



Australian Government
Productivity Commission

Indigenous Primary
School Achievement

Productivity Commission
Research Paper

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Foreword

The education outcomes of Indigenous Australians have been a focus of policy attention for many years, but there has been no sustained improvement in Indigenous primary school students' literacy and numeracy achievement. This suggests that current policies are not working, and that we need a stronger evidence base about what might work best to improve Indigenous education achievement.

This self-initiated research project was able to access a new national dataset that links information about all primary school students' literacy and numeracy achievement and demographic characteristics with information about the schools they attend. This made possible novel analysis of Indigenous Australian primary school students. But that analysis could only take us so far. While our analysis of the data provides new and useful insights, and some that are policy relevant, only a subset of the characteristics thought to be associated with education achievement are observed in the data.

More work is needed. One avenue our analysis identifies is the need for rigorous and systematic evaluation of schools where Indigenous students have higher achievement than might have been expected given their characteristics and those of the schools they attend. Our research finds that there are such 'outlier' schools, but public evaluations are few and far between.

Along with our current inquiry into the national education evidence base, this report should provide a better understanding of what evidence matters for better informed education policy that improves education achievement for Australian students.

This paper was produced by a team led by Lou Will, and included Josh Craig, Elizabeth Hynes and Rebecca Chin. It was overseen by Deputy Chair Karen Chester.

Peter Harris
Chairman

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These background papers are available from the Commission's website (www.pc.gov.au)

- 1 About Indigenous Australian students**
- 2 Contributors to education achievement — Indigenous and non-Indigenous primary school students**
 - Annex A — Modelling NAPLAN test scores: data, research methodology and results
 - Annex B — Modelling results table (Excel spreadsheet)

Acknowledgments

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This project used confidentialised student-level and school-level data provided by the Australian Curriculum, Assessment and Reporting Authority (ACARA). The Commission thanks ACARA for making this data available.

The findings and views reported in this paper are those of the Productivity Commission and should not be attributed to the external referees or ACARA.

Abbreviations

ABS	Australian Bureau of Statistics
ACARA	Australian Curriculum, Assessment and Reporting Authority
AITSL	Australian Institute for Teaching and School Leadership
APST	Australian Professional Standards for Teachers
ARIA	Accessibility/Remoteness Index of Australia
ASGC	Australian Standard Geographical Classification
BP 1	Background Paper 1
BP 2	Background Paper 2
CESE	New South Wales Centre for Education Statistics and Evaluation
COAG	Council of Australian Governments
ICSEA	Index of Community Socio-Educational Advantage
IRSAD	Index of Relative Socioeconomic Advantage and Disadvantage
LBOTE	Language Background Other Than English
LSAY	Longitudinal Surveys of Australian Youth
NAPLAN	National Assessment Program — Literacy and Numeracy
NMS	National Minimum Standard
OECD	Organisation for Economic Co-operation and Development
PC	Productivity Commission
PD	Professional Development
PISA	Programme for International Student Assessment
SES	Socioeconomic status
TIMSS	Third International Mathematics and Science Survey
VCAA	Victorian Curriculum and Accreditation Authority

OVERVIEW

Key points

- Despite a long history of policy attention, no consistent improvement has been made in the literacy and numeracy achievement of Indigenous Australian primary school students.
- A better evidence base and understanding of how to improve the literacy and numeracy achievement of Indigenous students is needed to improve policy outcomes.
- Access to newly available national data linking student achievement and demographic characteristics with school characteristics permits analysis of a subset of the characteristics thought to be associated with education achievement.
- Analysis of these data shows a wide variation in literacy and numeracy achievement among both Indigenous and non-Indigenous primary school students. But Indigenous students are over-represented among low achievers, and under-represented among high achievers.
- Disparate achievement between Indigenous and non-Indigenous students is also widespread geographically. While greatest in more remote areas, differences also manifest in metropolitan and provincial areas where most Indigenous students attend school. For example, in 2014, Indigenous students in non-remote areas accounted for 55 per cent of the national gap in reading achievement between Indigenous and non-Indigenous year 5 students.
- Achievement disparities remain even after other observed characteristics of students and their schools are taken into account. The reasons for this result are unclear.
- The well-established result that socioeconomic background explains more of the variation in literacy and numeracy achievement than any other characteristic observed in the dataset is confirmed for Indigenous and non-Indigenous primary school students. Other important factors include the general socioeconomic background of students attending a school and, for Indigenous students only, the average school attendance rate and the proportion of Indigenous students in a school's enrolment.
- However, characteristics observed in the dataset explain less than one third of the total variation in student achievement. Most of the unexplained variation is due to differences between students (rather than between schools).
- This meshes with findings from the broader education literature — emphasising that children have individually different learning needs — not readily categorised according to demographic characteristics. The literature suggests that the key to improving achievement, for all students, is individualised instruction.
- For Indigenous students, the evidence suggests that a culture of high expectations in schools; strong student–teacher, and community, relationships; and support for culture are also particularly important — all underpinned by strong school leadership.
- Policy development also needs to be informed by context, especially that many Indigenous students attend schools with few other Indigenous students. Arguably, quality teaching will be especially critical to these students in the absence of some forms of support better suited to students in schools with larger Indigenous enrolments, for example, Indigenous education workers.
- The analysis suggests some schools are punching above their weight — Indigenous students do considerably better than might be expected given their characteristics and those of the school they attend.
 - Insights from systematic evaluation of high (and low) achieving schools could shed light, in a cost effective way, on what works best to lift achievement of Indigenous students.

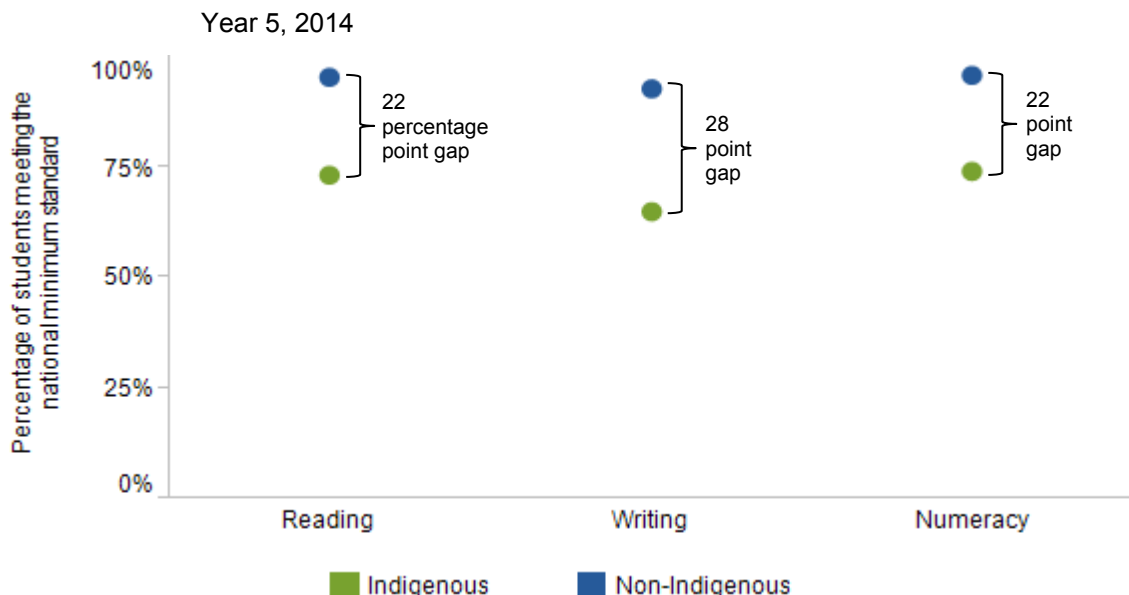
Overview

Formal education is central to life outcomes, and should provide a foundation of literacy and numeracy. Most Australian students finish primary school with the literacy and numeracy foundation for further learning, but some do not. Indigenous Australian students are more likely to be among the low achieving students.

Policy makers have been concerned about relatively low levels of literacy and numeracy achievement among Indigenous students for a long time — targets for improved achievement have been set since at least the 1980s. The most recent target, set in 2008 by the Council of Australian Governments (COAG), is to halve the gap in reading, writing and numeracy achievements between Indigenous and non-Indigenous children by 2018.

Despite these targets, and the long history of policy attention, there has been no consistent improvement in Indigenous primary school students' literacy and numeracy achievement for at least the past 16 years. Current gaps in achievement between Indigenous and non-Indigenous students (figure 1) are broadly in line with long standing differences.

Figure 1 **Indigenous students are much less likely to meet national minimum literacy and numeracy standards^{a,b,c}**



^a On each test, about 2000 Indigenous students (14 per cent) and 17 000 non-Indigenous students (6 per cent) did not participate. ^b Large gaps are also seen at other year levels. ^c These gaps differ slightly from those published in ACARA's National Report on Schooling. The numbers presented here use an updated dataset and exclude exempt students from calculations.

Source: Commission estimates based on ACARA data (unpublished).

Why this research?

The lack of improvement in Indigenous students' literacy and numeracy achievement suggests that current policies are not working. To improve policy requires a better understanding of the factors contributing to the literacy and numeracy achievement of Indigenous primary school students. And that understanding needs to be informed by an evidence base and analysis of how to improve achievement.

Data constraints have meant that previous statistical research is not specific to Indigenous primary school students. Data from the Australian Curriculum, Assessment and Reporting Authority (ACARA) that link information about all primary school students' achievement (measured via National Assessment Program — Literacy and Numeracy test scores) and demographic characteristics with information about the schools that students attend have recently become available. The Commission uses these data to examine the:

- extent to which the gap in literacy and numeracy achievement between Indigenous and non-Indigenous primary school students is explained by the achievement of students in different parts of the country
- association between students' demographic and school characteristics and literacy and numeracy achievement among Indigenous students and, for comparison, among non-Indigenous primary school students
- distribution of Indigenous primary-level students across schools.

This analysis is supplemented with a review of literature on what might work best to improve literacy and numeracy achievement among Indigenous students.

ACARA data — valuable, but limited

While the ACARA data contain useful information, and support policy relevant insights, only a subset of the characteristics thought to be associated with education achievement are measured (observed) in the dataset (figure 2). Characteristics like attendance at a student level and student disability, for example, are not included — for the purposes of this study, they are unobserved (the middle grey shaded column in figure 2). Measures for some of these unobserved characteristics exist in other data sources with national coverage but were not available to the Commission. For other unobserved characteristics, data sometime exist in surveys, but are not available for all students.

Two sets of characteristics are defined for the statistical analysis undertaken in this project — school-level (constant across individual schools), and student-level characteristics (specific to each child). School-level characteristics observed within the ACARA data are identified in the parts of figure 2 shaded green. Observed student-level characteristics (student and family demographics) are identified in the areas shaded blue.

Figure 2 **Many characteristics influence student achievement, but only a subset is available in the ACARA data^{a,b,c}**

	Observed in the dataset	Unobserved – data exist but not included in dataset	Unobserved – data do not exist
Social	<ul style="list-style-type: none"> Remoteness State 	<ul style="list-style-type: none"> Local unemployment rate 	<ul style="list-style-type: none"> Libraries and educational facilities
School	<ul style="list-style-type: none"> School sector Number of enrolments Staff numbers Attendance rate Finances 	<ul style="list-style-type: none"> Average satisfaction of teachers Teacher and principal turnover Principal characteristics 	<ul style="list-style-type: none"> School policies School culture Educational resources Extracurricular activities
Peers	<ul style="list-style-type: none"> % Indigenous students % LBOTE students % parents by education / occupation category 	<ul style="list-style-type: none"> Health School satisfaction 	<ul style="list-style-type: none"> Cognitive abilities Attitudes Aspirations
Teacher		<ul style="list-style-type: none"> Age Gender LBOTE Experience Qualifications 	<ul style="list-style-type: none"> Teaching style Attitudes
Family	<ul style="list-style-type: none"> Parental education Parental occupation 	<ul style="list-style-type: none"> Parent LBOTE 	<ul style="list-style-type: none"> Parent engagement Home learning activities
Student	<ul style="list-style-type: none"> Age Gender LBOTE 	<ul style="list-style-type: none"> Health and disability Attendance 	<ul style="list-style-type: none"> Cognitive abilities Attitudes Aspirations

Grouping of characteristics in the statistical analysis:
■ School-level ■ Student-level ■ Unobserved

^a The figure provides examples of characteristics. It is not an exhaustive list. ^b The figure categorises unobserved characteristics according to whether relevant information exists at a national level. Unobserved data that exist include data that are believed to be held in administrative records. ^c 'LBOTE' is an acronym for 'language background other than English'.

Achievement disparities are widespread

When examining Indigenous education, many commentators focus on remote and very remote areas (particularly in the Northern Territory). Indigenous primary school students in

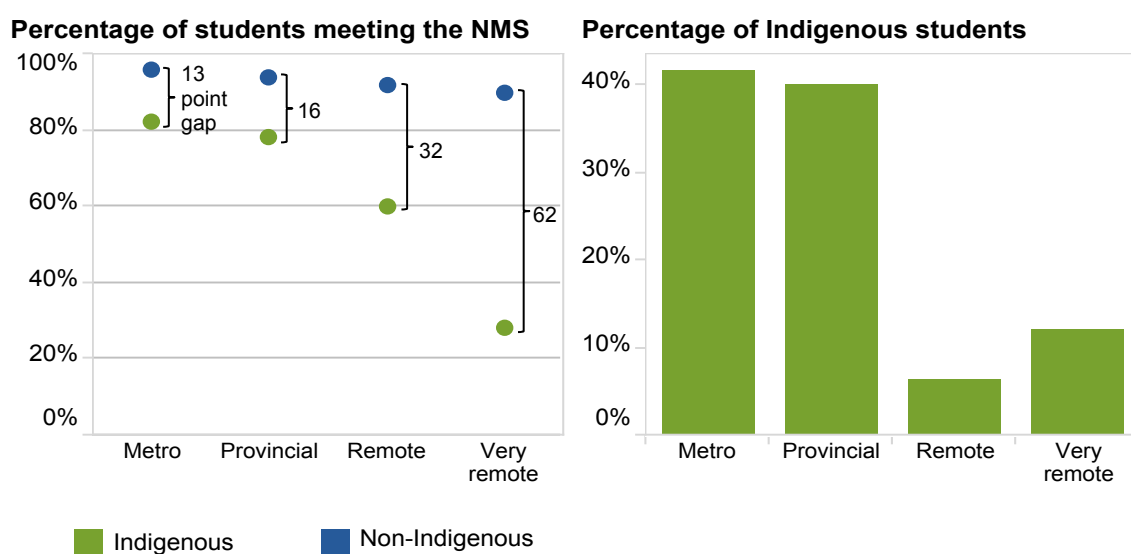
these areas certainly achieve well below the norm. But gaps in literacy and numeracy achievement between Indigenous and non-Indigenous primary school students are present across all regions (and across all states and territories). And remote and very remote students make up a relatively small share (20 per cent) of Indigenous primary school students (figure 3).

When the contributions of Indigenous students in different parts of the country to the national gap are assessed, no single geographic area makes a dominant contribution (figure 4).

Policy development needs to be informed by an understanding of how different geographic areas contribute to the national gap in Indigenous education achievement.

Figure 3 Gaps in education achievement increase with remoteness, but most Indigenous students do not attend school in remote areas^{a,b}

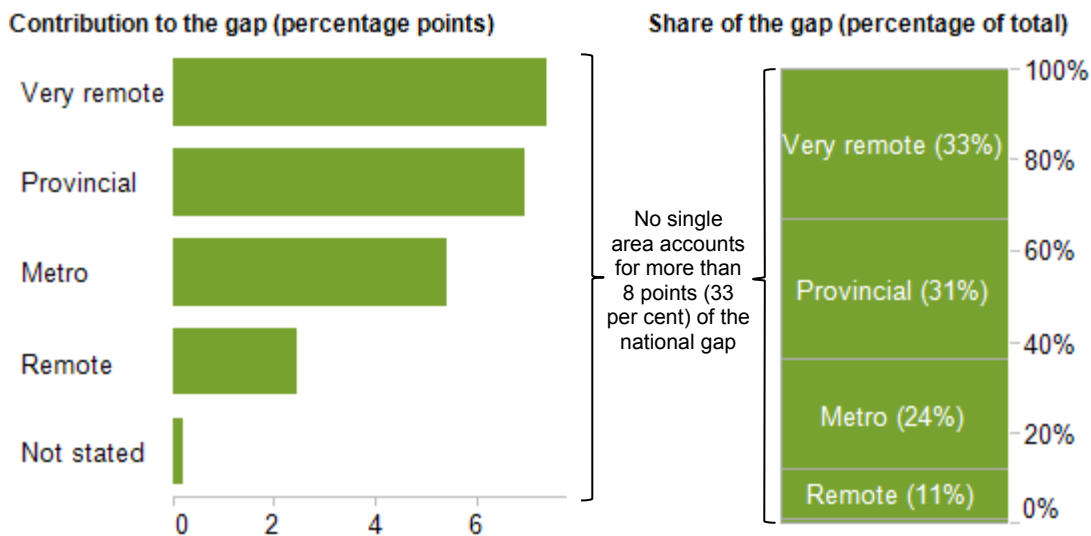
Year 5, 2014



^a Excludes 1975 Indigenous students (14 per cent) and 16 454 non-Indigenous students (6 per cent) who either did not participate in the reading test or had no defined region. ^b 'NMS' is an acronym for national minimum standard.

Source: Commission estimates based on ACARA data (unpublished).

Figure 4 **All areas contribute to the national gap in achievement^a**
National gap in reading scores, by remoteness (Year 5, 2014)



^a Excludes 1917 Indigenous students (13 per cent) and 16 208 non-Indigenous students (6 per cent) who did not participate in the reading test.

Source: Commission estimates based on ACARA data (unpublished).

Explaining variation in student achievement

There is wide variation in literacy and numeracy achievement among both Indigenous and non-Indigenous primary school students (figure 5). But Indigenous students are much more likely to record lower scores, and less likely to record higher scores, than non-Indigenous students.

Statistical techniques were employed to analyse this variation and examine the association between student- and school-level characteristics and literacy and numeracy achievement.

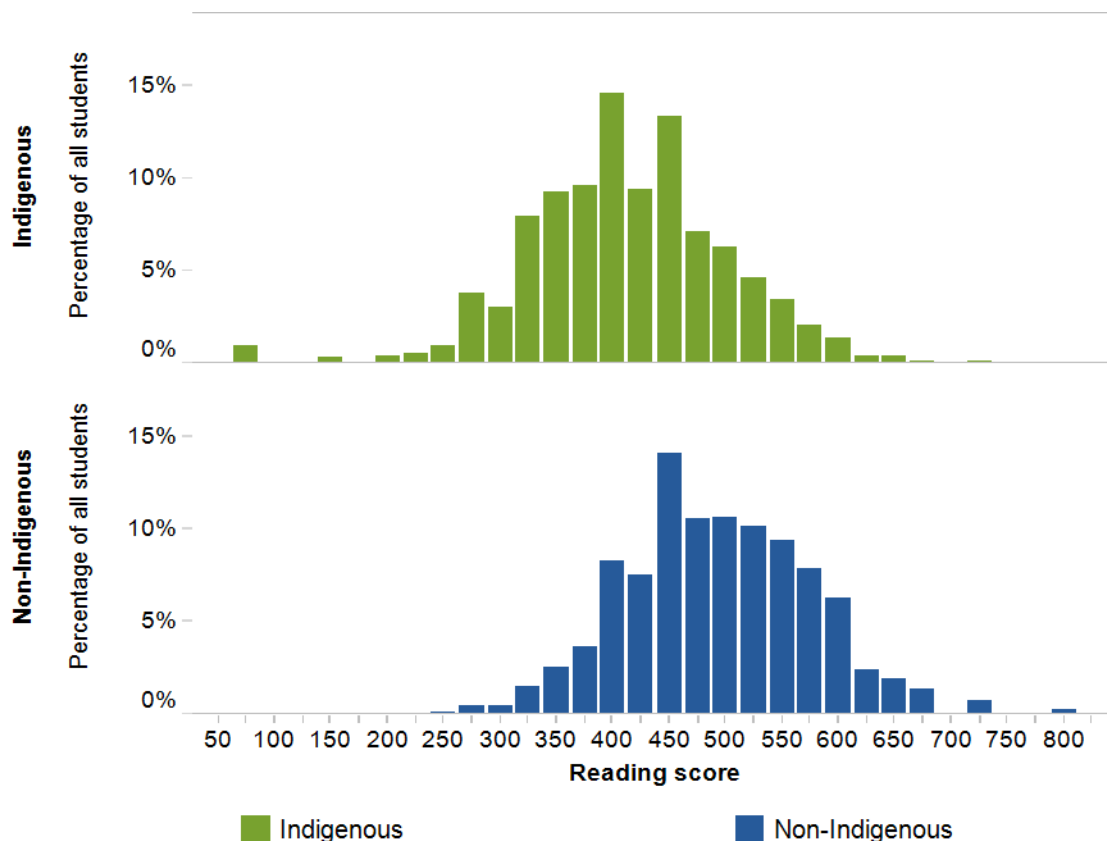
Student-level characteristics matter more to achievement than school-level characteristics

At the first step in the analysis, the total variation in achievement for both Indigenous and non-Indigenous primary school students was divided into parts attributable to student-level characteristics (both observed and unobserved) and to school-level characteristics (again, both observed and unobserved).

Most of the variation in student achievement seen in the ACARA data is attributable to student-level, rather than school-level, characteristics. This means that differences between students are much more important in explaining variation in achievement than differences

between schools. For Indigenous students, the share attributable to student-level characteristics (in either reading or numeracy) is about 75 per cent (figure 6). For non-Indigenous students, the share is over 80 per cent.

Figure 5 **There is wide variation in achievement between all students**
Reading scores for Indigenous and non-Indigenous students (Year 5, 2014)



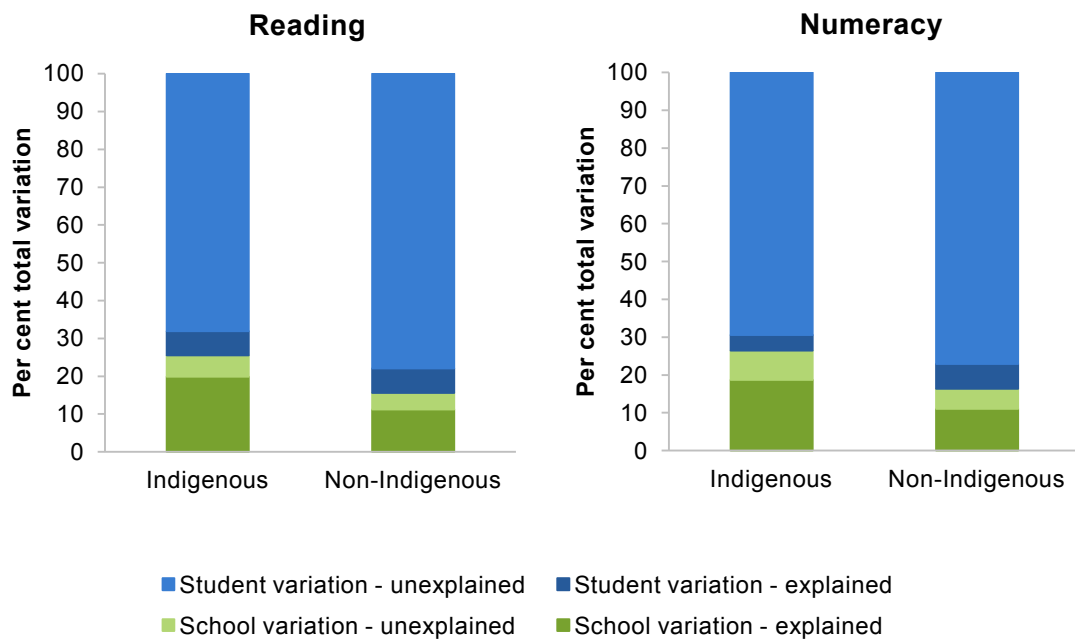
Source: Commission estimates based on ACARA data (unpublished).

But school-level characteristics do seem to matter more for very remote Indigenous primary school students compared with Indigenous primary school students in other areas. About 40 per cent of the total variation in achievement among very remote Indigenous students is attributable to school-level characteristics (in contrast with about 25 per cent for Indigenous students nationally). This means that there is less variation in the achievement and characteristics of students at very remote schools. This might be because of greater commonality in student-level characteristics in smaller communities, for example, similar cultural characteristics and community resources. Or it might be because very remote schools tend to be smaller with fewer teachers, and students attending them are more likely to have been taught by the same teachers — leading to commonality in teacher quality based levels of achievement. Overall, the characteristics of some very remote communities and teachers at very remote schools may be beneficial for student achievement, while others may make it more difficult to perform well at school. When very remote students are

excluded from the data, over 80 per cent of the total variation in Indigenous students' achievement is attributable to student-level characteristics — similar to the share for non-Indigenous students.

Figure 6 Student-level characteristics explain most of the variation in total achievement^a

Reading and numeracy, by Indigenous status (Year 5, 2013 and 2014 pooled)



^a Explained student or school-level variation is attributable to characteristics observed within the ACARA data. Unexplained variation is associated with unobserved characteristics.

Source: Commission estimates based on ACARA data (unpublished).

Much of the variation in achievement is unexplained

At the second step in the analysis, the variation attributable to each of student- and school-level characteristics was divided into parts that are explained by characteristics observed in the ACARA data and parts that are unexplained (associated with unobserved characteristics).

This analysis revealed that much of the total variation in primary school students' achievement remains unexplained. Student- and school-level characteristics observed in the ACARA data explain, at most, 30 per cent of the total variation, for both Indigenous and non-Indigenous students (figure 6).

This is not just a function of the relatively limited range of student- and school-level characteristics observed in the ACARA data. Other research, using datasets with richer

information about schools and students, and looking only at non-Indigenous (and typically high school) students, has only been able to explain at most about half of the variation in student achievement. This suggests that linking more information with the current ACARA data would enable richer analysis of student achievement, but it is likely that a large share of the variation in student achievement would remain unexplained — and our understanding of what might work best to lift achievement may not be markedly advanced by data of this type. A key reason for this likely outcome is that student achievement tends to vary widely for each characteristic considered (it does not cluster on the basis of particular characteristics). For example, having a mother with a relatively low level of education does not necessarily mean that a child will record a low test score. Conversely, having a university educated mother does not guarantee a child a high score.

The conclusion that a large share of variation in achievement is associated with unobserved student-level characteristics is well-established in the relevant literature. As discussed further below, this conclusion meshes with the view from the literature about what works best to lift achievement — strategies that target the learning needs of individual students.

Some observed student- and school-level characteristics matter more than others

Using a statistical process known as regression analysis, the relationships between literacy and numeracy achievement and a range of potentially associated student- and school-level characteristics can be disentangled. When other observed characteristics are taken into account, Indigenous primary school students are found to achieve lower literacy and numeracy results in schools with higher Indigenous enrolments, lower attendance rates (at a school level) and lower school socioeconomic status. These characteristics, individually, explain about 5 per cent of the variation in Indigenous students' achievement (so taken collectively they explain about 15 per cent of the total variation in Indigenous students' achievement). Students' own socioeconomic status explains a further 5 per cent of achievement variation.

Initiatives to address the effects of social disadvantage and to improve attendance rates could lift (and reduce variation in) achievement among Indigenous primary school students.

For non-Indigenous primary school students, the socioeconomic status of students and schools are the main observed contributors to achievement, and explain about 14 per cent of the total variation in achievement. (Attending a school with a higher Indigenous enrolment or lower attendance rate are also negatively associated with achievement for non-Indigenous students but, because relatively few non-Indigenous students attend schools with these characteristics, they explain very little (about 1 per cent each) of the variation in achievement among non-Indigenous students.)

