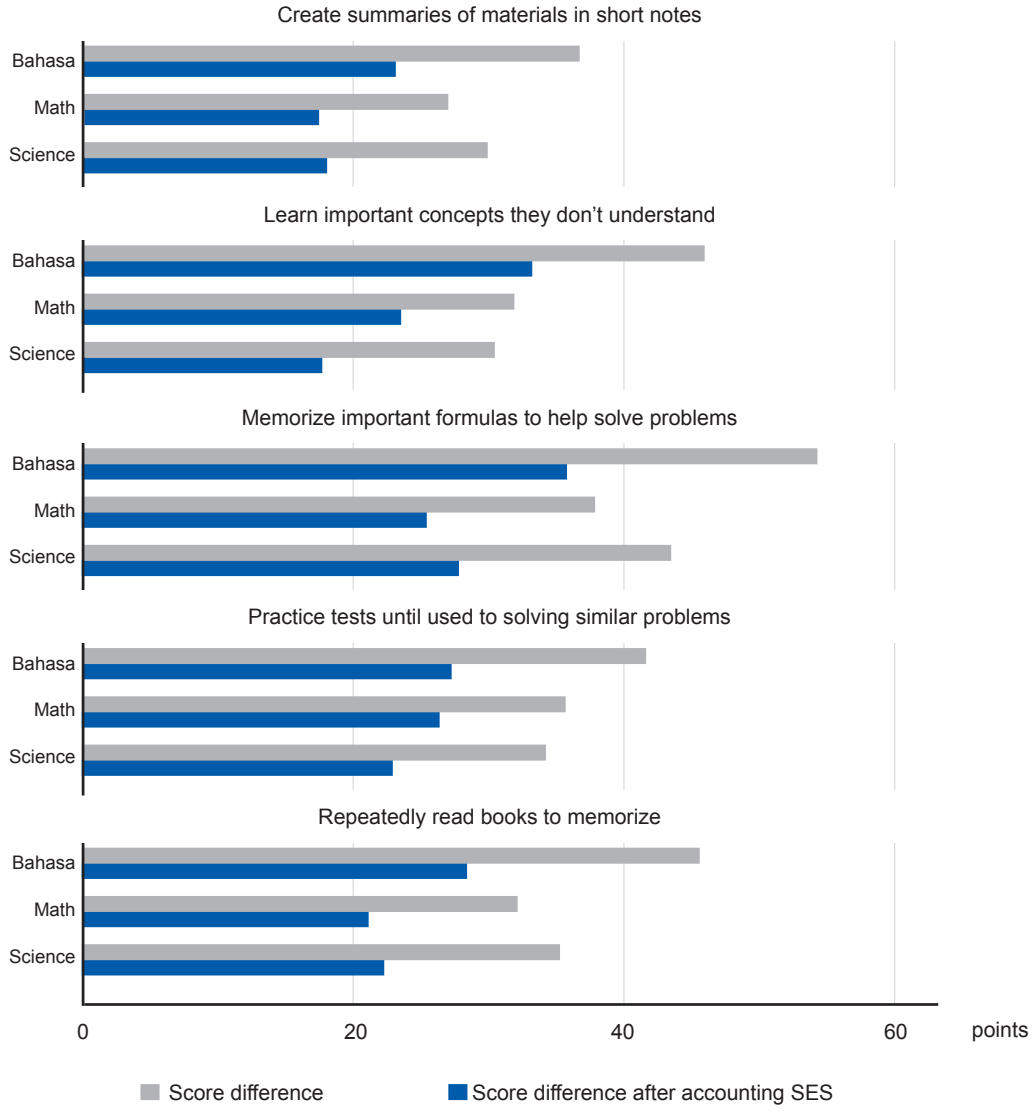
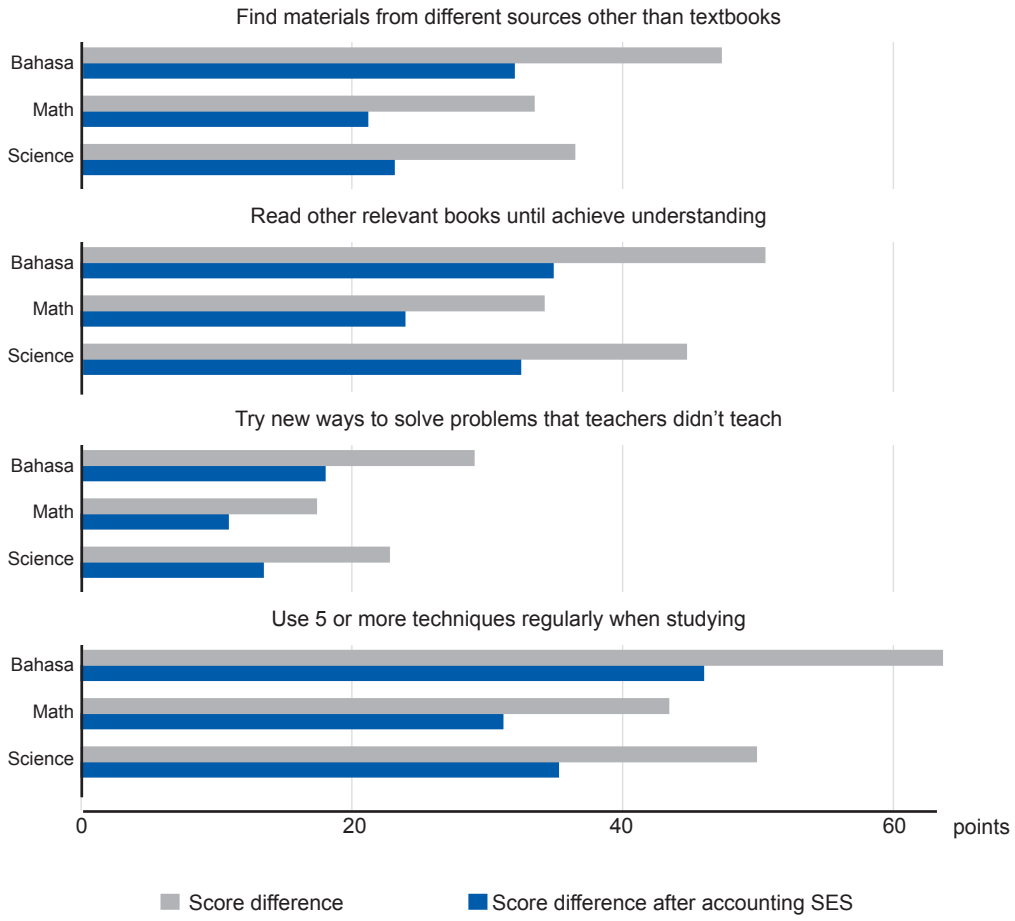


