

Wānangatia te Putanga Taurā  
National Monitoring Study  
of Student Achievement

# Mathematics and Statistics

## Contextual Findings 2022



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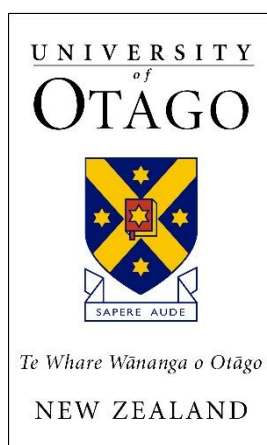
# Mathematics and Statistics 2022

## Contextual Findings

Educational Assessment Research Unit  
and  
New Zealand Council for Educational Research



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#### Key reports for Mathematics and Statistics 2022

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- 30: Mathematics and Statistics 2022 – Achievement Findings
- 31: Mathematics and Statistics 2022 – Contextual Findings
- 32: Technical Information 2022



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- the teachers who administered the assessments to the students
- the teachers and senior initial teacher education students who undertook the marking
- the Ministry of Education Research Team and Steering Committee.



# Contextual Factors Associated with Learning and Teaching in Mathematics

This report explores data collected about learning and teaching in mathematics<sup>1</sup> as part of the 2022 National Monitoring Study of Student Achievement (NMSSA). The data was collected using student, teacher, and principal questionnaires. The report is organised thematically, combining results from the students, teachers, and principals, as appropriate. After a brief description of the participants, the report focuses on three themes in turn: attitudes to and confidence in mathematics, learning and teaching opportunities in mathematics, and the impact of Covid-19.

Where the same or similar questions were asked in 2018, and there is a ‘notable’<sup>2</sup> difference in the data, a short description looking back at the responses made in that year is provided.

## 1. Participating students, teachers, and principals

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This section describes the sample of students, teachers, and principals that responded to the questionnaires.

### Participating students

The 2022 NMSSA mathematics study involved two nationally representative samples of students—a Year 4 sample and a Year 8 sample.

The samples were constructed using a two-stage sampling design. In the first stage, a stratified random sampling approach based on school decile, geographical region, and school size was used to select 100 schools at each year level. In the second stage, up to 25 students were randomly selected from each school at the appropriate year level. Table 1 shows the number of students assessed in each sample, by year level.

Table 1 Number of schools and students in the 2022 NMSSA Year 4 and Year 8 samples

Year level	Number of schools	Number of students
Year 4	100	2064
Year 8	100	1960

Up to 20 of the students in each school who had been assessed as part of the 2022 mathematics study were asked to also complete a student questionnaire. In total, 1724 students completed the questionnaire at Year 4 and 1703 students at Year 8. Table 2 shows the percentage of students who responded to the questionnaire, by decile band and year level.

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<sup>1</sup> For brevity, the word mathematics has been used to represent the mathematics and statistics learning area.

<sup>2</sup> A ‘notable’ difference is defined as a difference in response frequency of 10 percentage points or greater.

Table 2 Percentage of students who responded to the questionnaire, by school decile band and year level

Decile band	Year 4 (n=1724)	Year 8 (n=1703)
Low (decile 1-3)	20	21
Mid (decile 4-7)	40	49
High (decile 8-10)	40	30

### Participating teachers

Up to three teachers from each of the schools involved in the study were asked to fill in the teacher questionnaire. The teachers invited to participate were those who had the most students involved in the NMSSA study. Table 3 shows the percentage of teachers by school decile band<sup>3</sup> at Year 4 and Year 8 who responded. Note, that the teachers who completed the questionnaires at each year level do not necessarily constitute nationally representative samples. The findings related to teachers should be interpreted as a broad indication of New Zealand teachers' views about teaching and learning in mathematics.

Table 3 Percentage of teachers who responded to the questions related to mathematics in the questionnaire, by school decile band and year level

Decile band	Year 4 (n=200)	Year 8 (n=186)
Low (decile 1-3)	22	19
Mid (decile 4-7)	37	47
High (decile 8-10)	41	34

Teachers were asked to indicate the qualifications and experience they had that were relevant to mathematics teaching. Figure 1 shows their responses.

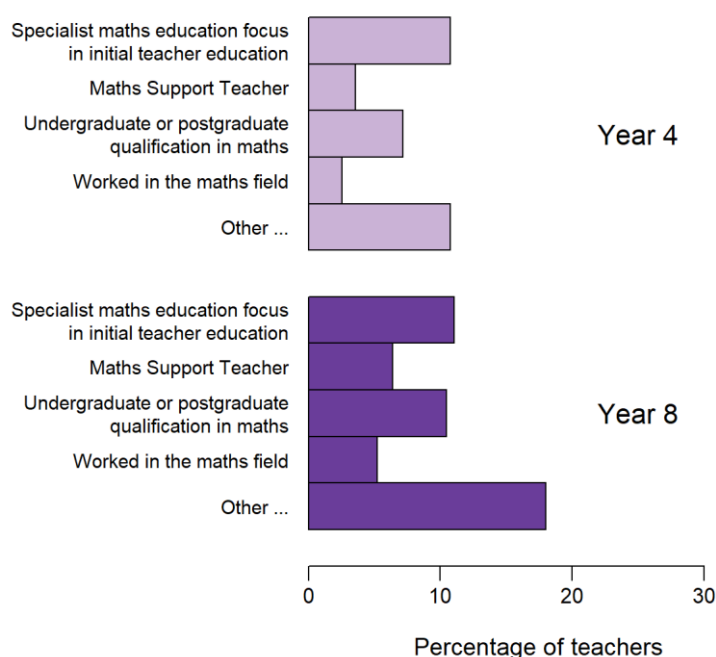


Figure 1 Percentage of teachers indicating that they had a specialist focus in teacher training, qualifications related to mathematics, and/or work experience in mathematics, by year level

<sup>3</sup> The use of decile bands in this report follows the conventions used for NMSSA reporting over the last ten years: low-decile schools involve decile 1 to 3; mid-decile involves deciles 4 to 7; and high-decile involves deciles 8 to 10).



The qualifications listed by teachers under ‘other’ included Accelerated Learning in Mathematics (ALiM) training, Numeracy Development Project and Developing Mathematical Inquiry Communities (DMIC) professional learning and development (PLD) or attending mathematics PLD workshops such as Just-in-time Maths.

### Participating principals

All principals from the schools in the study were asked to complete a principal questionnaire. Table 4 shows the percentage of principals that responded by school decile band at Year 4 and Year 8.

Table 4 Percentage of principals who responded to the questionnaire, by school decile band and year level

Decile band	Year 4 (n=90)	Year 8 (n=86)
<b>Low (decile 1-3)</b>	21	21
<b>Mid (decile 4-7)</b>	39	50
<b>High (decile 8-10)</b>	40	29

## 2. Attitude and confidence towards mathematics

This section reports on students' and teachers' attitudes and confidence towards mathematics.

### Students' attitudes towards mathematics

Students were asked how much they agreed with a series of six statements about their attitude towards mathematics. Figure 2 shows the statements and how students responded at each year level.

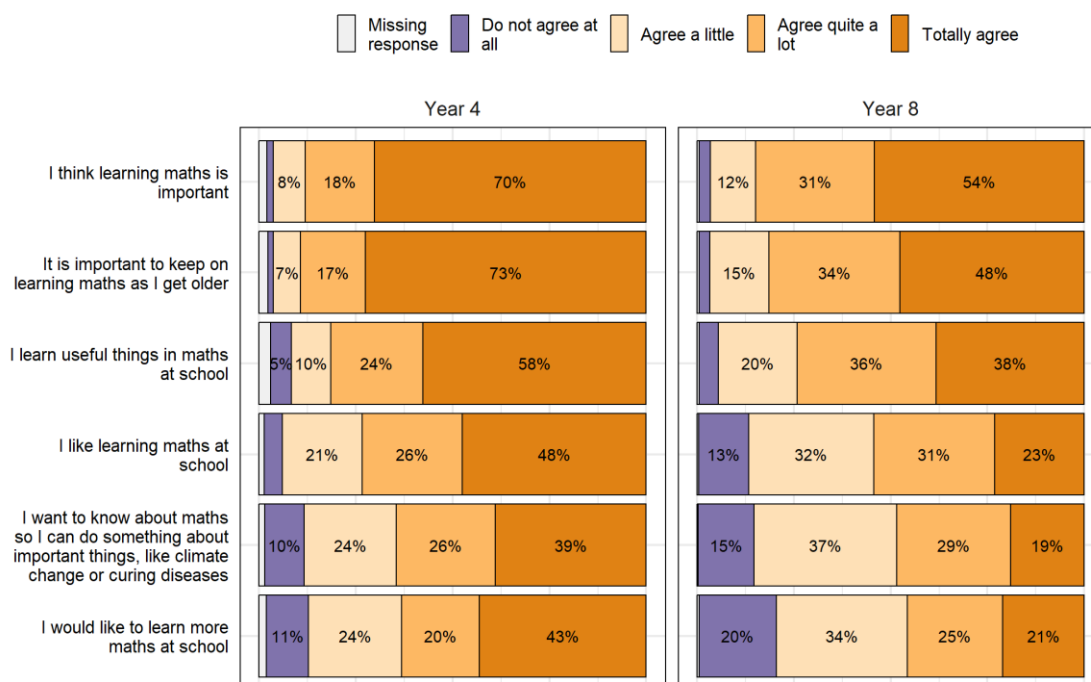


Figure 2 Percentage of student responses to statements about their attitude to mathematics, by year level

### Students were generally positive about learning mathematics

Most students in Year 4 and Year 8 indicated at least some level of agreement with each of the six statements related to their attitude towards learning mathematics at school. For example, at Year 4, 90 percent of students used 'agree quite a lot' or 'totally agree' to respond to the statement 'It is important to keep on learning maths as I get older'. At Year 8, the corresponding percentage was 82 percent. Overall, Year 8 students were less likely than those in Year 4 to use the 'totally agree' category when responding to each of the statements.

#### Looking back

For students in Year 8, there was a 'notable' decline in attitude between 2018 and 2022 for two of the six attitude statements. In 2018, 60 percent of Year 8 students selected 'agree quite a lot' or 'totally agree' when presented with the statement 'I want to know about maths so I can do something about important things'. In 2022, only 48 percent of Year 8 students selected these options. Similarly, in 2018, 64 percent of Year 8 students selected 'agree quite a lot' or 'totally agree' when presented with the statement 'I like learning maths at school', compared with 54 percent in 2022.

#### Attitude to Mathematics scale

The responses to the six attitude statements were used to construct an Attitude to Mathematics scale. To aid interpretation, the scale was broken into three score ranges. The ranges indicate the locations on the scale where students were typically 'very positive', 'positive' and 'not positive' in their responses. Figure 3 shows the distribution of the Attitude to Mathematics scale scores at Year 4 and Year 8.

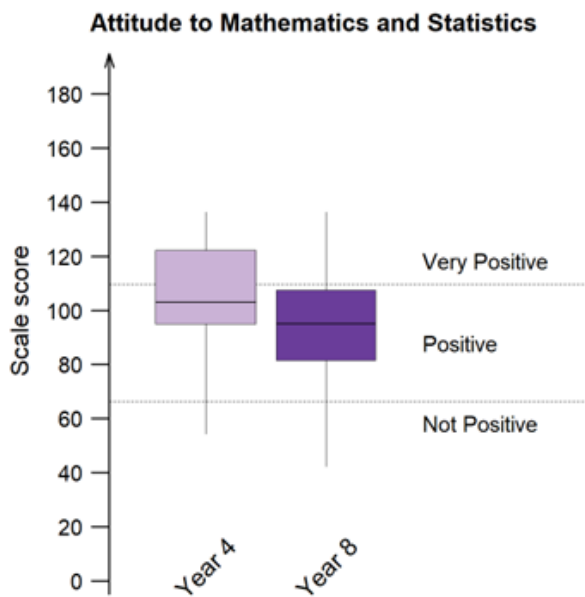


Figure 3 Distribution of students' scores on the Attitude to Mathematics scale, by year level

On average, Year 8 students' attitudes towards mathematics were less positive than Year 4 students

Year 8 students, on average, scored lower on the Attitude to Mathematics scale than Year 4 students by 12 scale score units. It has been typical of most learning areas assessed by NMSSA to see lower attitude scores, on average, for Year 8 students compared with students in Year 4.