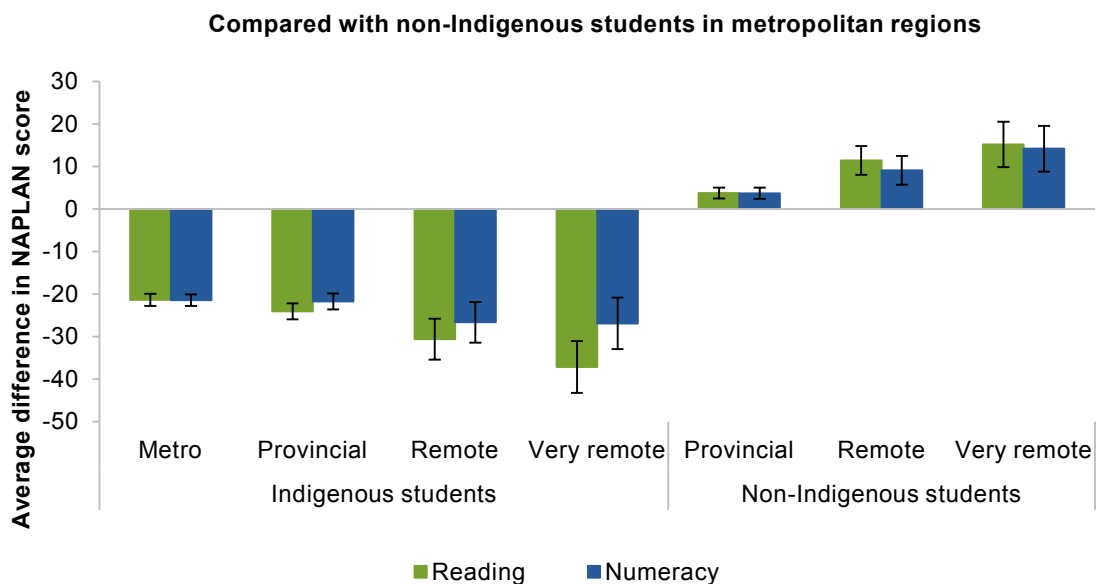
It is unclear why high rates of Indigenous enrolments contribute negatively to achievement. This issue merits further investigation.

The finding that socioeconomic status is associated with achievement is well-established in the literature, but that association needs to be put in context — the majority of the variation in achievement remains unexplained even after socioeconomic status is taken into account.

Reasons for low achievement among Indigenous students are unclear

Even after other observed characteristics such as language background and socioeconomic status are taken into account, Indigenous primary school students have lower test scores on average than non-Indigenous primary school students across all remoteness areas (figure 7). In other words, there are other factors at play (unobserved in the ACARA data), that could result in differences in achievement relative to non-Indigenous students. What these might be is unclear. Among possible explanations from the literature on Indigenous education are the effects of: relatively low rates of attendance at a student level; speaking Aboriginal English; relatively high rates of hearing loss; relatively low expectations of Indigenous students; and a lack of acknowledgment of, and support for, Indigenous culture among teachers and within schools. Some of these explanations might reflect discriminatory attitudes towards Indigenous students at a system, school and peer level.

Figure 7 **Indigenous students achieve lower results than their non-Indigenous peers, other characteristics equal^{a,b,c}**
Reading and numeracy (Year 5, 2013 and 2014 pooled)



^a Regression coefficients on Indigenous status and on Indigenous \times remoteness interaction terms have been summed together where relevant to produce these estimates. ^b Vertical lines represent 95 per cent confidence intervals (Background Paper 2). ^c Relationships for categorical variables should be interpreted relative to the default category (Background Paper 2).

Source: Commission estimates based on ACARA data (unpublished).

Some schools punch above their weight

There are some schools where the analysis suggests that Indigenous students do considerably better than might be expected given their characteristics and the observed characteristics of those schools, and some where they do considerably worse. The Commission cannot discern why this is so from the ACARA data. Perhaps there is something about the culture in these schools, the school leadership or teacher quality that contribute. All schools in the data are de-identified. However, if they were identified, they could be examined to see if there is something that could be learned from them. Before that happened however, it would be useful to cross check the results from this analysis using other methods of examining school performance to secure confidence that the schools identified for evaluation really are particularly effective, or ineffective, over time in educating Indigenous students.

Findings from the data analysis mesh with the broader education literature

The broader education literature suggests that the key to improving student achievement, for all students, is high quality instruction — including assessment of each child’s learning needs, identification of strategies to meet them and evaluation of the effectiveness of those strategies, that is, individualised instruction.

This implies that the fundamentals of what works best in supporting achievement for Indigenous children are the same as for non-Indigenous children (that is, individualised instruction). But, as the statistical analysis shows, Indigenous children have unobserved characteristics (that differ from those of non-Indigenous children) and that are negatively associated with achievement. Teachers may need to take these into account to effectively individualise instruction for Indigenous students. The available evidence suggests that a culture of high expectations in schools and strong student–teacher, and community, relationships are important to Indigenous students’ achievement. Recognition of, and support for, culture are also particularly important.

This emphasis on the importance of individualised instruction for improving achievement aligns with the observation from analysis of the ACARA data that unobserved student characteristics are the main contributor to variation in student achievement.

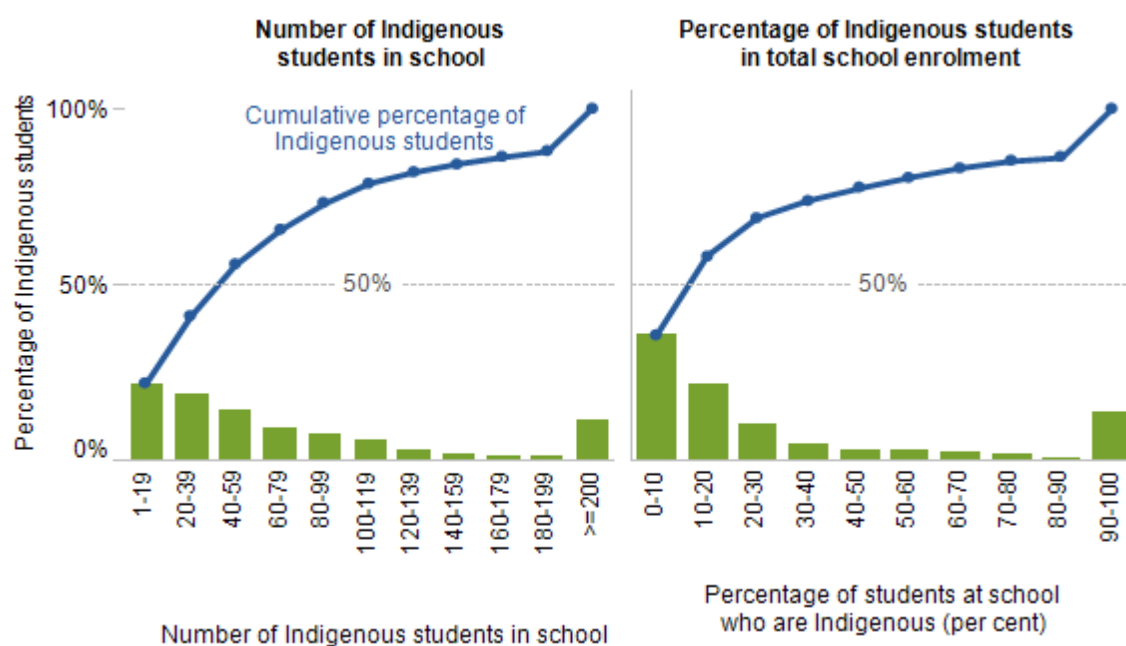
Context matters — Indigenous students are spread across schools

Developing the most efficient and effective strategies to promote Indigenous education achievement should be informed by many factors, one of which is how the Indigenous student population is distributed within the schooling system.

Indigenous students make up only 5 per cent of all primary school students, and the vast majority of schools have at least one Indigenous student. Most schools do not have a large Indigenous enrolment, and many Indigenous primary school students attend schools with few other Indigenous students (figure 8). Half of all Indigenous primary students attend schools where Indigenous students make up less than 15 per cent of total student enrolments and nearly one quarter attend schools with an Indigenous enrolment of less than 20 students. Looking at the combination of enrolment rates and student numbers, 20 per cent of Indigenous students attend schools where both the Indigenous enrolment rate is less than 15 per cent and there are less than 20 Indigenous students.

Figure 8 Many Indigenous students attend schools with few other Indigenous students^a

Percentage of Indigenous students by number of Indigenous students in school and Indigenous enrolment rate (2014)



^a Enrolment ranges are closed on the low side and open on the high side. For example, '10-20' means greater than or equal to 10 but less than 20 (not inclusive of 20). '90-100' includes schools with 100 per cent Indigenous enrolment.

Source: Commission estimates based on ACARA data (unpublished).

At schools with a large number of Indigenous primary school students, particularly in more remote areas, school-specific strategies that are tailored to local cultural and community conditions could be an effective complement to broader, individual-focused, teaching practices. At schools with a small number of Indigenous students, some school-specific strategies may not be feasible, although some strategies may be amenable to school clusters achieving a critical mass Indigenous students. Individual teacher understanding of

local Indigenous cultures, for example, may be even more important than is the case in schools with a relatively large enrolment of Indigenous students.

Some policy related observations

A number of policy related observations can be drawn from the project.

The ACARA data used in the study are a marked contribution to the national education evidence base. That said, the newly available data are only a subset of the characteristics thought to matter. Gaps remain in the evidence base, and in our understanding. These gaps could be in-part filled with information held by states and territories. Information about student health and individual attendance rates are noteworthy examples. But it is unclear whether our understanding of how to improve achievement would be markedly advanced by richer national-level data alone.

Policy thinking also needs to be informed by contextual evidence that the majority of Indigenous primary school students attend schools in metropolitan and provincial regions, and that those students also have lower achievement than their non-Indigenous peers. To be both effective and equitable, approaches to closing the gap in education achievement between Indigenous and non-Indigenous students must seek to materially improve the achievement of Indigenous students in metropolitan and provincial areas, as well as in remote and very remote areas, and across all states and territories.

Policy development also needs to be informed by the contextual evidence that many Indigenous students attend schools with low Indigenous enrolments. Arguably, quality teaching will be especially critical to these students in the absence of the types of support that can, perhaps, be provided to students in schools with larger Indigenous enrolments, for example, Indigenous education workers or physical acknowledgements of Indigenous culture in the school environment. An understanding of Indigenous cultures, the importance of high expectations and how to build strong relationships with Indigenous students is important for all teachers.

The fact that much of the variation in student achievement is a function of unexplained differences between students suggests that a ‘one size fits all’ approach to improving achievement is unlikely to be effective for Indigenous students. Different students bring different things into the classroom. And just because a student has a certain set of observed characteristics, for example, a low socioeconomic background, does not predestine them to lower achievement. Strategies that target the needs of individual Indigenous students, whatever their background characteristics, are likely to be particularly important in improving achievement.

Education is a large area of public expenditure. Better evaluation of initiatives is needed. Given the importance of unobserved factors to variation in achievement, insights from evaluation of high and low achieving schools (the achievement ‘outliers’) could shed light, in

a cost effective way, on what works best to lift achievement of Indigenous students. While there are some isolated published instances of outlier school evaluation, the findings of this project suggests that systematic evaluation of schools that do a particularly good job of educating Indigenous students, and those that do particularly poorly, is needed to better inform policy development to reduce the gap in educational achievement.

1 What is this report about?

Key points

- There has been no consistent improvement in the literacy and numeracy achievement of Indigenous Australian primary school students for at least the past 16 years, despite decades of concerted policy attention.
- Research into literacy and numeracy achievement among Indigenous primary school students has been limited by a lack of suitable data.
- This project accessed recently available data covering all Indigenous primary school students to look at the contributions of school-level and student-level characteristics to Indigenous students' literacy and numeracy achievement.
- The data, while valuable, include measures for only a limited subset of school- and student-level characteristics. The data analysis is, therefore, supplemented with a literature review of what might work best to improve achievement among Indigenous primary school students.

Formal education is central to life outcomes. Higher levels of education attainment can facilitate better health, more secure and higher paying jobs and a much lower likelihood of living in poverty. Literacy and numeracy skills developed through education are fundamental to a person's quality of life — and to education attainment. Without the ability to read, for example, many things in life are more difficult.

Primary schooling is a critical period for the development of literacy and numeracy skills. Most students finish primary school with a good foundation for further learning, but some do not, and Indigenous Australian children are more likely to be within this group.¹ Reflecting this, and on a number of occasions over the past 25 years, Australian governments have set targets for improving literacy and numeracy achievement among Indigenous students (box 1.1). The most recent target, set in 2008 by the Council of Australian Governments (COAG), is to halve the gap in reading, writing and numeracy achievements between Indigenous and non-Indigenous children by 2018.

Despite these targets, and decades of reviews and action statements (figure 1.1), there has been no consistent improvement in the literacy and numeracy achievement of Indigenous primary school students over the past 16 years (the period for which data are available) (figure 1.2).

¹ The term Indigenous Australians is used throughout the report to refer to Australia's first peoples. While this is convenient for drafting, the term does not reflect the diversity of Indigenous peoples, communities and nations.

The absence of any consistent improvement in Indigenous students' literacy and numeracy achievement suggests that there is merit in examining and better understanding the factors contributing to the literacy and numeracy achievement of Indigenous primary school students, particularly given newly available data.

Box 1.1 A history of literacy and numeracy targets for Indigenous students

Since at least the 1980s, governments have set targets for the literacy and numeracy achievement of Indigenous students specifically, or as part of targets for all children. None have been met.

Examples of government targets:

To enable [by 2000] Aboriginal attainment of skills to the same standard as other Australian students throughout the compulsory schooling years. (DEET 1989, p. 15)

States and Territories will set literacy, numeracy and employment targets in their 1997–99 Indigenous Education Agreements for Aboriginal Education Strategic Initiatives Program funding. (MCEETYA 1995b, p. 2)

That every child leaving primary school should be numerate, and be able to read, write, and spell at an appropriate level. (MCEETYA 1997, p. 1)

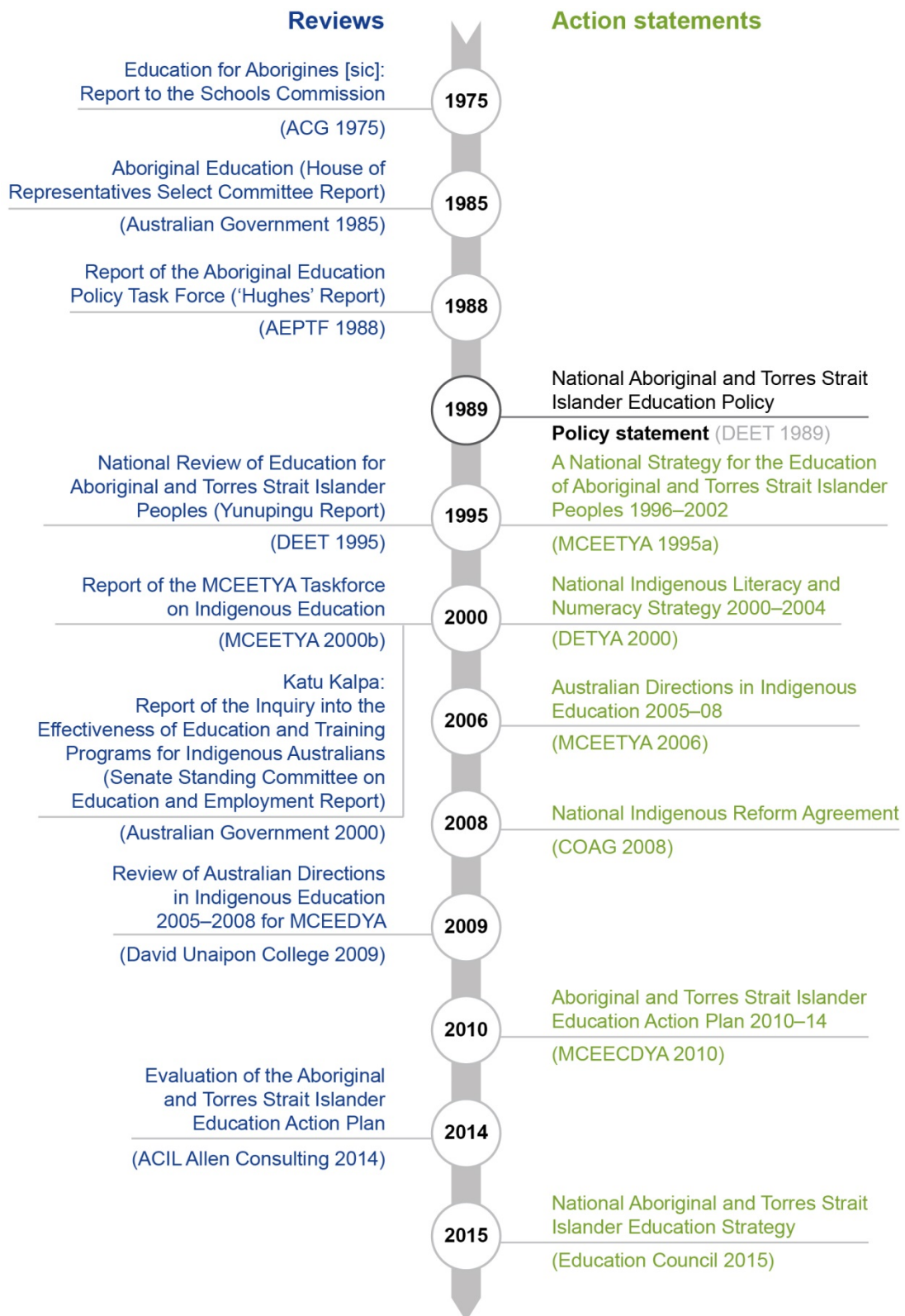
That every child commencing school from 1998 will achieve minimum acceptable literacy and numeracy standards within four years. (MCEETYA 1997, p. 1)

By the Year 2002, education and training systems/providers demonstrate significant increase in the proficiency of Aboriginal and Torres Strait Islander children in Standard Australian English [and numeracy] to levels comparable to mainstream Australian children. (Cited in MCEETYA 1998)

To achieve [by 2004] English literacy and numeracy for Indigenous students at levels comparable to those achieved by other young Australians. (DETYA 2000)

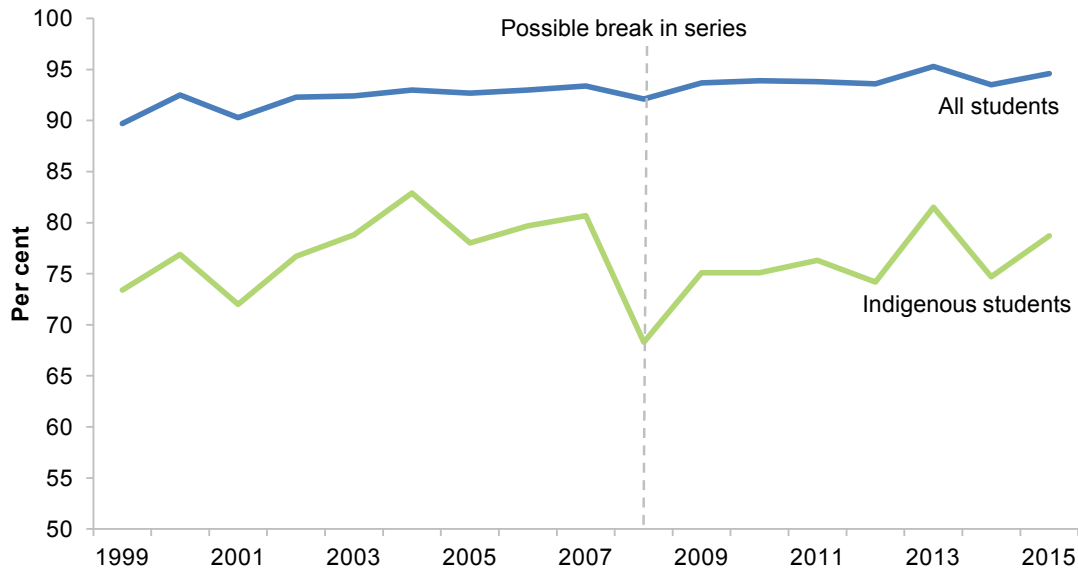
To halve the gap in reading, writing and numeracy achievements for children by 2018. (COAG 2008)

Figure 1.1 **Timeline — national Indigenous education reviews and action statements^a**



^a Many state and territory reviews have also been conducted over the past 40 years.

Figure 1.2 Absence of consistent improvement in Indigenous primary school students' reading achievement, 1999–2015^{a,b}
 Percentage of Year 3 students meeting national minimum reading standards



^a Prior to 2008, each state and territory conducted its own literacy and numeracy tests and results were reported on a nationally comparable basis. National tests (the National Assessment Program — Literacy and Numeracy) were introduced in 2008. Data pre- and post-2008 may not be comparable. ^b A similar conclusion would emerge from data for other year levels and subject areas.

Sources: ACARA (2015b); MCEETYA (2008).

1.1 Research questions and approach

Education research suggests that there is a range of characteristics that might influence education achievement (chapter 3, BP 2).² These include characteristics of the broader social environment in which a child lives, the school they attend, their peers, teachers and family, and of the students themselves.

Many of these characteristics lie outside the control of education policymakers, schools or teachers. Where a child lives, for example, or the education attainment of their parents are not easily changed. But, to the extent that characteristics of this type tend to be associated with achievement, an understanding of that association might help in the development of an education policy or program targeting improved achievement.

While there has been some analysis of the contributions of different characteristics to the literacy and numeracy achievement of Australian school students overall, there has been very little analysis for Indigenous primary school students. Datasets available to date have

² This report draws on two detailed background papers referenced as BP 1 and BP 2.

included relatively few Indigenous students, limiting the types of analysis that could be undertaken. In addition, most of those datasets included information only for Year 9 students, meaning little analysis of the contributors to achievement among primary school students has been undertaken.

Newly available data open up research possibilities

This project has been able to access newly available data for primary school students from the Australian Curriculum, Assessment and Reporting Authority (ACARA). These data include information for 2013 and 2014 about the literacy and numeracy achievement of all Australian Year 3 and Year 5 students who participated in the National Assessment Program — Literacy and Numeracy (NAPLAN) tests in those years, along with information about student and family demographics and characteristics of the schools that students attended. While students cannot be identified in the data, importantly, information about each, Indigenous and non-Indigenous, student and the school they attend can be linked — a function that permits richer analysis than would be possible if data were available only for students or only for schools.

Most importantly, because the data cover all Australian primary school students they support analysis of achievement among Indigenous children. In 2014, for example, the data included about 290 000 Year 5 students in total, about 14 600 of whom were Indigenous.

While these data permit analysis that was not previously possible, they only include information about a limited group of characteristics thought to influence education achievement. Some additional information is collected by state and territory governments (for example, student health and individual student attendance), but the Commission was unable to secure access.³

Furthermore, while the ACARA data cover all Indigenous students, test scores are only available for those who participated in NAPLAN. Indigenous students have relatively high non-participation rates. In 2014, for example, 13 per cent of Indigenous students in Year 5 did not participate in the reading test compared with 6 per cent of non-Indigenous students (BP 1).

The ACARA data are used in this paper to assess the contributions to education achievement of the characteristics for which measures are available (that is, characteristics that are observable to the Commission), and the research findings apply to students who participated in NAPLAN tests. Analysis of the data is supplemented with a literature

³ The Northern Territory and Western Australia were unable to create the datasets required within the project's timeframe. Western Australia was also concerned that the benefits of the project would not outweigh the costs of creating the datasets required. Queensland declined to support the Commission's data application on the grounds that the research was focusing on differences in outcomes between Indigenous and non-Indigenous students rather than questions relating only to Indigenous learners.

review around the question of what might work best to improve literacy and numeracy achievement among Indigenous primary school students.

In providing preliminary insight into what might work best, the report looks at three issues.

- The extent to which the gaps in literacy and numeracy achievement between Indigenous and non-Indigenous primary school students are explained by the achievement of students in different parts of the country.
- Contributors to literacy and numeracy achievement among Indigenous primary school students and, for comparison, among non-Indigenous students.
- The distribution of Indigenous primary-level students across schools.

The Commission's approach in looking at these issues is elaborated below.

Accounting for the gaps in achievement

While gaps in achievement between Indigenous and non-Indigenous primary school students are well known and widely reported (for example, ACARA 2014; Australian Government 2015; SCRGSP 2014), access to the ACARA data permits analysis of the contributions of students living in different parts of the country to those gaps.

It is well documented that Indigenous students living in very remote areas have particularly low literacy and numeracy achievement relative to non-Indigenous students. However, these students make up a relatively small proportion of all Indigenous students. The contribution of very remote students to the gap in achievement between Indigenous and non-Indigenous students is not clear. Despite this, commentary about Indigenous education issues has a tendency to focus on Indigenous students in remote and very remote communities (or focus on Indigenous students as a homogeneous group). Policy development needs to be informed by an understanding of how different geographic areas contribute to the national gap in education achievement between Indigenous and non-Indigenous students. The ACARA data are therefore used to evaluate the question:

- How much of the gap in literacy and numeracy achievement between Indigenous and non-Indigenous primary school students is accounted for by students living in different parts of the country?

The analysis provides a snapshot of differences in literacy and numeracy achievement between Indigenous and non-Indigenous primary school students in 2014, rather than providing a measure of the progress towards closing the gap that existed in 2008. (The forthcoming edition of the Commission's Overcoming Indigenous Disadvantage report will outline progress towards COAG targets.)

The literacy and numeracy achievement of Indigenous and non-Indigenous primary school students, including by location, is compared in chapter 2.

Contributors to literacy and numeracy achievement

As noted above, education research identifies a range of characteristics that might be associated with education achievement, and the ACARA data contain only a subset of these characteristics.

Two groups of characteristics are defined within the paper. Characteristics that are constant across the students within a school are labelled ‘school-level’ characteristics. These include, for example, information about the environment in which a school operates (for example, the region in which it is located), the school community, or students’ peers (for example, the socioeconomic status of the student body), and school operations (for example, the number of teachers per student). Characteristics that vary between students are labelled ‘student-level’ characteristics. Demographic characteristics of students and their families are an example.

Within these two groups, characteristics for which measures are available within the ACARA data are labelled ‘observed’ characteristics. The many characteristics for which measures are not available are labelled ‘unobserved’ characteristics.

The ACARA data are used to assess the following questions:

- What are the relative contributions of school- and student-level characteristics to Indigenous primary school children’s literacy and numeracy achievement?
- Among school-level characteristics, what matters most to literacy and numeracy achievement? Likewise, among student-level characteristics?
- Are the most important contributors to literacy and numeracy achievement the same for Indigenous and non-Indigenous primary school children?

Use of information about both students and their schools raises an issue that has to be taken into account in the statistical analysis of these questions. Students within the same school are likely to be more similar to each other than students in different schools and, therefore, students within a school cannot be treated as though they are independent of each other. The statistical technique used to address this issue has two implications for the analysis, one advantageous, the other, not.⁴

The advantage of the technique is that it can be used to identify schools where students appear to perform much better (or worse) than might be expected, independent of their characteristics. The ACARA data are therefore used to assess the question:

- Are there some schools where Indigenous students apparently do much better (or worse) than would be expected given their characteristics?

While the names of these schools are not available in the data used in the project, identifying details are known to ACARA. These schools are potential candidates for

⁴ The technique, multilevel modelling, is described in BP 2.

evaluation for insights into ways in which schools might contribute to improved achievement among Indigenous primary school students. However, a degree of imprecision is inherent in statistical analyses of the type used in this paper. Given the potential costs of a systematic evaluation of high and low performing schools, a cross check of school performance using alternative statistical techniques (suggested in BP 2) would be desirable. Checks of this type were not feasible within the scope and time frame of this project.

The disadvantage of the technique is that, to produce valid results, data in which there are a sufficient number of students in each school are required. Unfortunately, there is little guidance in the literature about how many students is sufficient. The ACARA data shows that many schools have relatively few Indigenous students. The result is that the analysis of the contributors to literacy and numeracy achievement using the ACARA data has a national focus. The following question, part of the Commission's original research design and intention, could not be pursued.

- Do the contributors to literacy and numeracy achievement for Indigenous primary school children depend on the state or region in which they live?

Statistical analysis of the contributors to literacy and numeracy achievement of characteristics observed within the ACARA data is presented in chapter 3.

Because the ACARA data contain only a limited number of variables, the data analysis is supplemented with a literature review about what works best to improve education achievement, particularly among Indigenous students (chapter 4). Recent policy developments aimed at improving student achievement are summarised as part of this work. The question considered through this work is:

- What might work best to reduce the gap in achievement between Indigenous and non-Indigenous primary school students?