**Figure 26 Score differences, by students' study techniques (other sources)**

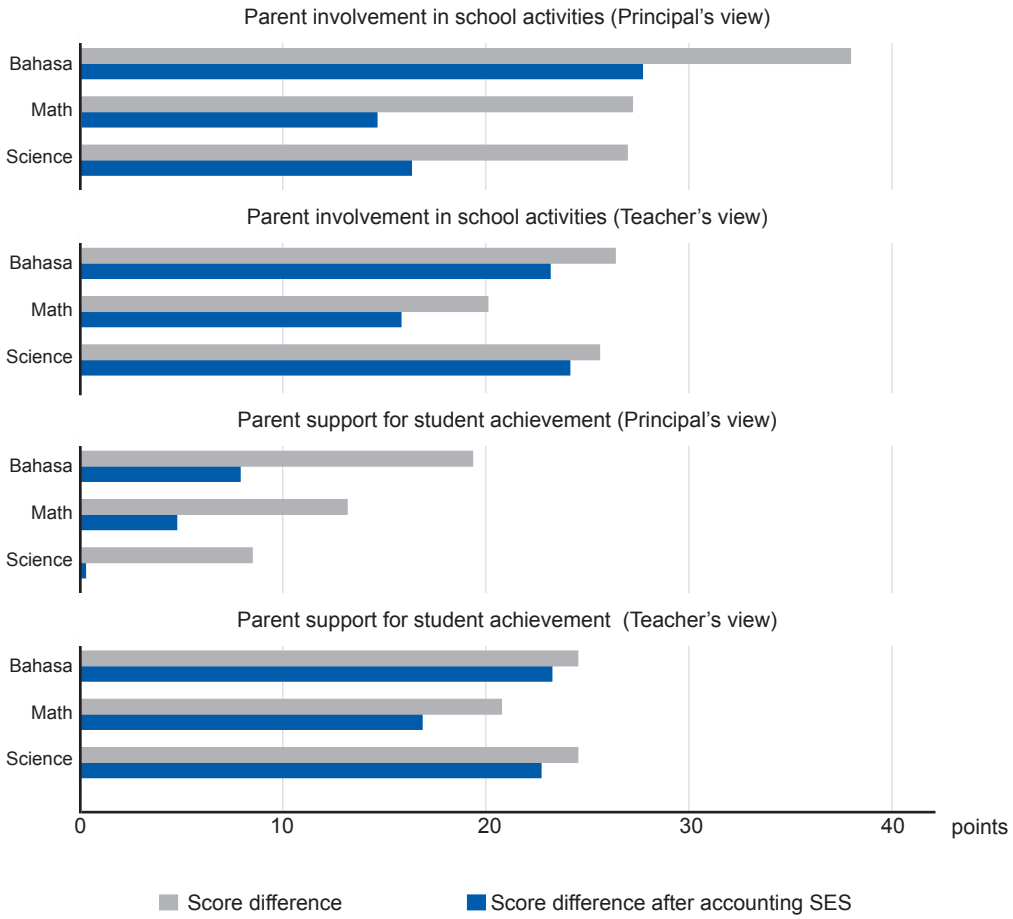



## SUPPORT FROM PARENTS

There are two source of information with regards to parent support to school and student achievement: school principal and teachers. These two views provide consistent results with regards to the correlation between parent involvement in