There were differences in Attitude to Mathematics scores related to ethnicity, gender, and decile band

On average, and at both year levels, non-New Zealand European students scored higher on the Attitude to Mathematics scale than New Zealand European students by 4 scale score units (Figures 4 and 5).

There were additional differences at the Year 8 level (Figure 5). On average, at Year 8:

- Pacific students scored higher on the Attitude to Mathematics scale than non-Pacific students (by 8 scale score units)
- Asian students scored higher on the Attitude to Mathematics scale than non-Asian students (by 7 scale score units)
- non-Māori students scored higher on the Attitude to Mathematics scale than Māori students (by 3 scale score units)
- boys scored higher on the Attitude to Mathematics scale than girls (by 3 scale score units)
- students at low decile schools scored higher on the Attitude to Mathematics scale than students at mid and high decile schools (by 3 scale score units).

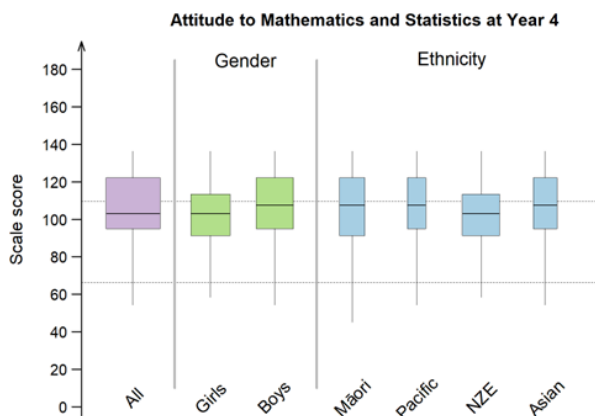


Figure 4 Distribution of Year 4 students' scores on the Attitude to Mathematics scale, by gender and ethnicity

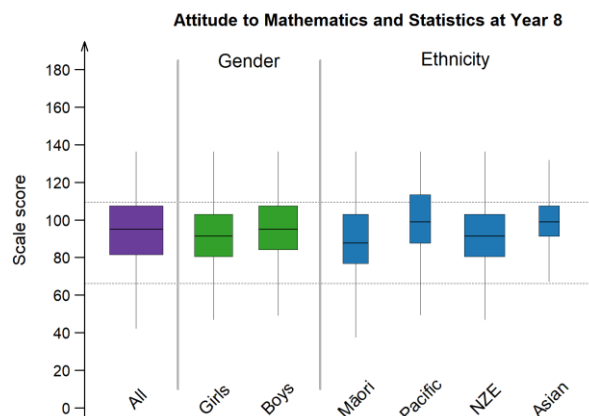


Figure 5 Distribution of Year 8 students' scores on the Attitude to Mathematics scale, by gender and ethnicity

### Looking back

There were similar patterns on the Attitude towards Mathematics scale between 2018 and 2022. One notable exception was the difference in attitude between Year 4 and Year 8 students. In both 2018 and 2022, Year 8 students, on average, scored lower on the Attitude to Mathematics scale than Year 4 students. In 2018, however, this difference was greater.

### Students' confidence in mathematics

Students were asked to indicate their level of agreement with a series of four statements about their confidence in mathematics. Figure 6 shows the responses of students, by year level.

#### Most students indicated confidence in their mathematics abilities

Overall, most students at both Year 4 and Year 8 indicated at least some level of agreement with each of the four statements related to their sense of confidence as a mathematics learner (Figure 6). Less than 13 percent of students at both year levels used the 'do not agree at all' response category when responding to each of the statements. Year 4 students were more likely to use the 'totally agree' response to each statement than Year 8 students.

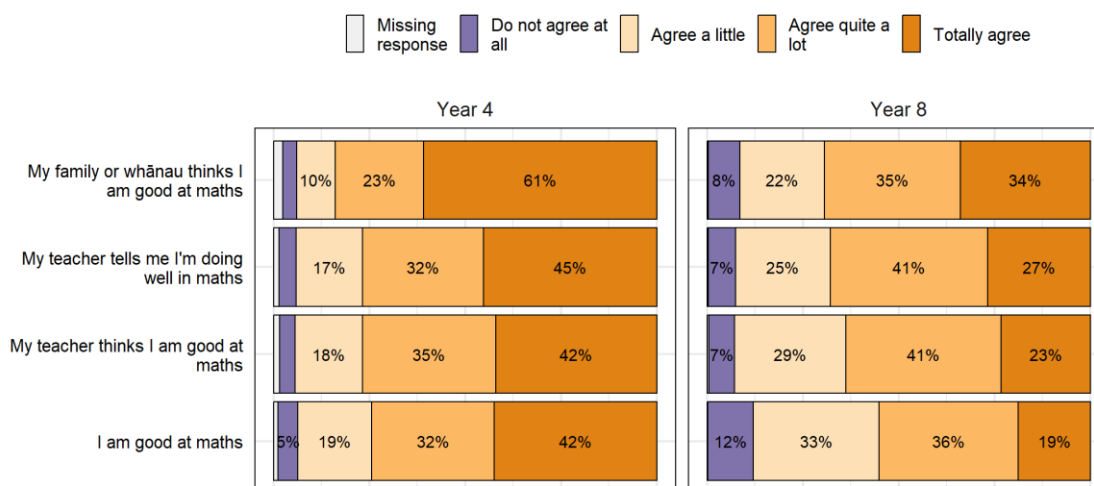


Figure 6 Percentage of student responses to statements about their confidence in mathematics, by year level

## Looking back

In 2018, 63 percent of Year 4 students ‘agreed quite a lot’ or ‘totally agreed’ with the statement ‘My teacher tells me I’m doing well in maths’. In 2022, 77 percent of Year 4 students were in agreement with this statement.

## Confidence in Mathematics scale

Students’ responses to the four confidence items were used to construct a Confidence in Mathematics (CIM) scale. The confidence scale was divided into three score ranges (‘very confident’, ‘confident’ or ‘not confident’) to aid the interpretation of scale scores. Figure 7 shows the distribution of scores on the CIM scale for Year 4 and Year 8 students.

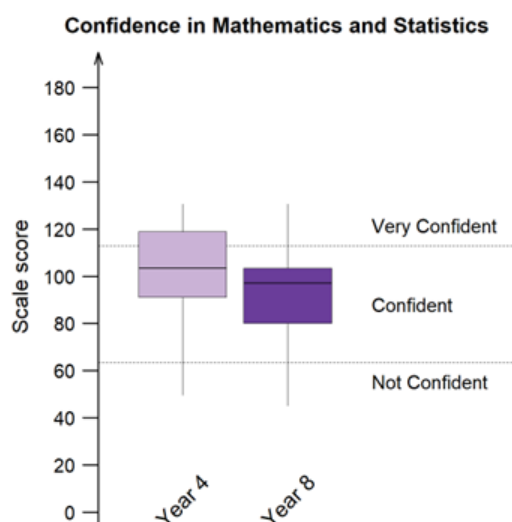


Figure 7 Distribution of scores on the Confidence in Mathematics scale, by year level

Students in Year 8, on average, indicated less confidence overall in mathematics than students in Year 4

Students in Year 8, on average, indicated less confidence overall in mathematics than students in Year 4 by 11 scale score units (Figure 7). Most students at both year levels scored in the ‘confident’ or ‘very confident’ parts of the scale.

On average, boys indicated a higher level of confidence in mathematics than girls

At both year levels, boys scored higher, on average, than girls on the Confidence in Mathematics scale. The difference in average scores was greater at Year 8 than at Year 4 (4 scale score units at Year 4, and 6 scale score units at Year 8).

There were differences in levels of confidence in mathematics associated with a range of subgroups

On average, and at both year levels:

- New Zealand European students scored higher on the Confidence in Mathematics scale than non-New Zealand European students by 3 scale score units.

There were additional differences at one year level only (see Figures 8 and 9).

- Year 4 non-Pacific students, on average, scored higher than Pacific students (by 7 scale score units)
- Year 8 non-Māori students, on average, scored higher than Māori students (by 5 scale score units)
- Year 4 students, on average, at high and mid-decile schools scored higher than those in low decile schools (by 4 scale score units)

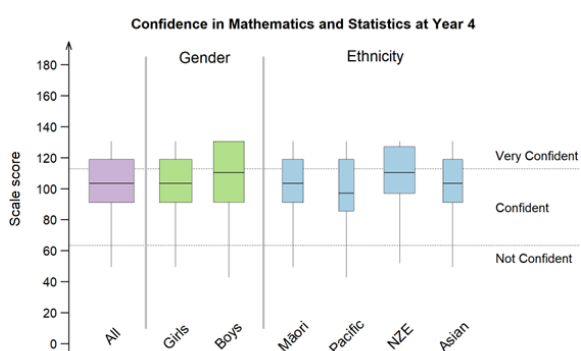


Figure 8 Distribution of Year 4 students' scores on the Confidence in Mathematics scale, by gender and ethnicity

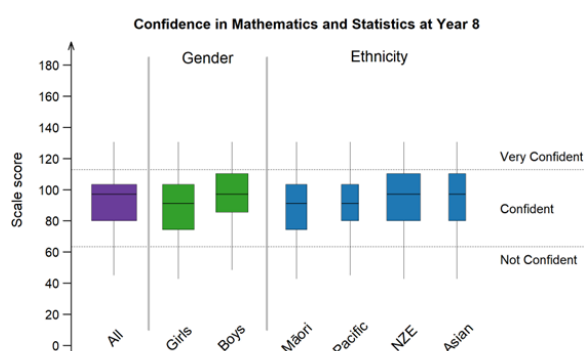


Figure 9 Distribution of Year 8 students' scores on the Confidence in Mathematics scale, by gender and ethnicity

## The relationship between attitude to mathematics, confidence in mathematics and achievement in mathematics

Attitude to Mathematics scores and Confidence in Mathematics scores were more highly correlated with achievement in Year 8 than in Year 4

Scores on both the Attitude to Mathematics scale and Confidence in Mathematics scale were positively correlated with achievement on the mathematics and statistics (MS) assessment used by NMSSA at both Year 4 and Year 8 (see Table 5). At both year levels, the magnitude of the correlation coefficient was greater between confidence and achievement than between attitude and achievement. For both attitude and confidence, the association with achievement was stronger at Year 8 than at Year 4. This was the same pattern as in 2018.

Table 5 Correlations between the attitudinal scales (Attitudes to Mathematics and Confidence in Mathematics) and achievement in mathematics, by year level

	Attitude to Mathematics*	Confidence in Mathematics*
Achievement in mathematics at Year 4	0.05	0.18
Achievement in mathematics at Year 8	0.20	0.41

\*All correlations were statistically significant at  $p < 0.01$

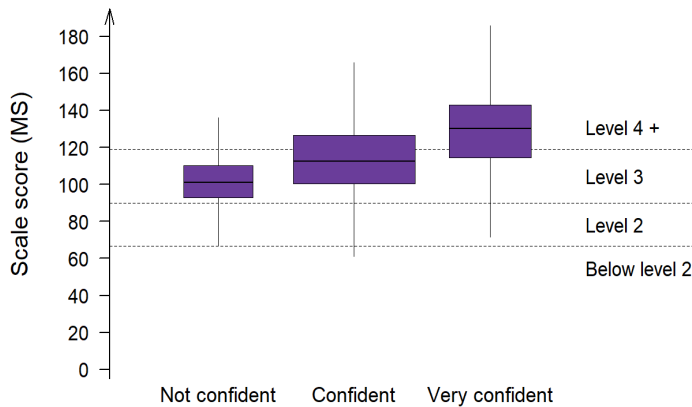


Figure 10 Distribution of Year 8 students' scores on the Mathematics and Statistics (MS) scale according to level of confidence on the Confidence in Mathematics scale

Figure 10 uses boxplots to show the relationship between achievement and confidence in mathematics at Year 8. Each boxplot shows the achievement distribution associated with a different level of confidence: 'very confident', 'confident' and 'not confident'. As can be seen, students whose overall response to the confidence items was categorised as 'very confident' typically scored higher on the MS assessment than those whose response was categorised as 'confident' or 'not confident'.