The distribution of Indigenous students across schools

The observation that many schools have relatively few Indigenous students raises a policy relevant issue. If initiatives for improving Indigenous students' achievement are more prevalent in schools with a reasonably large Indigenous enrolment, but many schools have a relatively small Indigenous enrolment, what proportion of Indigenous primary school students attend schools where initiatives that target them might be less common? This issue will be less significant to the extent that Indigenous students are more concentrated within schools. To shed light on this issue, the ACARA data are used to assess the following question:

- What proportion of Indigenous primary school students are in schools with a reasonably large Indigenous enrolment?

The distribution of Indigenous primary school students across schools is described in chapter 5.

2 Which areas account for the gap?

Key points

- In 2008, the Council of Australian Governments set a target to halve the gap in reading, writing and numeracy achievement between Indigenous Australian and non-Indigenous students by 2018.
- Policy development needs to be informed by an understanding of how the achievement of students in different geographic areas contributes to the national gap in educational outcomes between Indigenous and non-Indigenous students.
- Indigenous students who attend schools in remote and very remote areas — often the focus of policy commentary — perform much less well than other students.
 - Seventy-two per cent of Year 5 Indigenous students in very remote areas did not meet the national minimum standard for reading (compared with 10 per cent of non-Indigenous students in very remote areas).
- However, the gaps in educational achievement are present across all regions and across all states and territories.
 - Even in metropolitan areas, 20 per cent of Year 5 Indigenous students did not meet the national minimum standard for reading (compared with 4 per cent of non-Indigenous students in metropolitan areas)
- And the remote and very remote areas that perform least well account for a relatively small share of the total Indigenous student population.
 - The majority of Indigenous students go to school in the metropolitan and provincial regions of New South Wales and Queensland where the gap in achievement is smaller but still material and therefore meaningful.
- Overall, no single state or region makes a dominant contribution to the national gap in achievement because states and regions with larger Indigenous student populations tend to have smaller gaps.
 - Indigenous students attending schools in remote areas make a disproportionate contribution to the national gap in Year 5 reading and are worthy of particular attention in policy development and implementation, but Indigenous students attending schools in metropolitan and provincial areas still account for the majority of the national gap due to the larger number of Indigenous students in these areas.
- To be both effective and equitable, closing the gap requires concerted action to improve the educational achievement of Indigenous students in metropolitan, provincial and remote areas across all states and territories.

In discussions about Indigenous Australian education issues, remote communities are sometimes taken to be representative of all Indigenous communities even though most Indigenous students live, and attend schools, in metropolitan and provincial areas (McRae

et al. 2000). Many Commonwealth budget initiatives relating to Indigenous education over the past decade have also focused on students in remote areas. To better inform policy development, this chapter examines how students in different geographic areas contribute to the national gap in education achievement between Indigenous Australian and non-Indigenous students.

As this chapter outlines, it certainly is the case that Indigenous students attending schools in very remote areas tend to have particularly low literacy and numeracy achievement. However, these students make up a relatively small proportion of all Indigenous students.

The geographic distribution of Indigenous students is relevant to the Council of Australian Government's (COAG) goal to halve the gap for Indigenous students in reading, writing and numeracy within a decade (by 2018) (COAG 2008). To achieve this goal, consideration needs to be given to how Indigenous students in different geographic areas contribute to the national gap.

This chapter explores these issues. An introduction to how the analysis was conducted is set out in section 2.1. The sections that follow step through a summary of where Indigenous students go to school (section 2.2), how Indigenous students perform in different geographic areas (section 2.3), and how much students in different geographic areas contribute to the national gap in literacy and numeracy achievement (section 2.4).

2.1 About the analysis

The analysis in this chapter, and those that follow, is based on a confidentialised dataset provided to the Commission by the Australian Curriculum, Assessment and Reporting Authority (ACARA).⁵ The dataset includes student characteristics, school characteristics and National Assessment Program — Literacy and Numeracy (NAPLAN) test results (box 2.1).

Given the available data, the 'gap' in student achievement is not calculated in the same way as it is in relation to COAG targets. For COAG targets, the 'gap' is measured as the difference in the percentage of Indigenous and non-Indigenous students at or above the national minimum standard (NMS) on a given NAPLAN test using 2008 as the baseline. However, the dataset provided by ACARA only includes test scores for 2013 and 2014. Consequently, the calculations below use data from 2014 not 2008. In other words, the analysis provides a snapshot of differences in literacy and numeracy achievement between Indigenous and non-Indigenous students in 2014, rather than providing a measure of the progress towards closing the gap that existed in 2008. (The forthcoming edition of the Commission's *Overcoming Indigenous Disadvantage* report will outline progress towards COAG targets.)

⁵ The dataset was provided to the Commission on an 'as is' basis and ACARA takes no responsibility for its accuracy, quality or fitness for purpose. All analysis contained in this report was undertaken by the Commission and has not been validated by ACARA.

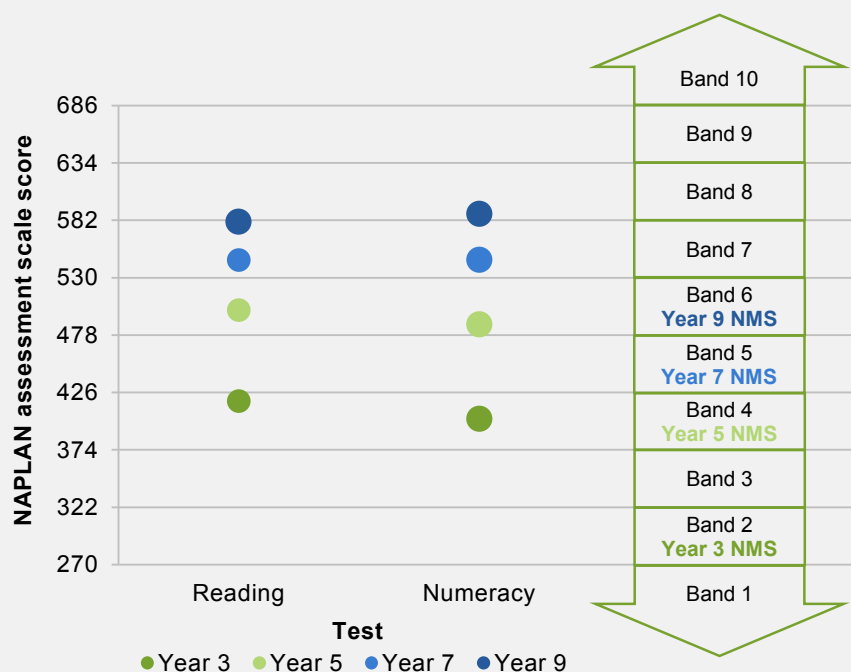
Box 2.1 About NAPLAN

The National Assessment Program — Literacy and Numeracy (NAPLAN) is an annual assessment of the literacy and numeracy skills of students in Years 3, 5, 7 and 9 that began in 2008. NAPLAN assessments take place over three days in the second full week of May and cover four domains: reading, writing, language conventions (spelling and grammar and punctuation) and numeracy.

NAPLAN results are scaled so that student scores across year levels and across test years can be presented on the same assessment scale. Five assessment scales are used — one each for reading, writing, spelling, grammar and punctuation, and numeracy. Students from all year levels participating in NAPLAN are represented on these same five scales.

Each scale is divided into ten bands. Band 1 covers all scores equal to or less than 270. Bands 2 to 9 each span a range of 52 points and Band 10 covers all scores above 686. These bands are used to relate NAPLAN scores to nationally agreed minimum standards for achievement at each year level. Students with results in the band representing the 'national minimum standard' (NMS) for their year level are considered to have demonstrated the basic elements of reading, writing, spelling, grammar and punctuation, and numeracy for that year level.

The figure below relates the NAPLAN assessment bands to the 2014 mean reading and numeracy test scores for students at each year level. For each year level, students in the bands below those marked 'NMS' are considered to be 'below the national minimum standard'.



Sources: ACARA (2015a); Holmes-Smith (2012).

Further, the COAG targets refer to gaps for three different tests (reading, writing and numeracy) and four year levels (years 3, 5, 7 and 9). For brevity, the analysis in this chapter mainly focuses on the gap in achievement on the reading test for Year 5 students.

The Commission’s unpublished analysis suggests the broad conclusions in this chapter would also hold for writing and numeracy (and for Year 3 students).

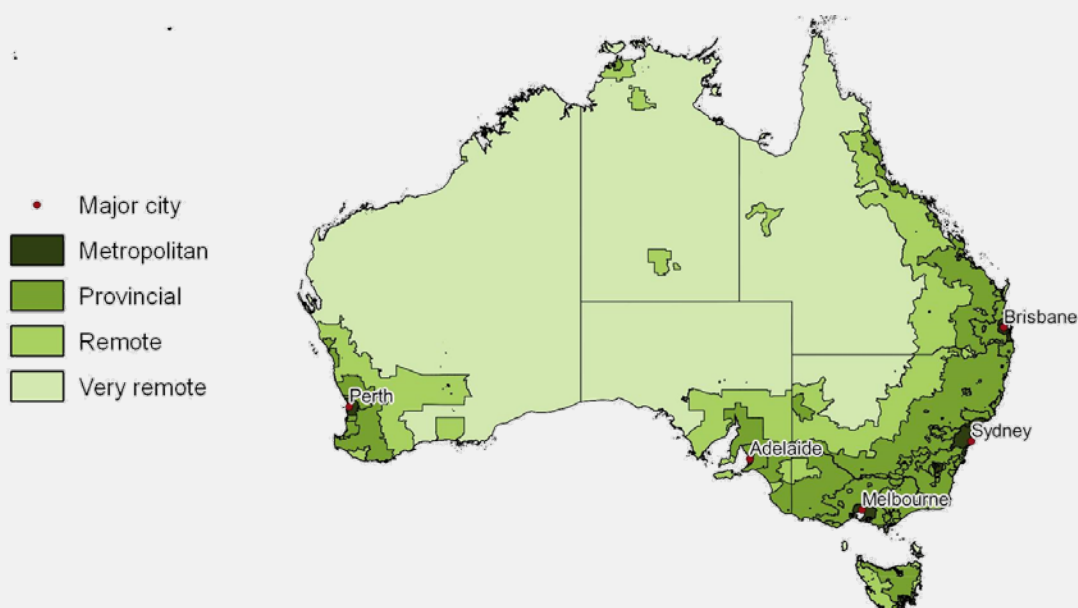
2.2 Where do Indigenous students go to school?

The first step to considering how different geographic areas (box 2.2) contribute to the gap in student achievement between Indigenous and non-Indigenous students is to examine how the Indigenous student population is distributed across the country.

Box 2.2 Defining remoteness

In the ACARA data, schools are categorised by state and territory, and by remoteness. Remoteness is defined using a classification developed in 2001 for the COAG Ministerial Council on Education, Employment, Training and Youth Affairs. Four zones of relative remoteness are defined: metropolitan, provincial, remote and very remote.

Metropolitan zones cover Australia’s most populous capital cities and other major urban regions. Other areas of Australia are classified using an index of remoteness that determines how accessible an area is based on the road distance to ‘service centres’ — towns or cities with more than 1000 people. More details about remoteness classifications are available in Background Paper 1.

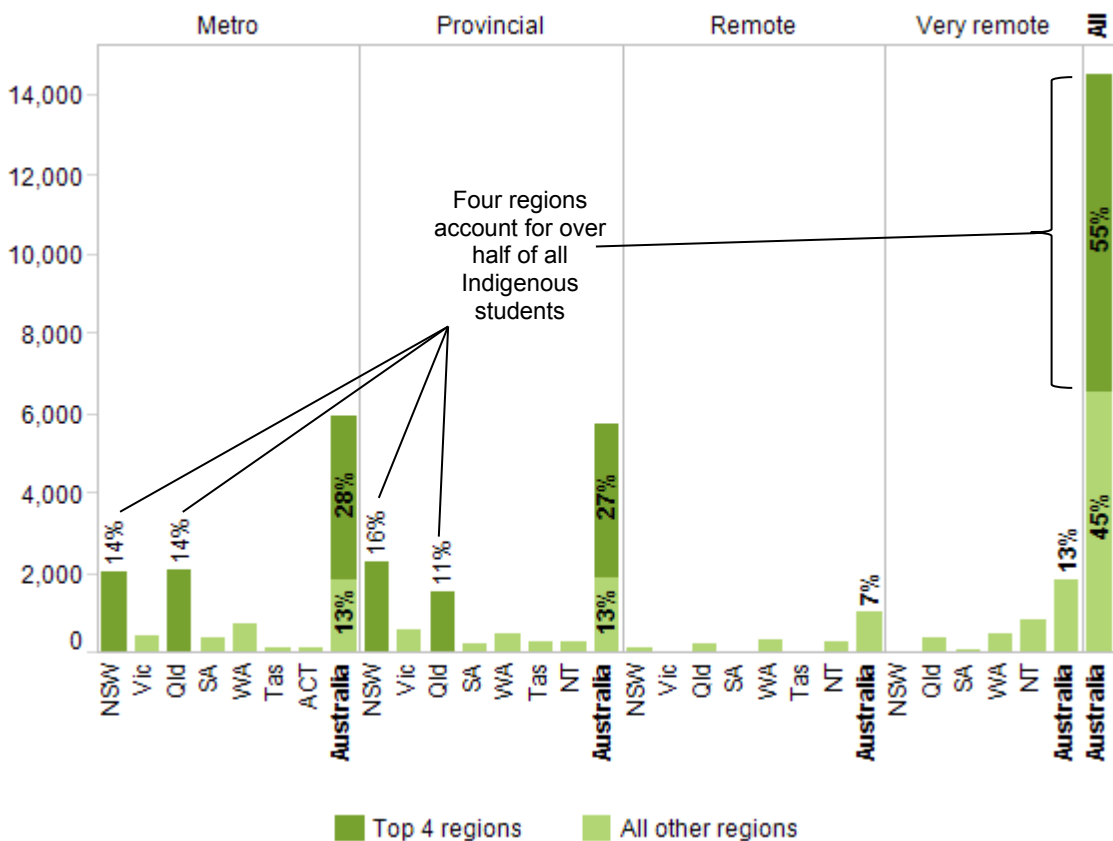


In the analysis that follows, results are presented by state and territory, by remoteness zone and by region (defined as remoteness zones within each state and territory — for example, ‘very remote Western Australia’). Not all areas within regions are necessarily physically connected (for example, ‘remote Northern Territory’ includes areas around Darwin, Katherine and Alice Springs).

Sources: APMRC (2015); Jones (2004).

While commentary about Indigenous education sometimes focuses on remote and very remote areas, Indigenous students attending schools in these areas make up a small proportion of the total Indigenous student population. In 2014, more than 80 per cent of Indigenous students in Year 5 went to school in either metropolitan or provincial areas. Indeed, the majority of Indigenous students (55 per cent) attended schools in just four regions: metropolitan New South Wales, metropolitan Queensland, provincial New South Wales and provincial Queensland (figure 2.1).

Figure 2.1 **Most Indigenous students go to school in just four regions^a**
Indigenous student population by region (Year 5, 2014)



^a Excludes 77 Indigenous students (1 per cent) who either had no defined region or went to school in a region with less than 30 Indigenous students.

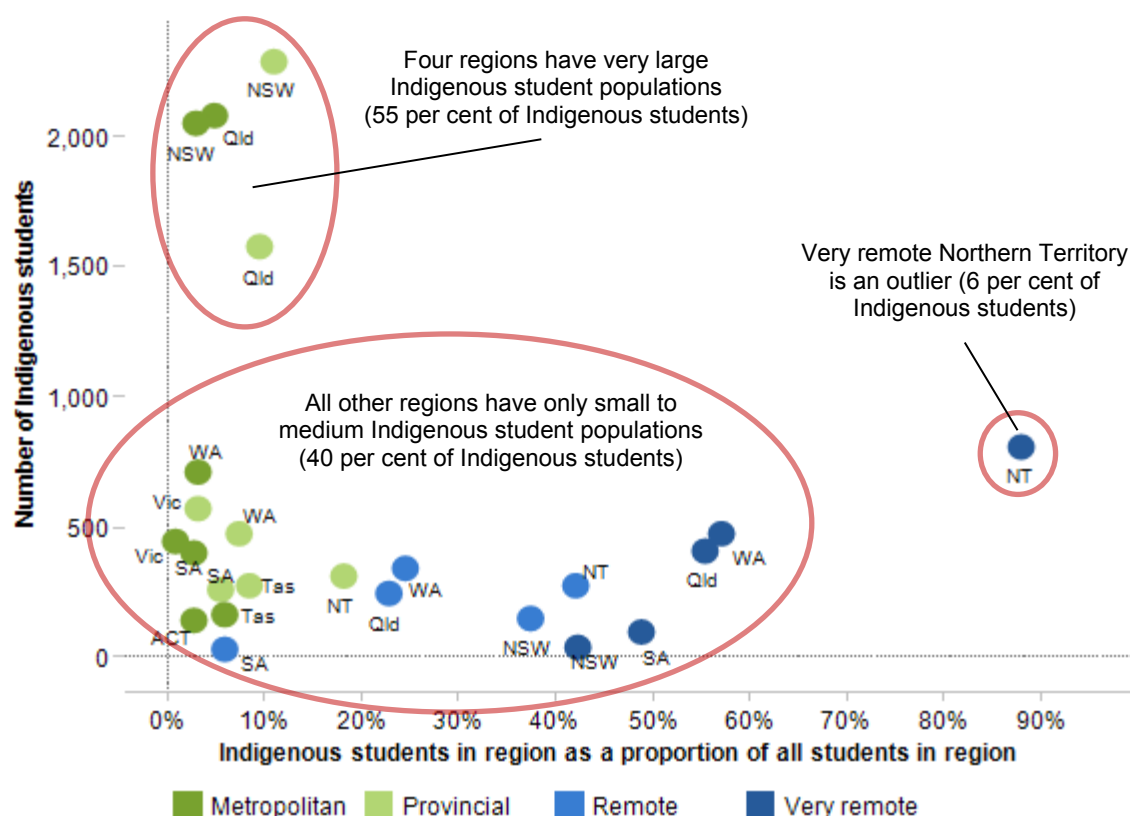
Source: Commission estimates based on ACARA data (unpublished).

That said, Indigenous students do make up a relatively large proportion of students in remote and very remote areas. Across Australia, Indigenous students represented 5 per cent of all Year 5 students in 2014, but 25 per cent of all Year 5 students in remote areas and 66 per cent of all Year 5 students in very remote areas. In very remote parts of the Northern Territory, Indigenous students accounted for 88 per cent of all Year 5 students.

In summary, the proportion of Indigenous students attending schools in a given region is not an accurate guide to where most Indigenous students actually attend school. While the metropolitan and provincial regions of New South Wales and Queensland have high absolute numbers of Indigenous students, they have relatively few Indigenous students when expressed as a proportion of the total regional student population (figure 2.2). With the exception of very remote Northern Territory, regions with the large *numbers* of Indigenous students tend to have small *proportions* of Indigenous students as part of the corresponding school population.

Figure 2.2 In regions with large numbers of Indigenous students, Indigenous students are (usually) a low percentage of all students^a

Year 5, 2014



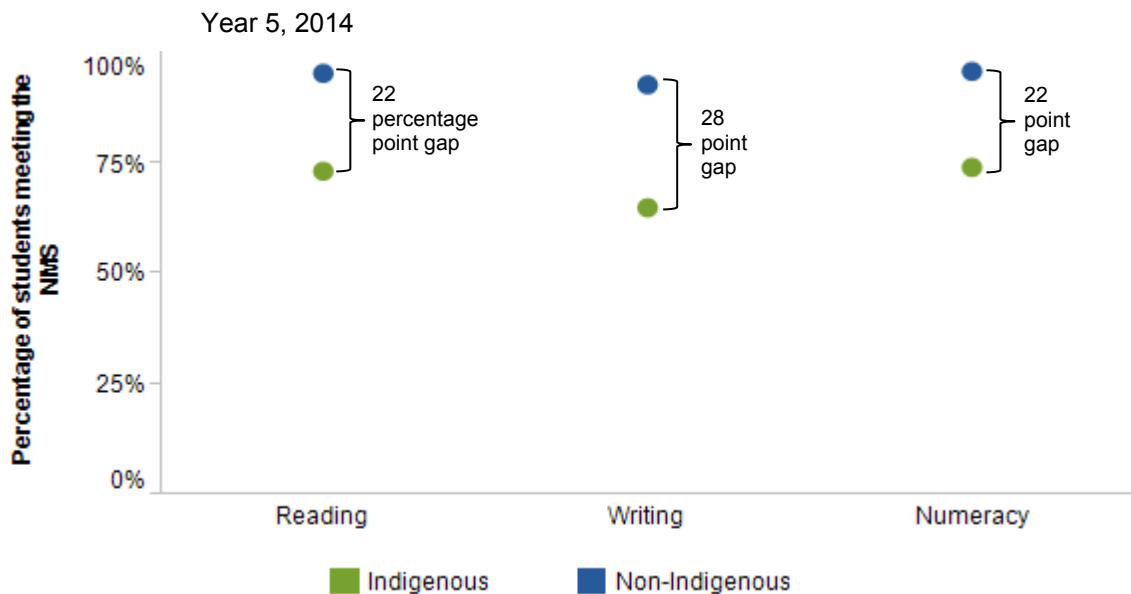
^a Excludes 77 Indigenous students (1 per cent) who either had no defined region or were in a region with less than 30 Indigenous students.

Source: Commission estimates based on ACARA data (unpublished).

2.3 How do the NAPLAN results of Indigenous and non-Indigenous students compare?

As is well acknowledged, Indigenous students tend to have low levels of literacy and numeracy achievement relative to non-Indigenous students. One way to illustrate this is to look at the relative proportions of Indigenous and non-Indigenous students at or above the NMS for reading, writing and numeracy.⁶ On the 2014 reading test, the proportion of Year 5 students at or above the NMS was 95 per cent for non-Indigenous students and 73 per cent for Indigenous students.⁷ This equates to a national gap of 22 percentage points. Writing and numeracy tests show similar gaps (figure 2.3).

Figure 2.3 **National gaps in reading, writing and numeracy are similar in size^a**



^a On each test, about 2000 Indigenous students (14 per cent) and 17 000 non-Indigenous students (6 per cent) did not participate.

Source: Commission estimates based on ACARA data (unpublished).

⁶ National minimum standards are mainly useful for providing an indication of the number of very low performing students. Alternative summary measures are presented in Background Paper 1.

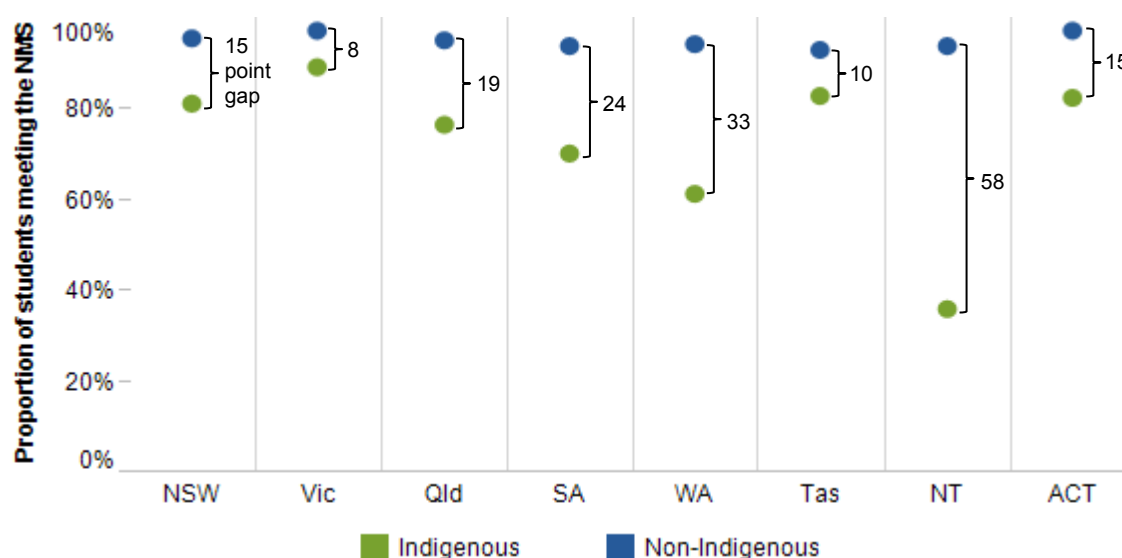
⁷ Not all students participate in NAPLAN testing. For example, in 2014, 13 per cent of Indigenous Year 5 students and 6 per cent of non-Indigenous Year 5 students did not participate in the NAPLAN reading test. The results presented in this section and later sections exclude these students. Participation rates vary from region to region, but changing assumptions about whether non-participants would meet national minimum standards would not markedly alter the overall impression of the gaps at regional, state or national levels. Further details about non-participant students are contained in Background Paper 1.

The ‘gaps’ between Indigenous and non-Indigenous students presented in this chapter differ slightly from those published in ACARA’s National Report on Schooling. The numbers presented here use an updated dataset and exclude exempt students from calculations.

At the state level, the gaps are less uniform (figure 2.4). The Northern Territory (with 9 per cent of Indigenous students) has the largest gap. Almost two thirds of all Northern Territory Indigenous students in Year 5 were below the NMS for reading, leading to a gap of 58 percentage points. However, other states and territories with much larger Indigenous student populations also have sizable gaps. In New South Wales the gap is 15 percentage points, in Queensland the gap is 19 percentage points and in Western Australia the gap is 33 percentage points.

Figure 2.4 **Reading gaps vary by state and territory^a**

Year 5, 2014



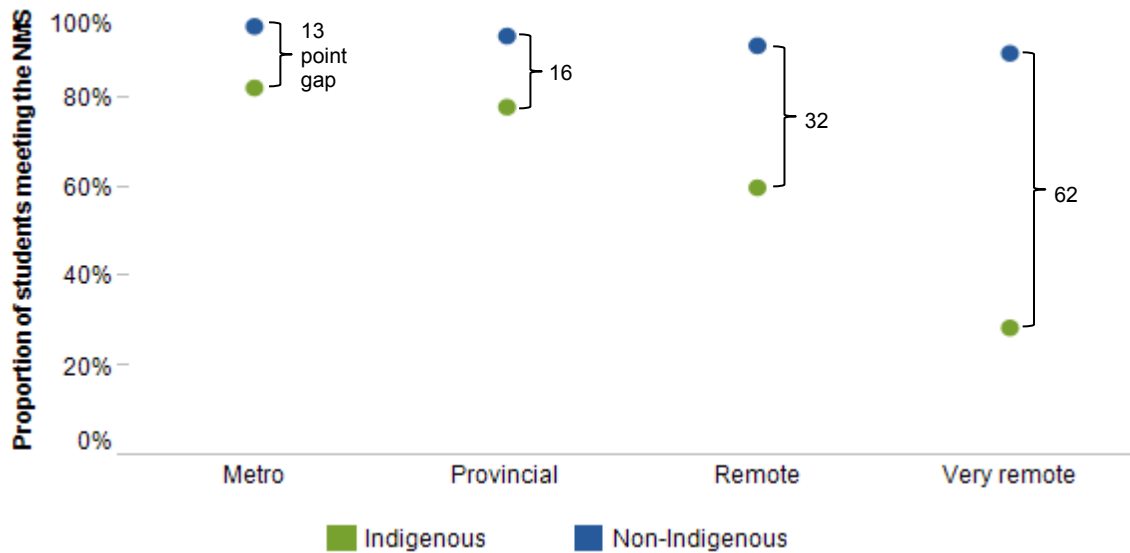
^a Excludes 1917 Indigenous students (13 per cent) and 16 208 non-Indigenous students (6 per cent) who did not participate in the reading test.

Source: Commission estimates based on ACARA data (unpublished).

The size of the gap also tends to increase with remoteness (figure 2.5). In 2014, the gap in the relative proportions of Indigenous and non-Indigenous Year 5 students at or above the NMS was 62 percentage points in very remote areas compared with 13 percentage points in metropolitan areas. While the gap in metropolitan areas is smaller in magnitude, as noted above, a much larger share of Indigenous students attend schools in metropolitan areas (41 per cent).

