AMSI CHOOSEMATHS RESEARCH

[No1 - 2020]

CHOOSEMATHS

School Survey and Teacher Survey 2016-2019

KEY FINDINGS

AMSI AUSTRALIAN MATHEMATICAL SCIENCES INSTITUTE

The findings presented in this report were based on the school surveys and teacher surveys between 2016 and 2019 in the CHOOSE**MATHS** program.

CHOOSE**MATHS** is a national program of the Australian Mathematical Sciences Institute (AMSI) and the BHP Foundation.

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More information about CHOOSE**MATHS**: https://schools.amsi.org.au/

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Key Findings

1. Female teachers were the main teaching force of school mathematics, with an older average age and a higher proportion teaching part-time than male teachers
2. Male teachers committed to the teaching profession for a shorter time period than female teachers
3. A significantly higher percentage of male teachers than female teachers were teaching the most senior mathematics classes in both primary and secondary schools
4. More than 95 per cent of the primary teachers and more than 80 per cent of the secondary teachers were trained to teach mathematics at appropriate levels, according to teachers' reports
5. Sixteen per cent of male and 24 per cent of female degree holders reported that their degrees did not prepare them adequately for the mathematics they were teaching
6. Three in five of the out-of-field teachers held Bachelor degree other than mathematics major or minor
7. Fifty-eight per cent of the out-of-field teachers reported that their degrees prepared them adequately for the mathematics they were teaching
8. Secondary teachers who were trained to teach mathematics at neither primary nor secondary level were teaching mathematics 2.5 hours shorter than the overall weekly average
9. In-field teachers on average have taught mathematics for longer years and longer weekly hours than out-of-field teachers
10. Out-of-field mathematics teachers were, on average, less confident in teaching mathematics than in-field teachers, especially in teaching senior year mathematics
11. Major in mathematics teachers were at least four times more likely to report that they taught mathematics well than teachers without a major or minor in mathematics
12. Out-of-field teachers had substantially lower confidence than in-field teachers in many aspects of mathematics teaching
13. Making use of assessment data and developing assessment tasks were the top professional learning topics preferred by teachers
14. CHOOSEMATHS has increased teacher confidence in teaching mathematics, as reported by nearly all principals surveyed
15. An increasing proportion of teachers has provided opportunities for career-related learning within the mathematics curriculum
16. Having mathematically confident female teachers teaching girls mathematics was rated by most teachers as 'Very Important', while having single sex classes for mathematics teaching was rated by fewest teachers as 'Very Important'
17. Student previous achievements in mathematics and enjoyment of mathematics were the most influential factors to student decisions to continue studying mathematics, according to the teachers

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Introduction

The Australian Mathematical Sciences Institute (AMSI) partners with the BHP Foundation to empower students, particularly girls and women, to pursue careers in mathematics. The five-year national project, CHOOSE**MATHS**, works with teachers, parents and students to challenge public perception of mathematics and deliver initiatives to increase engagement and capacity from the classroom and university to the industry frontline. Between 2015 and 2019 CHOOSE**MATHS** has been leading the implementation of key strategies to transform Australia's mathematical capability.

The CHOOSE**MATHS** program was monitored by several surveys throughout the course of the project. These included a Student Survey conducted before and after each CHOOSE**MATHS** research lesson or intervention session for Year 5 - 9 students, the Subject Selection Survey for Year 10 & 11 students, the School Survey that was answered by school principals or heads of mathematics, and the Teacher Survey for mathematics teachers in CHOOSE**MATHS** participating schools. An independent third party, the Australian Council for Educational Research (ACER) was commissioned for the administration of the school and teacher surveys, with additional analysis undertaken at AMSI by the Gender Researcher. This report is based on data from these two surveys.

Implementation of the various surveys was guided by the code of ethics under the National Statement on Ethical Conduct in Human Research. A total of 12 ethical clearance approvals were granted by State and Catholic Education authorities for conducting CHOOSE**MATHS** research in 120 schools across the country. Participation in the research surveys was voluntary and anonymous, making it impossible to track individual teachers over time. The information collected is thus a sequence of cross-section data. Any change across different years should not be attributed to within-person change.

The CHOOSE**MATHS** program originated as a response to industry's concern about the under-participation of students, especially girls and young women, in mathematics at school and university. As a mutual agreement, CHOOSE**MATHS** included schools in several pre-scribed clusters of mining towns where BHP is in operation. The rest of schools recruited into the project were largely scattered in low socioeconomic regions of the country. With such a systematic inclusion rule, CHOOSE**MATHS** schools do not necessarily represent the population of entire Australian schools. Rather, the findings of this report are most reflective of the situation in remote and rural areas where BHP operates and is most concerned about.

The target sampling units of the CHOOSE**MATHS** Teacher Survey are primary and secondary school teachers who teach mathematics or who are involved in the delivery of mathematics curriculum in the CHOOSE**MATHS** schools, regardless of whether the teachers are personally participating in the CHOOSE**MATHS** project in the survey year.

A total of 2694 mathematics teachers completed the Teacher Survey between 2016 and 2019. Of the sample, 70, 21, and 9 per cent came from primary, secondary and combined primary and secondary schools respectively. There were missing values for each variable. The share of secondary schools in our sample is higher than the national share and the share of combined primary and secondary schools is lower than the national share level (https://mccrindle.com.au/insights/blogarchive/national-

education-report-a-snapshot-of-schools-in-australia-in-2015/ last accessed on 7 Jan 2020), which seems to indicate that there are fewer combined primary and secondary schools in the remote regions.

KEY FINDING - Female teachers were the main teaching force of school mathematics, with an older average age and a higher proportion teaching part-time than male teachers

Figure 1. Gender composition of the surveyed teachers in primary and secondary schools

It was a widespread perception 15 years ago that most mathematics and science teachers were male, while most English and languages teachers were female. The situation has changed according to our data. In the 2131 primary and 563 secondary teachers who provided information on their gender, only 14 per cent of the primary teachers and 38 per cent of the secondary teachers were male (Figure 1). Overall, 80 per cent of all the teachers surveyed were female.

The largest age group of female teachers, as seen in Table 1, is 25-29 for all school types. The largest age group of male teachers was 30-34 years for primary schools and 25-29 years for secondary schools and combined primary and secondary schools.

Table 1. Gender and age of the teachers, by school type

Age	Primary						Combined Primary & Secondary						Secondary					
	Male		Female		Other		Male		Female		Other		Male		Female		Other	
	N	%	N	%	N	%	N	%	N	%			N	%	N	%		
20-24	12	5.7	108	8.8	1	4.8	0	0	14	10.6	0	0.0	15	10.3	14	6.3	0	0.0
25-29	39	18.4	238	19.5	6	28.6	8	28.6	27	20.5	0	0.0	36	24.7	53	24.0	2	40.0
30-34	45	21.2	152	12.4	2	9.5	5	17.9	16	12.1	1	25.0	12	8.2	25	11.3	0	0.0
35-39	39	18.4	138	11.3	3	14.3	2	7.1	8	6.1	0	0.0	15	10.3	26	11.8	1	20.0
40-44	31	14.6	157	12.8	2	9.5	3	10.7	11	8.3	1	25.0	6	4.1	22	10.0	0	0.0
45-49	10	4.7	174	14.2	3	14.3	2	7.1	18	13.6	0	0.0	22	15.1	35	15.8	0	0.0
50-54	12	5.7	107	8.8	2	9.5	3	10.7	16	12.1	0	0.0	17	11.6	18	8.1	2	40.0
55-59	20	9.4	88	7.2	0	0	1	3.6	10	7.6	1	25.0	16	11.0	14	6.3	0	0.0
60+	4	1.9	61	5.0	2	9.5	4	14.3	12	9.1	1	25.0	7	4.8	14	6.3	0	0.0
Total	212	100.0	998	100.0	21	100.0	28	100.0	132	100.0	4	100.0	146	100.0	221	100.0	5	100.0

Due to the relatively small number of combined primary and secondary schools, individual teachers are classified according to the highest school year level of mathematics they were teaching, and this is given in Table 2.

Although the largest age group of men was 30-34 for primary and 25-29 for secondary teachers, the overall age structure of male teachers was younger among the primary teachers, because 43 per cent of the male secondary teachers and only 22 per cent of the male primary teachers were aged 45 or above.

In addition, the age distribution among the primary teachers varied widely between male and female, with 39 per cent of male and only 23 per cent of female teachers aged between 30 and 39, and 36 per

cent of male versus 48 per cent of female teachers aged 40 years and above. No significant gender difference in age was seen among the secondary teachers.

Table 2. Summary of respondents 2016 - 2019, by gender and teacher type

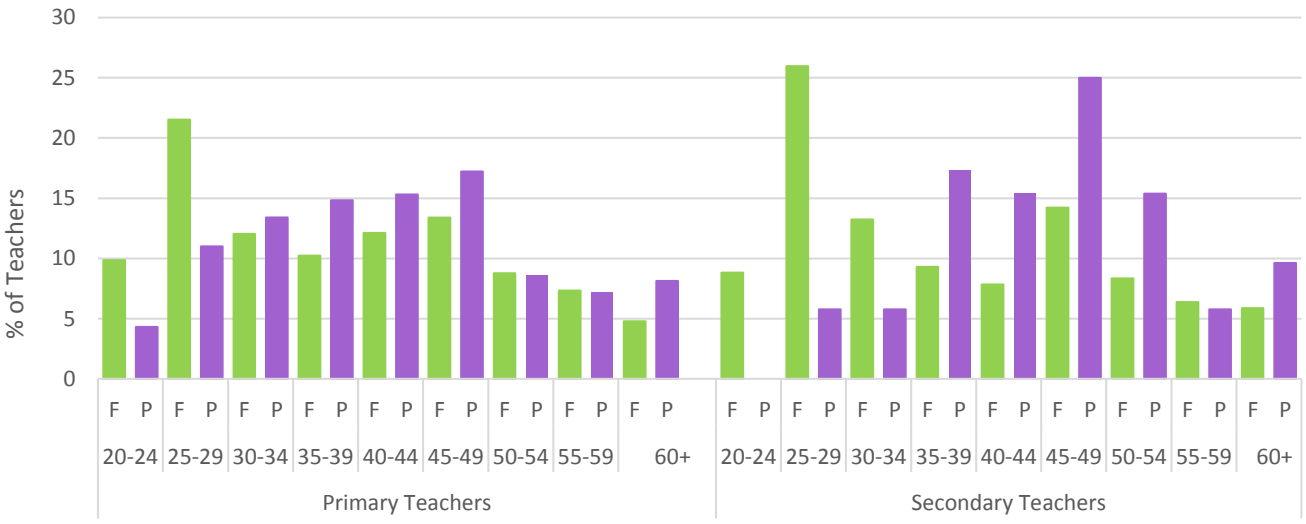
	Primary					Secondary					Grand Total
	Male	Female	Other	.	Total	Male	Female	Other	.	Total	
2016	57	426	0	9	492	43	83	0	2	128	620
2017	89	626	12	37	764	67	112	2	12	193	957
2018	85	472	8	0	565	60	93	4	14	171	736
2019	58	232	4	16	310	29	42	0	0	71	381
Total					2131					563	2694

Of the mathematics teachers surveyed, 4.6 percent of women and 8.4 percent of men were school principals. Sixty nine percent of the principals were women, a consequence of the female dominant teaching profession.

Time Fraction of Teaching

Sixteen per cent of women versus 7 per cent of mem among the primary teachers were teaching part-time. Among the secondary teachers, over 20 per cent of women versus less than 2 per cent of men were teaching part-time. Overall, 17 per cent of the female versus 5 per cent of the male teachers were teaching part-time.

Figure 2. Age distribution of full-time and part-time female teachers



Notes: There are 3 layers in the horizontal axis. The first layer F and P represent full-time and part-time respectively, the next layer represents age group, and the last layer refers to teacher type. The vertical axis represents percentage of teachers falling into each category of the horizontal axis. Green and purple represent full-time and part-time respectively.

On average, female teachers were more likely to work part-time as they grew older as compared to the male teachers. Moreover, for both primary and secondary female teachers, as in Figure 2, the part-time teachers (in purple) were significantly older than the full-time teachers (in green).

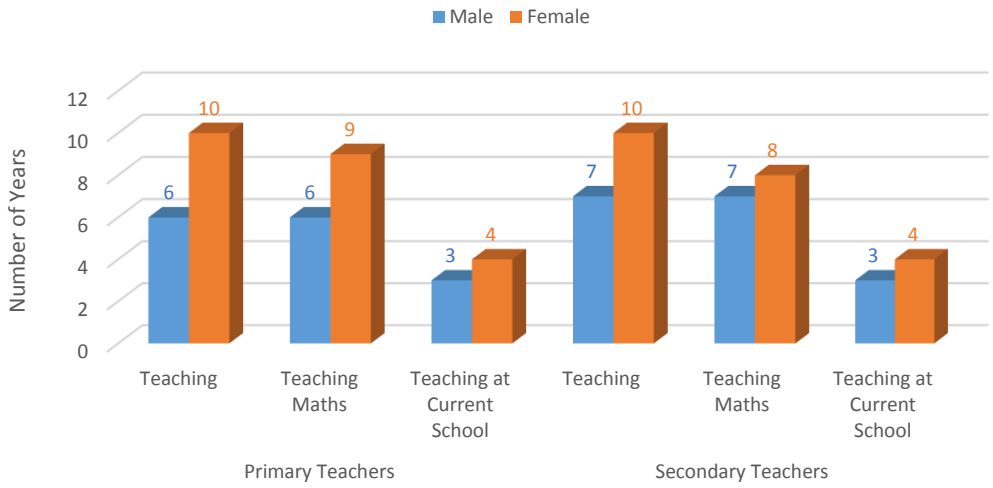
Tenure of Teaching

KEY FINDING - Male teachers committed to the teaching profession for a shorter time period than female teachers

Displayed in Figure 3 is the median length of teaching in three aspects, namely, the total length of general teaching career, length of time teaching mathematics and length of time teaching in the current school, separately for gender and teacher types.

A striking finding is that in all the three aspects male teachers had been teaching for a shorter time period than female teachers (the height of blue bar is shorter than that of red bar in each pair). Male teachers on average had stayed in the teaching profession for a shorter time period than female teachers, by 4 and 3 years among the primary and secondary teachers respectively. On the teaching of mathematics, the median length of teaching was 3 and 1 year shorter for male teachers than female teachers in primary and secondary schools respectively.