## Teachers' attitudes and confidence towards mathematics

### Teachers' attitudes to mathematics

Teachers were asked to indicate their level of agreement with three statements about their attitude towards mathematics. Results are shown in Figure 11.

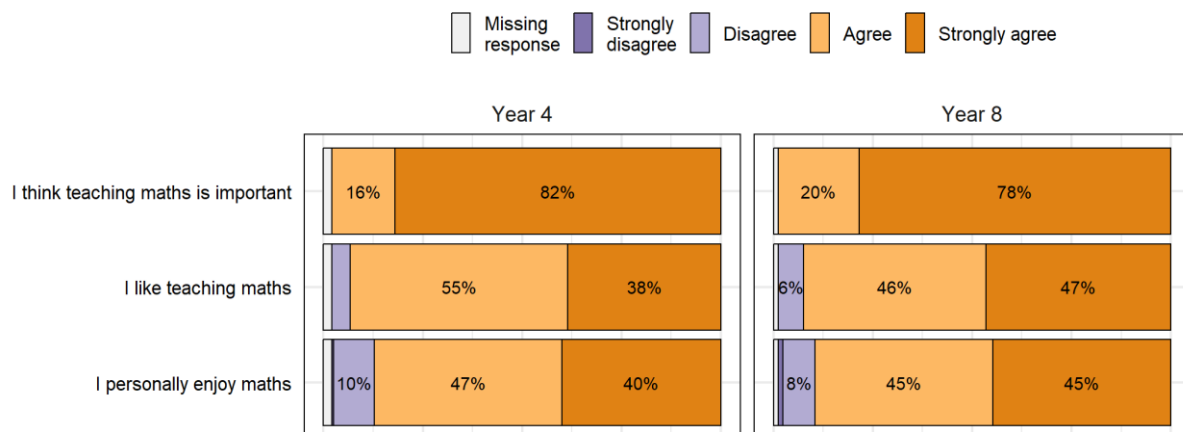


Figure 11 Percentage of teachers' responses to statements about their attitude to mathematics, by year level

### All teachers agreed teaching mathematics is important and most enjoy teaching mathematics

All teachers agreed with the statement 'I think teaching maths is important', with most teachers responding with 'strongly agree'. Most teachers at Year 4 and Year 8 agreed that they personally enjoy mathematics and like teaching it.



## Teachers' confidence in teaching mathematics

Teachers were asked to indicate their level of agreement with eight statements about their confidence in teaching mathematics. Results are shown in Figure 12.

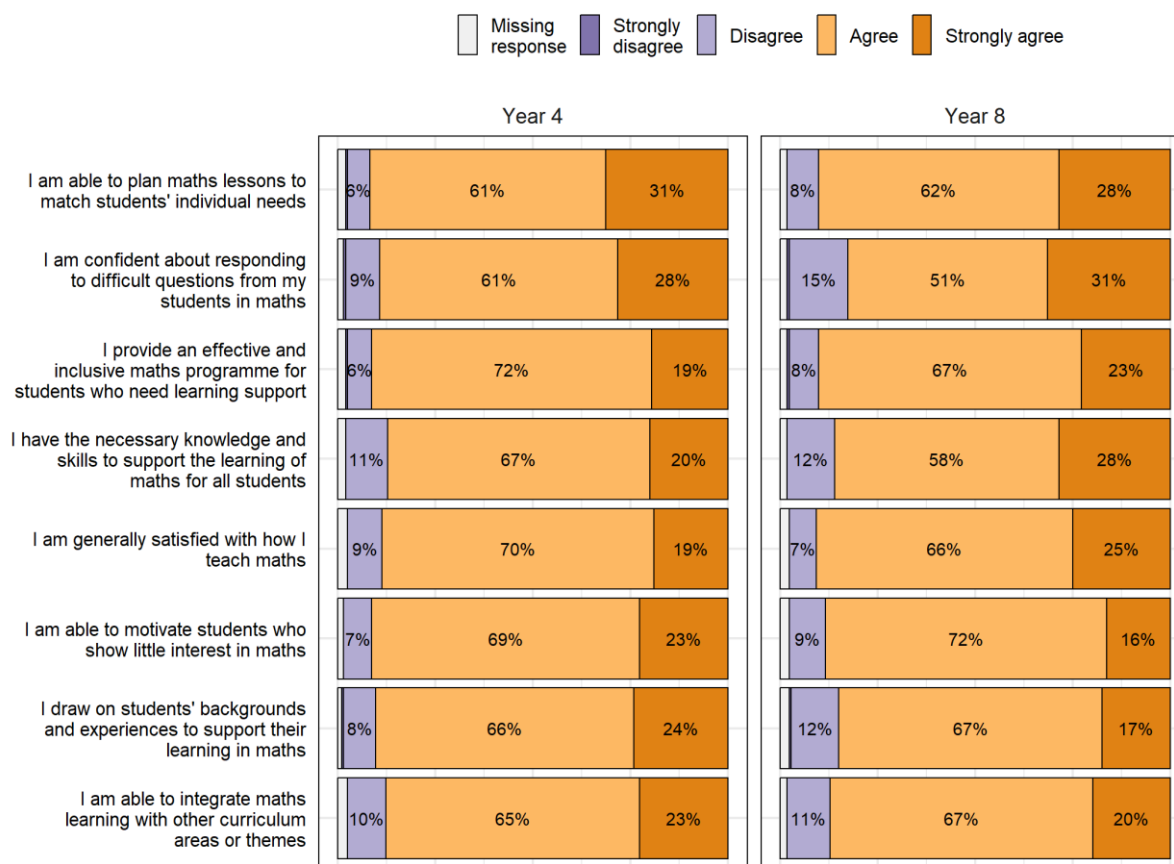


Figure 12 Percentage of teachers' responses to statements about their confidence in teaching mathematics, by year level

### All teachers agreed teaching mathematics is important and most enjoy teaching mathematics

Most teachers responded with 'agree' or 'strongly agree' to each of the eight statements related to their confidence in teaching mathematics (Figure 12). Fifteen percent of Year 8 teachers indicated that they were not confident about responding to difficult questions from their students in maths. The response patterns for teachers at both year levels were very similar. This follows the same pattern as 2018.

### Teacher confidence in each sub-strand of mathematics

At both year levels, teachers indicated the greatest confidence in teaching number and the least confidence in teaching algebra and fractions

As well as responding to statements about their confidence in teaching mathematics overall, teachers were asked to rate their confidence in teaching each sub-strand of mathematics. They were also asked, separately, to rate their confidence teaching fractions. Results are shown in Figures 13 and 14. At both year levels, teachers indicated the greatest confidence in teaching the number strand.

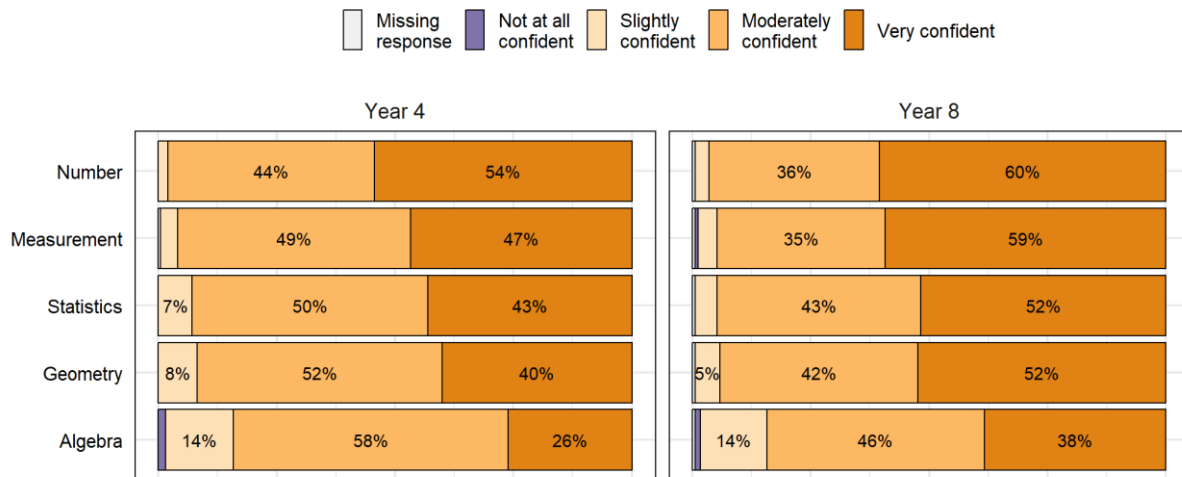


Figure 13 Percentage of teachers' ratings of their confidence for teaching each sub-strand of mathematics, by year level

Year 8 teachers expressed greater confidence than Year 4 teachers in teaching all sub-strands of mathematics and statistics

Overall, Year 8 teachers were more likely than Year 4 teachers to state that they were 'very confident' teaching each of the sub-strands of the mathematics and statistics learning area (Figure 13). This was also true when it came to teaching fractions (Figure 14).

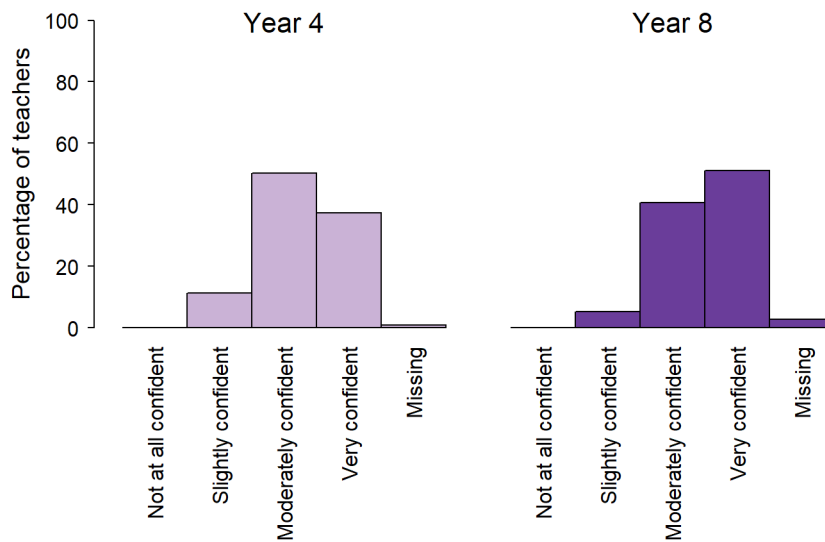


Figure 14 Percentage of teachers' ratings of their confidence for teaching fractions, by year level

### 3. Opportunities for teaching and learning mathematics

This section reports on questions related to the teaching and learning of mathematics. These include questions related to students’ and teachers’ perspectives on the activities provided for students, teachers’ reports of the time spent learning mathematics in school, and principals’ views on the teaching and learning of mathematics in their schools.

#### Students’ opportunities to learn mathematics

Presented with a range of statements describing learning opportunities in mathematics, most students in Year 4 and Year 8 indicated that they were involved in each of the opportunities at least ‘once or twice a month’ and usually on a weekly or daily basis (Figure 15).