Figure 2.5 **Reading gaps increase with remoteness^a**

Year 5, 2014

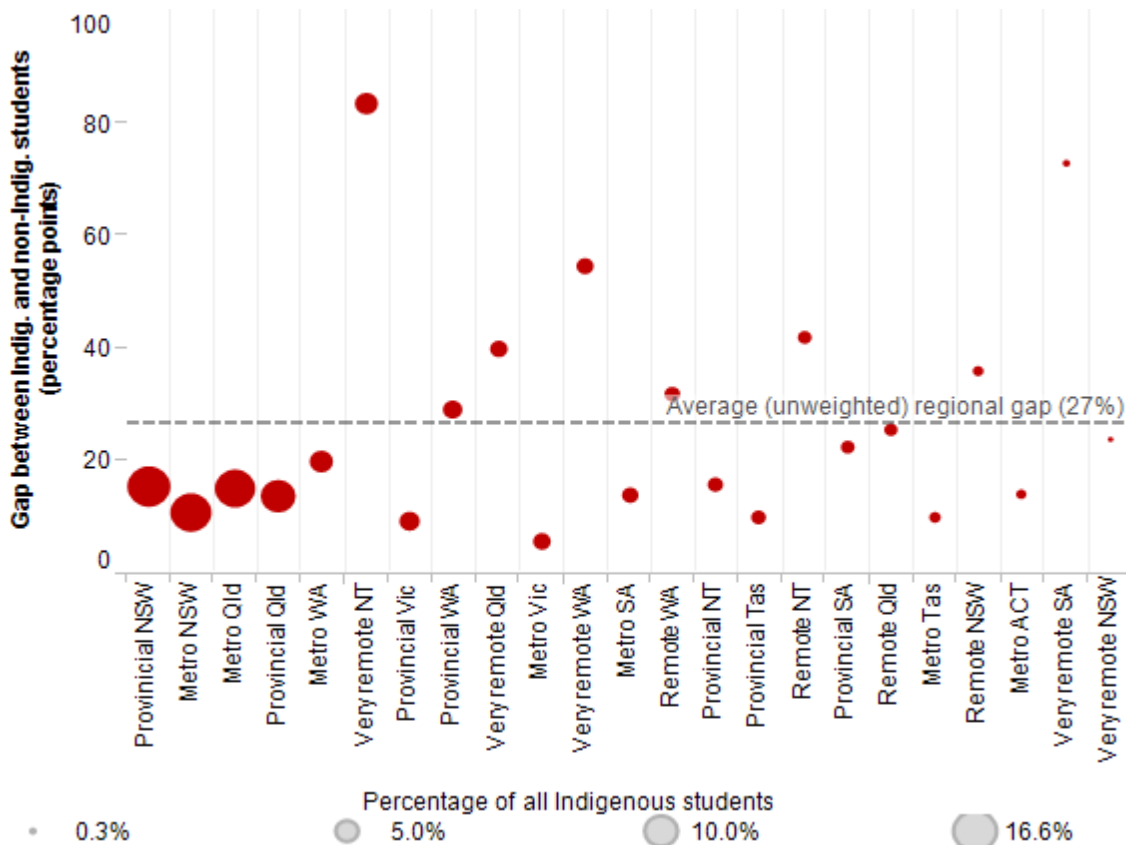


^a Excludes 1975 Indigenous students (14 per cent) and 16 454 non-Indigenous students (6 per cent) who either did not participate in the reading test or had no defined region.

Source: Commission estimates based on ACARA data (unpublished).

At the regional level, the size of the gaps varies even more, but when regions are ordered according to the size of the Indigenous student population it becomes clear that the bulk of Indigenous students attend schools in just a few regions where the gap in achievement is smaller but still material (figure 2.6). In the metropolitan and provincial regions of New South Wales and Queensland, where the majority of all Indigenous Year 5 students attend school, the regional gap between Indigenous and non-Indigenous students was between 11 and 15 percentage points.

Figure 2.6 **The most populous regions have smaller (but still material) reading gaps^a**
Year 5, 2014



^a Excludes 2017 Indigenous students (14 per cent) and 17 014 non-Indigenous students (6 per cent) who either did not participate in the reading test or had no defined region.

Source: Commission estimates based on ACARA data (unpublished).

2.4 Attributing the gap

How much do different states, remoteness zones and regions contribute to the national gap in educational outcomes between Indigenous and non-Indigenous students? The preceding analysis highlights two disparate fact bases. On the one hand, most Indigenous students attend schools in metropolitan and provincial areas, not in remote or very remote areas. On the other hand, Indigenous students in remote areas tend to perform relatively and materially less well than Indigenous student in non-remote areas.

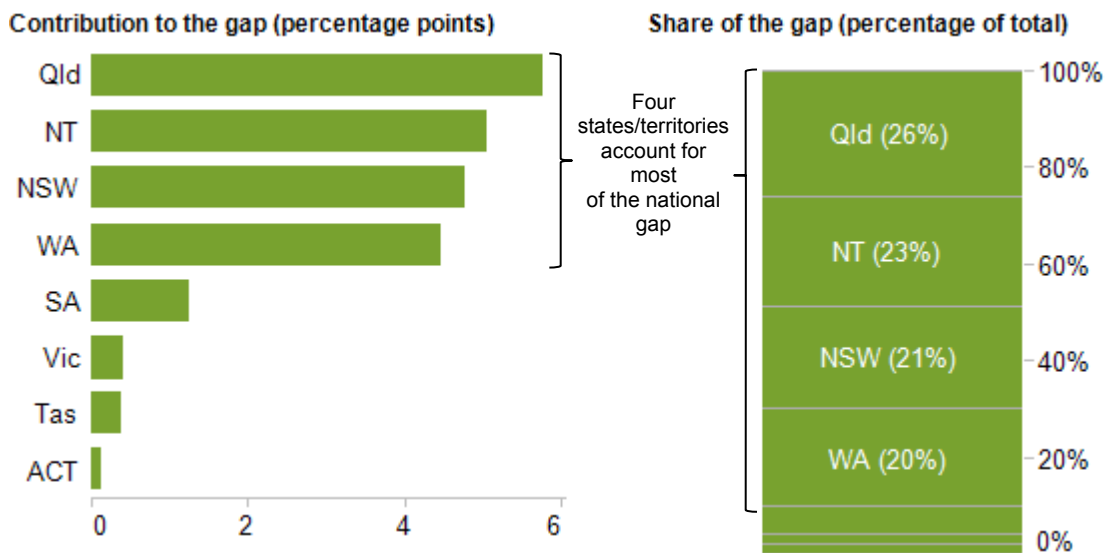
One way to calculate the contribution of Indigenous students in a given geographic area to the national gap in achievement is by assessing how much the gap would decrease if the percentage of Indigenous students that met the NMS in that area matched the percentage of non-Indigenous students at the national level. For example, the contribution of New South

Wales to the national gap can be estimated by looking at how much the national gap would change if the achievement of Indigenous students in New South Wales matched that of all students nationally — that is, if 95 per cent of Indigenous students in New South Wales met the NMS rather than 81 per cent.

Figures 2.7, 2.8 and 2.9 illustrate the results of this attribution calculation for the national NMS gap in Year 5 reading. The figures show, respectively, the share of the national gap attributable to each state and territory, remoteness zone and region. Each figure displays contributions to the gap in two ways: as a *percentage point contribution* to the gap (the national gap in Year 5 reading was 22 percentage points in 2014) and as a *percentage share* of the total gap (where the total national gap adds to 100 per cent).

Figure 2.7 Several states and territories make marked contributions to the gap^a

National gap in reading scores (Year 5, 2014)



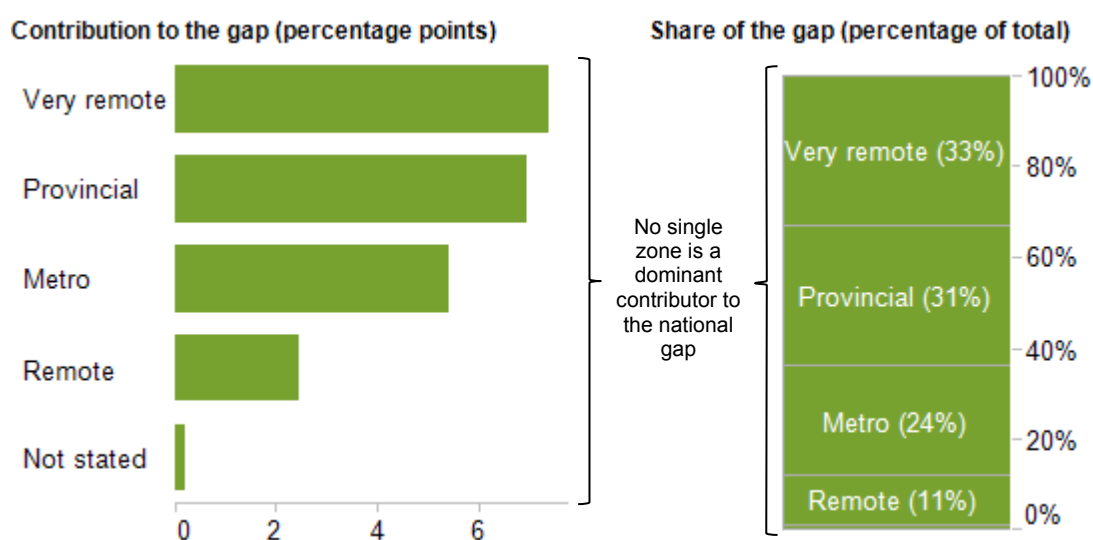
^a Excludes 1917 Indigenous students (13 per cent) and 16 208 non-Indigenous students (6 per cent) who did not participate in the reading test.

Source: Commission estimates based on ACARA data (unpublished).

No single state, remoteness zone or region is dominant in contribution to the gap. Across the states and territories, Queensland accounts for the largest share (6 percentage points or 26 per cent of the total gap), but no state or territory accounts for much more than a quarter of the total national gap. Across remoteness zones, the gap is fairly evenly attributed with very remote, provincial, and metropolitan areas each accounting for between about one quarter and one third of the national gap (5 to 8 percentage points). And across regions, very remote Northern Territory is the largest contributor, but only accounts for 20 per cent of the total national gap (4 percentage points).

This attribution reflects the competing effects of Indigenous student population size and gap size in each geographic area. The geographic areas with the largest gaps tend to have smaller Indigenous populations. Consequently, roughly the same share of the national gap is often attributed to areas with very different populations and gaps. For example, New South Wales (with a relatively small gap but large Indigenous population) accounts for about the same share of the national gap by state and territory as the Northern Territory (with a very large gap but smaller Indigenous population).

Figure 2.8 All zones share in the gap^a
National gap in reading scores, by remoteness zone (Year 5, 2014)



^a Excludes 1917 Indigenous students (13 per cent) and 16 208 non-Indigenous students (6 per cent) who did not participate in the reading test.

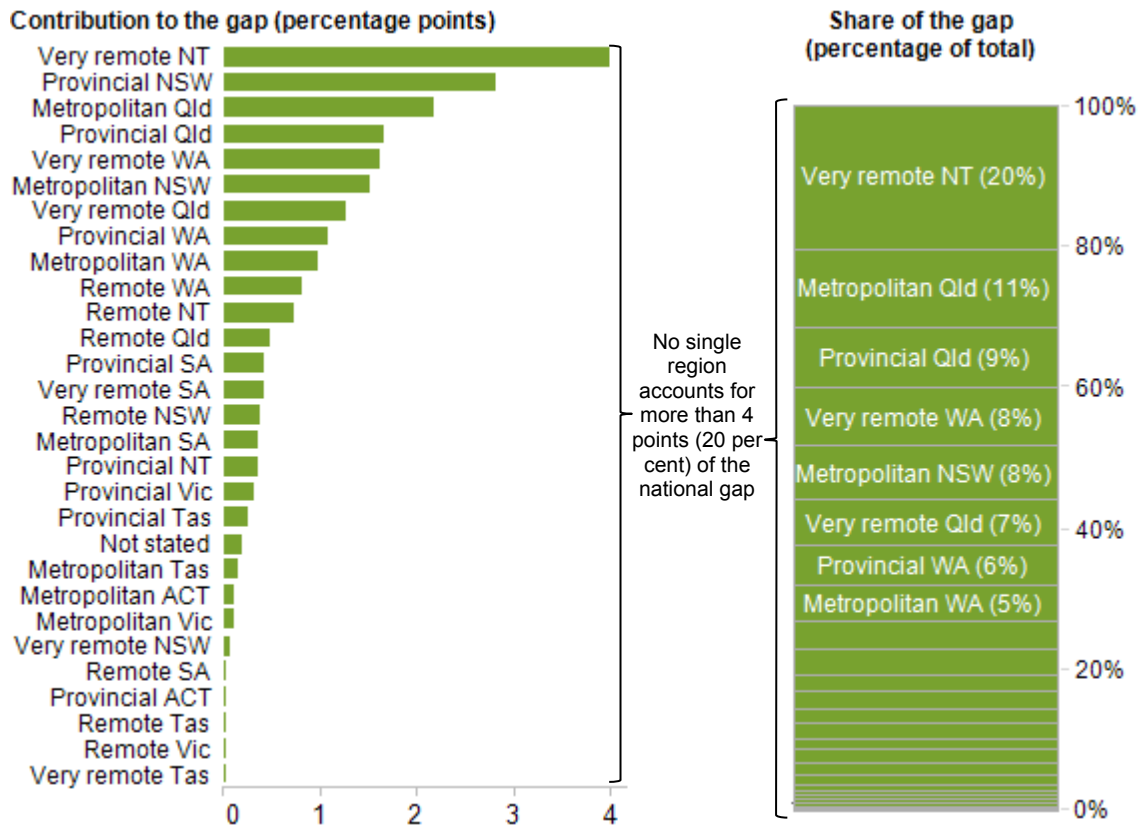
Source: Commission estimates based on ACARA data (unpublished).

Overall, a focus on remote and very remote areas is clearly warranted given the relatively greater gap in educational achievement. Care must be taken not to view all remote schools as relative underperformers though, as at some, Indigenous students perform much better than expected (chapter 3). On average, however, Indigenous students attending schools in remote areas perform well below the target on NAPLAN tests and, given their relatively small populations, make a disproportionate contribution to national gaps in educational achievement between Indigenous and non-Indigenous students. If the reading, writing and numeracy skills of remote and very remote Indigenous students significantly improved, it would therefore go a long way towards meeting COAG targets of halving the national gaps.

However, concentrating solely on Indigenous students attending schools in remote and very remote areas would not fully close the national gap. Indigenous students in metropolitan and provincial areas account for a large majority of the Indigenous student population and more than half (55 per cent) of the national gap in Year 5 reading. To be

both effective and equitable, approaches to closing the gap need to improve the educational outcomes of Indigenous students in metropolitan, provincial and remote areas across all states and territories.

Figure 2.9 Numerous regions contribute to the gap^a
National gap in reading scores, by region (Year 5, 2014)



^a Excludes 1917 Indigenous students (13 per cent) and 16 208 non-Indigenous students (6 per cent) who did not participate in the reading test.

Source: Commission estimates based on ACARA data (unpublished).

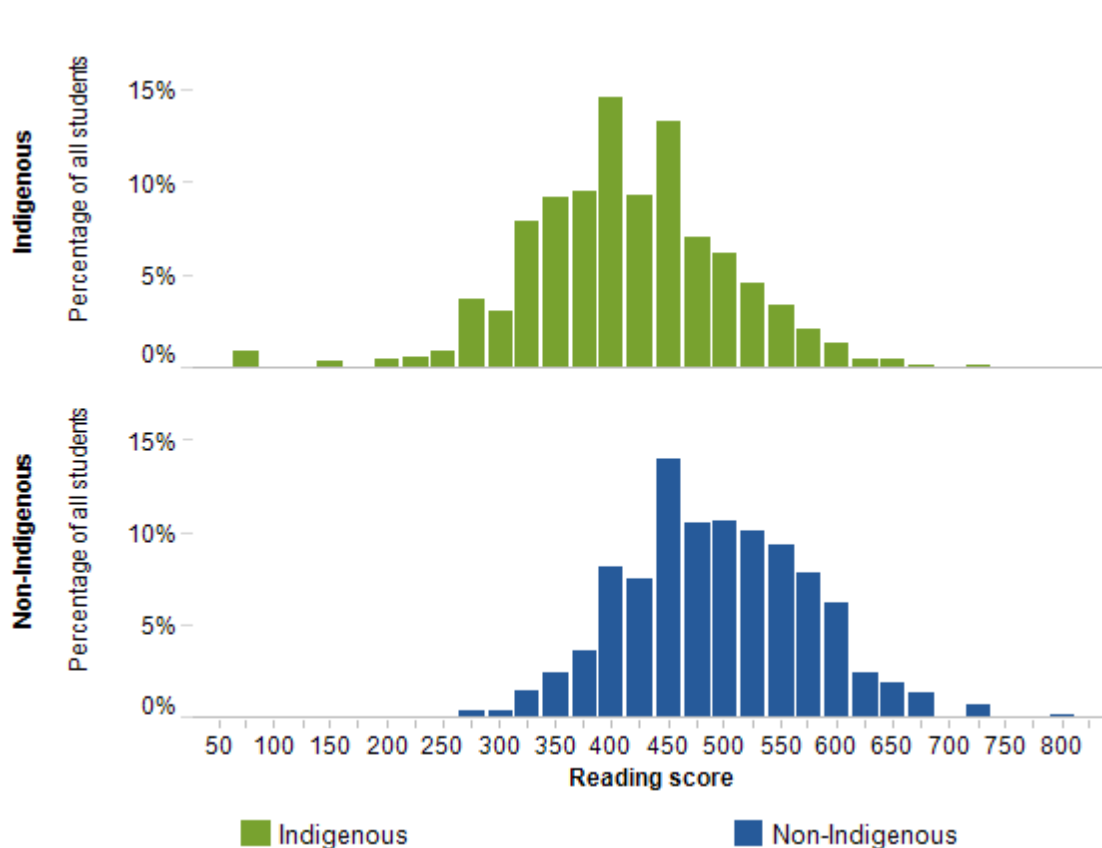
3 Statistical analysis of primary school education achievement

Key points

- Newly available data on Year 5 students in all Australian schools in 2013 and 2014 were used to investigate reading and numeracy achievement for Indigenous and non-Indigenous Australian primary school students. Analysis of the type undertaken has not previously been possible for Indigenous or primary school students.
- There is wide variation in reading and numeracy achievement among both Indigenous Australian and non-Indigenous primary school students. But Indigenous students are over-represented among low achievers, and under-represented among high achievers.
- For both Indigenous and non-Indigenous primary students, most of the variation in achievement seen in the data is attributable to student-level characteristics rather than school-level characteristics. That is, things that vary between students in a school, like demographic background or attitudes rather than things that vary between schools, like staff numbers and school fees paid. This is consistent with similar research for older students.
- Also in line with previous research, student-level characteristics that are actually observed in the data — parental education and occupation, and students' age, gender and language background — explain only a small share of the total variation in student achievement attributable to student-level characteristics. And, therefore, a small share of the total variation in student achievement overall. Policies targeting the needs of individual students are likely to be important in improving student achievement.
- Indigenous students have lower levels of achievement than non-Indigenous students even after observed characteristics such as language background and socioeconomic status are taken into account. It is unclear why this is the case.
- Among the characteristics that are observed in the data, the most important contributors to explaining variation in achievement are for:
 - Indigenous students, their own socioeconomic status and that of their school community, along with the attendance rate at their school and the school's share of Indigenous students. Where they attend school is relatively unimportant.
 - non-Indigenous students, student and school socioeconomic status (a well-established result for older students).
- Initiatives to address the effects of socioeconomic disadvantage and to improve attendance rates could lift (and reduce variation in) achievement among Indigenous students.
- Students at some schools do considerably better (or worse) than might be expected because of unobserved school characteristics.
- Further insight into why certain schools perform well, particularly for Indigenous students, could be gained by evaluating high-performing schools to see what sets them apart. These insights could be used to inform policy and lift Indigenous achievement in other schools.

On any test of achievement, at any level of schooling, there is wide variation in how well students do. The National Assessment Program — Literacy and Numeracy (NAPLAN) test is no exception. For Year 5 Indigenous Australian students, for example, the lowest achieving students in reading in 2014 had a test score of about 75; the highest achieving, a score of about 650 (figure 3.1). Similarly, there was wide variation in achievement among non-Indigenous students. But Indigenous students were much more likely to record lower scores, and less likely to record higher scores, than non-Indigenous students.

Figure 3.1 There is wide variation in achievement between all students
Reading scores for Indigenous and non-Indigenous students (Year 5, 2014)



Source: Commission estimates based on ACARA data (unpublished).

What contributes to this variation? Do students who do less well have different demographic characteristics from those who do well? Do they come from different socioeconomic backgrounds? Do the schools that they attend have different characteristics from those where students do well?

Analysis of the characteristics that contribute to differences in achievement should provide insight into the types of initiatives that would improve outcomes, particularly for the lowest achieving students.

This chapter looks at the contributions of some student demographic and school characteristics to education achievement among Indigenous primary school students. Achievement is measured using reading and numeracy test scores from the NAPLAN.

A key policy question is whether the same approaches that benefit non-Indigenous students work for Indigenous students. Consequently, the Commission's analysis distinguishes between these groups.

The chapter opens with a description of the characteristics that research to date indicates contributes to education achievement, and an outline of the data used in this paper (section 3.1). The analytical approaches adopted in the Commission's research are then summarised (section 3.2), before the main findings from the research and analysis are presented (section 3.3).

3.1 Characteristics related to achievement

Characteristics identified in the literature

As noted in chapter 1, researchers have identified a host of characteristics that influence education achievement. These include characteristics of the environment in which a child lives, the school they attend, their peers, teachers and family, and of the students themselves. Hattie (2009), in summarising the findings of thousands of studies from education systems worldwide, identified 138 influences (chapter 4). Figure 3.2 summarises some examples.

Characteristics identified in the data available to this study

In an ideal world, researchers and policymakers would have access to large scale datasets with rich measures of the many characteristics thought to influence achievement. But datasets of this type do not exist, and would likely be very expensive to create.

Instead, researchers and policymakers can typically access two types of data:

- large scale datasets constructed from administrative records. The key advantage of these data is that they cover all students within a population, for example, a country or a state. As a result, smaller groups within the population, for example, Indigenous students, can be studied. The key disadvantage is that they only include information that education providers choose to collect in the course of delivering education
- small scale, purpose specific datasets. The key advantage of these data is that the information collected can cover many characteristics of interest. The key disadvantage is that the data cover only a sample of the population. This can mean that they are not representative of the whole population, and that they contain only a small number of people from population subgroups.

Figure 3.2 **Many characteristics influence student achievement — but only a subset is available in ACARA data, many more remain unobserved^{a,b}**

	Observed in the dataset	Unobserved – data exist but not included in dataset	Unobserved – data do not exist
Social	<ul style="list-style-type: none"> Remoteness State 	<ul style="list-style-type: none"> Local unemployment rate 	<ul style="list-style-type: none"> Libraries and educational facilities
School	<ul style="list-style-type: none"> School sector Number of enrolments Staff numbers Attendance rate Finances 	<ul style="list-style-type: none"> Average satisfaction of teachers Teacher and principal turnover Principal characteristics 	<ul style="list-style-type: none"> School policies School culture Educational resources Extracurricular activities
Peers	<ul style="list-style-type: none"> % Indigenous students % LBOTE students % parents by education / occupation category 	<ul style="list-style-type: none"> Health School satisfaction 	<ul style="list-style-type: none"> Cognitive abilities Attitudes Aspirations
Teacher		<ul style="list-style-type: none"> Age Gender LBOTE Experience Qualifications 	<ul style="list-style-type: none"> Teaching style Attitudes
Family	<ul style="list-style-type: none"> Parental education Parental occupation 	<ul style="list-style-type: none"> Parent LBOTE 	<ul style="list-style-type: none"> Parent engagement Home learning activities
Student	<ul style="list-style-type: none"> Age Gender LBOTE 	<ul style="list-style-type: none"> Health and disability Attendance 	<ul style="list-style-type: none"> Cognitive abilities Attitudes Aspirations

Grouping of characteristics in the statistical analysis:

■ School-level ■ Student-level ■ Unobserved

^a The figure provides examples of characteristics. It is not an exhaustive list. ^b The figure categorises unobserved characteristics according to whether relevant information exists at a national level in datasets covering all students. Unobserved data that exist include data that are believed to be held in administrative records.

Because Indigenous children make up a relatively small share (about 5 per cent) of Australian primary school students, the types of analysis of their education achievement that can be undertaken using small scale datasets are limited. In particular, it is not possible to examine the contribution of schools to explaining achievement (one of the goals of this project). Analysis of that issue is possible with large-scale data, and the project team was fortunate in being able to access the new Australian dataset compiled by the Australian

Curriculum, Research and Reporting Authority (ACARA) that links administrative data for all students and schools.

The ACARA data permit national level analysis of some of the school and student characteristics thought to contribute to achievement among primary school students, and enable both a comparative and separate study of Indigenous students. The data include:

- test scores for all Australian students who participated in the Year 3 and Year 5 NAPLAN tests in 2013 and 2014
- measures of the characteristics listed in the first column of figure 3.2 — labelled ‘Observed’.

Ways in which these observed characteristics might influence achievement are summarised in table 2.1, BP 2.

The availability of the ACARA data is a marked contribution to the national education evidence base. That said, the data do not include measures of many of the characteristics that might influence student achievement. The data could be enriched with information contained in administrative records around the country. Preliminary analysis suggests that the characteristics in the column labelled ‘Unobserved — data exist’ in figure 3.2 could be accessed from these records (or, in a couple of instances, national collections like the Census). However, the potential costs of processing, linking and managing data would need to be compared with the potential benefits of access to richer datasets before new resources were developed. It is unclear whether our understanding of how to improve achievement would be markedly advanced by richer national-level data alone.

Despite the limited coverage of characteristics, the ACARA data do provide some insight into the project’s research questions (chapter 1). Further insight, gained from the education literature, is presented in chapter 4.

As noted in chapter 1, in the analysis presented in this paper, characteristics that are constant across schools (denoted using green in figure 3.2) are labelled school-level characteristics. Characteristics specific to each child (denoted using blue in figure 3.2) are labelled student-level characteristics. The influence of teachers on achievement will be reflected at a school level, to the extent that it is constant across schools, and at a student level to the extent that it is specific to each student.

Furthermore, characteristics for which measures are available within the ACARA data are labelled ‘observed’ characteristics. At a student-level, for example, observed characteristics cover demographics of students and their families. The many characteristics for which measures are not available are labelled ‘unobserved’ characteristics.

While the ACARA data include test scores for five NAPLAN tests, only reading and numeracy achievement are analysed in this chapter. Similar overall conclusions are drawn from Commission analyses for Year 3 students and for other NAPLAN test domains.

Finally, as outlined in chapter 1, the analysis is conditional on students having participated in the NAPLAN tests. The results cannot be generalised to students who did not sit the tests.

3.2 How are the available data used?

To answer the project's research questions, the ACARA data are analysed using three different statistical approaches. (These approaches, the reasons they were chosen and detailed results from the analysis are described in BP 2.)

First, a regression technique called multilevel modelling is used, for both Indigenous and non-Indigenous students, to examine:

- the relative contributions of school- and student-level characteristics to explaining variation in student achievement. The technique permits identification of contributions both from characteristics observed in the ACARA data, and from those that are unobserved
- the relationship between each characteristic observed in the ACARA data and achievement, taking other characteristics into account. For example, the difference in test scores, on average, between students whose mothers have completed at most Year 9 and those whose mothers have a university qualification is estimated, taking into account other observed characteristics, like students' language backgrounds and their mothers' occupations
- whether there are some schools where Indigenous students do better than would be expected, given their characteristics and the characteristics of the schools that they attend.

Second, for both Indigenous and non-Indigenous students, a technique called dominance analysis is used to examine which of the school- and student-level characteristics observed within the ACARA data make the largest contribution to explaining variation in student achievement.

Third, a technique called Blinder-Oaxaca decomposition is used to examine the extent to which the gap in reading and numeracy test scores between Indigenous and non-Indigenous students is because the two groups have different characteristics (for example, different socioeconomic backgrounds) or because the association between their characteristics and achievement is different (for example, coming from a low socioeconomic background has a smaller association with achievement for one group).

3.3 Key insights and take-outs

Using multilevel modelling it is possible to divide the total variation in student achievement into two parts. First, students are grouped into schools, and variation in the average test scores between students at different schools (that is, variation attributable to

school-level characteristics) is identified. Second, the variation in scores among students within each school (that is, attributable to student-level characteristics) is identified. Together, these two components account for the total variation in student test scores.

It is also possible using multilevel modelling to further divide the school- and student-level contributions to total variation into shares that are explained by observed characteristics and shares that are unexplained (that is, related to unobserved characteristics).