Figure 3. Median of teaching tenures, by gender and teacher type

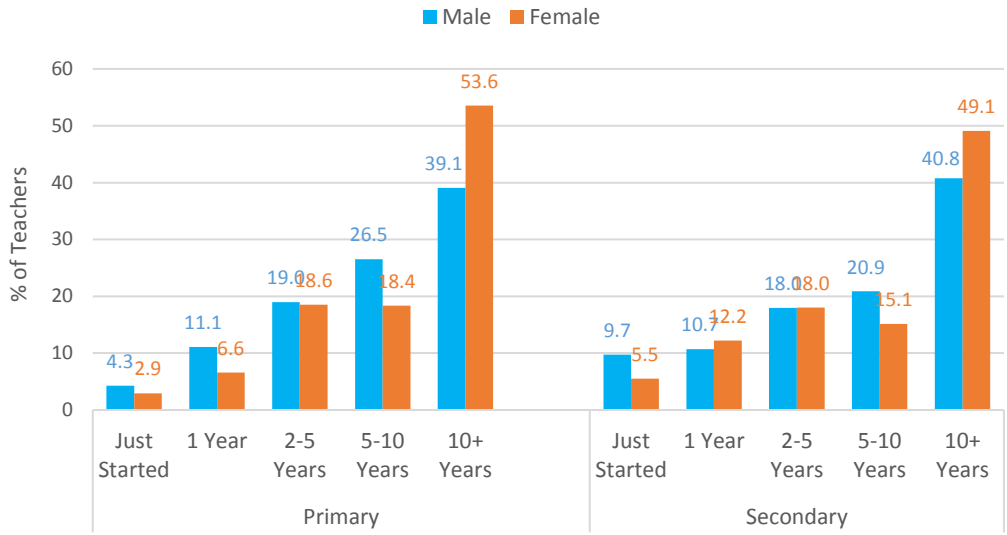


When the teachers was grouped according to the length of time teaching mathematics, shown in Figure 4, it was found that a higher proportion of men than women fall in the category 'Just started' teaching mathematics at both primary and secondary schools. This could indicate an improved gender balance in the newly recruited teachers, or that female teachers did not start teaching mathematics until the second year in their career, or a mix of both.

Roughly, 4 in 10 male teachers versus 5 in 10 female teachers had been teaching mathematics for 10 or more years, in primary and secondary schools. Compared to female teachers, a higher proportion of male teachers just started teaching mathematics, yet a lower proportion of male teachers stayed in teaching for 10 years or longer.

The fact that a higher proportion of male teachers just started teaching mathematics, yet a lower proportion of them taught for longer than 10 years seems to indicate that the male teachers often teach for less than 10 years before making a career change or giving up classroom teaching for leadership roles if staying in the teaching profession. By contrast, female teachers tended to stay in teaching positions for longer. Statistically significant gender difference was seen in leadership positions at both primary and secondary schools in the surveys - 7.0 per cent of male versus 3.4 per cent of female teachers reported to hold the position of principal or deputy principal at their schools.

Figure 4. Percentage of teachers falling in the various teaching tenures, by gender



In summary, 86 per cent of the primary teachers and 62 per cent of the secondary mathematics teachers in the surveys were female. Male mathematics teachers were more likely to leave classroom teaching or the teaching profession than female teachers, especially in primary schools. The need to understand how to support teachers, especially female teachers to grow in confidence and competence to teach mathematics is especially important given the large numbers of women in the teaching workforce.

Teaching Workload

Three measures of teaching workload in mathematics were collected in the CHOOSE**MATHS** Teacher Survey – the weekly hours of teaching mathematics, the number of year levels and the highest year level of mathematics taught. Although not taking preparation time into account, these measures can give a rough idea of the teaching workload of mathematics teachers.

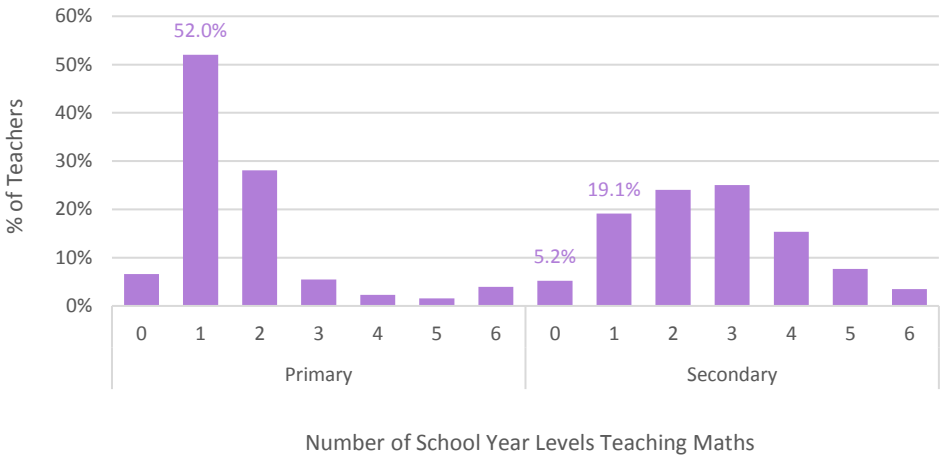
Table 3. Hours of teaching mathematics per week, by teacher type

		Male	Female	Other	Missing	Total
Primary Teachers	Mean	5.5	5.5	5.8	7.5	5.5
	SD	2.6	2.4	2.3	2.5	2.4
	N	260	1627	19	19	1925
Secondary Teachers	Mean	14.3	13.2	9.3	14.9	13.6
	SD	8.0	8.1	5.7	11.0	8.1
	N	206	325	5	7	543
Total	Mean	9.4	6.8	6.6	9.5	7.3
	SD	7.1	4.9	3.5	6.7	5.5
	N	466	1952	24	26	2468

No statistically significant gender difference was seen in the weekly teaching hours within primary or secondary teachers. However, unsurprisingly, the teaching patterns and loads were significantly different between primary and secondary teachers because secondary teachers usually focus on certain subject areas whereas primary teachers are responsible for overall classroom teaching. On

average, primary teachers teach 5.5 hours of mathematics per week, in Table 3, and secondary teachers teach mathematics longer than the primary teachers by 8.1 hours per week, often via teaching a wider range of year levels.

Figure 5. Total number of school year levels that the teachers were teaching mathematics



Less than 10 per cent of the primary teachers versus more than half of the secondary teachers were teaching 3 or more school year levels. Figure 5 indicates that more than half of the primary teachers were teaching a single year level, while three quarters of the secondary teachers were teaching multiple year levels.

KEY FINDING - A significantly higher percentage of male teachers than female teachers were teaching the most senior mathematics classes in both primary and secondary schools

Table 4. Highest school level of mathematics currently teaching, by teacher type

Highest Year Level Currently Teaching	Primary				Secondary			
	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
0	8	3.1	264	16.3				
1	11	4.2	206	12.8				
2	24	9.2	276	17.1				
3	23	8.8	170	10.5				
4	32	12.3	257	15.9				
5	37	14.2	131	8.1				
6	117	44.8	290	18.0				
7	9	3.5	22	1.4	9	4.4	28	8.7
8					11	5.4	26	8.1
9					20	9.9	45	13.9
10					15	7.4	50	15.5
11					42	20.7	55	17.0
12					106	52.2	119	36.8
Total	261	100.0	1616	100.0	203	100.0	323	100.0

Despite male teachers were under-represent in school mathematics teaching profession and males teachers on average had stayed in the profession for a shorter time period than female teachers, male teachers were teaching a substantially higher proportion of the senior year levels, as shown in Table 4. Among primary teachers, more than half of women were teaching mathematics for Year 3 or lower and less than 20 per cent of women were teaching mathematics for Year 6 or 7 (in those states where

Year 7 is in primary). By contrast, nearly half of male teachers were teaching Year 6 or 7. The situation was more balanced in secondary schools, where 52 per cent of male and 37 per cent of female teachers were teaching Year 12.

Among the Year 6 or 7 primary teachers, men on average had a shorter length of experience in teaching mathematics than women, by 2.8 for Year 6 and 3.5 years for Year 7 (Table 5). However, among the Year 12 teachers, men on average had a longer teaching experience in mathematics than women by 3.1 years.

Table 5. Average years of mathematics teaching, by the highest school level teaching

Highest Year Level Currently Teaching	Primary		Secondary	
	Male	Female	Male	Female
0	9.1	11.5		
1	2.7	11.1		
2	8.9	12.2		
3	6.3	12.1		
4	9.7	12.9		
5	9.6	10.1		
6	10.9	13.7		
7	9.4	12.9	1.8	4.9
8			12.8	9.6
9			8.6	12.6
10			7.6	9.7
11			9.1	10.8
12			15.6	12.5
Overall	9.5	12.2	11.9	10.9

Among these senior year level teachers, women appear to have an older age structure for primary and a younger age structure for secondary teachers, as given in Table 6. In Year 6 or 7 teaching, 38 per cent of men and 48 per cent of women aged 40 or above. In Year 12 teaching, 61 per cent of men and 46 per cent of women aged 45 or above. The Year 12 teachers had slightly older age structure than the Year 6 or 7 teachers.

Table 6. Age distribution for senior year level teachers (Measurement unit: Year)

	All teachers		Non-Senior Year Teachers		Year 6/7 Teachers		Year 12 Teachers	
Age	Male	Female	Male	Female	Male	Female	Male	Female
20-24	7.0	8.6	9.0	9.3	5.0	7.1	4.0	3.3
25-29	21.4	20.2	24.1	20.4	19.0	18.4	17.1	23.3
30-34	16.0	12.3	14.6	12.3	27.0	13.8	5.3	6.7
35-39	14.4	10.9	18.4	11.0	11.0	12.6	7.9	6.7
40-44	10.3	12.1	6.1	11.4	23.0	14.6	5.3	14.4
45-49	8.8	14.4	5.7	14.7	3.0	13.4	25.0	13.3
50-54	8.3	9.0	9.4	8.4	1.0	9.6	14.5	13.3
55-59	10.1	7.1	9.0	7.5	8.0	4.6	15.8	8.9
60+	3.9	5.5	3.8	5.1	3.0	5.9	5.3	10.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

With respect to the teaching experience in mathematics, the relevant summary of data is given in Table 7. From the last row of the table, on average, men were less experienced than women among the Year 6 or 7 primary teachers, by 2.7 years. By contrast, on average, men were more experienced than women by 3.1 years among the Year 12 teachers.

Table 7. Mean number of years teaching mathematics

	All teachers		Non-Senior Year Teachers		Year 6/7 Teachers		Year 12 Teachers	
Age	Male	Female	Male	Female	Male	Female	Male	Female
20-24	1.8	2.2	1.8	2.2	0.8	3.4	1.2	1.8
25-29	4.1	3.7	4.1	3.7	3.3	4.7	4.2	3.5
30-34	6.1	7.1	6.1	7.1	6.0	7.4	9.3	7.1
35-39	7.4	10.8	7.4	10.8	9.3	11.4	8.4	6.9
40-44	8.4	12.8	8.4	12.8	12.4	14.2	7.0	11.9
45-49	9.6	15.1	9.6	15.1	14.7	20.6	14.1	13.3
50-54	14.7	22.2	14.7	22.2	29.0	23.5	20.6	18.1
55-59	24.8	24.6	24.8	24.6	34.8	30.3	28.7	23.4
60+	25.0	30.1	25.0	30.1	32.3	31.9	40.3	27.9
Overall	8.6	11.7	8.6	11.7	10.8	13.5	15.6	12.5

In summary, no gender difference existed in weekly hours of mathematics teaching. However, male teachers on average taught mathematics at a wider range of school year levels, especially at the senior school year levels. Among the Year 12 mathematics teachers, men on average had a longer experience in teaching mathematics than women.

Qualifications and Training

Levels Trained and Formal Qualification

KEY FINDING - More than 95 per cent of the primary teachers and 79 per cent of the secondary teachers were trained to teach mathematics at appropriate levels, according to teachers' reports

Table 8. Level trained to teach mathematics, by gender and teacher type

Level Trained to Teach Mathematics	Primary Teachers				Secondary Teachers			
	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
Neither Primary nor Secondary	10	3.7	56	3.4	24	**11.8**	64	**19.3**
Primary school level	218	81.0	1,479	88.7	2	**1.0**	23	**6.9**
Secondary school level	6	2.2	12	0.7	157	77.3	206	62.1
Both Primary and Secondary Levels	35	13.0	120	7.2	20	9.9	39	11.8
Total	269	100.0	1666	100.0	203	100.0	332	100

An item in the CHOOSE**MATHS** Teacher Survey asks participants to indicate the level of mathematics for which they were trained to teach. From the data shown in Table 8, more than 95 per cent of the primary teachers received training to teach primary mathematics under the assumption that a secondary mathematics teacher is considered also appropriate for teaching primary mathematics. Seventy-nine per cent of the secondary teachers reported that they were trained at a level to teach secondary mathematics, under the assumption that a teacher trained at both primary and secondary levels is also considered to be appropriate for teaching secondary mathematics.