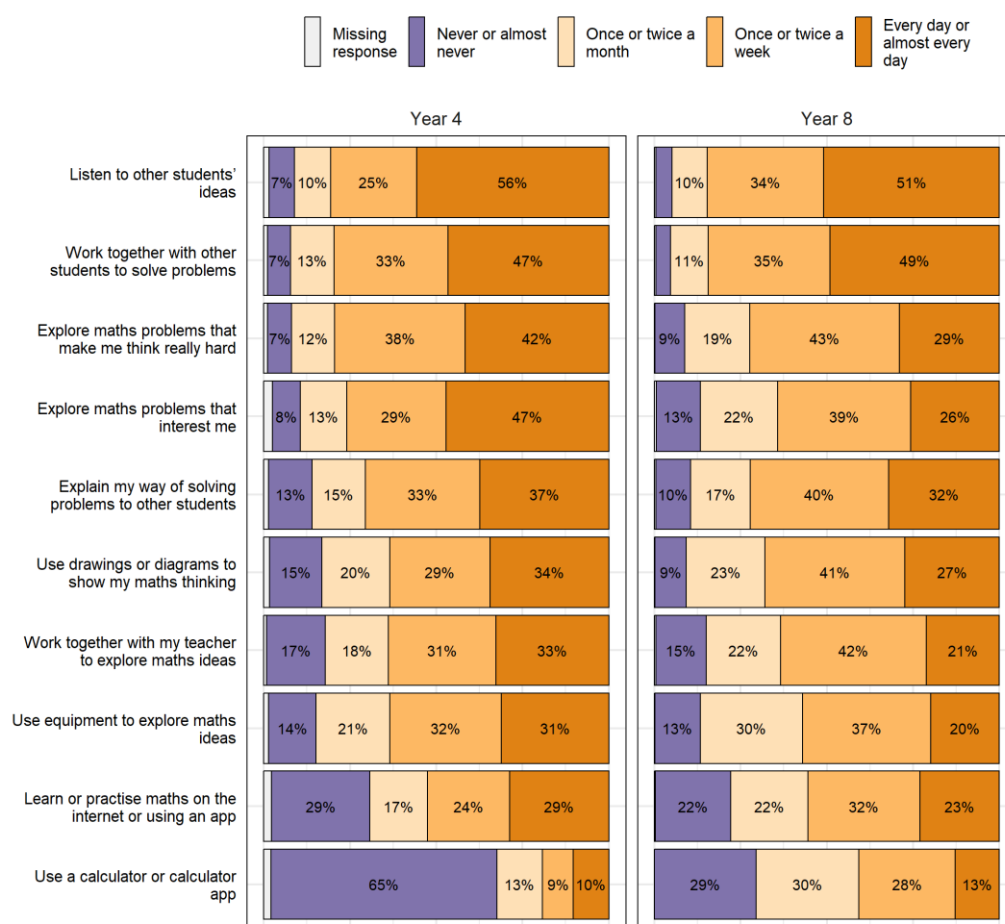


Figure 15 Percentage of students’ responses regarding their involvement in a range of learning opportunities in mathematics, by year level

At Year 4, two thirds of the students indicated they ‘never or almost never’ use a calculator or calculator app to solve problems

Two thirds of Year 4 students and about one third of Year 8 students indicated they ‘never or almost never’ use a calculator or calculator app to solve problems (Figure 15).

At both year levels there were differences in the way students from schools in different decile bands responded to this question. At Year 4, students at high decile schools were more likely to respond with ‘never or almost never’ (70 percent), than students at low decile schools (52 percent). At Year 8, students at low decile schools were more likely to respond with ‘never or almost never’ (34 percent), than students at high decile schools (21 percent).

There was substantial variation in the amount of time students reported learning or practising maths using the internet or an app

Twenty-nine percent of Year 4 students and 22 percent of Year 8 students reported that they ‘never or almost never’ learn or practise maths on the internet or using an app. Almost the same proportion of students reported that they did this ‘every day or almost every day’ (29 percent of Year 4 students and 23 percent of Year 8 students).

### Looking back

It is important to note that as the response categories used in 2018 for this item were different to those used in 2022, the results are not directly comparable.

However, in 2018, 14 percent of Year 4 students and 10 percent of Year 8 students indicated that they ‘never or almost never’ used a digital device or the internet to learn or practise maths.

### Teachers’ perspectives of learning opportunities in mathematics

Teachers were presented with the same series of learning opportunity statements as the students. The teachers were asked to indicate how often students in their class had each experience in mathematics at school (Figure 16). Most teachers indicated that each one happened at least ‘one or two times a week’, apart from using calculators at Year 4.

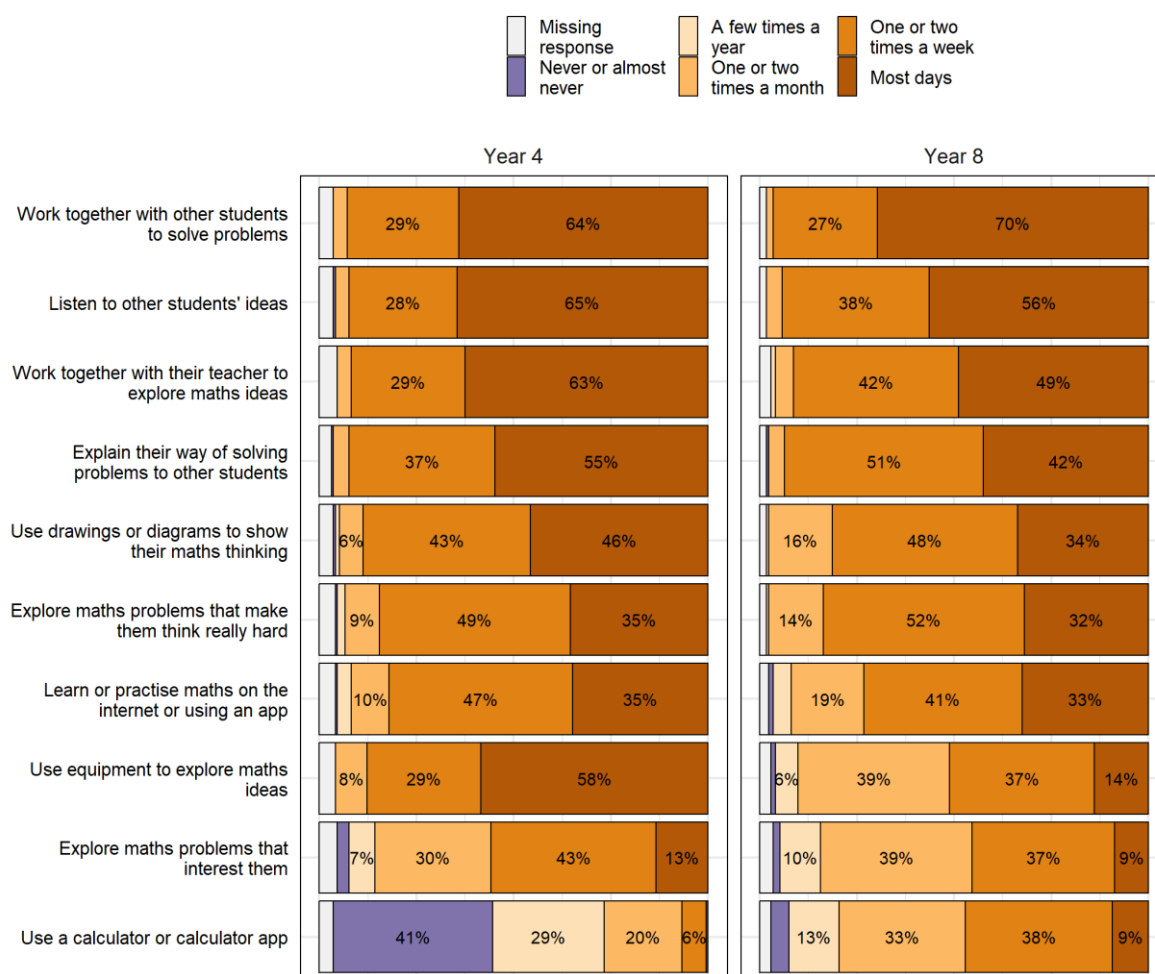


Figure 16 Percentage of teachers' responses regarding opportunities for students to learn mathematics, by year level

Most teachers agreed that students experienced a wide range of learning opportunities, however, there were notable differences related to school decile

At Year 4, teachers at low decile schools were seven times more likely to report that students explore maths problems that interest them ‘most days’ (35 percent at low decile schools and 5 percent at high decile schools). Year 4 teachers at low decile schools were also more likely to indicate their students explored maths problems that make them think really hard ‘most days’ (47 percent at low decile schools and 29 percent at high decile schools).

The opposite was reported at Year 8. Forty four percent of Year 8 teachers at high decile schools reported their students explored maths problems that make them think really hard ‘most days’, compared with 6 percent of Year 8 teachers at low decile schools.

Also at Year 8, 78 percent of teachers at high decile schools reported their students worked together with other students to solve problems ‘most days’, compared with 48 percent of teachers at low decile schools. At Year 8, teachers at low decile schools were more likely to indicate their students learn or practise maths on the internet or using an app ‘most days’ (45 percent) compared to high decile schools (24 percent).

There were differences between how the teachers and students rated the learning opportunity statements

As indicated, teachers and students rated the same list of learning opportunities (Figures 15 and 16, respectively). Overall, teachers tended to indicate that the students in their classes experienced each of the learning opportunities somewhat more often than the students themselves reported that they were involved in each one. One statement that did not follow this pattern related to how often students explore maths problems that interest them. In this case, 47 percent of Year 4 students indicated they did this ‘every day or almost every day’, as did 26 percent of Year 8 students. In comparison, 13 percent of Year 4 teachers and 9 percent of Year 8 teachers reported their students doing this with the same frequency.

### Talking to their teacher about their mathematics learning

Around one in three students indicated that they ‘never or almost never’ talked to their teacher about how they are doing or their next learning steps in mathematics

Students responded to two statements related to talking to their teacher about their learning in mathematics (Figure 17). For each statement, 32 percent of Year 4 students and about 28 percent of Year 8 students responded with ‘never or almost never’.

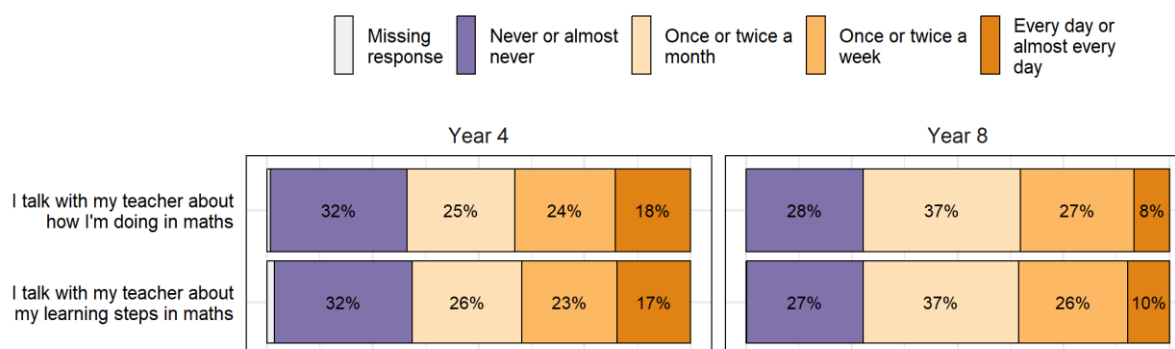


Figure 17 Percentage of students' responses regarding how often they talk with their teacher about their learning in mathematics, by year level

## Looking back

In 2018, at both Year 4 and Year 8, between 15 and 18 percent of students responded with ‘never or almost never’ regarding how often they talk to their teacher about their maths learning.

## Students’ perceptions about the difficulty of their maths learning

Most students rated the learning they did in mathematics as ‘about right for me’

When asked to rate the learning they did in mathematics in terms of difficulty, 74 percent of students at Year 4 and 81 percent of students at Year 8 responded using the ‘about right for me’ category (Figure 18). Of the remaining students, a greater proportion at each year level indicated that the mathematics they did was ‘too easy for me’ rather than ‘too hard’.