Results from this analysis follow.

School-level characteristics explain a relatively small share of the variation in student achievement

The analysis reveals that, for both Indigenous and non-Indigenous students, variation in achievement is primarily attributable to student-level, rather than school-level characteristics. Only about 25 per cent of the total variation in Indigenous students' achievement is attributable to the (observed and unobserved) characteristics of the schools that they attend (figure 3.3). For non-Indigenous students, the share is 16 per cent. Previous research into the education outcomes of Australian students, including analyses of tertiary entrance scores, Year 12 study scores and reading and numeracy achievement has similarly concluded that a relatively small share of the variation in outcomes is attributable to school-level characteristics (BP 2).

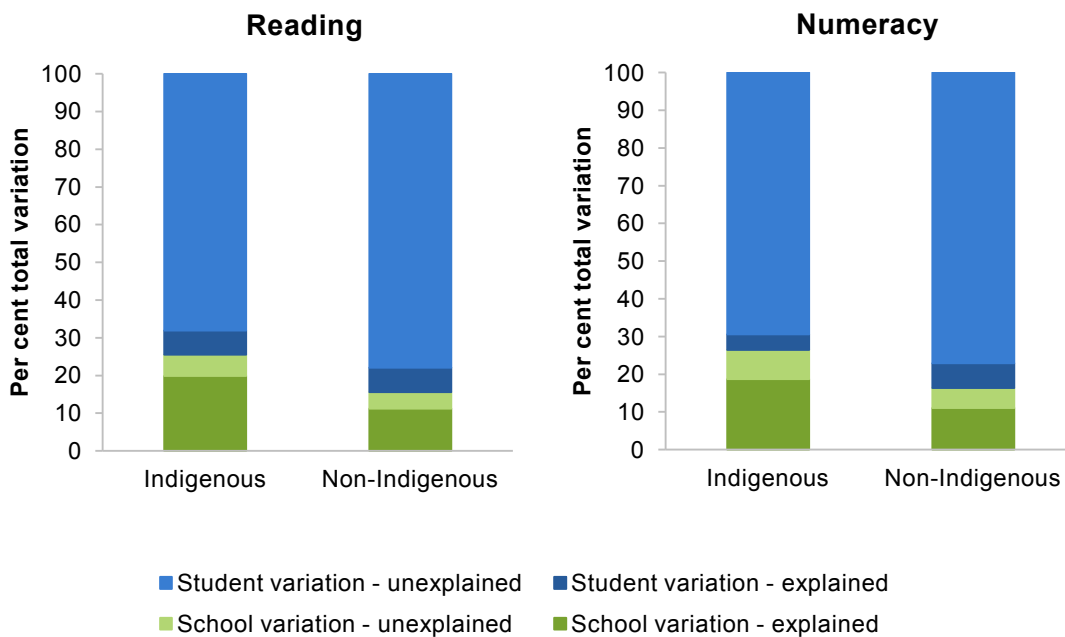
What might explain the difference in the contribution of schools to achievement for Indigenous and non-Indigenous students? The answer lies, in large part, in schools in very remote areas. A larger proportion (about 40 per cent) of the variation in achievement among Indigenous students in these areas is attributable to schools (BP 2). And, when students in very remote areas are left out of the analysis (that is, 12 per cent of Indigenous students), only 17 per cent of the variation in achievement between Indigenous students is attributable to the characteristics of the schools that they attend — a similar contribution to that made by schools for non-Indigenous students.

There are many possible explanations for why school-level variation may be larger for Indigenous students attending very remote schools. One possibility is that Indigenous students within the same very remote communities have similar social and family influences. Another is that very remote schools may be smaller, so students attending the same school in a very remote area may be more likely to have been taught by the same teachers. Therefore, the influence of teachers may be more likely to be captured in school-level variation than student-level variation.

At a broad level, the results might be read as suggesting that policy makers can have limited influence on student achievement through school-level initiatives in non-remote schools. However, a better interpretation might be that schools, in general, do not have as much influence as they could. There are some schools where students do better than their characteristics would suggest (a point taken up in more detail below). If there were more

schools where this was the case, there might be less variation in student achievement, students' characteristics might make a smaller contribution to that variation and schools' contribution might be larger.

Figure 3.3 School-level characteristics explain a relatively small proportion of students' test score variation^a
 Reading and numeracy, by Indigenous status (Year 5, 2013 and 2014 pooled)



^a Explained student or school-level variation is attributable to characteristics observed within the ACARA data. Unexplained variation is associated with unobserved characteristics.

Source: Commission estimates based on ACARA data (unpublished).

Observed characteristics do not explain much of the variation in achievement

Overall, much of the total variation in student achievement remains unexplained by the characteristics observed in the ACARA data (figure 3.3).

Furthermore, while most of the variation attributable to school-level characteristics (that is, about 70 per cent of the 25 per cent for Indigenous students) is explained, the student-level characteristics observed in the data (demographic characteristics of students and families) account for less than 10 per cent of the variation attributable to student-level characteristics (of 75 per cent).

These conclusions are in line with those from Australian studies that have used similar types of data (BP 2). However, even studies based on richer survey data tend to explain at most about one third of the variation in reading and numeracy achievement attributable to student-level characteristics (BP 2). In other words, they find that at least 50 per cent of the overall variation in achievement is attributable to unobserved student-level characteristics.

These results suggest that initiatives that address students' individual learning needs might be particularly effective in lifting achievement — for both Indigenous and non-Indigenous students. This conclusion is in line with the recent education literature (chapter 4).

Some observed characteristics have a strong relationship, on average, with achievement

A simple analysis suggests that achievement is related to many of the characteristics observed in the ACARA data (BP 1). For example, primary school children tend to do better on NAPLAN tests if their mothers have a higher level of education (figure 3.4). In 2014, the median NAPLAN reading test score of Year 5 Indigenous children whose mothers had completed at most Year 9, was about 400 points. In comparison, among Indigenous children whose mothers had completed a university qualification, the median score was about 480 points.

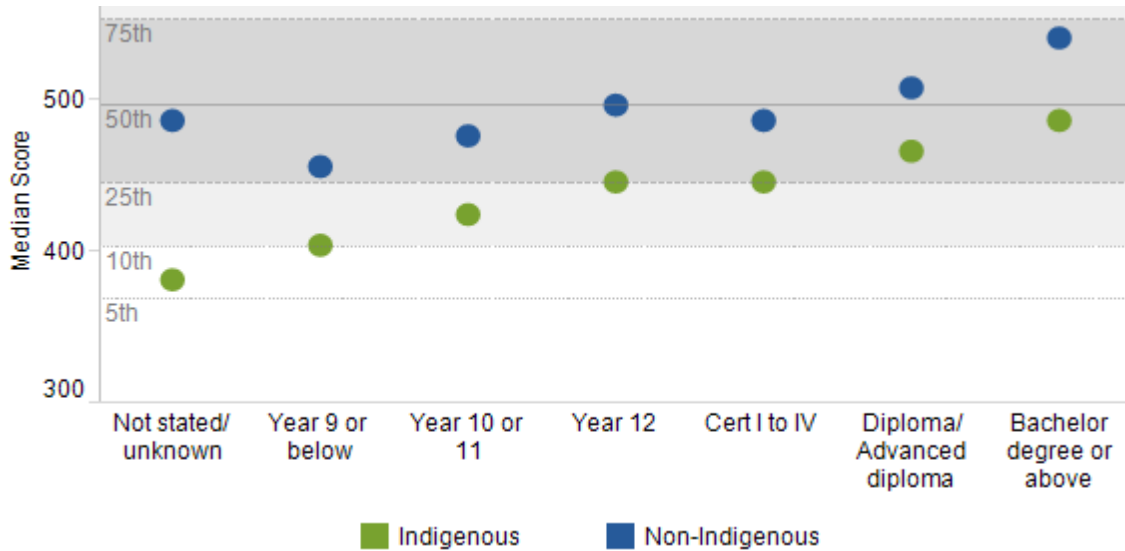
To provide context for the size of this gap, about 80 points separate the median scores of Year 3 and Year 5 students. In other words, the 80 point score gap associated with different levels of maternal education is as powerful as the median difference in Year 3 and Year 5 scores. More generally, a twenty point increase in a child's test score would move them from the fiftieth percentile of the score distribution to the sixtieth (BP 2).

Looking at another example, there appears to be a relationship between the remoteness of the area in which Indigenous students attend school and achievement (figure 3.5). In 2014, the median NAPLAN reading test score of Indigenous children attending schools in metropolitan areas was about 450 points. In comparison, the median score for Indigenous children attending schools in very remote areas was about 350 points.

But simple analysis of this type can give rise to misleading conclusions. It might be that students have other characteristics that are strongly related (highly correlated) to the characteristic of focus in the simple analysis. And it might be those other characteristics that are related to achievement. For example, if the mothers of Indigenous students in very remote areas tend to have lower levels of education than the mothers of Indigenous students in other areas (as is the case), it is possible that the apparent relationship between region and achievement in fact reflects the relationship between maternal education and achievement.

Figure 3.4 Children’s reading scores tend to be higher if their mothers have more education^{a,b,c}

Median scores of Indigenous and non-Indigenous students by mother’s highest level of formal education (Year 5, 2014)

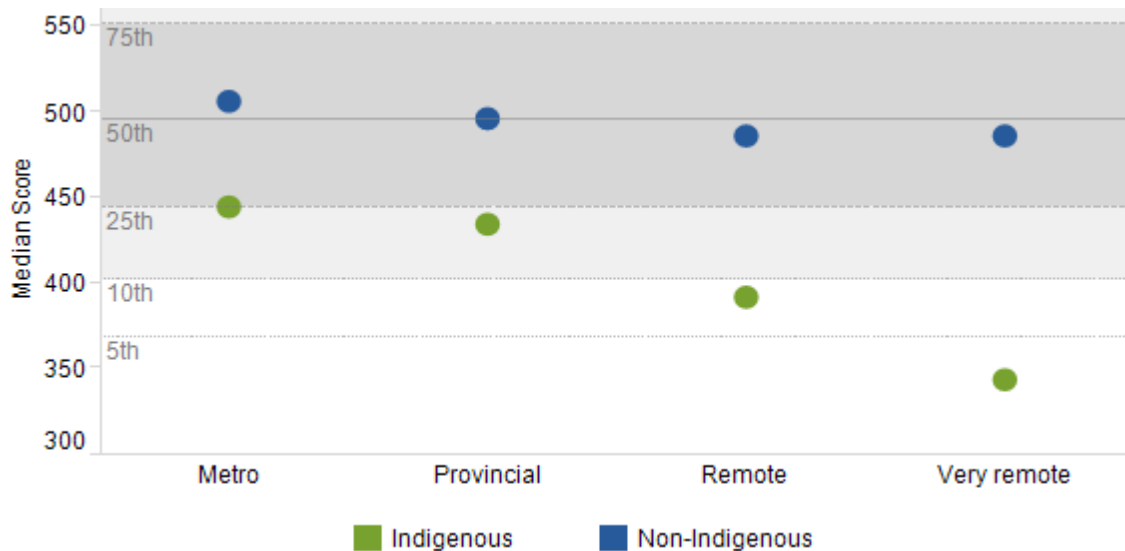


^a The dots on the chart represent the score for the median student in a group — that is, the student (or students) whose score sits in the middle of all scores for students in that group. The dots are one way of representing the central tendency for a group. Half of the students in the group have a score higher than that represented by the dot, half have a lower score. ^b The lines on the chart indicate achievement percentiles among all students. The 50th percentile, for example, denotes the score achieved by students in the middle of the data. Half of all students recorded a score below this level, half achieved a score above it. ^c The lines provide one indication of how the performance of a group of students compares with that of their peers. For example, half of all Indigenous students whose mothers had at most completed Year 9 were among the bottom 10 per cent of all students in terms of achievement on the NAPLAN reading test.

Source: Commission estimates based on ACARA data (unpublished).

Figure 3.5 **Children’s reading scores tend to be lower if they attend schools in more remote areas^{a,b,c,d}**

Median scores of Indigenous and non-Indigenous students by remoteness (Year 5, 2014)



^a Excludes 58 Indigenous students (0.5 per cent) and 246 non-Indigenous students (0.1 per cent) who had no defined region. ^b The dots on the chart represent the score for the median student in a group — that is, the student (or students) whose score sits in the middle of all scores for students in that group. The dots are one way of representing the central tendency for a group. Half of the students in the group have a score higher than that represented by the dot, half have a lower score. ^c The lines on the chart indicate achievement percentiles among all students. The 50th percentile, for example, denotes the score achieved by students in the middle of the data. Half of all students recorded a score below this level, half achieved a score above it. ^d The lines provide one indication of how the performance of a group of students compares with that of their peers. For example, more than half of all Indigenous students who attended schools in very remote areas were among the bottom 5 per cent of all students in terms of achievement on the NAPLAN reading test.

Source: Commission estimates based on ACARA data (unpublished).

Multilevel modelling can be used to disentangle the effects of potentially correlated characteristics on achievement. The resulting estimate of the relationship, on average, between achievement and any characteristic of interest takes other observed characteristics into account (BP 2).

Analysis of the ACARA data reveals a number of relationships. Most are very similar for Indigenous and non-Indigenous students, and most echo the conclusions of researchers who have looked at a range of education outcomes for secondary students (BP 2). For example, taking other characteristics into account:

- children whose mothers have a university degree have higher test scores, on average, than those whose mothers have completed at most Year 9 (by 30 to 40 points)
- children whose fathers work as senior managers have higher test scores, on average, than those whose fathers are not working (by 15 to 20 points)

-
- students attending schools where attendance rates are higher have higher test scores, on average (for example, students attending schools where the attendance rate is 95 per cent score about 10 points more, on average, than those attending schools with an attendance rate of 90 per cent).

The analysis also reveals that changing schools between Year 3 and Year 5 is associated with a small (6 to 8 score point), positive, effect on achievement for both Indigenous and non-Indigenous students.⁸

The ACARA data revealed some particular insights for Indigenous students.

First, Indigenous students do less well, on average, the higher the percentage of Indigenous students at their school. Taking other characteristics into account, Indigenous students score about 25 points less, on average, if they attend a school with a very high (95 to 100 per cent) Indigenous enrolment, relative to a school with a low (5 per cent or less) Indigenous enrolment. Non-Indigenous students also do less well on average as the Indigenous enrolment at their school is higher. As these results control for the socioeconomic status (SES) of students and their school community, as well as other observed characteristics including remoteness, it is not clear why this might be the case.

Second, once other characteristics are taken into account, the level of remoteness of the school in which an Indigenous student attends is no longer related to achievement. In other words, the observation from the simple analysis that Indigenous students in very remote areas do less well than Indigenous students in other areas actually reflects the fact that Indigenous students in those areas are more likely to have observed characteristics that are related to lower achievement. It is not simply because they attend a very remote school. (In contrast, non-Indigenous students have somewhat higher tests scores if they attend a school in a more remote area, even when other observed characteristics are taken into account.)

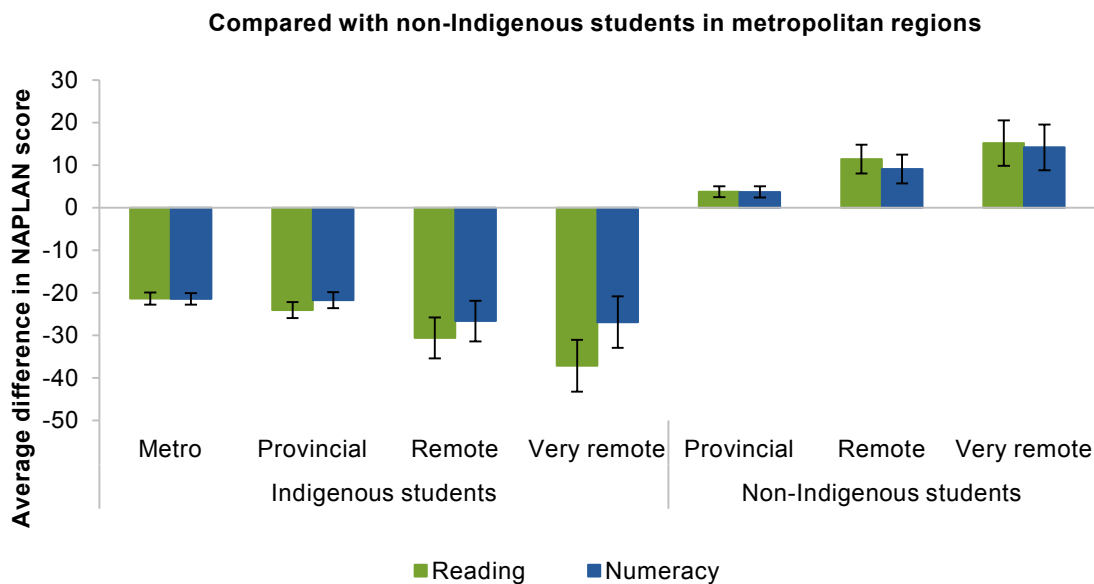
Third, in the main, the state in which an Indigenous student attends school has little relationship, on average, with their achievement. This suggests that differences in policy settings around the country are not sufficiently marked to influence student achievement.

Finally, perhaps the most important observation from this part of the analysis is that even after other observed characteristics are taken into account, Indigenous primary school students have lower test scores on average than non-Indigenous students (figure 3.6). It might have been hypothesised that the lower levels of achievement among Indigenous students described in chapter 2 and figure 3.1 were related to the demographic characteristics of students and their parents observed in the ACARA data. For example, an Indigenous student is much more likely than a non-Indigenous student to have a mother who has not completed high school — a characteristic associated with lower levels of

⁸ Information about change of school in the ACARA data captures whether a child was in different schools in Year 3 and Year 5. It would also be useful to distinguish, for example, between the number of moves made and the distance between the schools attended in Year 3 and Year 5, to see if moving multiple times or longer distances has a different association with achievement than the alternatives.

achievement (figure 3.4). However, even after this and other observed characteristics are taken into account, the test scores of Indigenous students in metropolitan areas are about 20 points lower, on average, than those of non-Indigenous students in those areas. And Indigenous students are further behind their non-Indigenous peers, other characteristics equal, the more remote the region in which they attend school. In contrast, after taking other characteristics into account, non-Indigenous students in more remote areas have higher test scores than their metropolitan peers.

Figure 3.6 **Indigenous students achieve lower results than their non-Indigenous peers, other characteristics equal^{a,b,c}**
Reading and numeracy (Year 5, 2013 and 2014 pooled)



^a Regression coefficients on Indigenous status and on Indigenous × remoteness interaction terms have been summed together where relevant to produce these estimates. ^b Vertical lines represent 95 per cent confidence intervals (BP 2). ^c Relationships for categorical variables should be interpreted relative to the default category (BP 2).

Source: Commission estimates based on ACARA data (unpublished).

In other words, Indigenous students have characteristics that are unobserved in the ACARA data that result in differences in achievement relative to non-Indigenous students. What these might be is unclear. Among many possible explanations from the literature on Indigenous education (but typically untested using large-scale datasets, if at all) are the effects of: relatively low rates of attendance at a student level⁹; speaking Aboriginal English; relatively

⁹ Hancock et al. (2013, p. 169), using data including measures of attendance at a student level for all Western Australian students (both Indigenous and non-Indigenous), concluded that ‘higher rates of absence are uniformly associated with progressively worse achievement’. Using data from the Longitudinal Survey of Australian Youth (Year 9 students), Biddle (2014) concluded that lower levels of attendance among Indigenous students accounted for about 20 per cent of the achievement gap with non-Indigenous students.

high rates of hearing loss; relatively low expectations of Indigenous students (and of their teachers); discrimination; and a lack of acknowledgment of, and support for, Indigenous culture among teachers and within schools.

More detail about the relationships between achievement and the characteristics observed in the ACARA data is presented in BP 2.

Insights into the most important contributors to achievement variation

Background to the analysis

The analysis described above focuses on the relationships, *on average*, between each observed characteristic and achievement. Of greater relevance from a policy perspective is the contribution of each observed characteristic to explaining the variation in student achievement. A characteristic might have a strong relationship, on average, with achievement, but that does not necessarily mean that it explains much of the variation in achievement between students. There are two reasons for this.

First, students with a given characteristic might make up only a small proportion of students.

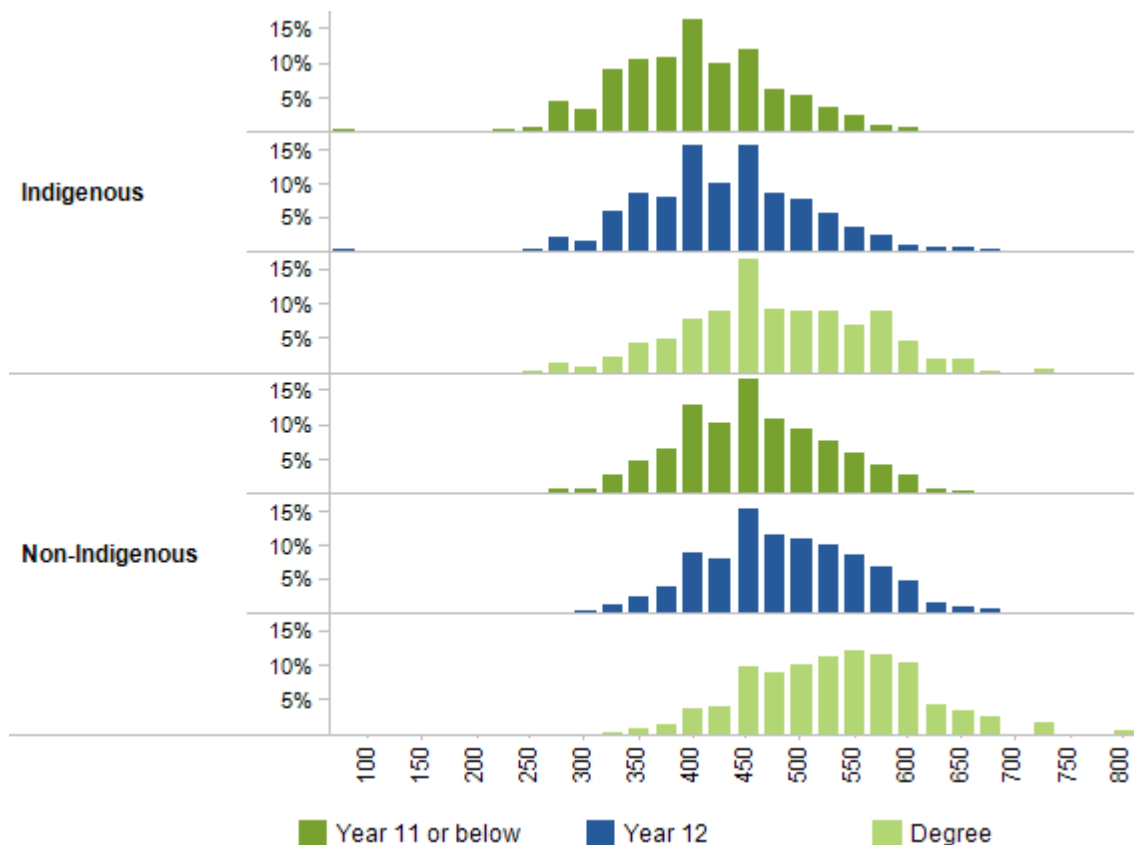
Second, the average relationship between a characteristic and achievement may not be a very good reflection of the relationship for many of the students with that characteristic. Drawing again on the example of maternal education, students with more highly educated mothers achieve higher test scores, on average. But having a mother with a relatively low level of education does not predestine a child to relatively low test scores. Conversely, having a university educated mother does not guarantee a child high scores. This point is evident in the variation in the test scores of both Indigenous and non-Indigenous children with relatively low and more highly educated mothers (figure 3.7).

If all of the students with a characteristic achieved a similar score (for example, if all of the children whose mothers had low education uniformly achieved low scores, and vice versa), then that characteristic would be an important contributor to the variation in student achievement. But there is no evidence that any of the characteristics observed in the ACARA data have this type of relationship with achievement.

In reporting regression results, many authors focus primarily on the average relationships uncovered in the analysis (as captured in regression coefficients). The policy evidence base would be strengthened if the contributions of the characteristics to explaining variation in achievement were also described. If it can be shown that students with a particular characteristic tend to do well and that this characteristic makes a marked contribution to explaining variation in achievement, the case for initiatives relating to the characteristic would be stronger.

Figure 3.7 **Grouped by mother's education level, student score distributions strongly overlap^a**

Distribution of reading scores by maternal education (Year 5, 2014)



^a Excludes 3334 Indigenous students (23 per cent) and 23 650 non-Indigenous students (9 per cent) for whom information on mother's education is unavailable. To show distinct groupings, students with mothers whose highest level of education was a certificate or diploma are also excluded from this figure.

Source: Commission estimates based on ACARA data (unpublished).

So what contributions do the characteristics observed in the ACARA data make to explaining variation in student achievement? While a methodology that delivers a hard and fast answer to this question has not been identified (BP 2), a technique called dominance analysis provides some insights.

Insights from the analysis

Looking first at non-Indigenous students, just under 20 per cent of the total variation in education achievement is explained by observed characteristics included within the regression analysis. The dominance analysis (summarised in figure 3.8) suggests that SES-related characteristics (at a student and school level) account for nearly three quarters of

this explained variation.¹⁰ None of the other characteristics included in the model play much of a role. Other researchers have also highlighted the importance of SES to achievement (BP 2). But the fact that observed characteristics explain less than 20 per cent of the variation in achievement among non-Indigenous students must be stressed. While SES-related characteristics matter, the dominant majority of the variation in student achievement remains unexplained.

For Indigenous students, the characteristics observed in the ACARA data explain more of the variation in achievement between students (about 30 per cent). And, although (student- and school-level) SES is important for Indigenous students' achievement, other characteristics are also relatively large contributors to explained variation. School attendance rates (possibly a function of low achievement and engagement) are the second most important contributor (accounting for about 15 per cent of the explained variation in Indigenous students reading scores, or nearly 5 per cent of overall variation). Similarly, the percentage of Indigenous students within a school contributes about 13 per cent to the variation in Indigenous students achievement that is explained by the characteristics included within the ACARA data, or a bit more than 4 per cent of overall variation.

While the analysis suggests that social disadvantage (reflected in SES and the percentage of Indigenous students within a school) is a key factor in Indigenous students' achievement, the large majority (about 70 per cent) of the variation in that achievement remains unexplained. The analysis suggests that initiatives to address the effects of socioeconomic disadvantage and to improve attendance rates could lift (and reduce variation in) achievement among Indigenous students, but a lot of variation between students is associated with other, unobserved, factors. Chapter 4 discusses what the literature suggests might work best to lift achievement.