school activities and student performance, where high parent involvement is correlated with a small to medium gain across all three subjects.

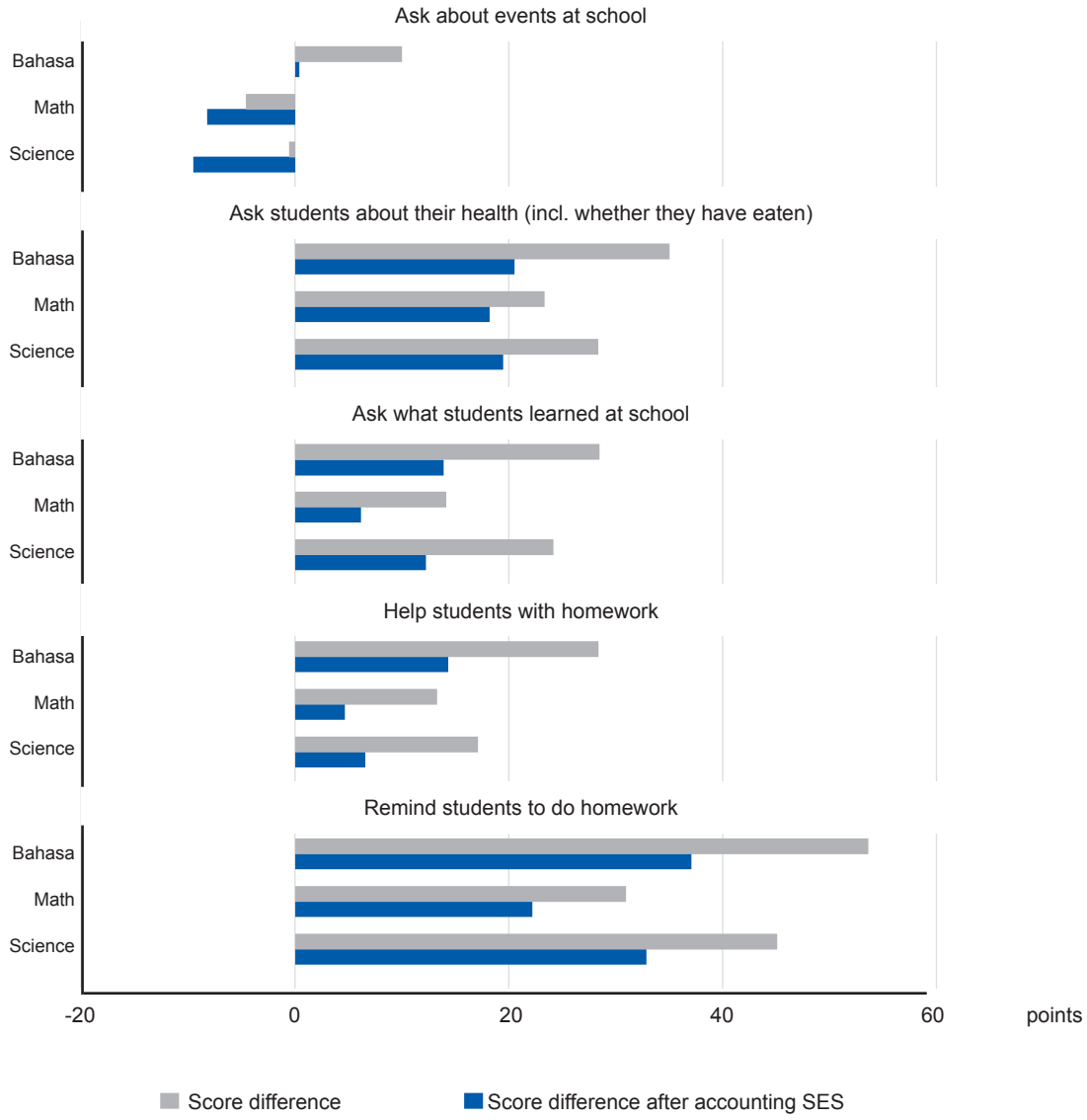
Overall, the data show that parent involvement has a positive correlation with student performance. Schools with high parent involvement performed around 15 points higher overall across the three subjects.