Table 9. Qualifications in the survey and the qualification holders

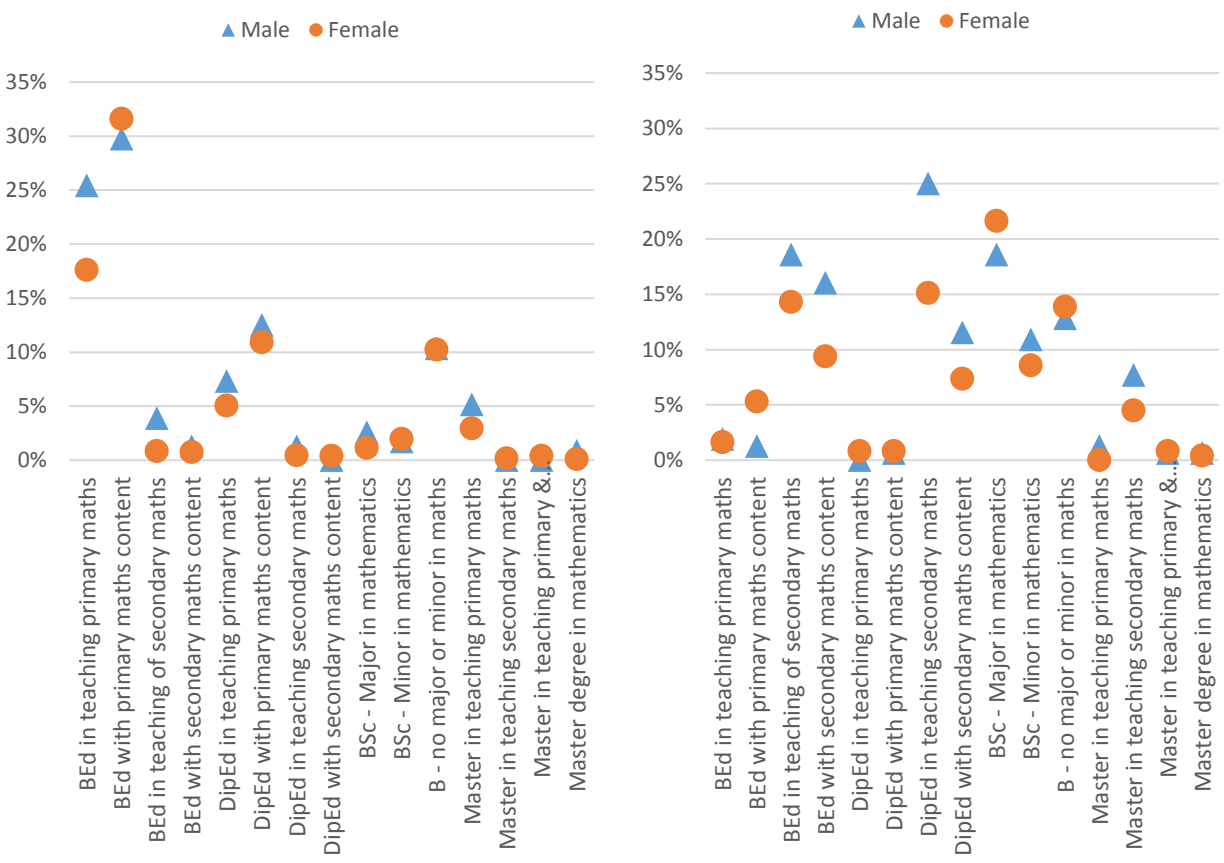
Qualification	Primary			Secondary		
	Male	Female	Person	Male	Female	Person
Bachelor of Education in teaching of primary mathematics	25.4	17.6	18.8	1.9	1.6	1.8
Bachelor of Education with primary mathematics content	29.7	31.6	31.3	1.3	5.3	3.7
Bachelor of Education in teaching of secondary mathematics	3.9	0.8	1.3	18.6	14.3	16.0
Bachelor of Education with secondary mathematics content	1.3	0.8	0.8	16.0	9.4	12.0
Diploma of Education in teaching of primary mathematics	7.3	5.0	5.4	0.0	0.8	0.5
Diploma of Education with primary mathematics content	12.5	10.9	11.2	0.6	0.8	0.8
Diploma of Education in teaching of secondary mathematics	1.3	0.5	0.6	25.0	15.1	19.0
Diploma of Education with secondary mathematics content	0.0	0.4	0.3	11.5	7.4	9.0
Bachelor degree - Major in mathematics	2.6	1.1	1.4	18.6	21.6	20.5
Bachelor degree - Minor in mathematics	1.7	2.0	1.9	10.9	8.6	9.5
Bachelor degree without a major or minor in mathematics	10.3	10.2	10.3	12.8	13.9	13.5
Masters degree in teaching of primary mathematics	5.2	2.9	3.3	1.3	0.0	0.5
Masters degree in teaching of secondary mathematics	0.0	0.2	0.1	7.7	4.5	5.7
Masters degree in teaching primary and secondary mathematics	0.0	0.4	0.3	0.6	0.8	0.8
Masters degree in mathematics	0.9	0.1	0.2	0.6	0.4	0.5

Noticeably, 11.8 per cent of male and 19.3 per cent of female secondary teachers reported that they were neither trained to teach mathematics at primary nor secondary level. A further 7 per cent of female secondary teachers were only trained to teach mathematics at primary level. Among all the secondary mathematics teachers with no reportedly appropriate training, more than 90 per cent were women.

Another survey item consisting of a list of 15 qualifications that are considered most relevant to the teaching of mathematics at schools was also administered to the survey participants who were asked to select the qualifications they have completed from the list. An addition category 'Other' and free text space were also provided in the questionnaire to capture some less expected cases. In data cleaning, the text responses were absorbed into the list variables wherever appropriate. A quarter of the survey participants did not select any qualification from the list nor gave any text responses. It is unclear what these non-responses indicate.

For the teachers who had valid responses, the percentage of teachers with each qualification is given in Table 9 and Figure 6. Qualifications held by the primary (left) and the secondary (right) teachers, separately for male and female and at primary and secondary levels. The percentages in each column of the table do not add up to 100 percent because some respondents held multiple qualifications.

Figure 6. Qualifications held by the primary (left) and the secondary (right) teachers



As expected, the distribution of qualifications differs a lot between primary and secondary teachers.

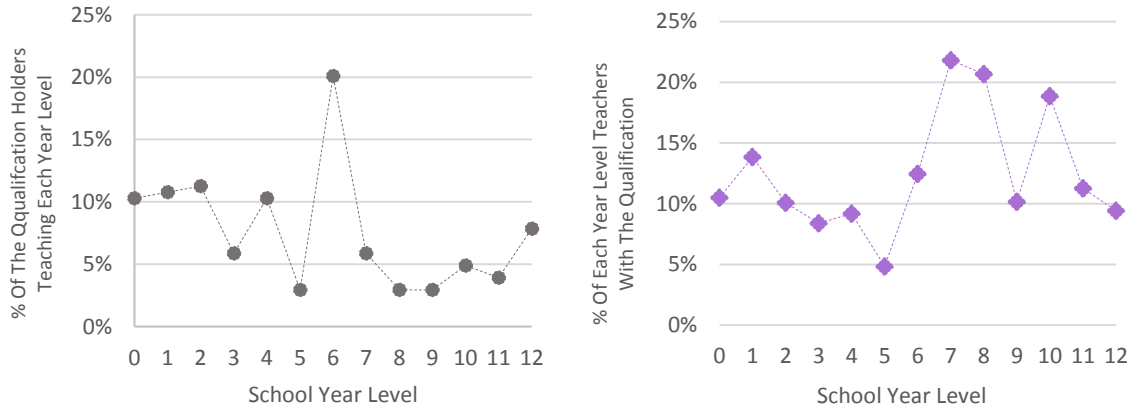
Among the primary teachers, more than 70 per cent of the teachers had a qualification from four categories, namely a) Bachelor of Education in teaching primary mathematics, b) Bachelor of Education with primary mathematics content, c) Diploma of Education with primary mathematics

content, and d) Bachelor degree without a major or minor in mathematics. The largest qualification group for the primary teachers was a Bachelor of Education with primary mathematics content, 12 per cent points more than the next largest qualification group.

The secondary teachers had more evenly distributed qualifications, with a quarter of the male and 15 per cent of the female teachers holding Diploma of Education in teaching secondary mathematics and one in five teachers holding a Bachelor degree with a major in Mathematics.

Analyses found that the teachers holding a Bachelor degree with a major in Mathematics was the most valuable group in terms of teaching Year 12 mathematics. Specifically, 25 per cent (see Figure 8) of all Year 12 mathematics teachers held this qualification, the biggest qualification group among Year 12 mathematics teachers. This group of teachers reported consistently higher confidence scores in the teaching of mathematics. Mathematics graduates have been an invaluable service provider for the most challenging mathematics subjects in secondary schools.

Figure 7. Bachelor degree without major or minor in mathematics at each year level



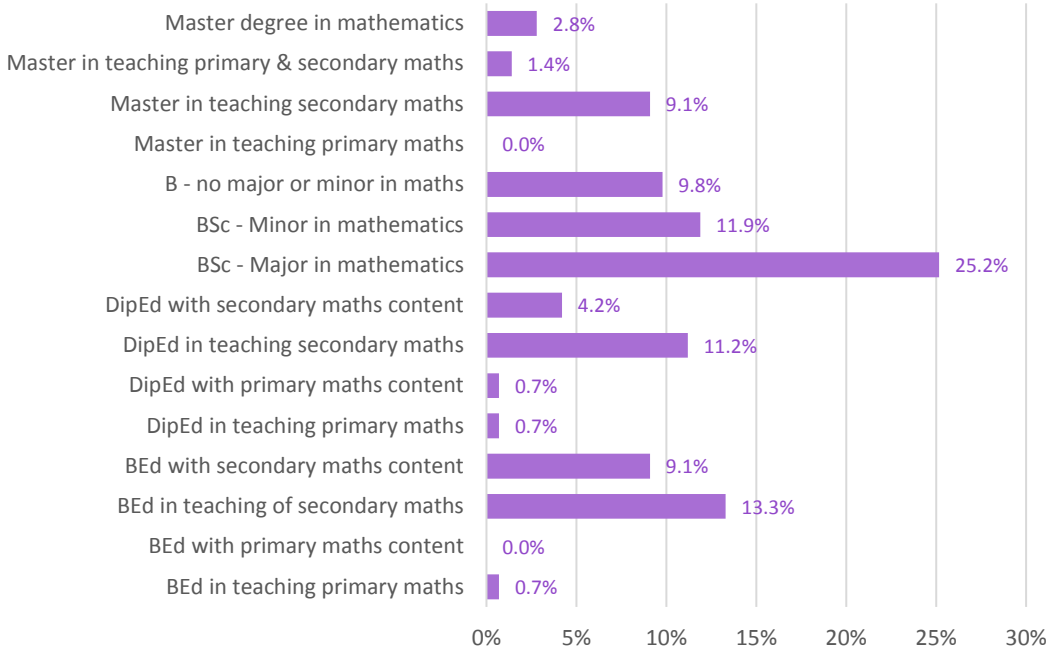
Of all the teachers surveyed, 10.5 per cent of them held a Bachelor degree without major or minor in mathematics. These teachers were teaching mathematics throughout all school year levels. The left graph in Figure 7 shows how the teachers with this type of qualifications distributed across various school year levels. It is seen that 20 per cent of this qualification holders, the largest group, were teaching Year 6. The right-hand-side graph in Figure 7 displays the percentage of a specific year level mathematics teachers who had a Bachelor degree without major or minor in mathematics. It is seen that the teachers in Year 7 and 8 mathematics classes had the highest percentage, more than 20 per cent, holding such type of qualifications.

Focusing on Year 12 mathematics teachers, we found that, in Figure 8, the largest qualification group was a Bachelor degree with a major in mathematics. Only 2 per cent of the Year 12 mathematics teachers held Bachelor or Diploma of Education in teaching of primary mathematics or with primary mathematics content. About 10 per cent of the Year 12 teachers held a Bachelor degree without major or minor in mathematics.

Overall, approximately one quarter of the teachers surveyed did not indicate any qualification in the survey list or gave a text comment. Among the secondary mathematics teachers who provided a response to the qualification item, 15.7 per cent held a Bachelor degree without a major or minor in mathematics, plus a further 4.8 per cent held degrees with primary mathematics content or teaching. Based on the data, it is estimated that up to 45 per cent of the qualifications (25 per cent non-

respondents plus 15.7 per cent plus 4.8 = 45.5 per cent) for the secondary mathematics teachers could be problematic in teaching secondary mathematics.

Figure 8. Qualifications held by Year 12 mathematics teachers



However, care is needed for interpreting teachers' qualification. Data from another survey item show that only 21 per cent of the secondary teachers were not explicitly trained to teach secondary mathematics. The discrepancy in teachers' responses between that item and the qualification item suggests that some teachers without an adequate qualification have received training from other sources to become appropriate (at least themselves believed so) for teaching secondary mathematics over the years after completing their initial qualification.

KEY FINDING - Sixteen per cent of male and 24 per cent of female degree holders in secondary schools reported that their degrees did not prepare them adequately for mathematics they were currently teaching

Among the teachers who selected at least one qualification from the survey list, 36 per cent of primary teachers and 21 per cent of secondary teachers considered that their degrees did not prepare them adequately for the mathematics they were teaching. The higher percentage of primary teachers than secondary teachers with a reported unpreparedness seems to reflect that the teaching of mathematics in primary schools is more demanding in teaching skills.

The reported unpreparedness was similar between male and female teachers in primary schools but was higher for female (24 per cent) than male (16 per cent) teachers in secondary schools, despite of their training. The reported unpreparedness also varies across school year levels. For example, 32 per cent of Foundation-level teachers and 41 per cent of Year 6 teachers reported lack of preparation by their degrees. Among all the secondary teachers with a reported unpreparedness, one third were teaching Year 12 and more than one third were teaching Years 9 and 10 each.

Overall, regardless of school type or gender, approximately one third of the surveyed teachers said that their degrees did not prepare them adequately for the mathematics they were teaching, even

though more than 80 per cent of them held at least one degree. This suggests the need for classroom support, especially for early career teachers.

Teaching Mathematics Out-of-Field

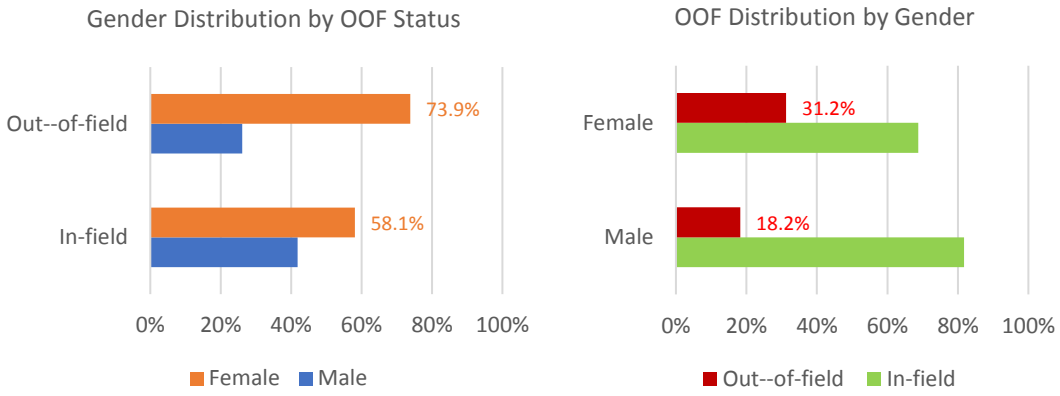
No unique definition for the terminology 'teaching out-of-field' or 'teaching out-of-area' exists. Loosely speaking, it refers to the practice of teaching a subject, area or school year level for which a teacher has no formal qualification, and/or no training in the subject content and/or teaching.