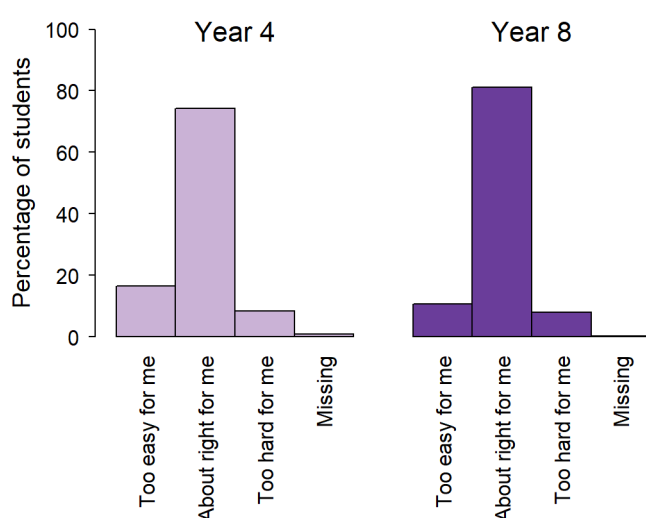


Figure 18 Percentage of students’ responses regarding the difficulty of their mathematics learning, by year level

At Year 4, how students perceived the difficulty of their learning in mathematics varied by gender and school decile

At Year 4, a greater proportion of boys than girls indicated they think the learning they do in maths is ‘too easy for me’ (22 percent and 12 percent respectively).

Year 4 students in low decile schools were less likely than those at high decile schools to report the learning they do in maths is about right for them (63 percent and 77 percent respectively). A greater proportion of Year 4 students at both deciles indicated that the mathematics they did was ‘too easy for me’ rather than ‘too hard’.

## Maths lessons outside of school

Students were asked whether they went to maths lessons outside of school (Figure 19). Eleven percent of Year 4 students and 12 percent of Year 8 students indicated that they attended maths lessons outside of school. The predominant source of maths lessons ‘somewhere else’ identified by students at both year levels was whānau or home.

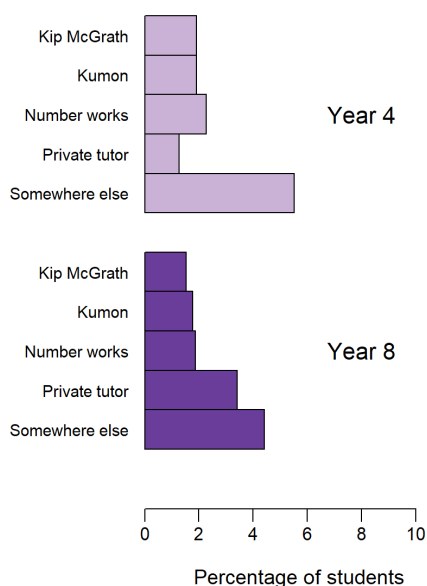


Figure 19 Percentage of students who stated that they attended maths lessons outside of school

## Organisational strategies for mathematics

### Time spent learning mathematics

The majority of teachers indicated they teach mathematics four to five times a week

Teachers were asked to indicate the number of dedicated maths sessions they included as part of their classroom programme in a typical week (Figure 20). In general, teachers at both year levels indicated that they included maths sessions in their classroom programme four to five times a week (92 percent of Year 4 teachers, and 86 percent of Year 8 teachers). Only a small percentage of teachers indicated that they included three or less maths sessions a week (3 percent at Year 4 and 9 percent at Year 8).

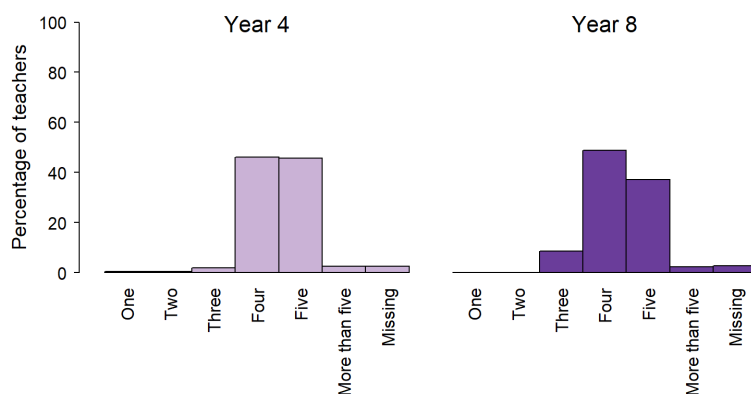


Figure 20 Percentage of teachers' responses regarding the typical number of maths sessions per week, by year level



## How long is a typical maths session

Teachers were also asked to indicate the amount of time their students spent, on average, learning mathematics in a typical maths session. At both Year levels, 45 to 50 minutes or 60 minutes were the most common responses.

## Grouping strategies

Ability group-based activities were regularly used as an organisational strategy for teaching mathematics

Most teachers reported regularly using a range of organisational strategies for teaching mathematics (Figure 21). Of the strategies presented, ability group-based activities were used the most regularly with 49 percent of teachers at Year 4 and 40 percent at Year 8 reporting they used ability group activities ‘every day or almost every day’.

At Year 4 and Year 8 the reported use of ability group-based activities was lowest among teachers at low decile schools (37 percent responded ‘every day or almost every day’ at Year 4, and 30 percent at Year 8). At both year levels, it was highest among teachers at mid-decile schools (56 percent of teachers at Year 4 responded ‘every day or nearly every day’, and 51 percent at Year 8).

At both year levels, the least used organisation strategy was using different interest or social groups (37 percent of Year 4 teachers and 30 percent of Year 8 teachers responded with ‘never or almost never’).

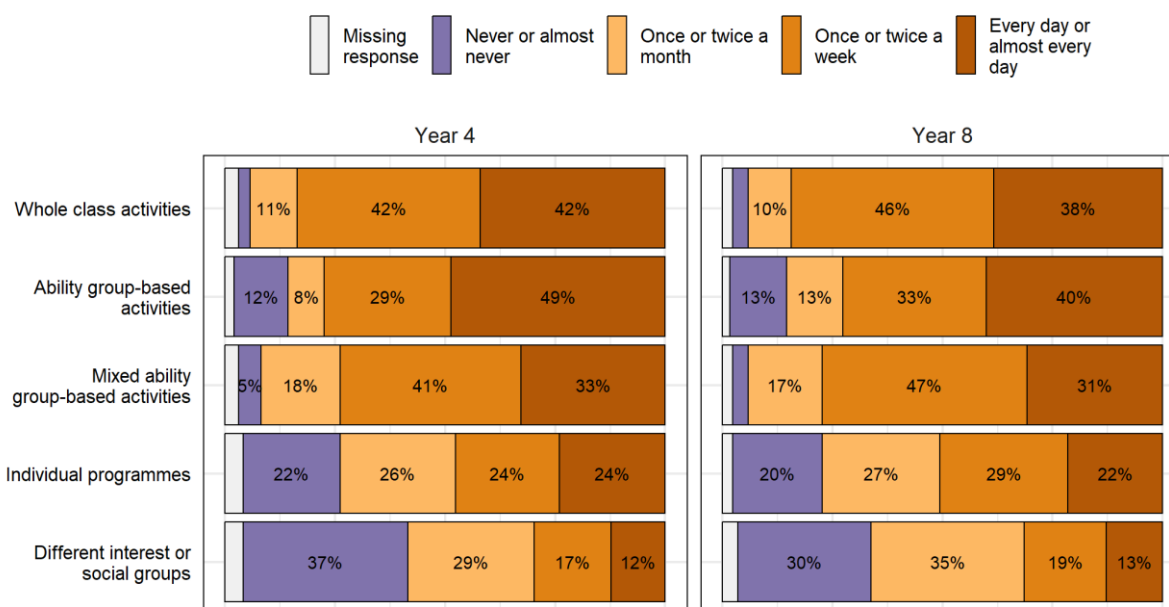


Figure 21 Percentage of teachers responses about organisational strategies they use in mathematics, by year level

## Looking back

In 2018, the reported rate of using ability-based grouping ‘every day or almost every day’ at Year 4 was 48 percent at low decile schools, and 62 and 61 percent at mid and high decile schools respectively. At Year 8, it was highest among teachers at low decile schools (58 percent of teachers at low decile schools responded with ‘every day or almost every day’ compared with 35 percent at mid decile and 47 percent at high decile schools).

## Resourcing and professional learning and development in mathematics

Teachers were asked whether they had access to the necessary resources that enabled them to support the learning of all students in maths.

Most teachers agreed that they had access to adequate resources for teaching mathematics

Overall, the majority of teachers indicated that they had access to the necessary resources to support the learning of all students in mathematics (Figure 22). However, at least 15 percent of teachers at both year levels did not agree.

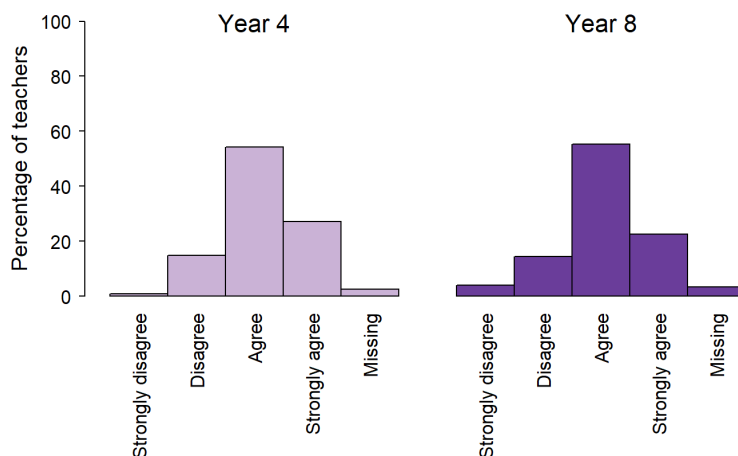


Figure 22 Percentage of teachers' responses regarding access to resources to support the learning of all students in mathematics, by year level

Most teachers indicated that they had participated in professional learning and development in mathematics less than two years ago

Around two thirds of teachers at both Year 4 and Year 8 reported that they had participated in PLD in mathematics education less than two years ago (Figure 23). Small groups of teachers indicated that the last time they had this kind of PLD was either more than five years ago or that they had never had this (12 percent of Year 4 teachers and 16 percent of Year 8 teachers).

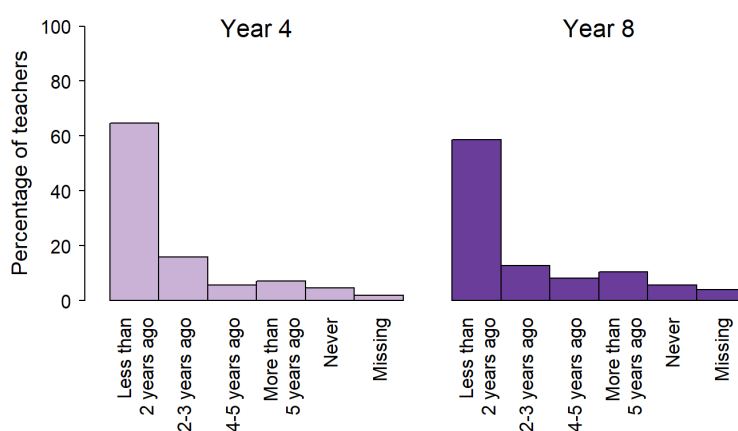


Figure 23 Percentage of teachers' responses regarding when they last had professional learning and development in mathematics education, by year level

Within schools, many teachers reported infrequent opportunities for observing a colleague teaching mathematics

Teachers were asked how often they were involved in four types of professional interactions with colleagues about teaching mathematics (Figure 24). Discussions about useful approaches to support the learning of mathematics for a diverse range of students, and teaching and assessing mathematics learning, were happening at least monthly for over half the teachers at each year level. Of the four types of interaction, observing a colleague was the least frequent, by a substantial margin.