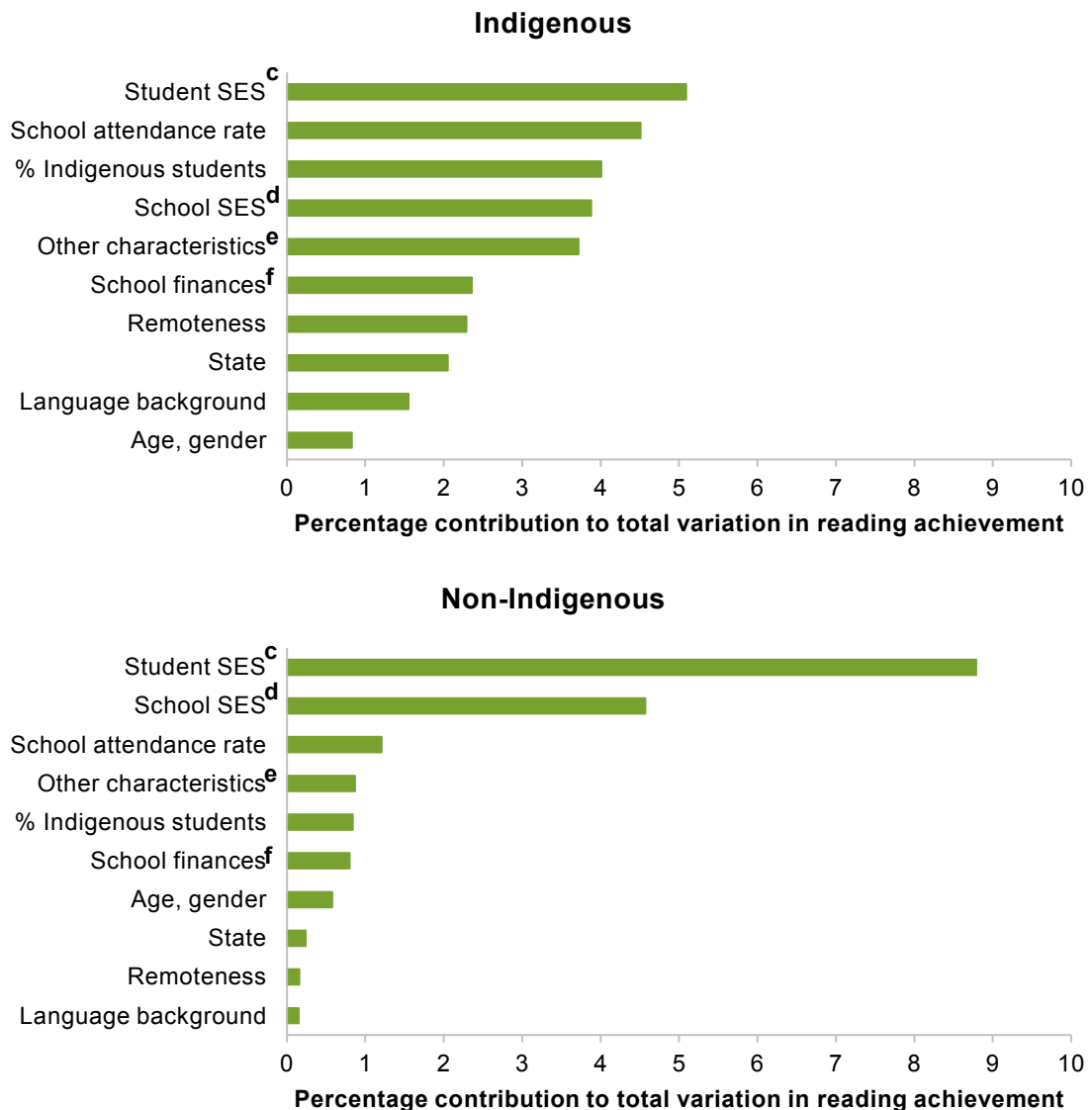
Differences in observed characteristics account for about half of the gap in average achievement

In 2014, the mean reading score for Year 5 Indigenous students was 426, and for non-Indigenous students it was 506 — a gap of 80 points. One possibility is that this gap is due to the fact that Indigenous students, as noted above, are more likely to have characteristics that are associated with relatively poorer education outcomes (BP 1). An alternative possibility is that the relationships between observed characteristics and achievement are different for Indigenous and non-Indigenous students. For example, as noted above, there is a small, positive relationship between remoteness and achievement for non-Indigenous students but no such relationship exists for Indigenous students once other characteristics are taken into account.

¹⁰ Only results for reading are presented, but a similar picture emerges for numeracy.

Figure 3.8 Relative importance of different observed characteristics in explaining NAPLAN reading achievement^{a,b}

Year 5, 2013 and 2014 pooled



^a Results presented are general dominance statistics, which reflect the average contribution of a set of observed characteristics to the model's total variation. ^b The relative importance of calendar year was not examined, but was included in all dominance analysis regressions. Calendar year explained 1 per cent or less of the variation in NAPLAN scores. ^c Student socioeconomic status: mother's and father's highest education level, mother's and father's occupation. ^d School socioeconomic status: percentage of mothers and fathers by highest education level, percentage of mothers and fathers by occupation, school fees and parent contributions per student (standardised by school sector) interacted with school sector. ^e Other characteristics: school sector, combined school indicator, average class size, non-teaching staff per student, number of enrolments, percentage LBOTE students, test participation rate, student mobility indicator. ^f School finances per student: recurrent funding (less school fees), capital income deductions, capital expenditure.

Source: Commission estimates based on ACARA data (unpublished).

The difference between the average test scores for Indigenous and non-Indigenous students can be divided into parts that identify the relative contributions of these two possible explanations for the gap (using a technique called a Blinder-Oaxaca decomposition (BP 2)). This attribution estimation is possible because of the way that regression analysis works. It identifies the relationships between observed characteristics and achievement that best explain the variation in achievement. As noted above, these are average relationships. If those average relationships are multiplied by the characteristics of the average student in the data, and summed, the result is the average test score. In other words, the average test score of both Indigenous and non-Indigenous students are a multiple of the characteristics of the average student in each group, and the average relationships between characteristics and achievement that are identified through the regression analysis for each group.

Using the Blinder–Oaxaca technique, differences in the characteristics of the average Indigenous and average non-Indigenous student, and differences in the average relationships between characteristics and achievement for each group estimated using regression analysis, can be used to divide up the difference in the average test scores of the two groups.

This analysis suggests that differences in characteristics account for about half of the gap in average test scores. In other words, if the average Indigenous student had the same observed characteristics as the average non-Indigenous student, the gap between their test scores would be half as large. The analysis also suggests that the share of Indigenous students in a school and school attendance rates are particularly important contributors to this conclusion. Together, Indigenous student enrolment rates and school attendance rates account for 25 per cent of the gap in mean reading outcomes. This illustrates the potential value to Indigenous students' education achievement of improving attendance and addressing factors that are likely to be related to the percentage of Indigenous students at a school (for example, perhaps, attitudes towards education and achievement expectations).

Differences in the relationships between characteristics and achievement account for the other half of the difference in average test scores between Indigenous and non-Indigenous students. It is not possible, however, to identify which relationships are most important to this result.

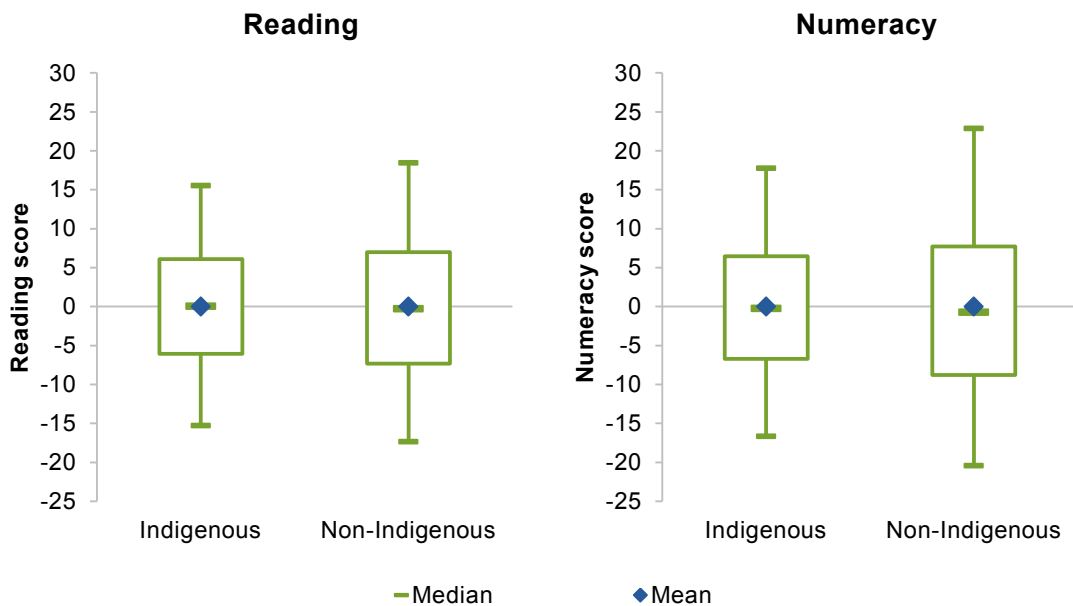
Students in some schools do better than might be expected

As discussed above, school characteristics that are unobserved in the ACARA data account for a small share of the variation in student achievement (figure 3.3). The statistical techniques used in the analysis underlying this paper generate an estimate for each school of the effects of these unobserved characteristics on student achievement. These estimates are typically interpreted in the literature as a measure of the extent to which students in a school do better (or worse) on the NAPLAN tests than might be expected, given their own characteristics and the observed characteristics of their school.

These effects (for Year 5 students in both reading and numeracy) are plotted in figure 3.9. The figure shows that the relationship between schools' unobserved characteristics and student achievement is very similar for most schools and is not large. (This is consistent with the observation that schools' unobserved characteristics explain only a small share of overall variation in student achievement.) But a small proportion of schools are outliers — their students appear to do considerably better (or worse) than might be expected. Year 5 students in the top 5 per cent of schools have test scores that are at least 16 points higher than those of their peers in other schools. Students in the bottom 5 per cent have test scores that are at least 18 points lower. Similar point advantages and disadvantages are seen for Indigenous and non-Indigenous students. For Indigenous students, 5 per cent equates to about 160 schools. For non-Indigenous students, the figure is about 360 schools.

Figure 3.9 Some schools perform better or worse than expected, given their observed characteristics^{a,b}

Box and whisker plot of school effects, reading and numeracy by Indigenous status (Year 5, 2013 and 2014 pooled)



^a The edges of the boxes represent school effects between the 25th and 75th percentiles. The 'whiskers' extending out from the boxes show the values for the 5th and 95th percentiles. ^b School effects are shrunk towards zero according to the level of uncertainty in the estimates.

Source: Commission estimates based on ACARA data (unpublished).

The extent to which the same schools were identified as high- or low-achieving for both Year 3 and Year 5 students and for reading and numeracy was tested. For both Indigenous and non-Indigenous students, only a very small group of schools were in the top or bottom 5 per cent of schools for both year levels and both subject area tests. In part, this is because the school effects are very similar for most schools. The distribution of effects is relatively narrow — a difference of a few test score points between analyses across year levels or

subject areas could result in a school being within the top five per cent in one analysis but just out of the top five per cent in another analysis. As a result, three categories of high- and low-achieving outlier schools were identified.

- Category A high-achieving (low-achieving) schools perform within the top (bottom) five per cent in *both* reading and numeracy tests for both Year 3 and Year 5 students.
- Category B high-achieving (low-achieving) schools perform within the top (bottom) five per cent in *either* reading or numeracy tests for both Year 3 and Year 5 students.
- Category C high-achieving (low-achieving) schools perform within the top (bottom) five per cent for either Year 3 or Year 5 and within the top (bottom) ten per cent for the other year level, for either reading or numeracy tests.

For Indigenous students, a total of 90 schools were identified as high-achieving, and 70 were identified as low-achieving. Schools in very remote areas, schools in the Northern Territory and schools that have a high Indigenous enrolment are disproportionately represented in both sets of (bottom and top) achieving schools (BP 2, Annex A). Because the data are de-identified, the Commission does not know which schools they are.

The study also examined the consistency of schools identified in the top and bottom five per cent of the distribution for Indigenous and non-Indigenous students. For reading, only about 17 per cent of the top five per cent for non-Indigenous students were in the top five per cent for Indigenous students. For the bottom five per cent, the degree of overlap was 12 per cent. The lack of consistency across Indigenous and non-Indigenous students could partly be because unobserved school characteristics that contribute to high achievement for non-Indigenous students may not necessarily be the same for Indigenous students, and vice versa.

There would be great value from gleaning further insight into why certain schools perform well (and some poorly) relative to others. This could be gained from case studies, or evaluations, of outlier schools to see what sets them apart. Few analyses of this type for Indigenous students have been located in the public domain (chapter 4). New South Wales has published analysis of a group of high performing schools, but this work does not have an Indigenous focus (CESE 2015). It is likely that other education systems work to identify and study outlier schools. This project suggests that analysis focusing specifically on Indigenous students is important.

While this analysis identifies one set of schools it would be important to crosscheck the results from this analysis with those from alternative approaches. Possible methods for these crosschecks are described in BP 2, Annex A.

4 What works best?

Key points

- The recent education literature suggests that the key to improving student achievement, for both Indigenous Australian and non-Indigenous students, is high quality instruction — including assessment of each child's learning needs, identification of strategies to meet them and evaluation of the effectiveness of those strategies. Particularly important to high quality instruction are:
 - the effective use of data in assessing where students are at and evaluating the impact of teaching interventions
 - high expectations (including a student's expectations of him or herself)
 - positive student wellbeing — which facilitates engagement
 - strong student–teacher relationships
 - supportive school and system leadership, including with respect to professional development of the teaching workforce.
- But teachers may face particular challenges and opportunities in teaching Indigenous children that, when taken into account, help them to more effectively individualise instruction. For example:
 - many Indigenous students speak a language other than English or a dialect — Aboriginal English
 - given the history of poor Indigenous educational achievement, system, school and teacher expectations of Indigenous learners might be low
 - the different cultural and language backgrounds of Indigenous students might affect their relationships with teachers and sense of self as learners (wellbeing), contributing to poor attendance and engagement
 - Indigenous students have a higher risk of health issues like hearing problems that affect learning.
- Cultural recognition, acknowledgment and support have been identified in the literature as fundamental to Indigenous students' school participation and achievement.
- The emphasis on the importance of individualised instruction for improving achievement aligns with the finding from chapter 3 that unobserved student-level characteristics are the main contributor to variation in student achievement.

Chapter 2 described the wide variation in achievement among both Indigenous and non-Indigenous Australian children. Chapter 3 revealed that differences between children and not differences between the schools that they attend are the major reason for that variation. It also showed that student characteristics like the educational attainment of a

child's mother, the occupation of their father and their language background explain some of the variation in achievement, but not much. This is because there are large differences in achievement between children with the same student characteristics. For example, while some children whose mothers have high educational achievement do well, some do not, so having a mother with higher education means a child is more likely to do well, but that outcome is not guaranteed. These findings dovetail with recent research that suggests that high quality instruction that addresses students' individual learning needs is particularly effective in improving achievement.

This chapter summarises the factors that research suggests have the strongest influence on children's education achievement.

The discussion looks first at the literature on what works best for children in general (section 4.2). It then considers ways in which a child's Indigenous background might be particularly relevant in thinking about tailoring what might work best for Indigenous children (section 4.3).

To set the scene for the discussion, recent developments in thinking about education policy are summarised (section 4.1). The chapter closes with an overview of recent reforms in education, including those that are particularly relevant to Indigenous students (section 4.4).

4.1 Recent developments in thinking about education policy

Education consistently rates among the top consumer concerns, particularly at a state and territory level (McAllister 2015), and governments respond with reforms aimed at improving student achievement. In the past decade Australian governments have cooperated on a major education reform agenda — national agreements and partnerships developed through the Council of Australian Governments (COAG) set out what governments aim to achieve, and how. Associated with that agenda, for example, the Australian Government has supported the development of an Australian curriculum, professional standards for teachers and the My School website. In having such an active education reform agenda, Australia is very similar to other OECD countries (OECD 2015).

Despite reform efforts, there has been little improvement in literacy and numeracy achievement at a national level for at least 16 years (as figure 1.1 showed). In this regard too, Australia is similar to many other countries:

Despite substantial increases in spending and many well-intentioned reform efforts, performance in a large number of school systems has barely improved in decades. (Barber and Mourshed 2007, p. 13)

This lack of progress has prompted researchers to ask why education policy reform has not been effective. A key conclusion has been that education achievement has not improved in

many school systems because reform has not resulted in effective change inside classrooms — the place where much learning occurs:

There has been growing recognition that more effective than setting ambitious targets for improved student performance, or attaching money or other consequences to student test results, is to work directly on developing the teaching and leadership *practices* that result in improved student outcomes. (Masters 2014, p. 10)

A study of the world’s best performing school systems (Barber and Mourshed 2007, p. 35), found that ‘[m]any of the reforms we studied failed to deliver improvement because they had little effect on what happened inside the classroom’ and proposed three guiding principles for those looking to improve achievement:

1) the quality of an education system cannot exceed the quality of its teachers, 2) the only way to improve outcomes is to improve instruction and, 3) achieving universally high outcomes is only possible by putting in place mechanisms to ensure that schools deliver high-quality instruction to every child. (Barber and Mourshed 2007, p. 43)

High quality instruction has been the focus of many recent education research publications. There is a widely held view that it involves assessing what each student knows, intervening at an individual level, evaluating the impact of that intervention, and then repeating the process (box 4.1). Commentators have also noted the role that school leadership and school systems can play in supporting high quality instruction (for example, Barber and Mourshed 2007; Hattie 2015), including the importance of resource allocation based on student needs (for example, Masters 2014; OECD 2014).

This focus on the importance of teaching that addresses students’ individual needs is consistent with the finding in chapter 3 that much of the variation in student achievement is due to unobserved differences between students. The research suggests that materially lifting achievement rests on individualised strategies.

This broad description about what matters to achievement raises four key questions:

- How can teachers most effectively assess what students know, and evaluate their impact?
- What are the most effective instructional methods and teaching interventions?
- What are the key contributors to effective and efficient delivery of instruction?
- How can schools and school systems most effectively support high quality instruction?

Collectively, and in other words, what works best to improve student achievement?

Box 4.1 **Recipe for success: assess, intervene and evaluate**

Many education researchers have advocated a similar approach to improving student achievement:

Teachers need to be able to assess precisely the strengths and weaknesses of each individual student they teach, select the appropriate instructional methods to help them learn, and deliver instruction in an effective and efficient manner. (Barber and Mourshed 2007, p. 29)

Although there is no single best teaching method, and what works for some students in some circumstances may not be effective for all students, there appear to be general principles that underpin highly effective teaching ...

- establishing where individuals are in their learning ...
- tailoring teaching to the progress and needs of individual learners ...
- providing personalised feedback that guides action ...
- assisting learners to see and appreciate the progress they are making. (Masters 2014, pp. 11–13)

Working together, teachers should assess what each student knows now, target their teaching to what they are ready to learn next, and track each student's progress over time. Teachers should then analyse their own impact, keep what works and change what does not. (Goss and Hunter 2015, p. 1)

[In order to achieve positive outcomes for students teachers need] to be able to make speedy and correct decisions on a moment-by-moment basis, to be able to know 'where to next' for twenty to forty students almost simultaneously, to know how to reliably diagnose and implement multiple teaching interventions and how to evaluate impact of teaching on learning ... (Hattie 2015, p. 26)

4.2 **What works best — for students in general?**

The following discussion draws on a handful of sources that aim to describe the most important influences on student achievement. Particular weight is given to two publications. The first, by the NSW Centre for Education Statistics and Evaluation (CESE), because it is Australian, recent and discusses a tractable seven themes. The second, John Hattie's book *Visible Learning: A Synthesis of Over 800 Meta-Analyses Relating to Achievement*, because it is probably the most influential recent international analysis of the factors thought to influence student achievement (box 4.2) (CESE 2014b; Hattie 2009).

Hattie (2009) considered 138 influences. This chapter focuses primarily on the top 20 — those that Hattie identified as having the largest potential influence on achievement (table 4.1).

It must be noted, however, that Hattie's work is limited to influences for which research exists. It is possible that influences exist that have not been studied. Furthermore, the question of whether the importance of different influences might vary between countries is an open one.

It must also be noted that some of the over 50 000 studies used in the meta-analyses underlying Hattie's synthesis were probably of relatively low quality. Hattie's work does not

obviate the need for more high quality research (of the type identified, for example by the What Works Clearinghouse in the United States (IES nd)).

The following uses the key questions posed above as a discussion framework. Separate sections are devoted to each of the four questions, and subsections present evidence against each of the CESE themes. Hattie influences that relate to a question, but not to a theme, are discussed under the subheading ‘others’.

Box 4.2 *Visible learning — an overview*

Hattie’s (2009) research synthesised over 800 meta-analyses — studies that integrate, and summarise, the findings of a number of papers on a given topic. The research underlying the meta-analyses was drawn from around the world, and was based on different time periods, different groups of students, different data collections and different modelling approaches. The majority of the research was based on small-scale studies.

In synthesising the meta-analyses, Hattie ranked 138 possible influences on achievement by size of effect. An effect size of 1 is equivalent to a one standard deviation increase in achievement — equivalent to advancing student learning by two to three years. The influences included in Hattie’s analysis had an average effect size of 0.4, and Hattie set this as the minimum for an influence to be considered as having a desirable impact on achievement.

Hattie has updated his 2009 work to take account of more recent meta-analyses (Hattie 2012) but he notes that the change to the overall ranking is negligible. The discussion in this chapter is based on Hattie’s (2009) analysis because it focuses on the influences on achievement. In contrast, Hattie (2012) explains how teachers can apply the conclusions of his 2009 work.

One question that receives more attention in the broader literature than in CESE (2014b) and Hattie (2009) is the role of schools and school systems in supporting high quality instruction. A subsection under the relevant question references some other researchers on this topic.

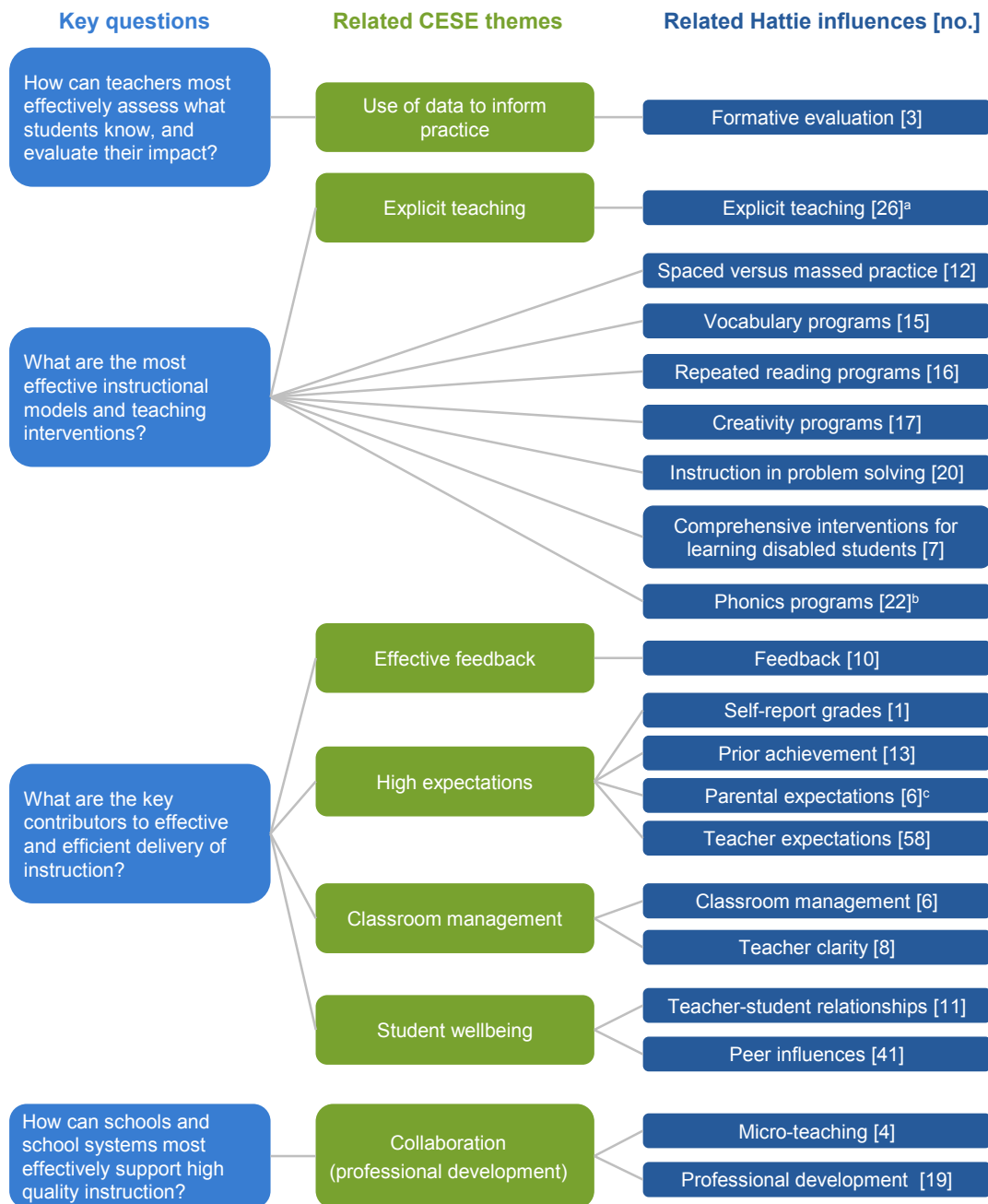
The relationships between the four key questions, the seven CESE themes and Hattie’s list of influences is summarised in figure 4.1. The discussion references Hattie’s top 20 (or so) influences, plus weaker influences where they relate directly to a CESE theme. Factors in Hattie’s top 20 that do not fit well against the questions are discussed at the end of the section.

Table 4.1 Hattie's top 20 influences on achievement

<i>Number</i>	<i>Influence</i>	<i>Effect size</i>
1	Self-report grades	1.44
2	Piagetian programs	1.28
3	Providing formative evaluation	0.90
4	Micro-teaching	0.88
5	Acceleration	0.88
6	Classroom behavioural	0.80
7	Comprehensive interventions for learning disabled students	0.77
8	Teacher clarity	0.75
9	Reciprocal teaching	0.74
10	Feedback	0.73
11	Teacher–student relationships	0.72
12	Spaced versus massed practice	0.71
13	Meta-cognitive strategies	0.69
14	Prior achievement	0.67
15	Vocabulary programs	0.67
16	Repeated reading programs	0.67
17	Creativity programs	0.65
18	Self-verbalisation / self-questioning	0.64
19	Professional development	0.62
20	Problem solving teaching	0.61

Source: Hattie (2009).

Figure 4.1 Linking the key questions, CESE themes and Hattie's influences on achievement



^a Included although not in Hattie's top 20 because it maps directly onto the CESE theme. ^b Included although not in Hattie's top 20 because it is discussed in the section on literacy and numeracy. ^c Hattie presented only an effect size for parental expectations, not a ranking. Given the effect size, parental expectations would sit at about number 6 on his list.

Sources: CESE (2014b); Hattie (2009).

Most effective approaches to assessment and evaluation

Use of data

Many researchers have pointed to the importance of data about individual students (both formal and informal) to inform effective teaching, for example:

... Professor John Hattie shows that the teaching strategies with the greatest impact are those that use evidence of learning to inform and improve teaching. (Goss and Hunter 2015, p. 1)

Teachers need to be able to design classroom assessments that are frequent, high-quality and have clear, consistent scoring criteria. To use this data to inform effective teaching practice requires teachers to have ... the ability to respond constructively to what the data is telling them, changing their practice where required. (CESE 2014b, p. 17)

The literature emphasises the importance of formative assessment or evaluation.¹¹ Historically, a lot of assessment has been summative — a test of a student’s level of achievement at the end of a course of study. The key purpose was to report to students and parents. In contrast, formative assessment informs the teacher and student about whether the student has followed the instruction, where the student’s learning is at and where to next. As such, formative assessment can involve formal testing or informal analysis (for example, questioning during a lesson), but is ‘low stakes’ — that is, there is not a lot resting on it, compared with, for example, Year 12 test scores. In other words, summative assessment is *of* learning, formative assessment is *for* learning.

The impact of improving formative evaluation might be profound. It came in at number three on Hattie’s list (with an effect size of 0.90).

A major argument throughout this book is the power of feedback to teachers on what is happening in their classrooms so they can ascertain “How am I going” in achieving the learning intentions they have set for their students, such that they can then decide “Where to next” for the students. (Hattie 2009, p. 181)

That said, there is very little evidence on the types of formative assessment that work best.

Most effective instructional methods and teaching interventions

Explicit teaching (or direct instruction)

Explicit teaching refers to an approach where a teacher clearly tells students what they need to do, demonstrates it to them and checks that they have mastered the concept. An alternative approach sees students discover knowledge for themselves. Explicit teaching is held to be particularly useful in teaching foundation skills:

¹¹ Some authors use the term formative assessment, others formative evaluation. The terms appear to refer to similar activities.

... Explicit teaching was found to have improved student outcomes in basic skills, cognitive-conceptual skills and affective skills to a greater extent than any other approach. (CESE 2014b, p. 9)

Other Australian research has argued that, while explicit teaching is clearly superior for the acquisition of basic skills, it does not cultivate higher order skills that require reasoning. Once basic skills are firmly in place through teacher-directed learning, it may be appropriate to shift to student-directed learning so students can undertake higher-order problem solving (Department of Education and Training 2014).

The approach is number 26 on Hattie's list (with an effect size of 0.59).

Further discussion of explicit teaching is presented in the section on what works best for Indigenous students.

Others

Literacy and numeracy

Looking at literacy and numeracy, there has been considerable debate about the most appropriate ways of teaching literacy, and there appears to be limited high quality evidence about the efficacy of many literacy and numeracy programs that are used in Australia (box 4.3).