Some authors consider the in-field teaching requires both content knowledge and teaching method, while others consider either content knowledge or teaching method of a subject suffices the in-field teaching. Since all primary teachers are qualified to teach in primary schools, in this section we consider only teachers teaching mathematics in secondary schools.

In the CHOOSE**MATHS** Teacher Survey, the phrase 'out-of-area' was used, without a formal definition. The survey item reads 'Are you teaching mathematics as "teaching out of area?"' with the response options 'Yes' and 'No'. If Yes, a free text space was provided requesting for more explanation. As such, the collected data rely on the individuals' interpretation and may not be directly comparable to other studies. In this report we use the terms *out-of-field* (OOF) and *in-field*.

There was no statistically significant difference in the proportion of OOF teaching teachers across the survey years. In the pooled data, 26.4 per cent of the secondary teachers reported that they were teaching mathematics out-of-field. A gender breakdown is provided in Figure 9.

Figure 9. Status of teaching mathematics out-of-field and gender



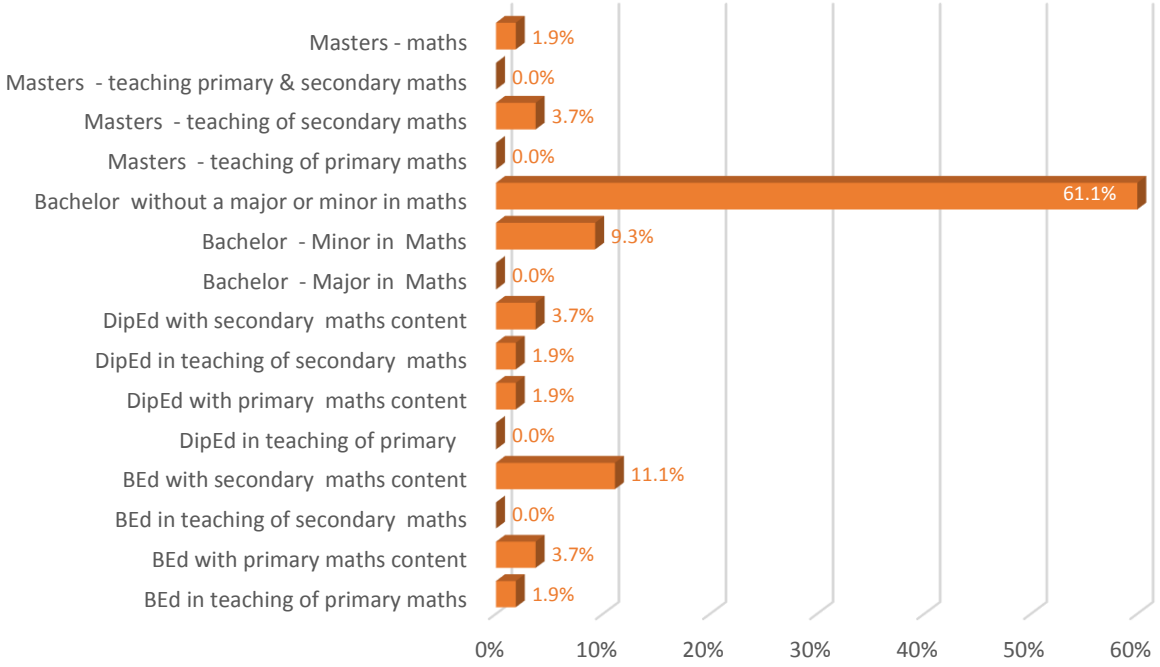
Female teachers were more likely to teach mathematics out-of-field than male teachers - 30 per cent of female as compared to only 18 per cent of male teachers were teaching OOF. Seventy three per cent of the secondary mathematics teachers who were teaching OOF were women. While 58 per cent of the in-field teachers were female, approximately three quarters of the out-of-field teachers were female. This proportion is agreeable with the gender composition of the secondary teaching workforce, three quarters of them were female, as given in Figure 1.

Overall, 26.4 per cent of the secondary teachers surveyed reported teaching mathematics OOF. The odds of OOF verse in-field mathematics teaching among the female teachers doubled that among the male teachers.

KEY FINDING - Three in five of the out-of-field teachers held Bachelor degree other than mathematics major or minor

Among the in-field mathematics teachers, the largest qualification group (23 per cent) was Bachelor degree with a major in mathematics. The next largest qualification groups were Diploma of Education in teaching secondary mathematics and Bachelor of Education in teaching secondary mathematics or with secondary maths content, constituting 11 per cent and 16 per cent respectively.

Figure 10. The distribution of qualifications for out-of-field teachers



Among the OOF teachers who responded to the qualification survey item (Figure 10), about 61 per cent of them held a Bachelor degree other than mathematics major or minor. This OOF rate is three and half times higher than that among the entire secondary mathematics teacher group (13.5 per cent as given in Table 9). It is also found that the proportion of OOF teachers is highest among those who were trained to teach mathematics at neither primary nor secondary level and lowest among those who were trained at secondary level.

The non mathematics major or minor Bachelor holders reported that their degrees were obtained from the areas of Agriculture, Biology, Business studies, Business Education and Careers, Chemistry, Community and Family Studies, Drama, Early Childhood, Economics, Health & Physical Education (HPE), Music, Personal Development, Health and Physical Education(PDHPE), Physics, Religion, and Special Education. The mismacthes between the targeted teaching area and the actual teaching area clearly indicate the shortage of adequately trained mathematics teachers in schools.

Qualification, Teaching Out-of-Field, and Preparedness

Measuring teacher preparation and readiness is challenging, because teacher education can be achieved in various pathways (no single model or requirement linking teacher education and teacher accreditation or registration). For pre-service, a four-year undergraduate degree is common for primary teachers and an undergraduate degree followed by a graduate degree in education is common for secondary teachers.

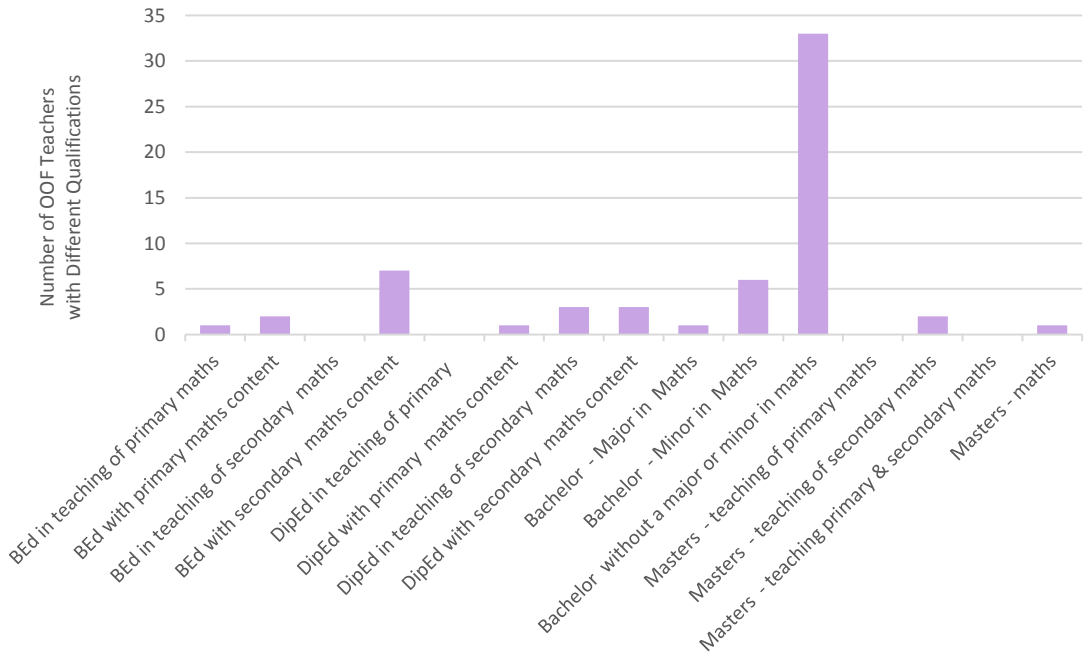
However, given the diverse range of programmes of different entry requirements and considerable variation in content and course structure, qualification alone only speaks part of the story. Ongoing professional learning and development following the initial training also play an important role on teacher education, especially on pedagogic skills and ability to communicate content knowledge to classroom. It is therefore quite possible that on one hand teachers with high qualification may feel their qualification did not prepare them for what they are teaching, and on the other hand some seemingly less qualified teachers can feel confident that they are readily prepared. These complications are reflected in teacher responses to various items in the CHOOSE**MATHS** Teacher Survey.

KEY FINDING – Fifty-eight per cent of the out-of-field teachers reported that their degrees prepared them adequately for the mathematics they were teaching

- 55% of those who felt that their degrees did not prepare them adequately were teaching in-field
- 19% of those who felt that their degrees prepared them adequately were teaching out-of-field
- 58% of the OOF teachers felt that their degrees prepared them adequately
- 60% of the OOF teachers held Bachelor degrees other than a major or minor in mathematics
- 67% of the OOF teachers were not trained to teach mathematics at secondary level
- 30% of the in-field teachers didn't provide information on qualification and 18% of the in-field teachers held Bachelor degrees with a major in mathematics
- 61% of the OOF teachers didn't provide information on qualification and 24% of the OOF teachers held Bachelor degrees without a major or minor in mathematics

The majority teachers who regarded themselves as being teaching mathematics OOF also reported that they were trained to teach mathematics at neither primary nor secondary level. Most of them did not provide information on qualification either. For the OOF teachers with qualification information, the frequencies of teachers in each qualification is displayed in Figure 11.

Figure 11. Number of out-of-field teachers holding different qualifications



KEY FINDING – Secondary teachers who were trained to teach mathematics at neither primary nor secondary level were teaching mathematics 2.5 hours shorter than the overall weekly average

Table 10 provides summary on hours of mathematics teaching per week for different levels at which the teachers were trained to teach mathematics. The row 'N' indicates the number of teachers in a category, and the 'Mean' and 'SD' respectively represent the mean and standard deviation of the weekly teaching hours for teachers in a category.

Among the primary teachers, those who were trained to teach mathematics at neither primary nor secondary level reported a higher average weekly load of mathematics teaching than those who received training at primary mathematics level, particularly for female teachers, which is hard to explain. Male primary teachers with the training to teach secondary mathematics on average teach 15.1 hours of mathematics per week, 2.3 hours longer than the weekly hours taught by the corresponding female teachers.

Table 10. Average weekly hours teaching mathematics by levels trained to teach

			Levels Trained to Teach Mathematics			
			Neither	Primary	Secondary	Both
Primary School Teachers	Male	Mean	6.4	5.3	15.1	7.8
		SD	5.7	1.9	7.3	6.2
		N	14	208	44	41
	Female	Mean	7.1	5.5	12.8	6.7
		SD	5.9	2.5	8.8	4.1
		N	75	1430	56	135
	Person	Mean	7.0	5.5	13.9	**7.**0
		SD	5.8	2.4	8.2	4.7
		N	89	1638	100	176
Secondary School Teachers	Male	Mean	9.9	10.5	14.8	16.8
		SD	7.2	3.5	8.0	8.2
		N	20	2	118	11
	Female	Mean	11.8	12.2	14.0	10.8
		SD	9.2	12.5	7.4	7.4
		N	40	14	156	17
	Person	Mean	11.2	12.0	14.4	**13.2**
		SD	8.5	11.7	7.6	8.1
		N	60	16	274	28

Among the secondary teachers, 16.8 per cent of the teachers said that they had not been trained to teach mathematics at either primary or secondary level. Two thirds of this group were women and they were teaching mathematics, on average, 11.8 hours per week, nearly 2 hours longer than the corresponding male teachers. It is unclear whether this difference is related to this sample only.

Overall, 4.4 per cent of the primary teachers and 15.9 per cent of the secondary teachers were trained to teach mathematics at neither primary nor secondary level. These teachers were teaching mathematics 1 hour longer than the average teaching hour of primary teachers and 2.5 hours shorter than the average teaching hour of secondary teachers.

Teaching Profile for Out-of-Field Teachers

Table 11 reports the number of hours teaching mathematics per week and number of years in teaching mathematics according to teacher's OOF status. Since the data were highly skewed, both median and mean are included.

KEY FINDING - In-field teachers on average have taught mathematics for longer years and longer weekly hours than out-of-field teachers

Table 11. Weekly hours in teaching mathematics and teaching tenure, by out-of-field status

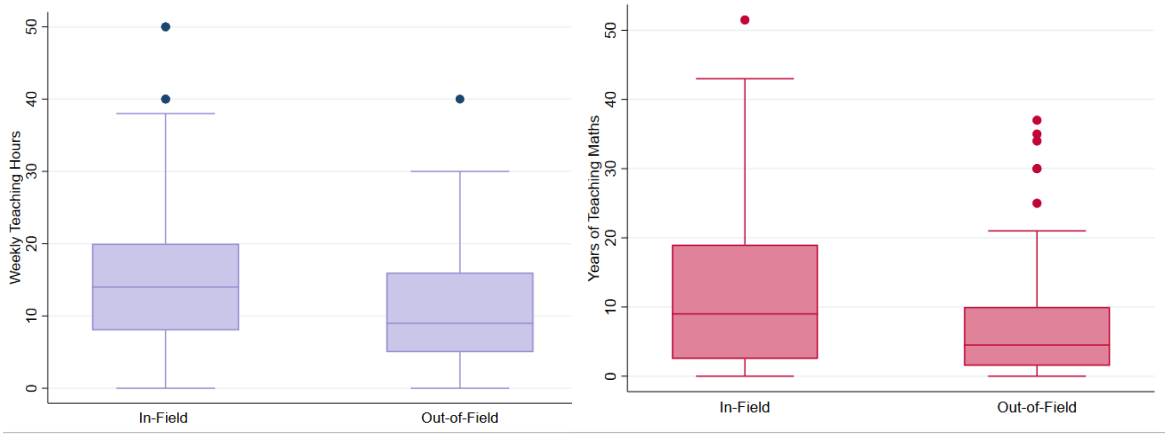
	OOF	Male			Female			Person		
		N	Mean	Median	N	Mean	Median	N	Mean	Median
Weekly Hours	No	156	15.4	15	211	14.2	14	373	14.7	14
	Yes	35	10.2	8	96	11.6	9.5	134	11.2	9
Years of Teaching	No	120	11.3	7	164	12.7	10	289	12.0	9.0
	Yes	27	10.2	6	64	6.2	3.5	94	7.3	4.5

From Table 11, the median time of teaching mathematics per week is 14 hours for in-field teachers (also in the left box of the purple graph in Figure 12) and 9 hours for the OOF teachers (also shown in the right-hand size box of the purple graph in Figure 12).