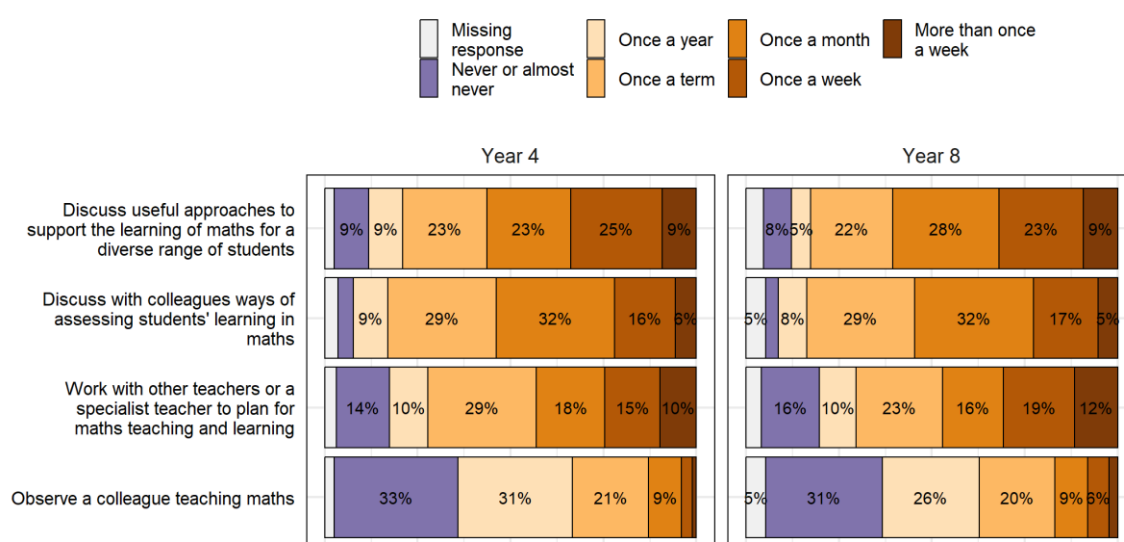


Figure 24 Percentage of teachers' responses regarding how often they have professional interactions about teaching and learning mathematics, by year level

Over half of all teachers rated their overall professional support for teaching and learning mathematics as 'good' or 'very good'

Teachers were asked to provide an overall rating for the professional support they received. Around half of the teachers at each year level (59 percent at Year 4 and 50 percent at Year 8) rated the professional support they receive for teaching mathematics as 'good' or 'very good'. Sixteen percent of Year 4 teachers and 24 percent of Year 8 teachers rated their professional support as 'poor' or 'very poor' (Figure 25).

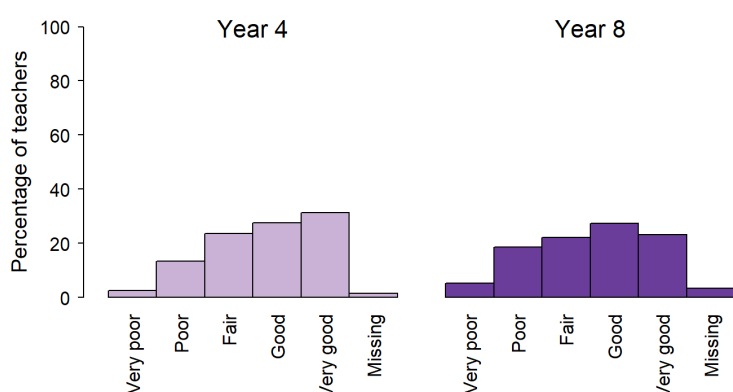


Figure 25 Teachers' ratings of the professional support they receive for teaching mathematics, by year level

## Instructional programmes, approaches or materials

Teachers were asked to indicate the extent to which particular instructional programmes, approaches or materials were used in their classroom maths programme (Figure 26).

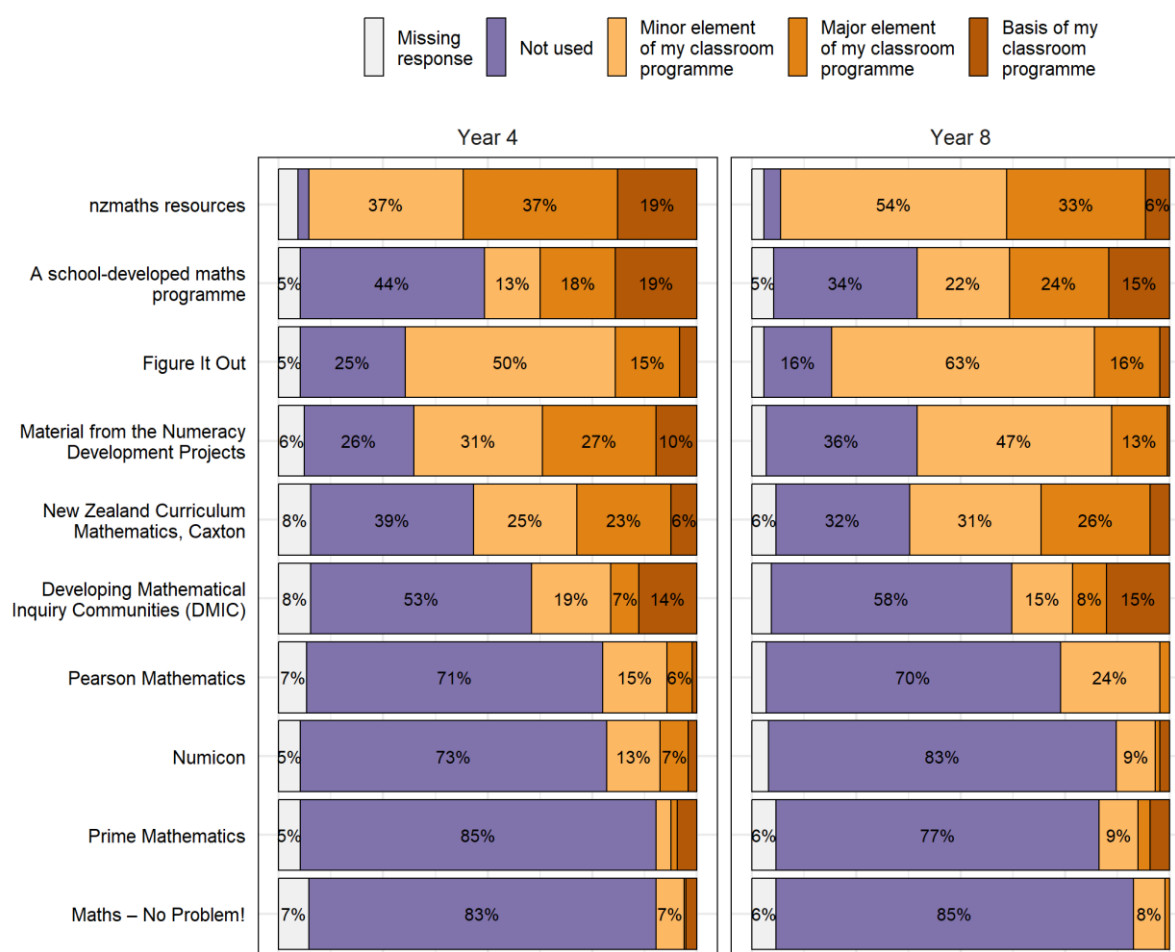


Figure 26 Percentage of teachers' responses regarding instructional programmes, approaches or materials by year level

Teachers reported that they use a range of instructional programmes, approaches or materials in their classrooms

Teachers reported that they used a range of instructional programmes, approaches or materials in their classrooms. However, at both year levels teachers predominantly draw on materials that originate in New Zealand and are closely aligned to the New Zealand Curriculum and context.

## Principals' perspectives on teaching and learning mathematics

Principals were asked about the provision of maths in their school, planning and assessment, teacher capability, and professional support for the teaching of maths.

### The school's provision for mathematics

Most principals were positive about their school's overall provision for learning in mathematics

Four fifths of principals rated their school's provision for learning in mathematics as either 'good' or 'very good' (Figure 27).

Overall, principals at high decile schools rated the provision for learning higher than principals at low decile schools. At high decile schools, 83 percent of Year 4 and 88 percent of Year 8 principals indicated ‘good’ or ‘very good’ provision. This compared with 58 percent and 72 percent, respectively, at low decile schools.

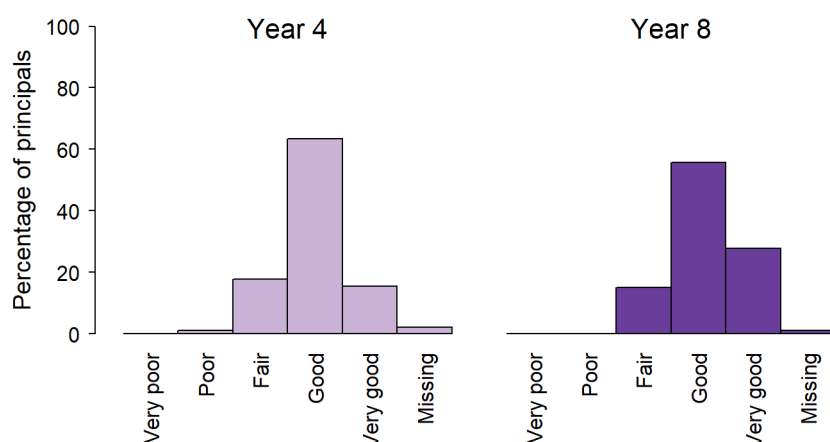


Figure 27 Percentage of principals' ratings of their schools' overall provision for learning in mathematics, by year level

### Looking back

In 2018, 82 percent of Year 4 principals at low decile schools reported their overall provision for learning in mathematics was ‘good’ or ‘very good’. This dropped to 58 percent in 2022.

Most principals were generally positive about their schools' curriculum planning, assessment, and sharing of information related to mathematics

Principals were asked to rate how much each of a list of statements about curriculum planning, assessment, and sharing information resembled what happened in their school (Figure 28 and Figure 29). Most principals rated each of the statements as ‘very like our school’. There was little difference between Year 4 and Year 8 principals' responses to the statements.