Hattie concluded that vocabulary programs (that teach students words and their meanings) are beneficial for developing reading skills and comprehension. Likewise, repeated reading programs (in which students read and re-read a passage until they demonstrate satisfactory fluency) were also found to be particularly effective, especially for students with learning disabilities. These programs were at numbers 15 and 16 on Hattie's list, each with an effect size of 0.67).

In terms of mathematics, the meta-analyses covered by Hattie reported stronger effects for teaching approaches (for example, feedback and direct instruction) as distinct from programs of maths instruction. Meta-analyses also focused on the use of aids, for example, calculators and materials that could be manipulated. The combination of mathematics influences included in Hattie's analysis were associated with an effect size of 0.45, placing them at number 54 on the list.

Learning disability interventions, creative thinking and problem solving

Hattie concluded that comprehensive interventions for learning-disabled students (for example, students with dyslexia, dysgraphia and disorders like autism and attention deficit) are strongly correlated with improved outcomes. Interventions to address learning disabilities were number 7 on his list (with an effect size of 0.77). Programs that teach students to think creatively have also been found to have a large effect on achievement,

and were at number 17 on Hattie's list (with an effect size of 0.65). And the teaching of problem solving methods was number 20 on Hattie's list (with an effect size of 0.61).

Box 4.3 Approaches to teaching literacy and numeracy

Both the content of literacy programs, and the best ways to teach that content, have been a focus of debate for decades (NT DE&T 2010). Two approaches — whole language and skills-based — have polarised the debate. Proponents of the whole language approach argue that children should learn to read by recognising whole words. Proponents of the skills-based approach (also called phonics), argue that children should be taught the correspondence between letters or groups of letters and sounds, so they learn to read by sounding out words. As noted above, phonics was number 22 on Hattie's list of influences on student achievement with an effect score of 0.6. Whole language programs were number 129 with a very small effect size of 0.06.

Current thinking, however, suggests that there is merit to using both approaches; 'the most effective literacy teachers use aspects of both approaches in a balanced and integrated way' (NT DE&T 2010, p. 2). That said, the current view also holds that 'direct systematic instruction in phonics during the early years of schooling is an essential foundation for teaching children to read' (DEST 2005, p. 11).

Many literacy and numeracy interventions (programs, strategies and initiatives) have been developed to improve student outcomes, but evidence on what works best is sparse. The Australian Council for Educational Research reviewed a range of interventions for a NSW Ministerial Advisory Group in 2013, concluding that:

In general, independent, valid and reliable evidence for the efficacy and effectiveness of specific literacy and numeracy interventions currently implemented (or which could be implemented) in the early years is relatively scarce, particularly for interventions focused on numeracy. (Meiers et al. 2013, p. xi)

The researchers found little or no research evidence for the efficacy of most of the programs included in the evaluation. Meiers et al. (2013) stressed that this did not mean the programs did not achieve results, only that quality evidence that they did was not available.

Most effective contributors to instructional delivery

Effective feedback

Feedback ranks at number 10 on Hattie's list (with an effect size of 0.73). However, Hattie noted that, while feedback from teacher to student can have a powerful influence on learning, not all feedback is helpful. Feedback that relates to the way a student has performed on a task or the process they adopted, or that guides them to greater self-regulated learning (management of their own learning) were found to be effective (Hattie 2009). Simple praise for an individual (for example, saying 'well done') was found to be less effective. Hattie also noted that there is no point in giving feedback if a student has no initial learning.

High expectations

Expectations influence actions, and expectations of students at a self, parent, teacher, school leadership and system level are all strongly correlated with students' outcomes.

A child is born into and grows up in a world of expectations. These expectations are powerful enhancers of — or inhibitors to — the opportunities provided in schools. (Hattie 2009, p. 31)

... it is now widely accepted that teachers do form expectations about student ability and skills and that expectations affect student achievement ... teachers (as human beings) are more likely to have their students reach the “expected outcomes”, regardless of the veracity of those expectations. (Hattie 2009, pp. 121–22)

[High-performing systems] start by setting clear and high expectations for what individual students should know, understand, and be able to do. (Barber and Mourshed 2007, p. 38)

Students' expectations of their own performance (labelled self-report grades) are the best predictor of performance — and rank number one on Hattie's list of factors that affect achievement (with an effect size of 1.44). As Hattie (2009, p. 44) noted:

... these expectations of success (which are sometimes set lower than students could attain) may become a barrier for some students as they may only perform to whatever expectations they already have of their ability.

Related to this, prior achievement was also a very strong predictor of performance (ranking number 13 on Hattie's list with an effect size of 0.67).

Parental expectations have an effect size of 0.80, and teacher expectations of 0.43 (with a range of values around that for different types of expectations). In summarising contributions to achievement from the home, Hattie (2009, p. 70) concluded that ‘[a]cross all home variables, parental aspirations and expectations for children's educational achievement has the strongest relationship with achievement’.

With an effect size of 0.8, parental expectations would rank at number 6 on Hattie's list.¹²

Classroom management

Classroom behaviour ranks sixth on Hattie's list of interventions (with an effect size of 0.8) and classroom management — used to refer to well-managed classrooms — is number 42 (with an effect size of 0.52). However, in commenting on one meta-analysis relating to classroom management, Hattie reported larger effect sizes for a number of specific influences including tangible recognition of appropriate behaviour (an effect size of 0.98), teachers being able to retain emotional objectivity (0.71) and disciplinary interventions (0.91). Elsewhere, Hattie has noted that the climate of the classroom is among the more critical factors in promoting learning (2012).

¹² Although Hattie presented an effect size for parental expectations, this influence on achievement was not included in the ranking of 138 influences.

Strategies nominated as contributing to well-managed classrooms include: fostering and maintaining student engagement; established classroom rules; structure and routines; reinforcement of positive behaviour; and consistent consequences for misbehaviour (CESE 2014a). Teacher-student relationships (mentioned again below) are also an important factor, as is teacher clarity (number 8 on Hattie’s list with an effect size of 0.75) — which includes characteristics like organisation, explanation, guided practice and clarity of speech.

Student wellbeing

Wellbeing has been a focus of policy effort in recent years (for example, NSW DE&C 2015; Queensland DETE 2012). The NSW framework argues that:

Wellbeing, or the lack of it, can affect a student’s engagement and success in learning. Educators need to understand the potential wellbeing has to bring about positive change, what is required to foster wellbeing, and how it can become a powerful force in students’ learning and development. (NSW DE&C 2015, p. 2)

Optimal student wellbeing has been defined as:

... a sustainable state characterised by predominantly positive feelings and attitude, positive relationships at school, resilience, self-optimisation and a high level of satisfaction with learning experiences. (ACU 2008, p. 9)

While wellbeing is not covered explicitly in Hattie’s work, the importance of relationships, trust, caring and a safe school environment is emphasised. Teacher-student relationships sit at number 11 on Hattie’s list (with an effect size of 0.72). Better relationships — characterised by features like respect, empathy, warmth and non-directivity — correlate strongly with achievement, and are a key factor in student attendance. Peer influences, which cover positive and negative relationships between students, come in at number 41 on Hattie’s list (with an effect size of 0.53).

Commentators also emphasise that doing well at school contributes to positive wellbeing.

Most effective contributions from schools and school systems

Professional development (including collaboration)

Great teachers don’t just ‘happen’; they are developed and keep on developing throughout their professional life ... [extensive evidence shows] the role professional learning and collaborative practice can play in improving teacher quality. (CESE 2014b, p. 26)

In analysing the characteristics of the best performing education systems, Barber and Mourshed (2007) paid particular attention to teacher training and ongoing professional development (PD). In terms of what might work best for teacher training, they reported that trainee teachers in several of the best performing systems spent a relatively high

proportion of their time in classrooms.¹³ And Hattie found that micro-teaching — intensive analysis of a trainee teacher’s performance in delivering a mini-lesson — was particularly effective in building skills. It came in at number four on his list of influences on achievement (with an effect size of 0.88). More generally, PD comes in at number 19 in Hattie’s list (with an effect size of 0.62), and a focus on teachers’ professional development is a common characteristic of rapidly improving school systems (Barber and Mourshed 2007).

School systems can play an important role in identifying what teachers need to know (professional standards), and schools play an important role in supporting teachers’ ongoing PD.

A common view from the research is that ‘the best professional development teachers can receive is to directly help them teach their students’ (Jensen 2014, p. 5). Collaboration, through which teachers learn from each other and are supported by instructional leaders, is central to effective PD (Barber and Mourshed 2007; CESE 2014b; Hattie 2015). As Hattie (2015, p. 23) sees it:

We need communities within and across schools that work collaboratively to diagnose what teachers need to do, plan programmes and teaching interventions and evaluate the success of the interventions. We need communities that promote and share professional development aimed at improving teacher effectiveness and expertise, that devise ‘dashboards’ to show success in learning and achievement and that build a coalition of the successful.

The weight that Hattie attaches to collaboration is evident in the subtitle of his (2015) paper *What Works Best in Education — The Politics of Collaborative Expertise*, and he identifies implications of collaborative expertise for both school leaders and systems. School leaders ‘must have the expertise to enable teachers to work collaboratively and question their effectiveness’ (Hattie 2015, p. 24). The role of school systems:

... is to support leaders’ skills to develop such communities [of expertise], to provide resources that assist feedback to teachers and school leaders about their impact on all students and to reward robust discussion about that impact. (Hattie 2015, p. 25)

¹³ Barber and Mourshed (2007) also strongly emphasised the importance of selecting the right people to become teachers.

Other roles of schools and school systems

Hattie (2015, p. 24) believes a school leader should be seeking answers to two major questions:

1. What is the evidence that each student is gaining at least a year's progress for a year's input in every subject?
2. What is the school doing in light of this evidence?

This requires that teachers and school leaders are clear about what a year's progress looks like. School systems have an important role to play in developing a curriculum and the standards that define progress.

All of the top performing and rapidly improving systems have curriculum standards which set clear and high expectations for what students should achieve. (Barber and Mourshed 2007, p. 38)

Arguably, both schools and school systems also have a role to play developing the tools that will help assess if a year's progress has been made, and school systems have a role to play in monitoring schools' progress in lifting achievement and intervening where necessary (Barber and Mourshed 2007).

Schools and school systems are also key (as noted above) in setting expectations; and in engaging parents in their children's learning:

Schools have an important role in helping parents to learn the language of schooling so that the parents can provide every possible assistance to their children in terms of developing the child's learning and love of learning, and in creating the highest possible shared expectations for learning. (Hattie 2009, p. 33)

Beyond that, school systems need to ensure that schools have sufficient funding, facilities and other key resources (Barber and Mourshed 2007). And, as the OECD (2014, p. 1) has noted 'high-performing countries and economies tend to allocate resources more equitably across socio-economically advantaged and disadvantaged schools'.

In systems that do not allocate resources equitably, disadvantaged schools tend to have lower quality resources.

However, only two factors that Hattie associated with schools make it into the top 20 — classroom behaviour and acceleration (moving bright students into higher grades). Classroom management is discussed above (and is, perhaps, more in the hands of teachers than schools), and acceleration, Hattie noted, is little used in schools.¹⁴ Factors like school

¹⁴ Hattie notes that concerns about children's social development and emotional maturity are a factor in resistance to acceleration. Perhaps these concerns apply more in the case of primary schools. A number of Victorian high schools offer 'select entry, acceleration programs'. The social issues are perhaps addressed by having cohorts of students progress more rapidly through the curriculum.

size (at number 59, with an effect size of 0.43), leadership (number 74, effect 0.36) and finances (number 99, effect 0.23) are further down the list.

Hattie did note, however, that not all leadership is the same. Instructional leadership, where principals focus on high expectations of teachers and students, clear teaching objectives and a disruption-free learning climate, has a much stronger influence on achievement than transformational leadership. The latter refers to an approach by principals that focuses on inspiring staff to work towards greater student achievement. The effect size is an average across different leadership styles.

Remaining top 20 influences

A summary of the five remaining top 20 strongest influences on achievement not discussed above is presented in box 4.4. Meta-cognition and self-verbalisation deserve a special mention because Hattie (and others, for example, SVA (2016)) emphasised the value to achievement from students becoming their own teachers through the use of strategies in these areas.

Box 4.4 Other influences in Hattie's top 20

2. *Piagetian programs* are based on Piaget's four stages in children's cognitive development associated with different ways of thinking. Piaget programs take into account the ways learners think and how this can be constrained by their stage of development. Hattie cites only one meta-analysis for this influence, and it is not highlighted by other key authors.
9. *Reciprocal teaching* involves each student taking a turn at being the teacher.
12. *Spaced versus massed practice* refers to the finding that students learn a skill more effectively in multiple short, spaced sessions rather than in one lengthy session.
13. *Meta-cognitive strategies* or thinking about thinking. Students learn to set goals and monitor and evaluate their own progress. The evidence indicates that such strategies are particularly effective for older students (SVA 2016) (and so are less relevant to this study).
18. *Self-verbalisation and self-questioning* are related to self-regulation (identified by some authors (SVA 2016) in tandem with meta-cognition as a particularly strong influence on achievement). Self-regulation enables a student to apply meta-cognitive strategies effectively.

Source: Hattie (2009).

4.3 What works best — for Indigenous students?

Is there any reason to think that what works best for students in general might not work best for Indigenous students? Might Indigenous children learn differently or have other characteristics that affect their learning?

Researchers have looked at whether Indigenous children have strengths in certain learning styles stemming from being raised in an Indigenous culture. The conclusion was that:

... there was not just one set of strengths, just as there is not one Aboriginal culture or one stereotypical Aboriginal student ... identifying individual students' learning strengths and engaging them can be seen as important for Indigenous students, just as it is for all other students. (Hughes et al. (2004) cited in What Works. The Works Program (2016a, p. 1))

Researchers have also concluded, however, that characteristics like culture and language impact on Indigenous students' achievement. An evaluation of 83 projects that sought to identify ways in which Indigenous students' outcomes could be improved relatively quickly (box 4.5) concluded that the basic requirements for success included three inter-related general factors (McRae et al. 2000):

- cultural recognition, acknowledgment and support
- the development of requisite skills (in particular, fluency in Standard Australian English)
- adequate levels of participation.

The researchers also concluded that:

... the learning outcomes for Indigenous students can be accelerated when educators combine commitment with high expectations and with what is generally regarded as good teaching and learning practice. (McRae et al. 2000, p. iii)

This report suggests this challenge to members of the teaching profession. A good job is what is required, and all that is required — a job done with the sensitivity and persistence that mark professionalism. (McRae et al. 2000, p. 2)

Furthermore, a government-funded collection of resources related to improving outcomes for Indigenous students that draws strongly on the conclusions of McRae et al. (2000) included the message that:

In the case of Indigenous students, teachers' work *must* be pervaded by knowledgeable and sensitive respect for Indigenous peoples and cultures. Without that, a teacher's work is likely to be much less effective. (What Works. The Works Program 2016b, p. 1)

Similarly, work by the Closing the Gap Clearinghouse concluded that three strategies worked to increase achievement: student-focused strategies concentrating on the needs of students at risk of low achievement; a school culture and leadership that acknowledged and supported Indigenous students and their families; and strategies to maintain student engagement (Helme and Lamb 2011). 'A "one size fits all" approach that either treats Indigenous students the same as non-Indigenous students or assumes that all Indigenous students are the same' (p. 1) does not work.

In other words, the research suggests that high quality instruction is also key to the outcomes of Indigenous students, but teachers may need to take a child's Indigenous background into account to effectively individualise instruction. In particular, the research suggests that responsiveness to diverse Indigenous cultural contexts, which rests on cultural knowledge and respect, is important.

The following discussion explores how factors like Indigenous students' cultural and linguistic backgrounds might interact with the contributors to what works best discussed above. The structure of the discussion mirrors the structure used in the preceding section.

Unlike the preceding section, this section does not draw primarily on one or two key references that summarise a large body of relevant research. Instead, while it cites McRae et al. (2000), it draws more broadly on research relevant to each issue.

Box 4.5 Evaluation of Strategic Resources Projects under the Indigenous Education Strategic Initiatives Project

The following discussion draws on McRae et al. (2000).

In 1998-99, the then Australian Government Department of Education, Training and Youth Affairs sought applications for projects that addressed the question 'What changes to education and student support delivery practices will result in improved Indigenous student learning outcomes within a relatively short period of time?' (p. 13). Projects were to be completed within 12 months, and evaluated against project-specific performance indicators.

Eighty-three projects were funded across all education and training sectors (including early childhood). Funding outlays were \$12.7 million, and the large majority of per capita project costs were less than \$2000.

The evaluation of the projects concluded that:

Providers of education and training were challenged, and did 'demonstrate that improving Indigenous student learning outcomes can occur in a relatively short space of time through concerted efforts', across a very broad range of projects in varied locations and contexts. (p. 5)

Crucially, the success of the projects was not due to innovative practices. In preliminary findings, the evaluators looked for innovation but, after review, concluded that:

... the bulk of the results have been achieved by people working more intensively with strategies which are widely familiar ... what people had done 'did not appear to be rocket science' ... [It was] no more than should be legitimately expected on a far more widespread basis. (p. 157)

The evaluators attribute the projects' success to:

- a strong belief among project participants that something could and should be done and professional interest (common characteristics, as the evaluators noted, among people working in education and training)
- the use of performance indicators — participants worked toward clear and concrete goals
- the project funding which provided both an incentive, and enabling resources, for projects to proceed.

Taking a child's Indigenous background into account in student assessment and evaluation

In terms of collecting data, the potential that test items assume knowledge or experience that an Indigenous student might not have, and for this to disadvantage them, is well recognised. For example, cultural and linguistic bias has been a concern since the

introduction of the National Assessment Program — Literacy and Numeracy (NAPLAN) (Australian Government 2010, 2014).

Notwithstanding that NAPLAN test items are reviewed by specialists in Indigenous education, there is evidence that test questions sometimes assume cultural knowledge that Indigenous students from remote communities may not possess. Sample questions from the 2008 Year 3 reading test related to concepts like cinema session times, movie classification systems and newspaper delivery boys (Wigglesworth, Simpson and Loakes 2011).

With respect to linguistic bias, commentators have raised concerns about testing of students who do not possess Standard Australian English as a first language. For example, NAPLAN literacy test questions are the same for all students, but non-native speakers learn language skills in a different order and with different milestones to native speakers. For example, Wigglesworth et al. (2011, p. 323) noted that:

Mastery of a sentence like ‘She likes cats’ is trivial for a first language speaker of English, but it is an achievement for a child whose first language is Kriol [an English-based creole spoken in some Indigenous communities], because they will have had to learn the difference between he/she, the subject-verb agreement of likes, and the plural of cats, all features which are not present in Kriol.

The result is that literacy tests may sometimes fail to identify language proficiency among non-native speakers of Standard Australian English — questions cannot be targeted to identify the skills and knowledge that non-native speakers possess, and assume a level of background knowledge consistent with the learning pathway of a native speaker (ACTA 2013).

The likely impact of this issue is unclear. Australian Census data on language spoken at home includes about 230 Indigenous languages, including Kriol (6800 speakers). Only 11 per cent of Indigenous Australians reported speaking a language other than English at home. A further 5 per cent did not answer the relevant question. The vast majority of Indigenous Australians (83 per cent) nominated English as their language spoken at home. That said, many Indigenous Australians speak non-standard dialects of Australian English collectively known as Aboriginal English (Eades 2000). The New South Wales Government, for example, has observed that Aboriginal English is widely used by students and families and ‘is a key marker of Indigeneity’ (NSW DE&C 2010, p. 4).

Taking a child’s Indigenous background into account in instructional methods and teaching interventions

In line with the conclusion that there are no learning styles common to all Indigenous students, no method of instruction specifically for Indigenous students has been identified. There is a view, however, that explicit teaching might be particularly effective for Indigenous students with weak foundation skills. Promotion of the approach by the Cape York Aboriginal Australian Academy has contributed to this view.

The Cape York Aboriginal Australian Academy adopted Direct Instruction — a commercial program based on the explicit teaching approach — as one component of an initiative to improve student achievement in 2010. An evaluation of the initiative in 2013 was unable to conclude whether it had had an effect on student learning. However anecdotal evidence suggested a positive causal connection (Australian Council for Educational Research 2013).

In 2014, the Australian Government announced a grant of \$22 million over four years to the not-for-profit organisation *Good to Great Schools Australia* to implement the Flexible Literacy for Remote Primary Schools Program. This program aims to address the relatively poor literacy outcomes of children in remote primary schools through the implementation of direct and explicit instruction in 33 remote schools (Department of Education and Training 2016). Independent evaluation will occur during the life of the initiative and a summative report will be provided to government in 2017.

Taking a child's Indigenous background into account in instructional delivery

High expectations

Many commentators have pointed to low expectations of Indigenous students among students themselves, their parents, teachers and schools as an important factor in relatively low rates of achievement (for example, IHEAC 2006; Pearson 2011; Sarra 2011). Why might expectations tend to be low?

Among students and parents

Researchers have found that a child's expectations of their educational achievement are strongly correlated with their parents' expectations. And that a parent's expectations are strongly correlated with his or her level of education:

... parents with higher levels of education have higher expectations for their children's educational attainment and are more involved in their children's education than parents with lower levels of education. (Yu and Daraganova 2015, p. 105)

The research also shows that both child and parental expectations are influenced, not surprisingly, by a child's academic achievement.

Indigenous students are much less likely than their non-Indigenous peers to have family members who finished school or completed post-school qualifications (BP 1). In addition, the history of Indigenous education is not conducive to a positive attitude towards schooling, or expectations of high educational attainment. During the first half of the twentieth century, it was common for Indigenous children who enrolled in public schools to be expelled if non-Indigenous parents objected to their presence (AHRC 2001). States set a separate, lower standard, curriculum for Indigenous schools, and these schools tended to be poorly resourced in comparison to public schools. For example, many teachers were

not qualified (AHRC 2001). This situation probably reflected ‘a perception common to all state policies that Aboriginal people were inherently inferior and should receive minimal schooling’ (Zubrick et al. 2006, p. 39). Across the century, relatively few Indigenous people finished high school and even fewer attended university.

Among teachers and schools

This history is one contributor to a ‘deficit’ discourse — an assumption underlying discussions of Indigenous education that students lack something and are deficient (Harrison 2011). Some research suggests that deficit thinking is reasonably common:

Despite decades of reform *and* intervention, many educators continue to work from a baseline of deficit assumptions about Indigenous cultures and peoples. (Luke et al. 2013, p. 13)

A deficit discourse can translate into low teacher and school expectations of students.

Even if teachers do not consciously have a deficit view of Indigenous students, research suggests that some have unconscious negative biases. Researchers in New Zealand (Bishop and Berryman 2006) have interviewed students and teachers about their experiences in the classroom. They concluded that teachers in New Zealand entered classrooms with theories about race, culture and students’ performance, and that this led them to unconsciously act in ways that left their Maori students with the perception that their teachers viewed them as low achievers, whatever past performance suggested.

Bodkin-Andrews et al. (2010) found that perceived racial discrimination had a strong negative effect on a number of outcomes for Indigenous students. These experiences of racism were not just limited to interpersonal forms (for example, name-calling), but also to racism at a much broader level (for example, a lack of care among other Australians for the hardships faced by people from Indigenous cultures). Bodkin-Andrews, Denson and Bansel (2013) also found negative effects on student engagement of racism emanating from teachers.

Addressing the low expectations held by Indigenous students lies at the heart of the often cited *Stronger Smarter* approach which aims to improve Indigenous student attendance, numeracy and literacy outcomes, and engagement of Indigenous children and their families (Ockenden 2014; Rauland and Adams 2015). (An evaluation of the approach, however, concluded that schools that had adopted the Stronger Smarter philosophy had not succeeded in improving attendance and achievement on conventional measures (Luke et al. 2013). The schools had not been successful in ‘translating “high expectation promotion” into systematic changes in classroom pedagogy that might “close the gap” on Indigenous student achievement.’ (p. 30.))

Classroom management

There is evidence that behavioural problems stemming from health and home life issues might be a particular issue among some Indigenous students. Respondents to a review of Indigenous education in the Northern Territory:

... echoed a constant theme, especially but not only in remote schools; problems associated with student behaviour constitute a barrier to effective teaching and learning ... [respondents to the review] identified hearing loss, lack of sleep, foetal alcohol syndrome, hyperactivity and trauma-associated emotional issues and other aspects of mental health as factors. (Wilson 2013, p. 175)

Research suggests that hearing problems are prevalent among some groups of Indigenous students. McRae et al. (2000) reported on a project that tested the hearing of 1032 children from remote communities. Nearly 80 per cent had an educationally significant hearing loss. And hearing was the most prominent health issue raised in the Northern Territory review (Wilson 2013).

Some commentators (including McRae et al. (2000) and Lee et al. (2014)) have also suggested that some Indigenous children are raised to be more independent than their non-Indigenous peers and that this can create challenges for teachers:

Inexperienced non-Indigenous teachers of younger Indigenous children are often affronted by their non-conformity with ‘school’ behaviour: not following directions immediately or at all; choosing when and how to interact; reacting very negatively to ‘growling’ [that is, being growled at by the teacher]; and dislike of being singled out for attention. (McRae et al. 2000, p. 144)

Wellbeing

Wellbeing has been identified as a key contributor to student engagement, and school attendance rates are relatively low for Indigenous students (DPM&C 2016), suggesting that improvements in wellbeing might contribute to greater school participation and achievement.

McRae et al. (2000) emphasised the importance of cultural recognition, acknowledgment and support to Indigenous students’ school participation and achievement. Many others support this view (for example, Bodkin-Andrews et al. (2010), Sarra (2011) and Pearson (2011)). Culture and achievement are linked through at least two pathways related to wellbeing — students’ sense of self and teacher-student relationships.

Culture is fundamental to an individual’s identity.

Humans are cultural beings. We learn to communicate and understand our world through the context of our languages, traditions, behaviours, beliefs and values. Our cultural experiences and values shape the way we see ourselves and what we think is important. When individuals are part of a cultural group, we learn the ways of that culture (e.g., behaviour and beliefs), which enable us to feel like we belong to our community. (Kids Matter nd, p. 1)

In the case of Indigenous children:

Evidence increasingly shows that connection to culture is fundamental to Aboriginal children and young people's identity and wellbeing. The absence of culture may, therefore, contribute to low self-esteem and a poor sense of self. (CCYP 2009, p. 2)

In short, acknowledgment of and respect for Indigenous students' cultural background will likely contribute to their self-esteem and confidence, and improved learning outcomes. That said, it is very important to acknowledge that '[t]here is no single Aboriginal or Torres Strait Islander culture or group, but numerous groupings, languages, kinships and tribes, as well as ways of living' (Purdie, Dudgeon and Walker (eds) 2010, p. xxvii).

Positive relationships

Positive relationships rest on factors like respect and empathy and these flow from knowledge and understanding of other people. Shared linguistic and cultural backgrounds reduce the barriers to gaining knowledge and understanding. It takes more time and effort to develop a relationship the more different a person's background is from one's own.

Researchers point to a positive connection between teacher awareness of Indigenous culture and teacher-student relationships:

Professional development focused on cultural awareness for non-Indigenous teachers is important in terms of their knowledge and understanding of Indigenous students and their cultures, and frequently leads to some re-shaping of teacher attitudes. It is reported that this leads to more positive and productive interactions between non-Indigenous teachers and Indigenous students, and thus enhanced learning. (McRae et al. 2000, p. 40)

Bishop and Berryman (2006) also noted the importance of respect for culture to teachers' relationships with Maori students:

... some students did talk about their experience of teachers who did show respect for the cultural knowledge and aspirations of their students, and as a result, had been able to build up positive relationships with them. This resulted in improved student behaviour, engagement, and involvement in learning for all students. (p. 256)

The relevance of culture to participation achievement is a key reason for the emphasis in many reviews and action statements on the desirability of an Indigenous education workforce.

Taking a child's Indigenous background into account at the school and system level

Professional development

Given that Indigenous students' different cultural backgrounds might be a hurdle to non-Indigenous teachers in building relationships, strategies that help teachers develop

knowledge and understanding of their Indigenous students are likely to contribute to improved student outcomes:

... there is ample evidence to suggest that carefully-documented descriptions of culturally-distinctive ways of learning need to be part of the background knowledge of teachers working with Indigenous students. (McRae et al. 2000, p. 144)

The Australian Professional Standards for Teachers (AITSL 2014b, p. 1) (launched in 2011) include elements relevant to this point. Focus area 1.4 covers ‘strategies for teaching Aboriginal and Torres Strait Islander students’. And focus area 2.4 requires that teachers ‘understand and respect Aboriginal and Torres Strait Islander people to promote reconciliation between Indigenous and non-Indigenous Australians’.