The median length of experience in teaching mathematics is 9 years for in-field teachers (left box of the red graph in Figure 12) and 4.5 years for OOF teachers (right-hand side box of the red graph in Figure 12).

The difference is highly statistically significant in both aspects. The different average length of teaching experience is highly associated with the fact that, in terms of percentage, there were fewer teachers younger than 35 years old and more teachers over 50 years old in the in-field teacher group as compared to the OOF teachers. Such an age distribution also reflects that the OOF teachers may have a higher tendency to leave the teaching profession than the in-field teachers.

Figure 12. Weekly hours (left) and number of years (right) in teaching mathematics



About 18 per cent of the male teachers were teaching mathematics out-of-field, for an average of 8 hours per week. One third of the female teachers were teaching mathematics out-of-field, with 1 hour longer per week than the male teachers. On average, the out-of-field teachers had been teaching mathematics half of the time of the in-field teachers.

Impact of Out-of-Field Teaching

Enjoyment and Confidence

The CHOOSE**MATHS** Teacher Surveys asked the question 'To what extent do the following apply to your teaching of mathematics?' on a list of statements about teachers' feelings and practice in teaching mathematics. The items were measured using a scale from 0 to 10, with 0 and 10 representing 'Never Applies' and 'Always Applies' respectively. For positively worded statements, higher scores indicate higher confidence. The last item 'Putting off topics that you find difficult' has been reversely coded.

Figure 13. Percentage of most confident teachers between the in-field and out-of-field teachers

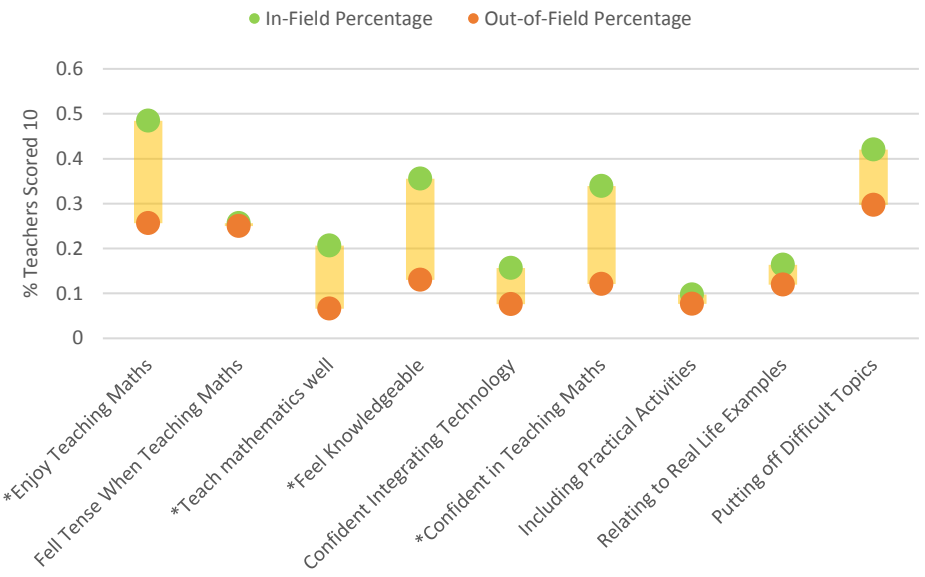


Figure 13 displays the proportion of teachers who rated themselves the score 10 in each item, separately for in-field (in green) and out-of-field (red) teachers. The difference in percentage between the two types of teachers is highlighted in yellow. The items with asterisks indicate that the differences for these items are statistically significant and the 95% confidence interval for the proportion of teachers who scored 10 is displayed in Table 12.

For all the items in Figure 13 the percentage of teachers who scored 10 is higher among the in-field teachers than among the out-of-field teachers. The largest differences are evident in responses to the statements 'Enjoy teaching mathematics', 'Feel knowledgeable', 'Confident in teaching mathematics', 'Teach mathematics well', and not 'Putting off difficult topics'.

The proportion and associated boundaries of the confidence interval for each item is given in Table 12 below. For some items, such as the enjoyment in teaching mathematics, the estimated maximum percentage of most confident out-of-field teachers, 31 per cent, is lower than the minimum percentage of most confident in-field teachers, 43 per cent, rending a statistically significant

difference in the proportion of most confident teachers between the two groups. Similar arguments apply to the other 3 items, marked with an asterisk in the table.

Table 12. Confidence interval of the percentage of highest scorers, by out-of-field status

Various Aspects	Out-of-Field			In-Field		
	Lower Boundary	Proportion	Upper Boundary	Lower Boundary	Proportion	Upper Boundary
*Enjoy Teaching Maths	0.21	0.26	0.31	0.43	0.48	0.54
Feel Tense When Teaching Maths (rev)	0.17	0.25	0.35	0.21	0.26	0.31
*Teach mathematics well	0.02	0.07	0.14	0.16	0.21	0.26
*Feel Knowledgeable	0.07	0.13	0.22	0.30	0.36	0.41
Confident Integrating Technology	0.03	0.08	0.15	0.12	0.16	0.20
*Confident in Teaching Maths	0.06	0.12	0.21	0.28	0.34	0.40
Including Practical Activities	0.03	0.08	0.15	0.07	0.10	0.14
Relating to Real Life Examples	0.06	0.12	0.20	0.12	0.16	0.21
Putting off Difficult Topics (rev)	0.21	0.30	0.40	0.36	0.42	0.48

*Note: * indicates statistically significant difference*

Teaching Specific Year Levels

KEY FINDING - Out-of-field mathematics teachers were, on average, less confident in teaching mathematics than in-field teachers, especially in teaching senior year mathematics

A further comparison of the reported confidence levels between in-field and OOF teachers who were teaching identical year level found that the grounp difference in confidence was generally larger for higher school year levels. This is evident in Figure 14 that displays the distribution of confidences of teachers teaching specific year levels. The differences are statistically significant between the in-field and OOF teachers for Years 10, 11 and 12 teachers. Notably, while more than 80 per cent of the in-field Year 11 teachers had confidence levels of 8 or above, only 20 per cent of the OOF teachers reported so.

This is also evident in teachers' binary responses of 'Yes' or 'No' to the question 'Do you feel comfortable and confident teaching the following levels of mathematics?' on

a. Lower level secondary mathematics (Year 7 and 8)
b. Middle level secondary mathematics (Year 9 and 10)
c. Upper level secondary mathematics (Year 11 and 12)
d. Specialist mathematics / Extension 1 and 2 / Maths C.

The percentage of response 'Yes' to this question at each level is shown in *Figure 15*. The proportion of teachers reporting comfortable teaching lower level is indistinguishable between the in-field and OOF groups. The proportion of response 'Yes' was lower among the OOF group than the in-field group, by 9, 36, and 38 percentage points for middle, upper, and specialist mathematics respectively. While 86 per cent of the in-field teachers and half of the OOF teachers felt comfortable teaching upper level mathematics, the in-field teachers were 3 times more comfortable teaching specialist mathematics than the OOF teachers.

Figure 14. Confidence in teaching between in-field and OOF teachers, by year level

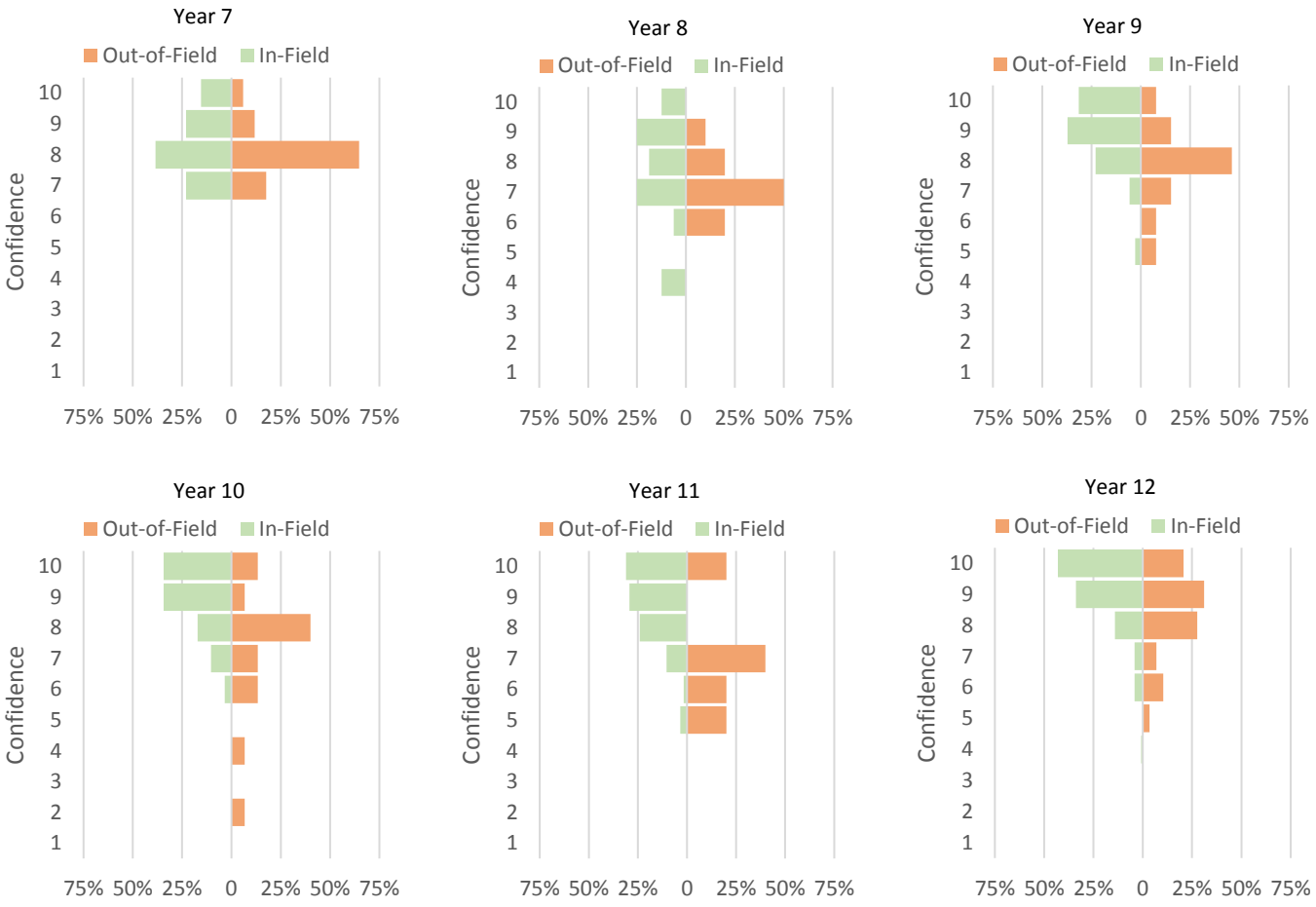
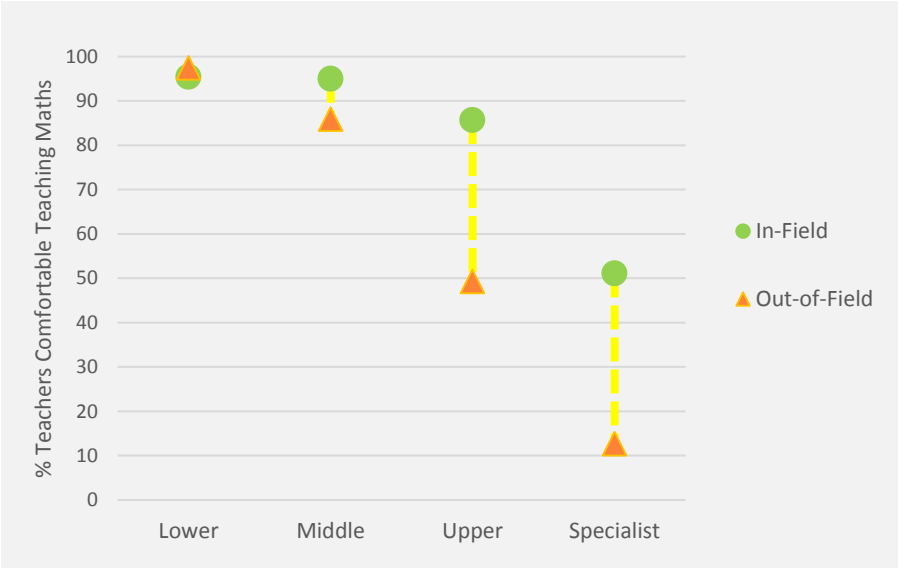


Figure 15. Percentage of teachers comfortable teaching different levels of mathematics



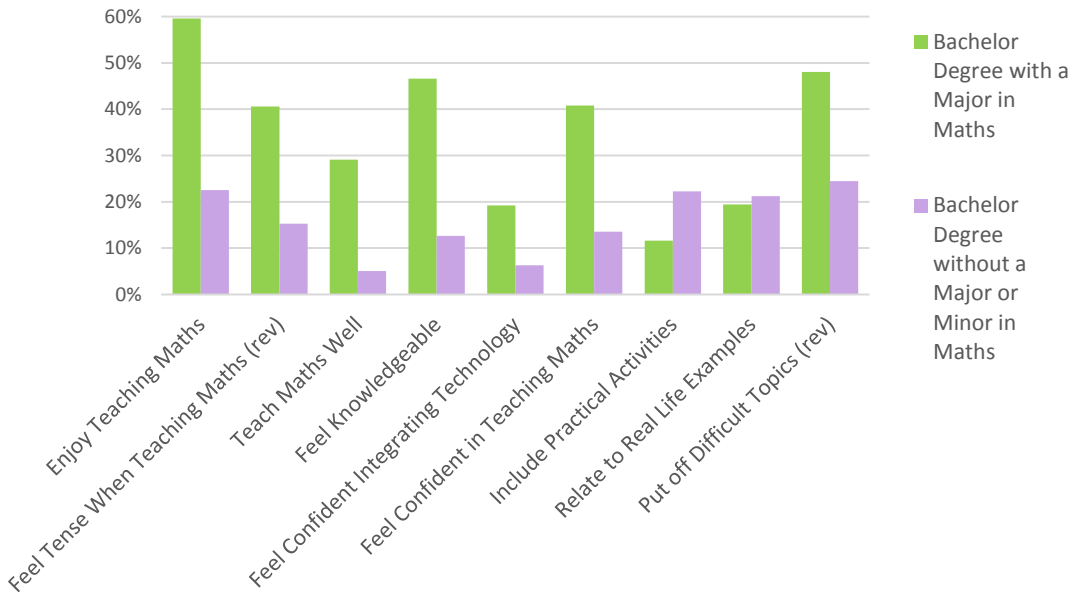
Teachers Holding Bachelor Degree with a Major in Mathematics

We report here the data items that were mentioned in page 18 for two groups of teachers who hold Bachelor degrees without a major or minor in mathematics and who hold Bachelor degree with a major in mathematics. Confidences in various aspects of teaching mathematics for each qualification group are displayed in Figure 16 via the proportion of teachers who scored 10 on the scale 0-10, green for major in mathematics group and purple for the other.