**Figure 27 Score differences, by principals' and teachers' perception of parent support**




The INAP survey also asked students on their parents' involvement and support at home. From the five kinds of support, asking about health and reminding about homework are correlated with better performance in all three subjects, by about 16 to 37 points. Asking about learning resulted in better reading and science performance. In contrast to simply reminding about homework, actually helping students to do homework has small and statistically insignificant correlation with performance. This subtlety appears to be important: parents should remind their children to do homework, but probably not actually help their children to do the homework.

**Figure 28 Score differences, by student report of parent support at home**




Across the province, only four out of ten students reported that their parents remind them about homework every day, and only 46 percent reported that their parents ask them about their health every day. The differences between districts are relatively high. In Lombok Timur, only 19 percent and 31 percent of students stated that their parents remind them about homework and ask about their health every day. At the other end of the spectrum, 45 percent of students in Kota Mataram are reminded about homework by their parents daily, and six out of ten students are asked about their health every day. Therefore, there may be evidence to support a kind of parent education program such that they pay more attention to their children.

# Chapter 6: Implications for Policy and Practice

## WHAT FACTORS INFLUENCE STUDENT PERFORMANCE?

The first to note is that the correlation between scores in the three subjects range between 0.52 and 0.65. The highest correlation is between science and reading scores, mainly because at the primary level, students learn science through reading. So those who are more proficient in reading are also more proficient in science. The correlations between these two scores with mathematics, meanwhile, are lower at around 0.52 (science) and 0.58 (reading) respectively. With this condition, it is unsurprising to find that many factors that are significantly correlated with reading performance are also correlated with science performance. In contrast, many factors that are correlated with science and reading are not correlated with mathematics score.

The INAP survey in NTB indicates that many factors are significantly correlated with student performance. Class size of around 28 – 40 students appear to be the optimal size in supporting better performance in all three subjects. Students in smaller or larger classrooms performed worse. Fortunately, classrooms larger than 40 students are rare in NTB. However, the findings call for attention to schools with small classrooms.

The analysis also finds that some school facilities are positively correlated with student performance, although there is heterogeneity in the correlation for different kinds of facilities. Laboratory equipment, which is the least prevalent school facility in NTB, has the largest association with scores in all three subjects. Availability of books in the library and computers for students are also correlated with reading and science performance.

The survey also allows us to compare the correlation between different extracurricular activities and student performance. We find that enrichment programs has a significant and positive correlation with science score and to a lesser extent reading score, but not mathematics score.

Moving onto principal characteristics, we find very little correlation between various characteristics, including experience and attendance in professional development programs, and scores in all three subjects. However, we find that schools with female principals perform better in reading. Given that only one-fifth of school principals are female, there is scope to assign more females as school principals, assuming enough are willing to take up the appointment.

From the teacher survey, we find that disruptive students and, although less prevalent, students with special needs could have an adverse effect on teaching, resulting in significantly lower score for all students in reading (disruptive students) and all three subjects (special needs students). To avoid disruption and to provide quality teaching for special needs students, there may be a need for further training for the teachers.