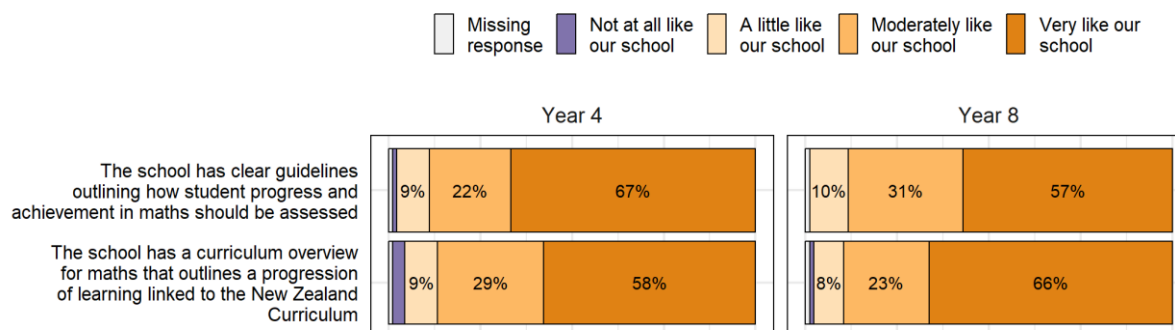


Figure 28 Percentage of principals' ratings of statements related to school approaches to curriculum planning for mathematics, by year level

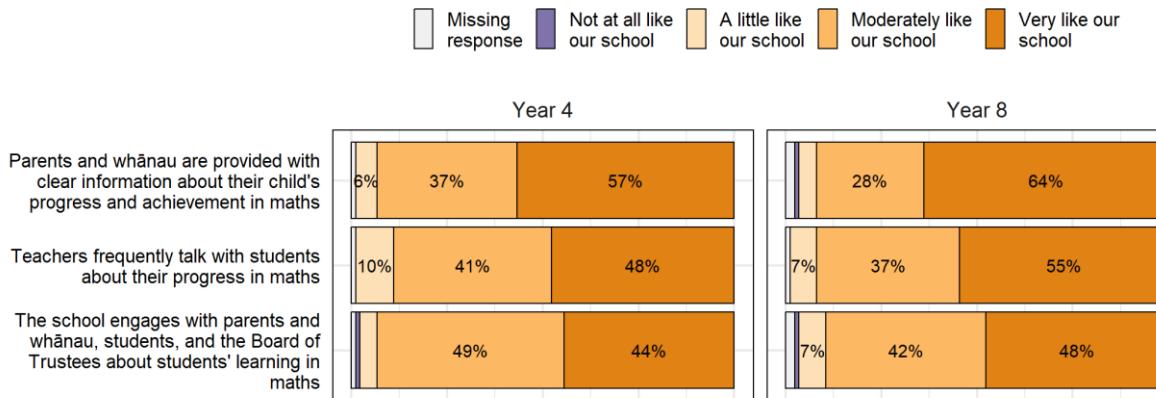


Figure 29 Percentage of principals' ratings of statements related to school approaches to sharing information for mathematics, by year level

### Overall, principals were positive about school support for teaching and learning in mathematics

In general, principals at both year levels were positive about the capabilities of the teachers in their schools to support teaching and learning in mathematics (Figure 30). However, they rated statements about teachers' pedagogical and content knowledge in mathematics and ability to respond effectively to students' learning needs less positively than other statements.

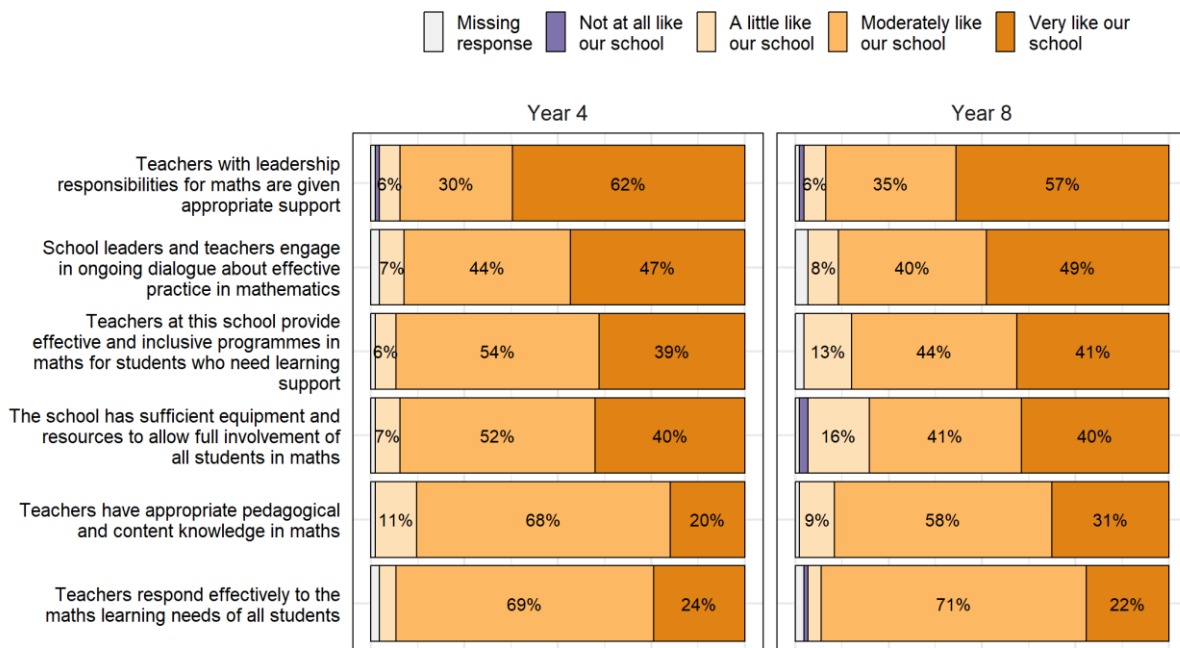


Figure 30 Percentage of principals ratings of statements relating to practices that support teaching and learning in mathematics, by year level

Most principals reported that mathematics had been a focus of development in the last five years

Around half of the principals reported that mathematics had been a major focus for development in the last five years. At least another third indicated it had been a minor focus (Figure 31).

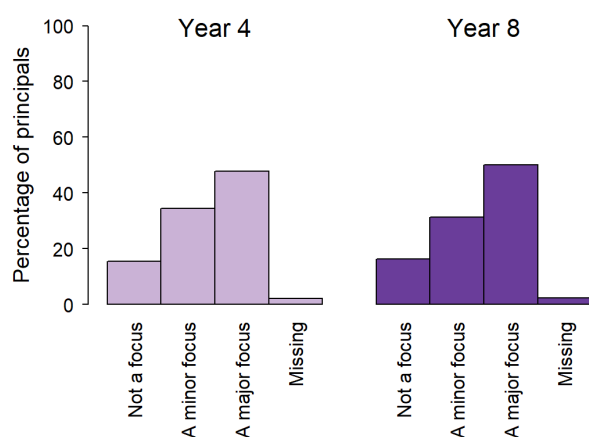


Figure 31 Percentage of principals' responses regarding whether mathematics had been a focus for development in the last 5 years, by year level

Most principals indicated that teachers had 'moderate' to 'extensive' access to professional learning and development in mathematics

At both Year 4 and Year 8, most principals indicated that they had 'moderate' or 'extensive' access to professional learning in mathematics (Figures 32 and 33). At Year 8 however, principals of mid and high decile schools were more likely to indicate little or no access to PLD, compared with principals of low decile schools (18 and 24 percent of principals from high and mid decile schools, respectively, compared with 6 percent of principals from low decile schools).

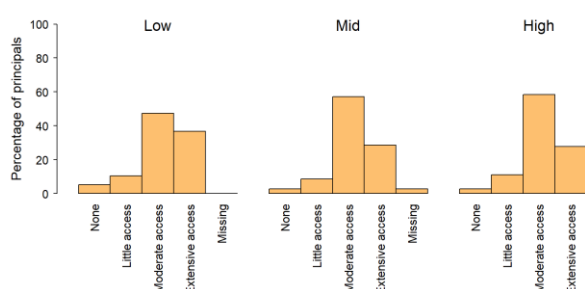


Figure 32 Percentage of Year 4 principals' responses regarding access to professional learning and development, by decile

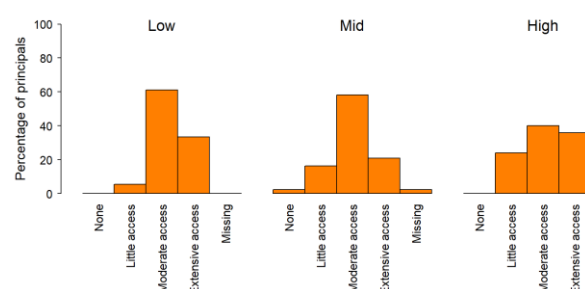


Figure 33 Percentage of Year 8 principals' responses regarding access to professional learning and development, by decile

### Looking back

At Year 4 in 2018, 5 percent of principals of low decile schools indicated little or no access to PLD in mathematics compared with 29 percent of mid decile schools and 22 percent of high decile schools. At Year 4 in 2022, 15 percent of principals of low decile schools indicated little or no access to PLD in mathematics, compared with 12 percent of mid decile schools and 14 percent of high decile schools.



#### 4. The impact of Covid-19 on teaching and learning mathematics

The students, teachers, and principals were asked a series of questions about their experiences of teaching and learning mathematics during the Covid-19 pandemic. This section identifies some of the key themes associated with the responses from each of the three groups.

##### The overall impact of Covid-19

While most teachers and principals indicated that Covid-19 had negative impacts on teaching and learning, most students were positive about their learning at home experiences

The students, teachers and principals were asked to provide an overall indication of the impact of Covid-19 on the teaching and learning of mathematics. While the teachers and principals were generally negative about the impact, students were generally positive.

The teachers were asked to indicate how Covid-19 had impacted maths teaching in their classrooms, overall. At both Year 4 and Year 8, 58 percent of teachers reported a ‘negative impact’ or ‘very negative impact’ on their mathematics teaching (Figure 34).

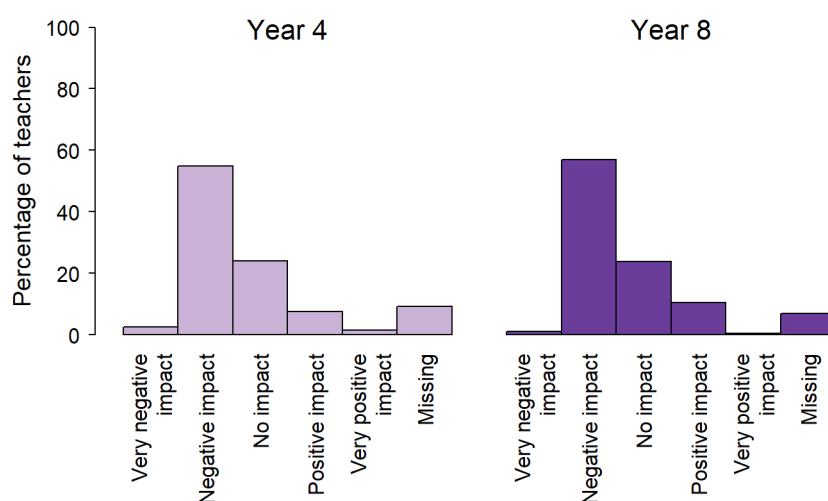


Figure 34 Percentage of teachers' responses regarding how Covid-19 impacted maths teaching in their classroom, by year level

Teachers provided a variety of responses when asked to comment on the biggest impact. A key theme was that there were ‘gaps in learning’ due to interruptions from lockdowns, lack of engagement, and absenteeism. Some teachers did mention more positive impacts. For instance: ‘it has strengthened home school partnerships’ and ‘children were able to have greater agency by the way I had to adapt and change my planning due to online learning’.

Most of the principals in the study were also negative about the overall impact of Covid-19 on teaching and learning (Figure 35). The Year 8 principals were notably more negative, overall, than the Year 4 principals.

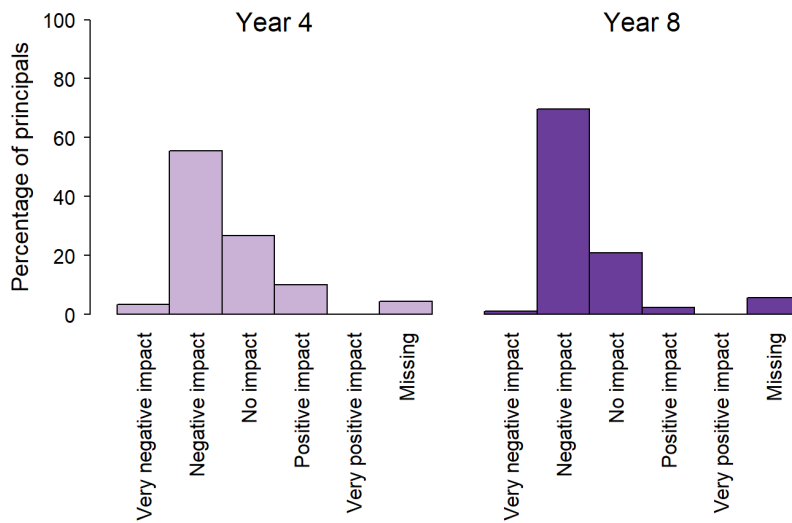


Figure 35 Percentage of principals' responses regarding the impact of Covid-19 on teaching and learning mathematics and statistics, by year level

At Year 8, the level of negativity reported by principals varied by decile. At high decile schools, 52 percent of principals indicated 'negative' or 'very negative' impacts on teaching and learning, compared with 84 percent of principals at low decile schools.