KEY FINDING – Major in mathematics teachers were at least four times more likely to report that they taught mathematics well than teachers without a major or minor in mathematics

Clearly, all the green bars are taller than the purple bars except in two cases. The proportion of 10 scorers was higher among the teachers holding Bachelor degree with a major in mathematics than among the other group in regard to 'Enjoy teaching mathematics', 'Not feel tense when teaching mathematics', 'Feel confident integrating new technologies', and 'Feel confident in teaching mathematics'. The proportion of 10 scorers among the mathematics major group was 5.8 times as high as that among the other group regarding 'Teach mathematics well', and 3.7 times as high as that regarding 'Feel knowledgeable and on top of the mathematics content'. The proportion of 10 scorers among the mathematics major group almost doubled that among the other group with regard to 'Putting off topics that you feel difficult'.

Figure 16. Percentage of teachers who scored 10 in each statement, by qualification



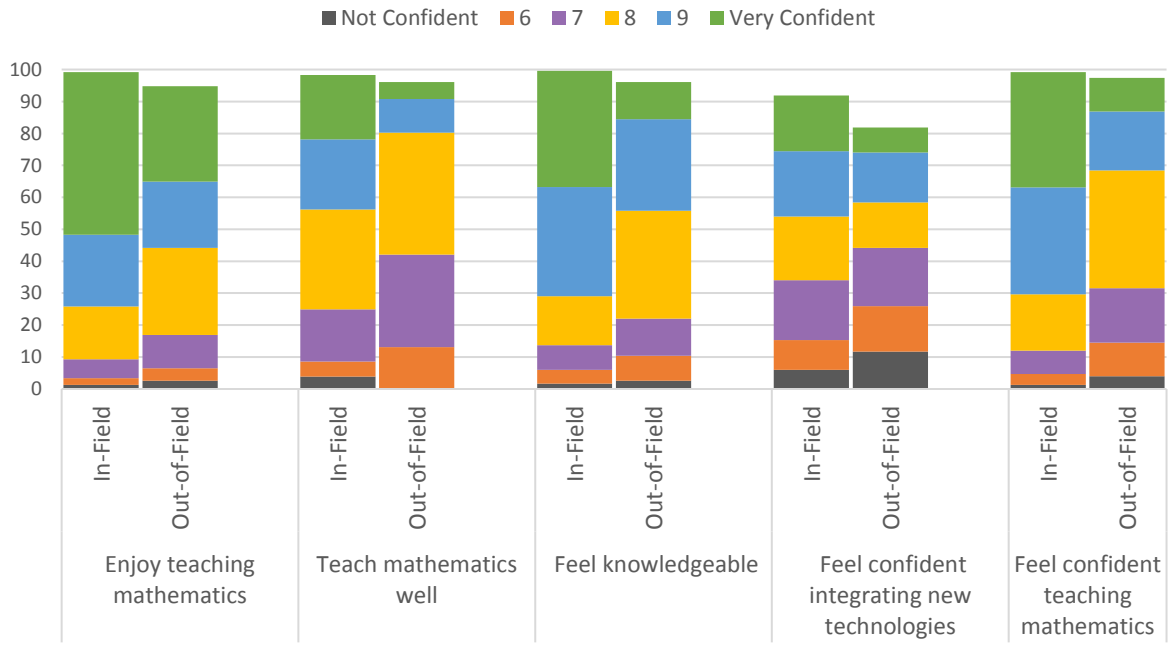
A higher proportion of teachers in Bachelor degrees without a major or minor in mathematics scored 10 than that in Bachelor degree with a major in mathematics in two aspects - 'Include practical mathematics activities' in teaching and 'Relate mathematics to real life examples and activities'. In fact, the proportion of teachers who reported top score on 'Include practical mathematics activities' among the mathematics major group was only half of that among the other group. Teachers with a degree other than mathematics major or minor tend to bring into mathematics classes more activities and examples from their broad backgrounds and experiences, which is highly valuable in making the teaching more attractive.

Other Aspects

KEY FINDING - Out-of-field teachers had substantially lower confidence than in-field teachers in many aspects of mathematics teaching

The CHOOSE**MATHS** Teacher Survey participants expressed the extent of their agreement on a set of statements regarding mathematics teaching, via the scale of 0-10 where 0 and 10 represent 'Not Confident at All' and 'Very Confident' respectively. Due to low frequencies on 1-5 and to achieve a clearer display, in Figure 17 we suppressed the scores 1 to 5. For each of the five aspects under measure, the left and right columns represent data from the in-field and OOF groups respectively. Each column in the group, composed of several colours, represents the share of teachers who rated themselves with various scores, black for the lowest score and green for the highest score. Clearly, the share of OOF teachers with top score is smaller than that of the in-field teachers, persistently across all aspects. Tests have shown that these differences are not likely due to random chances. The OOF teachers were therefore exhibiting lower self-efficacy with respect to enjoyment in teaching mathematics, teaching mathematics well, feeling knowledgeable, being confident in integrating new technologies, and feeling confident teaching mathematics.

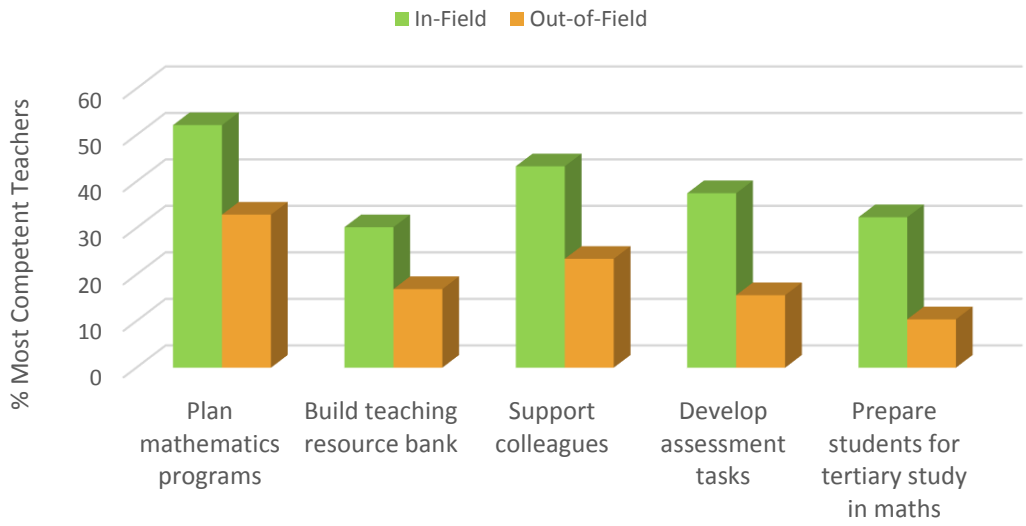
Figure 17. Confidence between in-field and out-of-field teachers in various aspects



No statistically significant difference was found between the two groups of teachers in the following aspects: feel tense when teaching mathematics, prefer using a textbook, prefer developing own material, include practical mathematics activities, relate mathematics to real life examples, and put off topics that the teacher finds difficult.

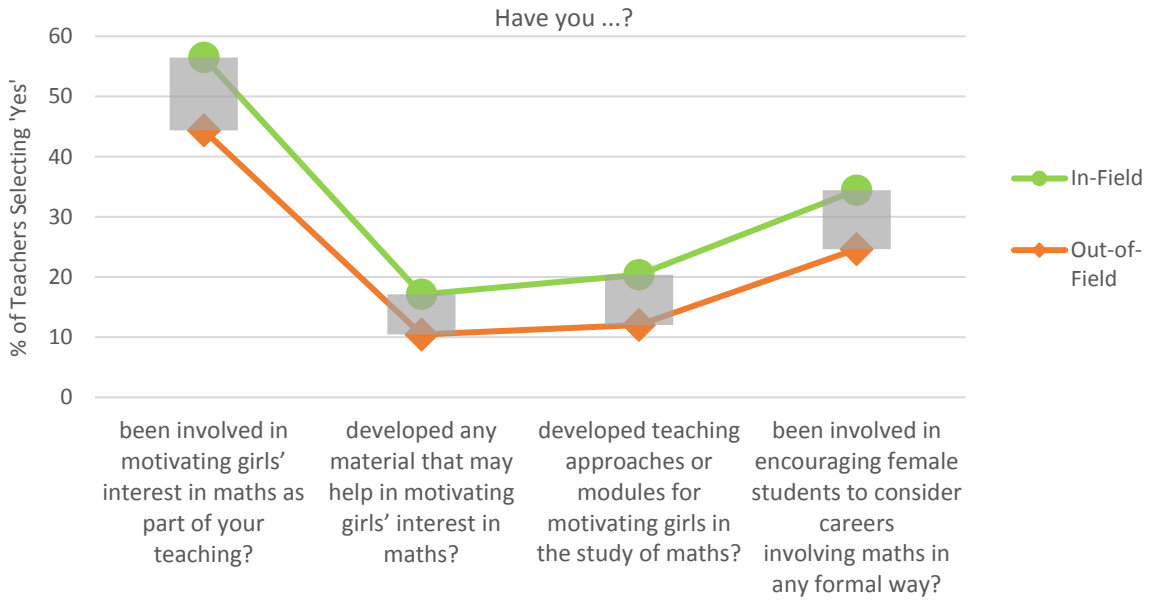
Data from another item showed that a higher percentage of OOF teachers felt comfortable teaching Year 7 to Year 9 mathematics curriculum and 'Year 11 mathematics lower level'. By contrast, a higher percentage of in-field teachers reported confident in teaching 'Year 10 mathematics curriculum all levels', 'Year 11 mathematics curriculum all levels' and 'Year 12 mathematics curriculum all levels'. Notably, one third of the in-field teachers versus one tenth OOF teachers were confident teaching Year 12 mathematics curriculum at all levels.

Figure 18. Most confident teachers in various teaching aspects, by OOF status



Data on another set of aspects in teaching practice, measured via a Likert scale 'Not confident', 'Somewhat confident', 'Confident', and 'Very confident', are displayed in Figure 18 in terms of the proportion of teachers reporting 'Very confident'. Clearly, a substantially lower proportion of the OOF teachers rated themselves as 'Very confident' than the in-field teachers, in every aspect. With regard to the preparation of students for tertiary studies in mathematics, the proportion of 'Very Confident' response among the OOF teachers was less than one third of that among the in-field teachers.

Figure 19. Teachers adopting various teaching practices, by out-of-field status



Significant differences were also seen in aspects of encouraging girls to study mathematics. The responses to several questions, including 'Have you been involved in motivating girls' interest in mathematics as part of your teaching?', are displayed in Figure 19, where the vertical axis represents proportion of teachers ticking 'Yes'. Clearly, a higher percentage of the in-field teachers selected 'Yes' in all aspects. This once again reflected the adverse impact from OOF teaching practice.