Unsurprisingly, teacher's understanding of curriculum and ability to implement the curriculum are associated with much better performance. Across NTB, only around 50 percent of teachers met these two criteria. Therefore, there is much to be done, especially in Lombok Tengah and Lombok Timur, in terms of preparing and supporting teachers to understand and implement the national curriculum. Further teacher training indeed has a positive correlation with student performance, where students whose teachers have recently participated in a professional development program perform better in reading and mathematics.

In terms of practice, our analysis finds that teachers who spend more than 10% of their working hours on preparing for assessments result in better science and mathematics performance of their students. Meanwhile, spending more than 10% of working hours on interacting with students appear to improve reading scores, but not the other scores. Having said that, students whose teachers proactively check their level of understanding of the lessons perform significantly better in reading and science. Similarly, students who are regularly praised by teachers and push themselves to perform highly, indeed perform significantly better in all three subjects.

In terms of assignments, students whose teachers gave them different types of assignments and activities, such as reading other books or clipping information, perform much better in reading and sometimes science – but not mathematics.

In contrast to attending professional development or other teaching practices described above, teacher characteristics such as age, gender, experience, and certification status have no significant correlation with student performance.

Moving to students' perception and conditions, the analysis finds that one-third of students in NTB reported feeling scared at school. And these students perform poorer in all three subjects. In contrast, feeling excited for school has a positive correlation with all three subjects. Therefore, schools need to address sources or conditions at school that result in the students feeling afraid, such as bullying.

We also find student conditions that are significantly correlated with student performance but beyond the authority of the schools. Children who come to school in an undernourished condition perform much worse in mathematics and reading. There are, however, some things that the school can encourage more. We find that parent attention in terms of reminding about homework or asking about health has a positive and sizeable correlation with all three subjects. Students whose parents ask daily about her/his experience with learning in school perform better in reading and science. Finally, using various studying techniques, that are based on repetition or non-repetition, have similarly substantial and positive correlations with all three subjects. The more techniques used, the higher the scores. A more straightforward message from these findings is that students who seriously study at home will perform much better in every subject. Although these are largely the purview of parents, schools can still play a role by encouraging these activities, especially given the still low level of parent attention in some areas, such as Lombok Timur.

## IMPLICATIONS FOR PROVINCIAL AND DISTRICT POLICIES

All three types of skills are important. The Province of Nusa Tenggara Barat in general, and districts outside Kota Mataram in particular, are significantly left behind compared to the national level. Therefore, subnational governments should enact policies that would improve performance in all three areas.

From the findings presented in this report, the ones that are relevant to subnational-level policymakers – as opposed to teachers, school principals, or supervisors – are:

1. Distribute teachers and design schools such that smaller classrooms are merged, and larger ones are split.
2. Provide sufficient and high quality laboratory equipment and books in the library.
3. Offer science enrichment programs, and remedial programs when necessary. Another option is to enrich local content curriculum, which is the purview of the subnational government, with science-related topics.
4. Investigate whether more female teachers or supervisors are interested to become school principals, and appoint those who are qualified.
5. Provide teachers with training on classroom management to handle disruptive students, on differentiated learning to cater to students with special needs, on formative assessment, and on curriculum implementation.
6. Ensure that teachers and school principals have sufficient job satisfaction.
7. Encourage parents to increase their support to children's learning, through parent education. This is especially true in districts with low level of parent attention.
8. Consider providing supplementary food programs, targeting poor households.

There is an important caveat. Given that the findings in this report are mainly correlational, rather than causal, policymakers may need to experiment various policy options on a small scale to evaluate and substantiate their impact, before implementing any large-scale policies.

## IMPLICATIONS FOR SCHOOL POLICIES AND PRACTICES

There are also a number of implications for school policies and teacher practices, which have the potential to be piloted. It has to be noted that some of these practices are straightforward and do not require much training, but others may need to be preceded by training:

1. Teachers could implement more regular formative assessment to ensure that their students are not left behind, and frequently praising the students' effort.
2. Teachers could diversify the assignments that they provide.
3. Principals and supervisors could encourage parents to be more attentive and support their children, especially in terms of checking about learning, reminding about homework, and checking their children's health.
4. All school stakeholders should strive to stamp out bullying and other practices that result in students feeling scared. Safety in school for everyone, especially the young students, is of

utmost importance. School needs to be a place where children and adults are excited to be in and feel safe in.