However, reviews of both initial teacher education and professional development raised concerns about the effective implementation of these focus areas:

The pre-service teacher education preparation of the non-Indigenous cohort to teach Aboriginal and Torres Strait Islander students was found ... to be egregious. (Moreton-Robinson et al. 2012, p. 154)

... the common issues raised at the local level about teacher professional development and professional learning in Aboriginal and Torres Strait Islander Education and Aboriginal and Torres Strait Islander Studies were that ... :

- The approach to formal teacher professional development is patchy, ad hoc and lacking in cohesiveness ...
- Teachers have fear and resistance about these particular Focus Areas. (Ma Rhea, Anderson and Atkinson 2012, p. 6)

Other roles of schools and school systems

Schools can play an important role in supporting Indigenous learners. For example, Munns, O’Rourke and Bodkin-Andrews (2013) analysed four NSW primary schools identified as achieving particularly positive outcomes for Indigenous students. Two of the schools were in urban areas, two were in rural areas. The size of the Indigenous enrolment at the schools ranged from small to reasonably large. The researchers conducted a case study of each school, guided by three themes:

The first was to explore the school’s practices and policies from a *social justice perspective* ...

The second was to investigate ways that at both school and classroom levels *culturally inclusive curricula* ... were implemented ... The third theme was to describe ways that teachers employed *culturally differentiated quality teaching*. (Munns, O’Rourke and Bodkin-Andrews 2013, p. 2)

The researchers found that these schools: had developed strong community relationships; reflected Aboriginal education in the school’s physical environment; taught and valued Aboriginal perspectives; focused on quality teaching; had targeted support for Aboriginal students (such as Aboriginal tutors); and ensured Aboriginal students had meaningful relationships with teachers.

Many commentators stress the importance of strong community involvement in efforts to improve Indigenous students' achievement. One particularly important observation from the McRae et al. (2000) evaluation of projects was that contextual factors (personnel, place and history) mattered. Different projects achieved similar goals but in different ways and partnerships at a local level were key to what happened and how.

School systems also play an important role — for example, in setting, and monitoring against, expectations, and resourcing schools and initiatives. Wilson's (2013) review of Indigenous education in the Northern Territory identified many impediments to improving outcomes. Overall, he concluded that:

The review has identified the lack of a clear, long-term strategic framework and consistent practice as obstacles to improvement in Indigenous education. There are too many initiatives, timelines are too short, and there are constant changes in direction. The department is not clear enough about expectations at each level of the education system, and resources are not effectively targeted to priority areas. Decisions that should be made centrally are devolved to school and regional level. (p. 16)

4.4 Recent policy developments

Indigenous education policy

As noted in chapter 1, there have been many reviews and strategy statements for Indigenous education over the years. The most recent statement (Education Council 2015, p. 5) identifies seven priority areas for actions to improve outcomes for Indigenous children. These reflect the preceding discussion about what works best for improving literacy and numeracy achievement among Indigenous students:

1. *leadership, quality teaching and workforce development* — children are taught by skilled educators who are culturally competent; expectations of learners are high; effort is invested in building a well-qualified Indigenous education workforce
2. *culture and identity* — education sectors acknowledge, respect and reflect the histories, values, languages and cultures of Indigenous Australians; all children have the opportunity to learn about Indigenous history and culture
3. *partnerships* — quality partnerships involving listening and responding, active engagement, information sharing and informed decision making are encouraged
4. *attendance* — barriers to attendance are addressed
5. *transition points including pathways* — children are supported at critical stages of their education
6. *school and child readiness* — high quality early childhood services build a strong foundation for early learning, including through a child's transition to school
7. *literacy and numeracy* — proficiencies are developed by applying proven, culturally inclusive, responsive and personalised approaches to learning.

Very similar priority areas have been identified across time (table 4.2). One change has been a shift in emphasis from increasing access to improving rates of attendance — as access has been extended.

The fact that these priorities align with the research on what works best, but Indigenous students' literacy and numeracy achievement has improved little over time, is concerning. If government priorities are already aligned with what the literature suggests should be done to improve Indigenous students' literacy and numeracy achievement, why has there been no progress in closing gaps in achievement?

One possibility is that government priorities are right but that there are barriers to implementation. Another is that the existing literature does not provide us with a sufficiently complete picture of why Indigenous students do not achieve as well as non-Indigenous students. The Closing the Gap Clearinghouse has recently identified a number of gaps in the evidence on what works for Indigenous students (Closing the Gap Clearinghouse 2016).

In either case, published systematic evaluations of schools where Indigenous students have particularly high achievement and those where achievement is particularly low could shed light on what might work best to lift Indigenous achievement. (As noted in chapter 3, analyses that focus on Indigenous students are important.) Only two evaluations of this type have been identified (box 4.6). Conclusions from the work were consistent with the literature on what works best. Whether this work has directly influenced policy is an open question.

High-level evaluation of recent data on the My School site for the schools examined in one of the evaluations (NCS 2012) suggests that there would be value in researchers revisiting the analysis of these schools. The data suggest that the schools' relatively strong performance has not been sustained. Understanding why this is the case would contribute to, and inform, our understanding of what matters to particularly effective schools. It is possible that the relative decline in these schools' results reflects staff turnover. If that is the case, it suggests that people were *the* key factor in the schools' success.

Table 4.2 Forty years of national priorities for Indigenous education, 1975–2015

	2015	2010	2006	1995	1988	1975
Leadership, quality teaching and workforce development ^a	✓	✓	✓	✓	✓	✓
Culture and identity	✓	✓		✓	✓	✓
Partnerships (community involvement)	✓	✓	✓	✓	✓	✓
Attendance	✓	✓				
Pathways to post-school options	✓	✓	✓			
School and child readiness	✓	✓	✓	✓	✓	
Literacy and numeracy	✓	✓		✓		
Access and participation				✓	✓	✓

^a The 1975 report emphasised the need for Indigenous Australians to be involved in high-level administrative and decision-making positions that affect the education of Indigenous children. School leadership and quality teaching became more of a focus from 2006.

Sources: ACG (1975); AEPTF (1988); Education Council (2015); MCEECDYA (2010); MCEETYA (1995a, 2006).

Box 4.6 Evaluations of ‘outlier’ schools

Munns, O’Rourke and Bodkin-Andrews (2013), cited in the text above, is one example of a study that systematically looked at (four NSW) schools identified as schools where Indigenous students had relatively good academic outcomes.

National Curriculum Services (NCS 2012) is another example. This study looked at 11 remote or very remote schools that were identified as having demonstrated sustained improvement in literacy and/or numeracy achievement. Researchers visited each school and investigated what they were doing to influence outcomes. Strategies and actions in evidence across the schools were identified and seven common themes relating to achievement were recognised. These reflect the content of the preceding discussion about what works best.

Education policy more broadly

As noted above, there has been an active education reform agenda in Australia in recent years. Improvements in teacher quality have been one focus.

The Australian Institute for Teaching and School Leadership (AITSL) was established in January 2010 to provide national leadership in promoting excellence in teaching and school leadership (AITSL 2014a). To that end, AITSL has released:

- the Australian Professional Standards for Teachers (APST) in 2011
- the Australian Professional Standards for Principals in 2011
- the *Australian Teacher Performance and Development Framework* and the *Charter for the Professional Learning of Teachers and School Leaders* in 2011

-
- strengthened standards and procedures for accreditation of initial teacher education programs in December 2015 (following a review by the Teacher Education Ministerial Advisory Group (TEMAG 2014)).

The strengthened standards for initial teacher education require providers to declare, and subsequently demonstrate that they have achieved, goals for the teacher education courses that they deliver; and to publish their criteria for selecting entrants to those courses. The standards also require that graduating teachers possess literacy and numeracy skills broadly equivalent to the top 30 per cent of the population. And, in future, all teacher graduates will need to be specialists in one part of the curriculum.

In addition, from 2016, the New South Wales Government has set a requirement that entrants to undergraduate teaching courses have a score of 80 per cent or more in at least three Higher School Certificate subjects including English (BOSTES 2016). Victoria is considering a similar model (Cook and Butt 2016).

The Australian Curriculum, Assessment and Reporting Authority (ACARA) was established in 2009 with responsibility for the national curriculum, national assessment and a national data collection and reporting program (ACARA 2013). It has overseen the:

- introduction of NAPLAN in 2009
- launch of the My School website in 2010
- development of the Australian Curriculum.

The Australian Curriculum:

... means that all young Australians can learn about the histories and cultures of Aboriginal and Torres Strait Islander peoples, of their contribution to Australia, and of the consequences of colonial settlement for Indigenous communities, past and present. For Aboriginal people and Torres Strait Islanders, the Australian Curriculum promotes the importance of pursuing excellence within education settings that respect and promote their cultural identity. (ACARA 2012, p. 7)

Policy makers are also giving increased attention to data-driven decision making. Initiatives like the CESE (established in 2012) and a collaboration between the Victorian Department of Education and Training and Melbourne Institute researchers (established in 2011) reflect policy makers' desire to use evidence to improve outcomes (as does the recent terms of reference from the Australian Government to the Productivity Commission to undertake an inquiry into the National Education Evidence Base). Also on the data front, the APST include a standard that requires teachers at all levels (from graduate to lead) to be able to interpret student data.

Initiatives of this type should contribute to the Australian evidence base on what works best. Ideally they will underpin an increase in robust, evidence-based studies, including more experimentation and observation, to better inform what works best to improve achievement for all students in Australian classrooms.

5 How are Indigenous students distributed across primary schools?

Key points

- Developing the most efficient and effective strategies to promote Indigenous Australian educational achievement should be informed by many factors, one of which is how the Indigenous student population is distributed within the schooling system.
- Though Indigenous students make up just 5 per cent of all primary school students across Australia, 77 per cent of all schools with primary school students have at least one Indigenous student.
 - This means most teachers across Australia are likely to interact with Indigenous students at some time and suggests that some understanding of Indigenous cultures and how to establish strong relationships with Indigenous students may be important for all teachers.
- Forty per cent of Indigenous students attend schools where Indigenous students account for a small share of total enrolments (less than 15 per cent) and have relatively few Indigenous students (less than 50). But a considerable minority (16 per cent) attend schools where Indigenous students account for a large share of total enrolments (50 per cent or greater) and have a large number of Indigenous students (100 or more).
 - Differences in Indigenous enrolment shares and student numbers are largely a regional phenomenon. In metropolitan areas, most Indigenous students attend schools with low Indigenous enrolment rates and relatively few Indigenous students. Whereas in very remote areas, most Indigenous students attend schools with very high Indigenous enrolment rates and larger numbers of Indigenous students.
- At schools with a large number of Indigenous students, particularly in more remote areas, school-specific strategies that are tailored to Indigenous students could be an effective complement to broader, individual-focused, teaching practices. However, such strategies would need to acknowledge the cultural and linguistic diversity of Indigenous students.
- At schools with a small number of Indigenous students, some school-specific strategies may not be feasible, but Indigenous students in these schools should not be overlooked.

As explained in chapter 4, the available evidence suggests that what works best to improve achievement among Indigenous Australian students is to adopt teaching strategies tailored to individual students, to foster a culture of high expectations in schools and to build strong student–teacher, and community, relationships. To do this effectively, the research suggests, requires schools to be resourced, and teachers to be trained, to recognise and support the different cultural and linguistic backgrounds of students, and to anticipate and respond to any associated challenges. Effective school leadership is important.

For Indigenous students, many different strategies have been proposed and implemented to recognise and support Indigenous culture and to cultivate a learning environment where Indigenous students are active and engaged participants. Examples include the employment of Indigenous education workers, physical acknowledgements of Indigenous cultures in school environments, and professional training in cultural awareness for non-Indigenous teachers.

Understanding the distribution of Indigenous students across schools can help to inform the development of strategies to promote improved achievement. For example, if most Indigenous students attend a small fraction of all schools then a strategy like teacher training on Indigenous cultural awareness may best be implemented on an as-needed basis. However, if Indigenous students are present in most schools, then most teachers can expect to interact with Indigenous students at some time, and it could make sense to provide some foundation training on a universal basis. Furthermore, some strategies are only likely to be cost effective where schools have a critical mass of Indigenous students. The percentage of Indigenous students that attend such schools provides an indication of the potential reach of these strategies.

This chapter explores the national distribution of Indigenous primary school students. To the Commission's knowledge, this is the first time such analysis has been presented. The dataset used for this analysis is described in chapter 2. It includes the total student enrolments at all schools that had at least one Year 3 or Year 5 student in 2014. This has two implications. First, a small number of very small schools that did not have either a Year 3 or Year 5 student in 2014 are excluded. Second, some of the students included in the analysis are secondary-school level students. This is because roughly 17 per cent of primary-school level students attend combined, secondary or special schools rather than stand-alone primary schools. Including secondary-school level students at combined schools in the analysis is more appropriate if the feasibility of implementing many of the strategies aimed at improving Indigenous student achievement depends on the absolute number of Indigenous students in a school, regardless of whether the students in question are being taught at a primary-school or secondary-school level. It is assumed that this is the case. That said, it may be that strategies that work for primary-school age students will not necessarily work for secondary-school age students, and vice versa.

The chapter presents analysis of the number of schools that Indigenous students attend, the proportion of Indigenous students in schools with small (and large) Indigenous enrolments and how the distribution of Indigenous students across schools varies with remoteness (section 5.1). A summary concludes the discussion (section 5.2).

5.1 The distribution of Indigenous students

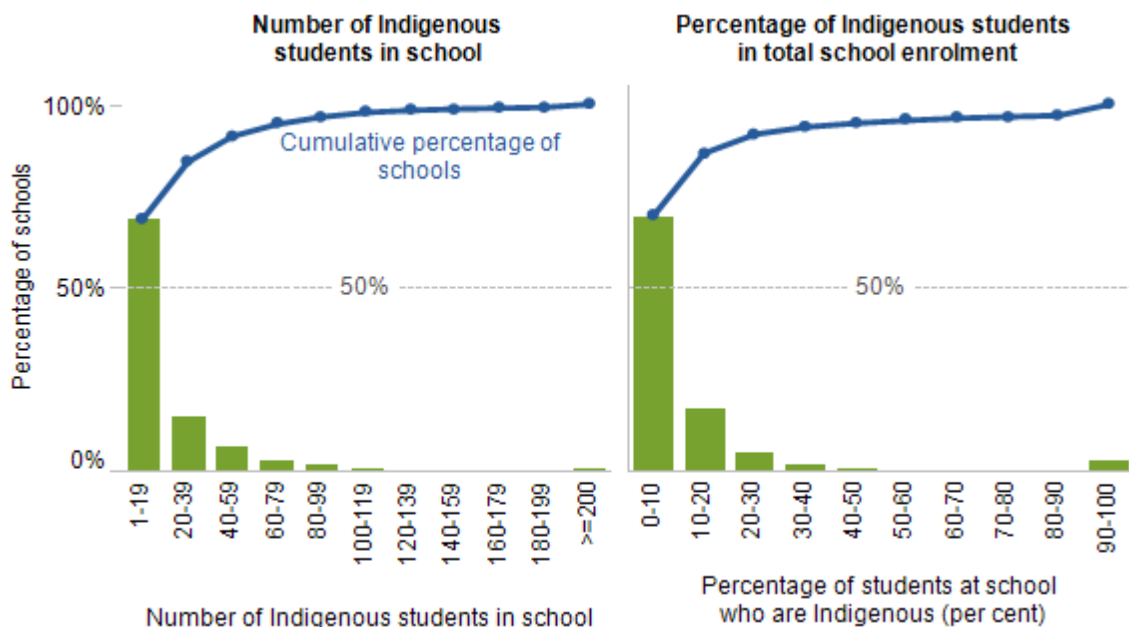
How many schools have Indigenous students?

In general, Indigenous students are both widespread and sparsely concentrated across schools. Though Indigenous students make up just 5 per cent of all students across the country, 77 per cent of all schools with primary school students have at least one Indigenous student. This is because, while most schools have at least some Indigenous students, few have a large number of Indigenous students. Of schools with at least one Indigenous student, 69 per cent have less than 20 Indigenous students in total (figure 5.1, left) and 70 per cent have less than 10 per cent Indigenous students in their total student enrolment (figure 5.1, right).

This means that most teachers will interact with Indigenous students at some time, but few will teach a class with a large number of Indigenous students. Strategies for improving Indigenous achievement need to account for this reality.

Figure 5.1 **Of schools with Indigenous students, most have less than twenty^a**

Percentage of **schools** by number of Indigenous students in school and Indigenous enrolment rate (2014)



^a Excludes schools with zero Indigenous students. Enrolment ranges are closed on the low side and open on the high side. For example, '10-20' means greater than or equal to 10 but less than 20 (not inclusive of 20). '90-100' includes schools with 100 per cent Indigenous enrolment.

Source: Commission estimates based on ACARA data (unpublished).

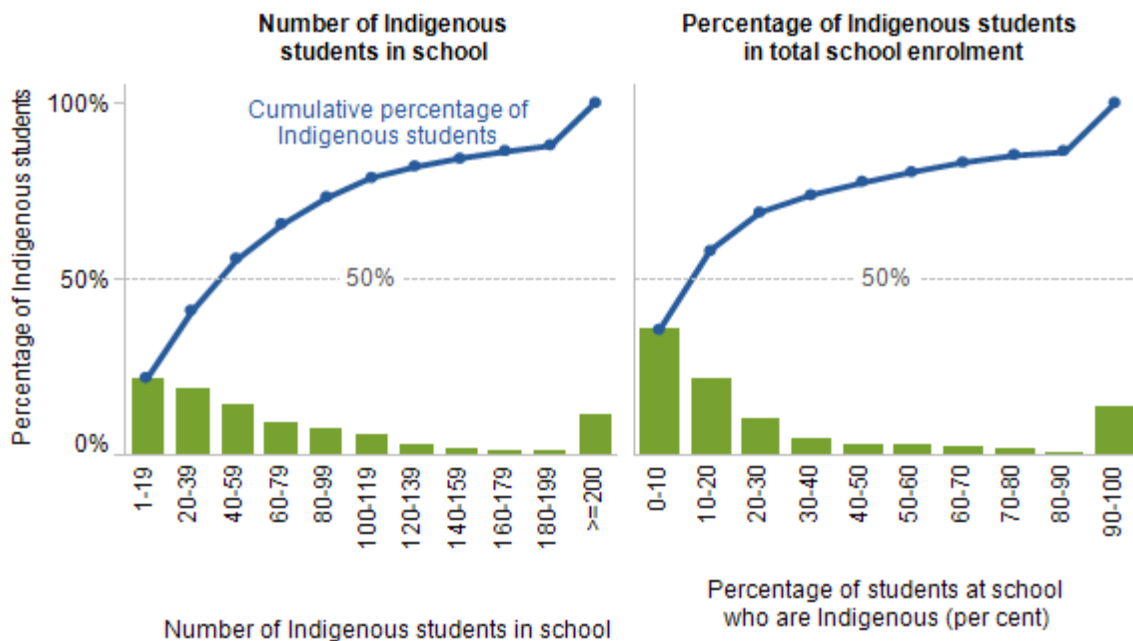
How many Indigenous students go to schools with few Indigenous students?

Another way to look at this distribution is to change the unit of analysis from schools to Indigenous students. While figure 5.1 shows how many *schools* have a small number of Indigenous students and how many *schools* have a small percentage of Indigenous students, figure 5.2 shows how many *Indigenous students* attend schools that have a small number of Indigenous students (left) and how many *Indigenous students* attend schools that have a small percentage of Indigenous students (right).

Over half of Indigenous students (56 per cent) go to schools with less than 60 Indigenous students and over half (58 per cent) attend schools where Indigenous students make up less than 20 per cent of total student enrolments. That said, a considerable minority (15 per cent) also go to schools where Indigenous students make up 80 per cent or more of total student enrolments.

Figure 5.2 **Many Indigenous students attend schools with few other Indigenous students^a**

Percentage of **Indigenous students** by number of Indigenous students in school and Indigenous enrolment rate (2014)



^a Enrolment ranges are closed on the low side and open on the high side. For example, '10-20' means greater than or equal to 10 but less than 20 (not inclusive of 20). '90-100' includes schools with 100 per cent Indigenous enrolment.

Source: Commission estimates based on ACARA data (unpublished).

Furthermore, about 16 per cent of Indigenous students attend schools with both a large Indigenous enrolment and number of Indigenous students (table 5.1).

Perhaps more importantly, a large percentage of Indigenous students attend schools where Indigenous students are both few in absolute number *and* a small percentage of the total enrolment. For example, 20 per cent of all Indigenous students attend schools that have less than 20 Indigenous students in total and an Indigenous enrolment rate of less than 15 per cent (that is, less than 3 Indigenous students in an average class of 20 students). A further 20 per cent attend schools that have between 20 and 49 Indigenous students and an Indigenous enrolment rate of less than 15 per cent. For such students, it may not be cost effective to adopt many whole-of-school programs related to improving Indigenous achievement. Rather, educational strategies that are feasible on a small scale might be preferred.

Table 5.1 Most Indigenous students attend schools with *both* few, and a low proportion of, Indigenous students

Percentage of Indigenous students, by the Indigenous enrolment rate and number of Indigenous students (2014)

<i>Number of Indigenous students</i>	<i>Percentage of Indigenous students in total enrolment^a</i>				<i>Total</i>
	<i>0-15</i>	<i>15-30</i>	<i>30-50</i>	<i>50-100</i>	
<i>1-19</i>	19.7	1.6	0.3	0.5	22.1
<i>20-49</i>	20.4	4.5	1.1	1.7	27.8
<i>50-99</i>	7.8	7.9	3.1	4.3	23.2
<i>100-199</i>	1.5	4.4	2.5	6.4	14.8
<i>>=200</i>	0.0	1.1	1.3	9.8	12.2
<i>Total</i>	49.5	19.6	8.3	22.7	100.0

^a Enrolment ranges are closed on the low side and open on the high side. For example, '15-30' means greater than or equal to 15 but less than 30 (not inclusive of 30). '50-100' includes schools with 100 per cent Indigenous enrolment.

Source: Commission estimates based on ACARA data (unpublished).

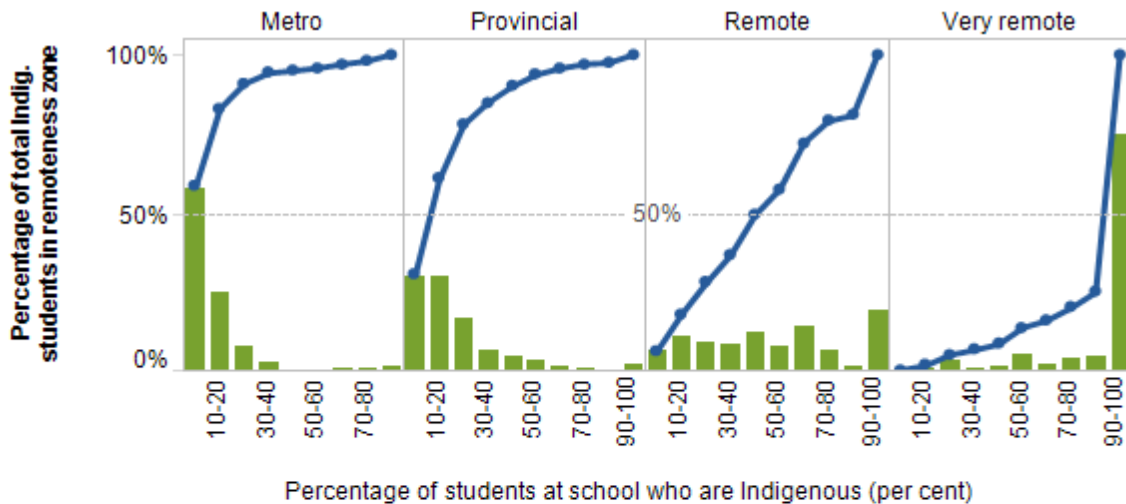
How does the distribution of Indigenous students vary with remoteness?

High Indigenous enrolment rates and, to a lesser extent, high numbers of Indigenous students in a school are associated with the remoteness of a school. Figure 5.3 shows the percentage of Indigenous students *in each remoteness area* according to the Indigenous enrolment rate at the school they attend and the number of students in the school they attend. In metropolitan areas, Indigenous students are concentrated in schools with low Indigenous enrolment rates and often attend schools with few Indigenous students in total (reflected in the relatively flat slope in the middle section of the cumulative percentage curves). Whereas, in very remote areas, Indigenous students are concentrated in schools with very high Indigenous enrolment rates and almost half go to schools with 200 or more Indigenous students (reflected in the very steep slope towards the end of the cumulative percentage curve).

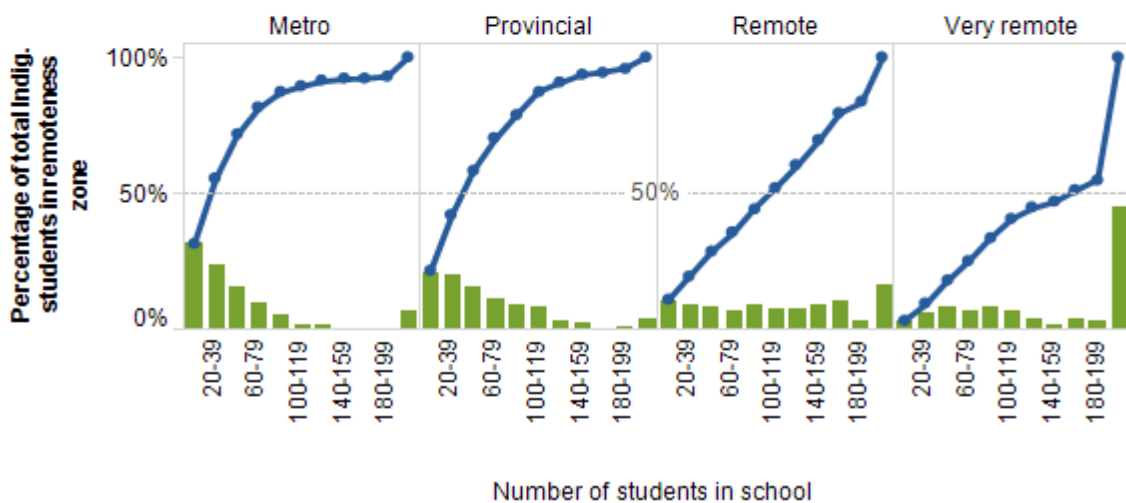
Figure 5.3 A high proportion of Indigenous students go to schools with high Indigenous enrolment rates in more remote areas^a

Percentage of Indigenous students, by the Indigenous enrolment rate in schools and number of Indigenous students, by remoteness area (2014)

Percentage of Indigenous students in total school enrolment



Number of Indigenous students in school



^a Enrolment ranges are closed on the low side and open on the high side. For example, '10-20' means greater than or equal to 10 but less than 20 (not inclusive of 20). '90-100' includes schools with 100 per cent Indigenous enrolment.

Source: Commission estimates based on ACARA data (unpublished).

5.2 Summary

Overall, the preceding analysis further suggests why there can be no 'one size fits all' approach to improving Indigenous education achievement. Indigenous students are spread across the school system and mostly go to schools with few Indigenous students.

Consequently, programs that only target schools with a large number of Indigenous students or with a large percentage of Indigenous students will miss the vast majority of Indigenous students. Given the spread of Indigenous students, some strategies may be best applied across the school system.

On the other hand, a material minority (15 per cent) of Indigenous students do go to schools with very high Indigenous enrolment rates, and these students are concentrated in very remote areas where literacy and numeracy achievement tends to be particularly low (chapter 2). In these areas, there may be a role for whole-of-school strategies tailored to Indigenous students to complement broader, individual-focused, teaching practices.

Even here, however, a note of caution is required. It is important to acknowledge the diversity of languages, cultural practices and spiritual beliefs of Indigenous groups within Australia. Given that many Indigenous students attend schools ‘off country’ (away from their traditional homeland), a high Indigenous enrolment rate at a school does not necessarily imply that students have a common cultural identity. Whole-of-school strategies to recognise and support Indigenous culture must be cognisant of, and sensitive to, this diversity.

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