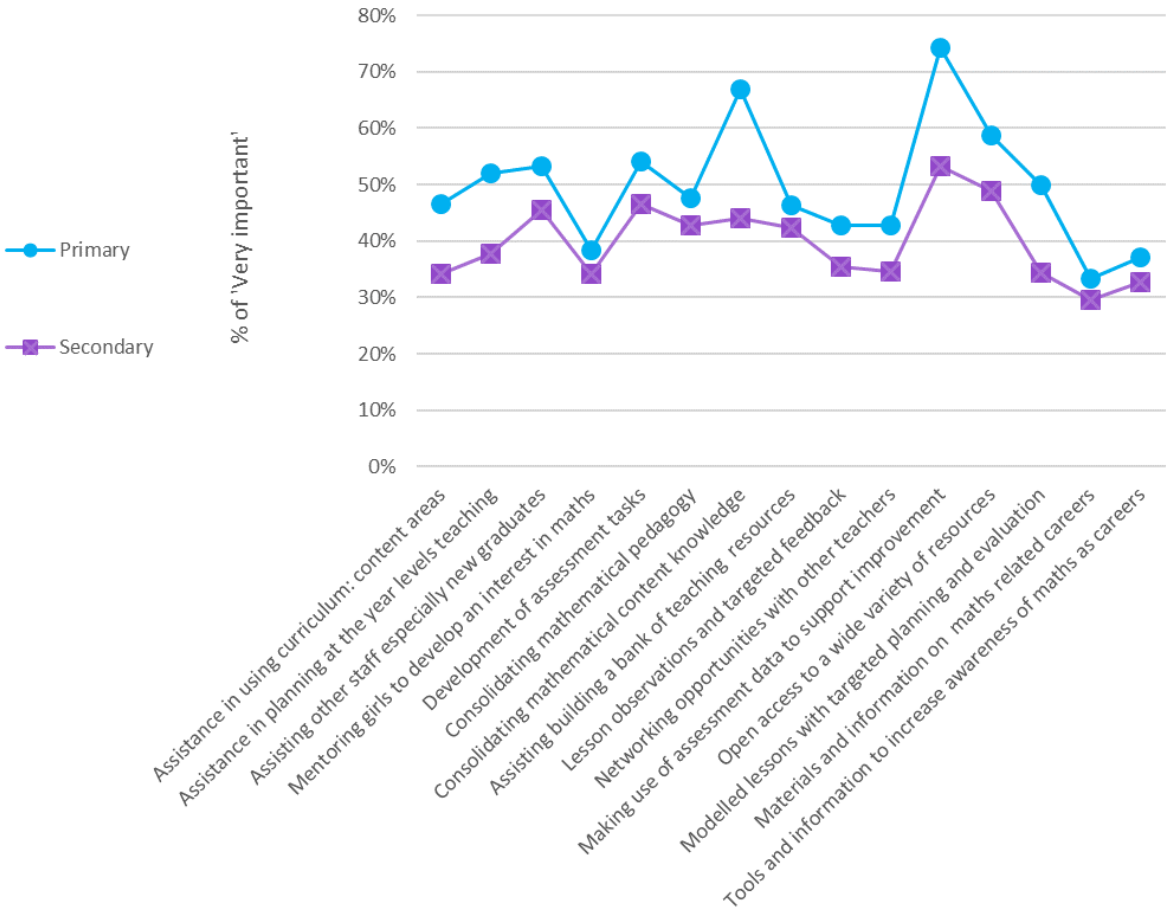
In summary, OOF teachers were teaching all year levels similarly to the in-field teachers. However, the OOF teachers consistently reported lower confidence scores than the in-field teachers in many important aspects of classroom teaching, especially in teaching senior secondary year levels.

Professional Learning and Development

PD Options

Participants in the CHOOSE**MATHS** Teacher Survey were asked to indicate their opinions on the importance and helpfulness of a few professional development (PD) options in mathematics teaching, listed along the horizontal axis in Figure 20. Based on between 1820 and 2448 valid responses, the graph displays proportion of teachers reporting 'Very important' under the response choices 'Not important', 'Somewhat important', and 'Very Important' to each PD option, separately for primary and secondary teachers.

Figure 20. PD options and percentage of 'Very important' perceived by the teachers



Notably, a higher proportion of primary than secondary teachers selected 'Very important' to all the PD options. This could mean that the primary teachers considered these topics to be more important that they felt that they needed more assistance through PD, or, that this particular set of PD options are more relevant to primary teachers, or a mixture of both.

The most frequently chosen 'Very Important' PD option by all teachers was 'Making use of assessment data to support improvement in teaching and learning'. It was followed by the options 'Consolidating

mathematical content knowledge', 'Open access to a wide variety of resources for teachers and students', 'Development of assessment tasks', 'Assistance in planning at the year levels they teach' and so on. The least selected 'Very Important' PD option was 'Materials and information on careers in mathematics and mathematics in careers'.

Table 13. Teachers (%) reporting that the PD topics were 'Very Important'

	PD Topics	Gender		OOF Status		Level Trained to Teach			
		Male	Female	In-Field	OOF	Neither	Primary	Secondary	Both
a	Assistance in using the Australian mathematics curriculum: Mathematics content areas in your planning	40.8	45.0	30.5	41.7	42.5	46.8	31.8	46.0
b	Assistance in planning at the year levels you teach	47.2	50.0	35.0	42.0	50.3	51.8	37.3	50.7
c	Assisting other staff especially new graduates	53.1	51.6	44.3	44.7	44.8	53.8	45.8	50.5
d	Mentoring of girls to encourage them to develop an interest in mathematics	37.0	37.6	33.6	33.6	43.8	37.9	35.1	35.9
e	Development of assessment tasks	49.7	53.4	44.4	49.2	54.2	53.6	47.0	54.0
f	Consolidating mathematical pedagogy	45.8	47.2	42.8	40.2	45.5	47.7	44.2	45.8
g	Consolidating mathematical content knowledge	57.1	63.9	41.5	52.8	58.6	68.0	40.6	61.6
h	Assisting with research and building a bank of teaching resources	43.3	46.3	43.1	40.9	49.7	46.6	42.3	43.4
i	Lesson observations and targeted feedback	43.9	40.9	35.3	34.1	41.7	42.8	35.9	39.6
j	Networking opportunities with other teachers	40.5	41.6	35.9	30.3	35.4	43.1	37.9	35.6
k	Making use of assessment data to support improvement in teaching and learning	62.1	72.4	51.8	53.3	59.1	75.4	53.8	69.2
l	Open access to a wide variety of resources for teachers and students	53.2	57.9	49.6	42.8	53.9	58.8	50.8	56.1
m	Team teaching/modelled lessons with targeted planning and evaluation	42.1	48.1	33.3	34.9	43.5	50.1	35.2	43.4
n	Materials and information on careers in mathematics and mathematics in careers	29.2	33.2	30.0	27.3	33.1	33.8	29.4	29.3
o	Tools and information for teachers, parents and students to increase awareness of mathematics and mathematics related fields as careers for students and in particular girls	35.3	36.4	32.5	30.3	33.1	37.7	32.6	34.3

Note: The red entries indicate that the test for difference between the entries was statistically significant under the Fisher's exact test or Chi-square test.

KEY FINDING - Making use of assessment data and developing assessment tasks were the top professional learning topics preferred by teachers

Whether a particular group of teachers prefers specific PD options is examined in Table 13. The table shows the proportion of teachers selecting 'Very Important' to each topic according to gender, OOF status, and the level trained to teach mathematics. The red entries in the table indicate that testing for difference between the entries within an aspect was statistically significant under the Fisher's exact test or Chi-square test. For example, the first topic 'Assistance in using Australian mathematics curriculum: Mathematics content areas in your planning' was rated as very important by 40.8 per cent of male and 45.0 per cent of female teachers (with a non-statistically significant difference), and by 30.5 per cent of the in-field teachers versus 41.7 per cent of the OOF teachers and this difference was statistically significant.

Table 14. Top 5 PD option topics for different teacher groups

Gender		OOF Status		Trained to Teach			
Male	Female	In-Field	Out-of-Field	Neither	Primary	Secondary	Both
k	k	k	k	k	k	k	k
g	g	i	g	g	g	i	g
i	i	e	e	e	i	e	i
c	e	c	c	i	c	c	e
e	c	h	i	b	e	f	b

Note: the letters in the body of the table refer to the corresponding PD options in Table 13.

Looking at the top five PD options that were rated as 'Very important' in each groups, shown in Table 14, we see that all groups agreed that making use of assessment data to support improvement of teaching and learning was very important. The other single option appearing in every group's top five choices was the Option e (Development of assessment tasks).

The in-field teachers and the group of teachers trained to teach mathematics at secondary level considered Option i (Open access to a wide variety of resources for teachers and students') to be the next very important topic, compared to Option g (Consolidating mathematical content knowledge) for the other groups. Option b (Assistance in planning at the year levels taught) appeared as the top five options in only two groups – the teachers trained to teach mathematics at neither primary nor secondary level and the teachers trained to teach mathematics at both levels.

Teachers' Needs in Professional Learning

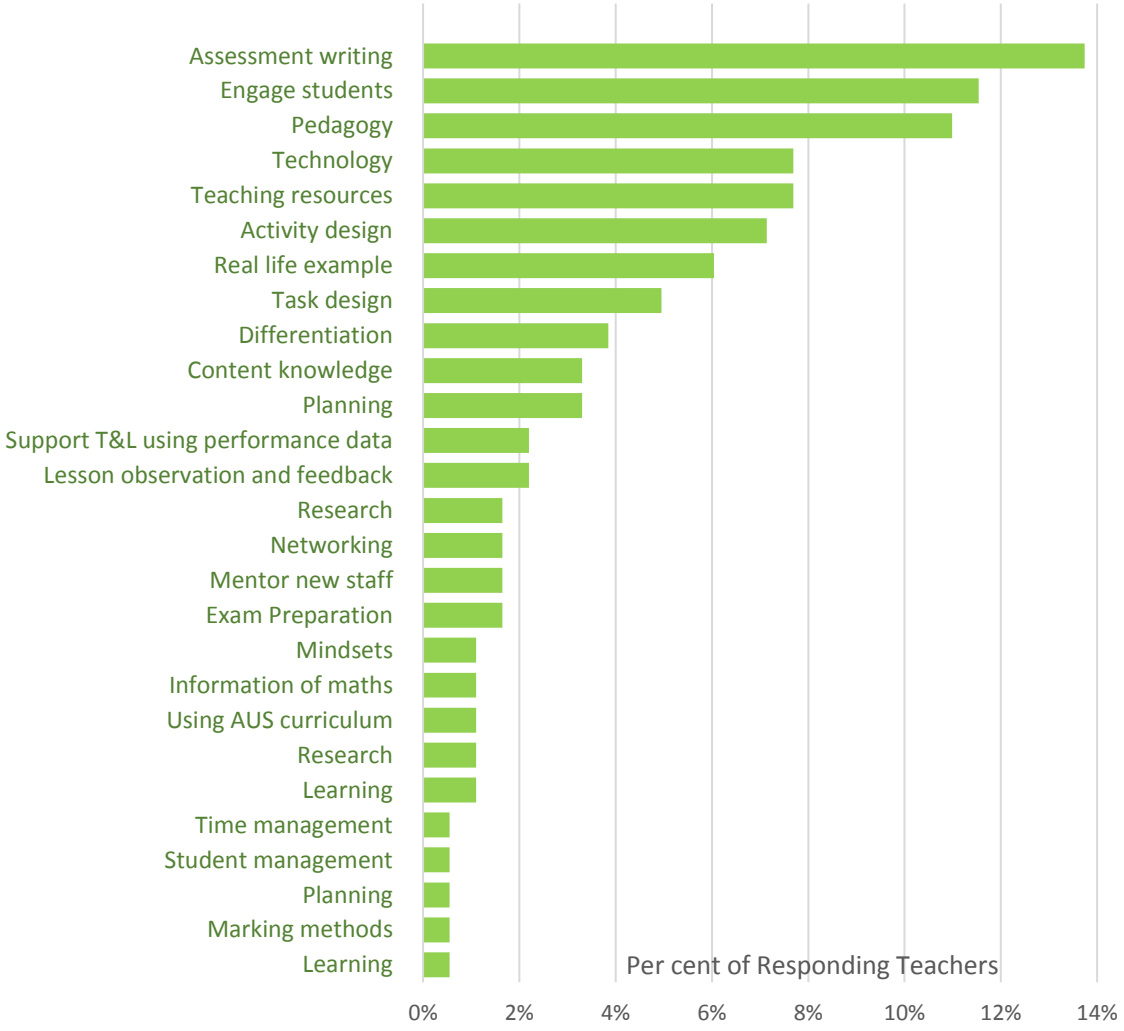
When asked to name one PD topic that would best help in teaching mathematics at the year levels they teach, the teachers responded proactively. The text responses, grouped and sorted according to the frequency of appearance, are display in Figure 21.

These free text responses are largely consistent with the pre-listed PD option data, with a slightly wider range of topics being suggested though. Assessment writing was the mostly recommended PD topic, named by nearly 14 per cent of the respondents. The next top recommendations, engaging students and helping with pedagogy, were each suggested by more than 10 per cent of the teachers.

Gender differences existed in the perceived importance of 5 PD topics, namely, the Topics b, e, g, h, and k as shown in Table 13. Teacher opinions regarding the importance of these 5 PD topics in helping mathematics teaching were substantially different between male and female teachers. The female

teachers seemed think two topics, c and i – assisting new staff and lesson feedback, were not as important as the male teachers. This could indicate that male teachers are more willing to interact with colleagues, or that female teachers are less confident with assisting others and/or giving/receiving feedback on lessons. For the rest of the items in the table, female teachers rated all topics higher than male teachers, indicating a higher demand for PD training by female teachers.

Figure 21. PD topics suggested by the mathematics teachers



Compared to in-field teachers, the OOF teachers mostly needed help with the Topics g and a – consolidating mathematical content knowledge and use of the Australian curriculum in their teaching. Compared with those who were trained to teach mathematics at secondary level, the teachers who were trained to teach mathematics at neither primary nor secondary level mostly needed assistance with the Topics g, b and a – consolidating mathematical content knowledge and planning.

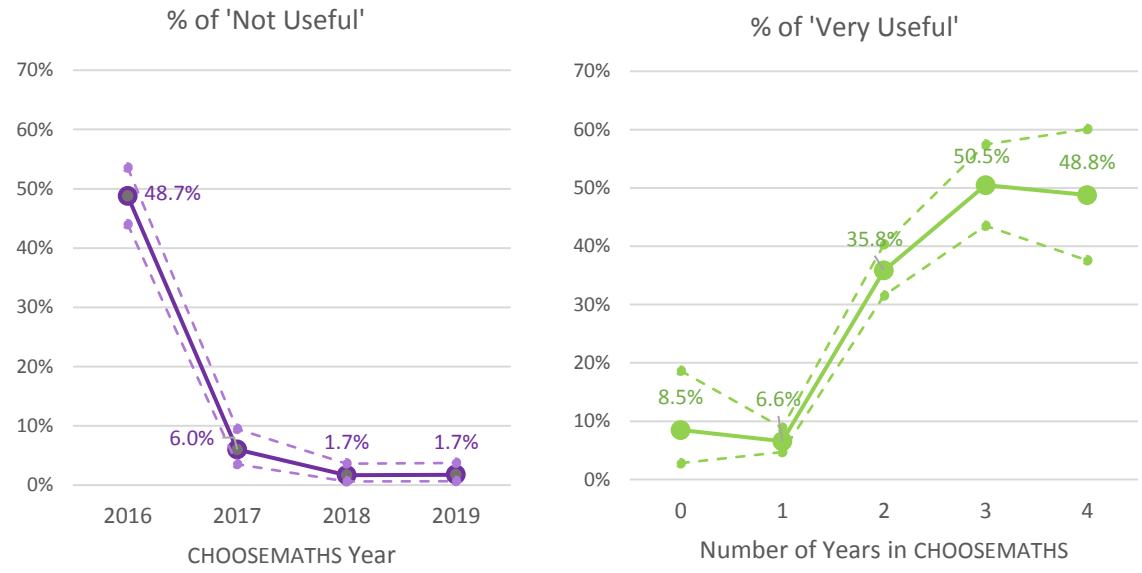
Effectiveness of The CHOOSEMATHS Project

Reported Positive Changes

The CHOOSE**MATHS** Teacher Surveys recorded the number of years a teacher participated in the CHOOSE**MATHS** program. In each wave of the Survey, participants were asked about 'How useful do you think CHOOSE**MATHS** is to you?' under response categories 'Not at all Useful', 'Somewhat Useful', 'Useful', and 'Very Useful'. Focusing on the extreme options 'Not at all Useful' and 'Very Useful', we display these data on the left and right panel of Figure 22, where the dotted lines represent 95% Binomial confidence intervals for the estimated proportions.