5. Special needs students must be catered for, so that both those students and the rest of the students can learn effectively.
6. Boys underperform relative to girls, especially in reading. More attention may need to be provided to them, so that they acquire as much learning as girls.

## FURTHER ANALYSES

The INAP collects rich data. There will be two more analyses done using the data. First, as mentioned, within each subject, the test can measure a student's knowing, applying, and reasoning domains. Therefore, an analysis of achievements in various skill domains will produce more detailed information as to the strengths and weaknesses of NTB students, and what policies could be implemented to address them. Secondly, richer multivariate analyses will be conducted to enrich the results presented in this report.

# References

Cohen, Jacob. 1992. “A power primer.” *Psychological Bulletin*, 112(1): 155-159.

# Appendix 1: Calculation of Sample Weights

The target population of the INAP in NTB were students in public and private primary schools in the general sector (*sekolah dasar* or SD) under the responsibility of the Ministry of Education.

In NTB, all 10 districts were selected to take part. From each district, a number of schools was selected using stratified cluster sampling, assuming Probability Proportional to Size (PPS) of the school. The number of schools to sample in each district is determined by the total number of students in the district as follows:

- If there are < 4,000 students in the district, select 15 schools
- If there are < 10,000 students in the district, select 20 schools
- If there are > = 10,0000 students in the district, select 25 schools

Within each school, one class of eligible students is selected randomly. Within the selected class, a maximum of 30 students are selected to participate.

Based on these stages, three different weights are estimated: school weight, class weight and student weight. For each weight, a Base Weight (BW) and Final Weight (FW) are estimated, the latter from an adjustment for the difference between the number of units (school or student) sampled and the number of units that actually participated in the survey.

The School Base Weight (*BWSC*) for each school within the district is defined as

$$BWSC = \frac{Number\ of\ Students\ in\ District}{(Number\ of\ students\ in\ sampled\ School) \times (Number\ of\ sampled\ Schools)}$$

The School Base Weight can also be defined as:

$$BWSC_{j,k,l} = \frac{1}{ProbP\_Sch_{k,l}}$$

Where $ProbP\_Sch_{k,l}$ is the probability of selecting school l within district k. For certainty schools, the probability of selection is equal to 1.

The Factor Adjustment for School participation (FADJ2) in each district is defined as:

$$FADJ2 = \frac{Number\ of\ sampled\ Schools}{Number\ of\ participating\ Schools}$$

So the Final School Weight (F*WSC*) for each school within the district is:

$$FWSC = BWSC \times FADJ2$$

The Class Base Weight (*BWCL*) for each class within the school is defined as

$$BWCL = \frac{Number\ of\ Classes\ in\ School}{(Number\ of\ Sampled\ Classes)}$$

Since only one class is selected in each school, then the Base Weight Becomes:

$$BWCL = Number\ of\ Classes\ in\ School$$

The Factor Adjustment for class participation (FADJ3) in each school is defined as:

$$FADJ3 = \frac{Number\ of\ sampled\ Classes}{Number\ of\ participating\ Classes} = 1$$

As there is only one participating class in each school, the Final Class Weight for each School is therefore:

$$FWCL = BWCL \times FADJ3 = Number\ of\ Classes\ in\ the\ School$$

The Student Base Weight ($BW_{Student}$) for each Student within the sampled Class is defined as

$$BWST = \frac{Number\ of\ Students\ in\ Sampled\ Class}{(Number\ of\ Sampled\ Students)}$$

The Factor Adjustment for Student participation (FADJ4) in the sampled class is defined as:

$$FADJ4 = \frac{Number\ of\ sampled\ Students}{Number\ of\ participating\ Students}$$

In Case the estimated Factor adjustment is positive but lower than 1, it is recoded as 1 but flagged as such by the indicator flag_fa4 in the database.

The Final Student Weight for each Sampled Class is therefore:

$$FWST = BWST \times FADJ4$$

The Total Final Weight is the product of the 4 Sampling weights:

$$FWTOT = FWDS \times FWSC \times FWCL \times FWST$$

One final adjustment is made to the FWTOT. The value must not exceed 4 times the medina final weight in the province, therefore the adjusted Total Final Student Weight is:

$$FWTOT_{adj} = Min[FWTOT, 4 * MEDIAN(FWTTOT)]$$

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