Students, in contrast, were generally positive about the impact of learning at home. At Year 4, 92 percent of students indicated that learning at home 'didn't affect my learning' or 'made my learning better'. A similar proportion of Year 8 students (85 percent) indicated the same (Figure 36).

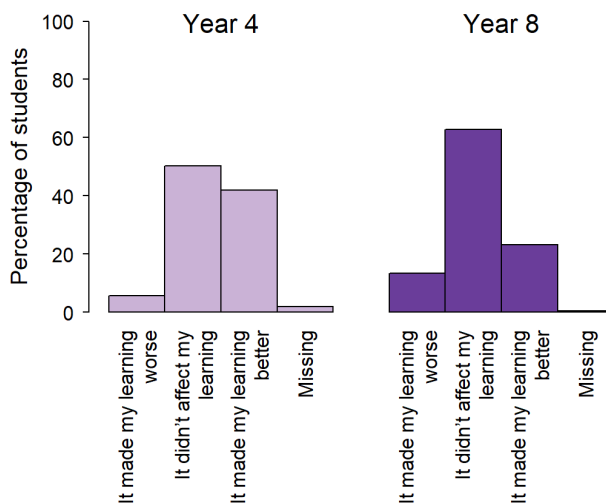


Figure 36 Percentage of students' responses regarding how learning maths at home during the Covid-19 pandemic affected their learning, by year level

### Students' experiences of learning mathematics at home during the Covid-19 pandemic

Students were asked to indicate how much they agreed with four statements related to their experiences of learning mathematics at home during pandemic (Figure 37). Most students agreed at least a little, that they had been given online maths activities, had talked with their whānau about their learning, liked doing maths at home, and that their teacher has got to know them and their whānau better. For all of the statements, Year 4 students were more likely to 'totally agree' than those at Year 8. A greater proportion of Year 8 students compared with Year 4 students indicated they did not agree at all that they liked doing maths at home.

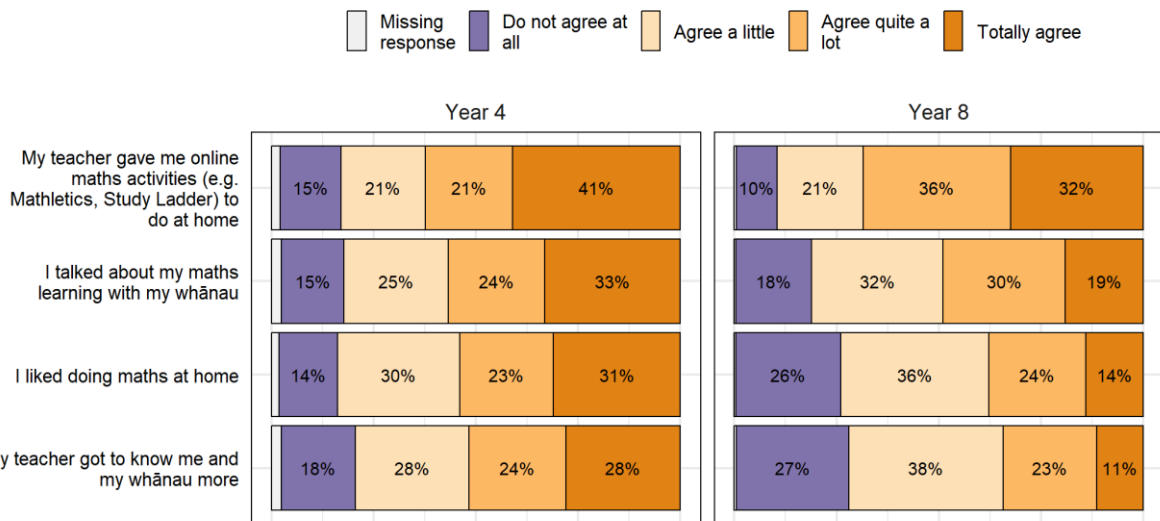


Figure 37 Percentage of students' responses regarding their learning in mathematics at home during the Covid-19 pandemic, by year level

Over half of students rated the amount of maths they did when they were learning at home as 'about the same as normal' or 'more than normal'

Students were asked to rate how much the amount of maths they did at home compared with amount normally done at school (Figure 38). Overall, 57 percent of Year 4 students and 59 percent of Year 8 students reported they did 'about the same as normal' or 'more than normal'. About 20 percent of the students at Year 4 indicated they were unsure.

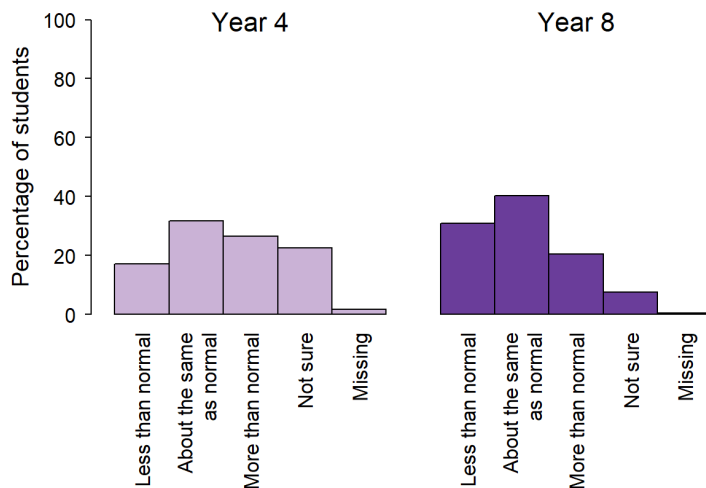


Figure 38 Percentage of students' responses regarding how much maths they did at home during the pandemic, by year level

### Teachers' experiences of learning mathematics at home

Teachers were asked to indicate how successfully they adapted their mathematics teaching and learning programme, and how they built on school and home partnerships during periods of learning at home (Figure 39).

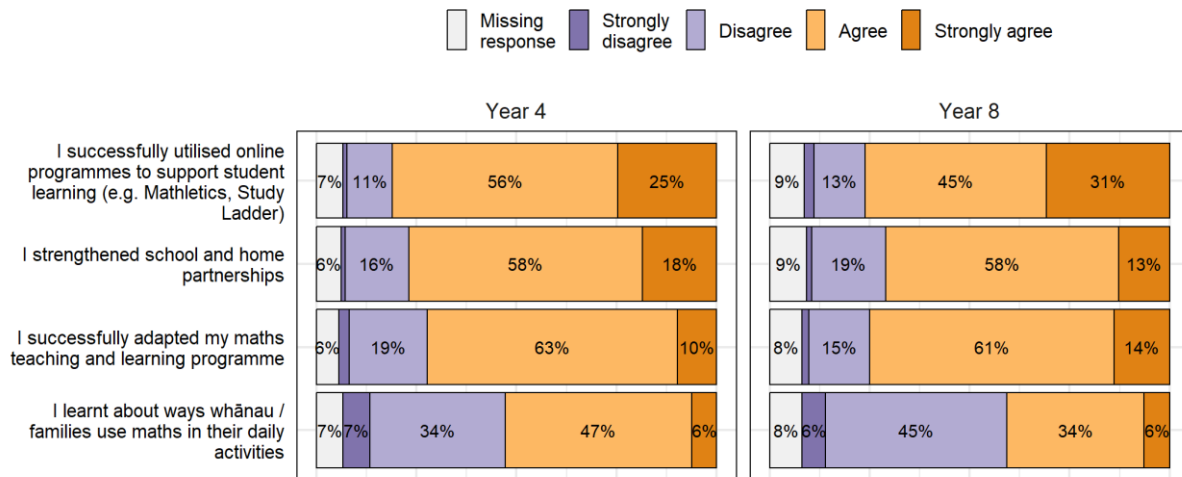


Figure 39 Percentage of teachers' responses regarding how learning maths at home affected their teaching of mathematics, by year level

Overall, the teachers were positive about adapting their teaching and learning programme, utilising online learning, and strengthening home and school partnerships. However, they rated a statement related to learning about ways whānau use maths in their daily activities less positively than other statements. Forty one percent of Year 4 teachers and 51 percent of Year 8 teachers 'disagree' or 'strongly disagree' that they learnt about ways whānau use maths in their daily activities.

### Principals' perspectives on the allocation of time and resources during the pandemic

Principals were presented with a series of statements describing different aspects of teaching and learning. They were asked to indicate how the amount of time and resource the school allocated to each of these compared with the amount allocated pre-Covid-19 (Figure 40).

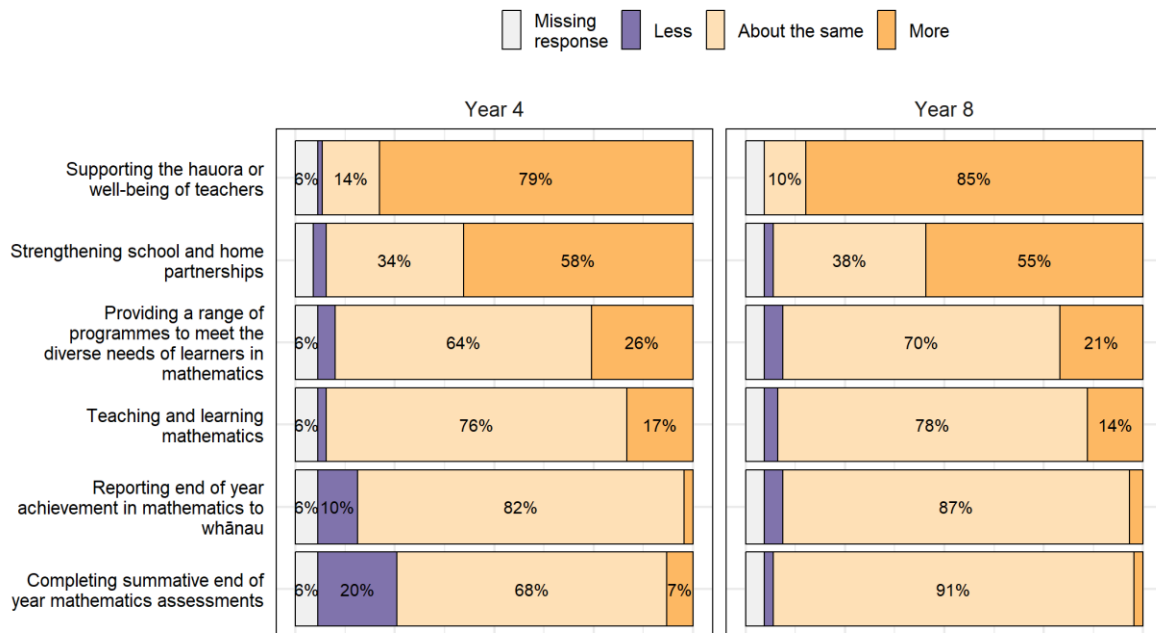


Figure 40 Percentage of principals' responses regarding the allocation of time and resources during the Covid-19 pandemic, by year level

Most principals indicated that they allocated ‘more’ time and resources to supporting the hauora or well-being of teachers and strengthening home and school partnerships during the Covid-19 pandemic

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At both year levels, most principals reported allocating ‘more’ time and resources to supporting the hauora and wellbeing of teachers during the pandemic. Over half of the principals at each year level indicated that ‘more’ time and resources were also allocated to strengthening home and school partnerships (53 percent and 55 percent at Year 4 and 8, respectively). At Year 4, 20 percent of principals indicated ‘less’ time and resources were allocated to completing summative end of year mathematics assessments. This pattern was not evident at Year 8.