From Figure 22, the proportion of teachers reporting that CHOOSE**MATHS** was not useful at all has decreased dramatically over time as well, from 49 per cent in 2016 to about 2 per cent in 2019.

*Figure 22. Teachers' evaluation of the CHOOSE**MATHS** program over time*



There has been significant increase in the reported usefulness of CHOOSE**MATHS** over time. The proportion of teachers reporting 'Very Useful' was only 7 or 8 percent among those who did not participate in CHOOSE**MATHS** or only participated in the program for a single year. By contrast, around half of those who participated in CHOOSE**MATHS** for 3 or 4 years rated the program as 'Very Useful'. A dramatic increase happened to those who received CHOOSE**MATHS** training for 2 years - 35 per cent of them reporting 'Very Useful' and the percentage further jumped to 50 per cent for another year of training in the program.

In their free text responses, the teachers expressed that they gained benefits from participating in CHOOSE**MATHS** in a wide range of aspects, including: increased mathematics knowledge, good strategies in lesson planning, different approaches in problem solving, classroom coaching, performance analysis for improvements, and setting up hands on activities. The teachers felt that they

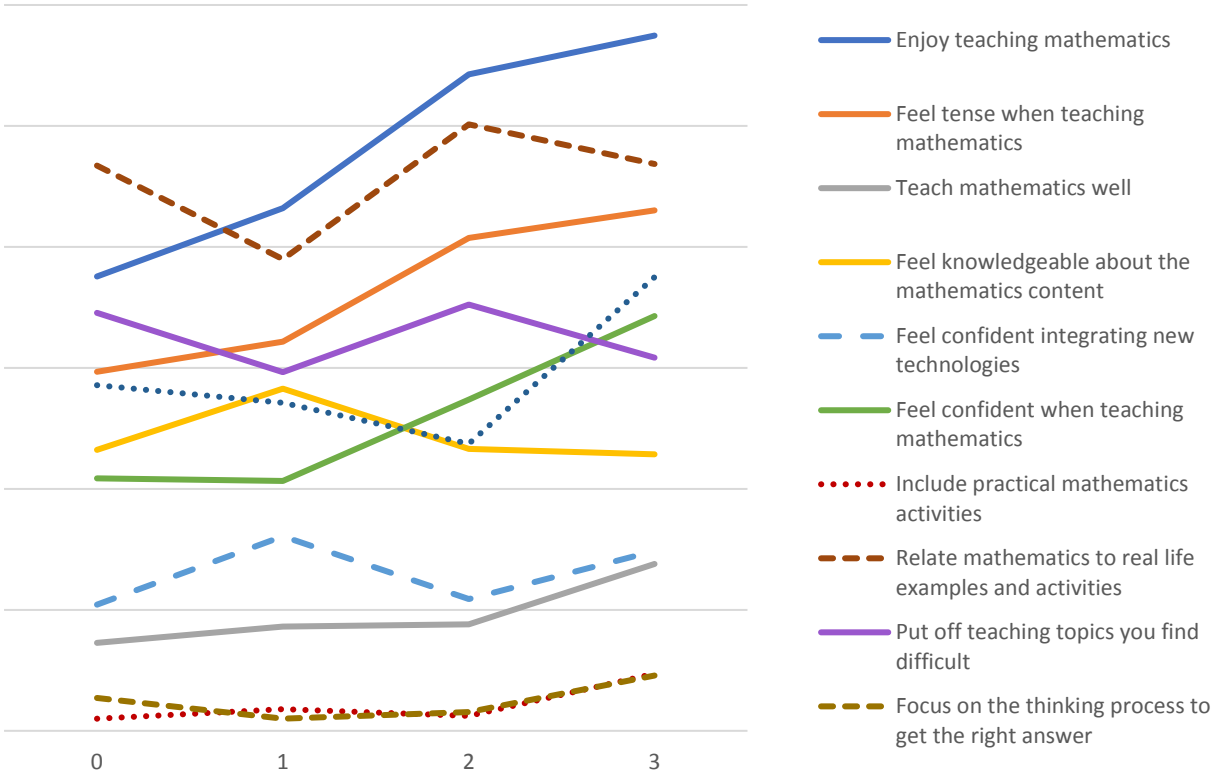
were supported and learnt a great deal from the model lessons and the feedback to their own lessons in the program.

As a result, teachers indicated more awareness of the importance of promoting mathematics. The proportion of teachers who strongly agreed that raising the profile of mathematics is very important increased continuously, from 45 per cent to 69 per cent and further to 80 per cent over 2016, 2017 and 2018. The proportion of teachers recognizing the importance to have a school mathematics policy in place that includes strategies specifically designed to encourage girls to study mathematics also increased, from 30 per cent in 2016 to 64 per cent in 2018.

Likewise, the proportion of teachers reporting that it is crucial to promote the importance of mathematics to parents and guardians increased from 50 per cent, to 69 per cent, and further to 77 per cent over 2016 - 2018. Similarly, the proportion of teachers who reported it is very important to organise extra-curricular activities to engage students and in particular girls increased monotonically over time, from 20 per cent in 2016, to 52 per cent in 2017, and 57 per cent in 2018.

Growing Confidence in Teaching Mathematics

Figure 23. Percentage of top confident teachers over the duration of participation



*Note: Items 'Feel tense when teaching mathematics' and 'Put off teaching topics you find difficult' were reversely coded. Due to the small sample size and heavy missing values for the group of teachers who participated in CHOOSE**MATHS** for 4 years, this small group was excluded. For the same reason, primary teacher data were displayed here.*

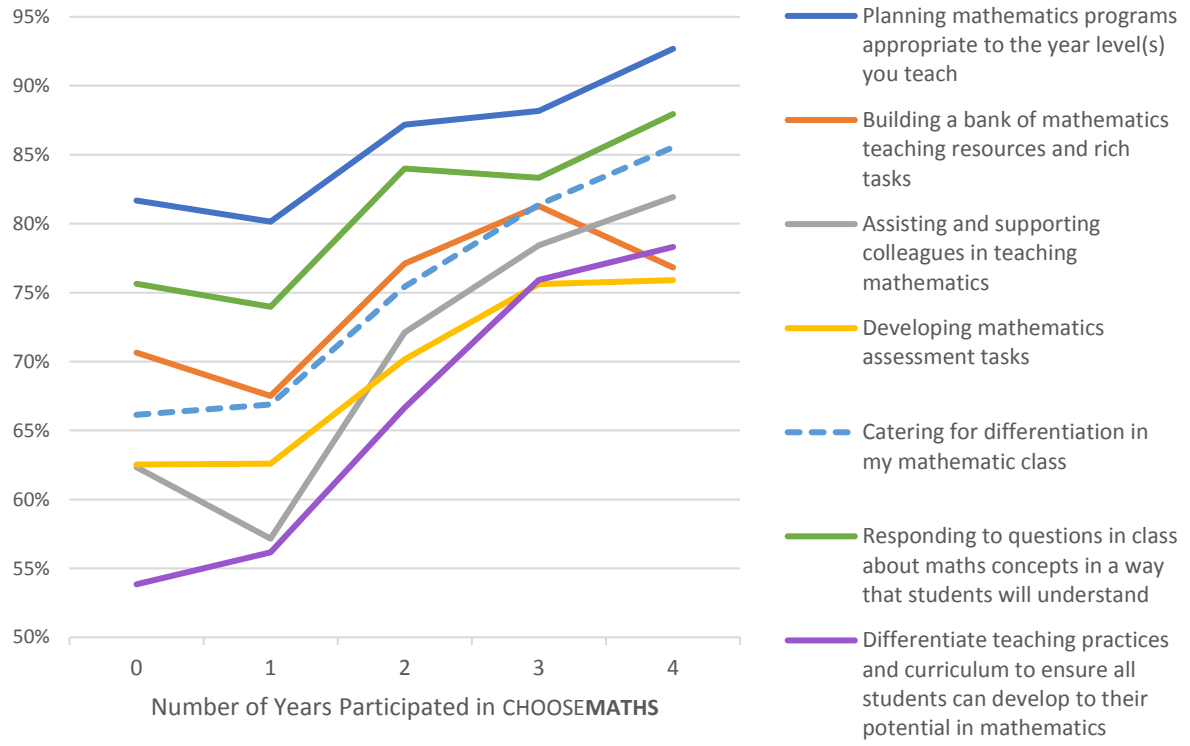
CHOOSE**MATHS** participating teachers gained confidence in teaching mathematics through the project. Listed in Figure 23 are a group of items measuring teacher confidence in the teaching of mathematics. Each item was answered with a rating from 0 to 10, representing the lowest and highest degree of agreement respectively. The graph displays percentage of primary teachers who rated themselves 10

out of 10 for each item as a function of the duration of participation in CHOOSE**MATHS**, shown as 0, 1, 2 and 3 years in the graph.

While the percentage of most confident teachers in each aspect fluctuated over time, this percentage tended to be higher for longer time period in most cases.

The program has witnessed teacher confidence in differentiating student needs in mathematics soaring. Teachers were asked about 'How confident do you feel you are regarding the following?' on a set of questions under response options 'Not confident', 'Somewhat confident', 'Confident', and 'Very confident' in every wave of the survey. Figure 24 displays the proportion of teachers reporting 'Confident' or 'Very confident' for each question as a function of the number of years participating in CHOOSE**MATHS**.

Figure 24. Percentage of competent teachers over the duration of participation



The percentages varied over time but clearly showed an increasing trend, particularly on the aspect of differentiating teaching practices and curriculum to ensure all students can develop to their potential in mathematics (the purple line) – the percentage of teachers reporting 'Confident' or 'Very Confident' has increased from 53 per cent monotonically to 78 per cent after 4-year participation in the CHOOSE**MATHS** program. Teacher confidence in other aspects also increased dramatically, except in one aspect – building a bank of mathematics teaching resources and rich tasks. Building a repository of mathematics resources is an ongoing task for the AMSI Schools Team.

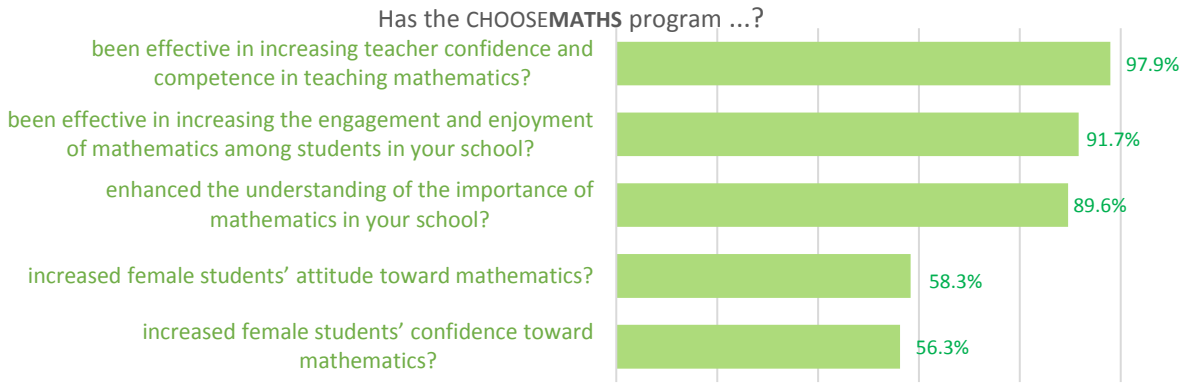
Principals' Opinions

KEY FINDING - CHOOSEMATHS has increased teacher confidence in teaching mathematics, as reported by nearly all principals surveyed

The CHOOSE**MATHS** School Survey asked principals to provide their opinions on perceived effectiveness of the CHOOSE**MATHS program** in their schools.

Nearly all the participating principals confirmed that the program has been effective in increasing teacher confidence and competence in the teaching of mathematics at their schools. Figure 25 displays the proportion of principals reporting 'Yes' to this and several other questions.

*Figure 25. Response 'Yes' (%) to questions regarding benefits of attending CHOOSE**MATHS***



More than 90 per cent of principals agreed that the program has been effective in increasing the engagement and enjoyment of mathematics among students and has enhanced the understanding of the importance of mathematics in their schools. More than half of the principals agreed that the program has increased female students' attitude and confidence toward mathematics in their schools.

According to another survey item in the School Survey (see Table 15), more than 90 per cent of the principals agreed that their schools benefitted from CHOOSE**MATHS** in building and improving teacher confidence in effective teaching, building teacher capacity, and improving teacher quality and knowledge. More than 80 per cent of the principals reported that the program enhanced student learning and improved teacher competence in curriculum planning. Three quarters of the principals agreed that CHOOSE**MATHS** enhanced student engagement and improved their learning outcomes.

*Table 15. Reported main gains from CHOOSE**MATHS** by school principals*

Gains	% Yes
Improvement in the teaching of mathematics	93.8%
Building teacher confidence in teaching mathematics effectively	93.8%
Improvement in teacher quality, understanding and knowledge of mathematics	87.5%
Capacity building of teachers	85.4%
Enhanced student learning	81.3%
Improved competence in the planning of the mathematics curriculum	79.2%
Student engagement and ability in mathematics	75.0%
Improved student learning outcomes	75.0%
Improved consistency of strategies across schools in the teaching of mathematics	60.4%
Improved competence in curriculum documentation	39.6%
More parent involvement through CHOOSEMATHS events	29.2%
Improved focus on mathematics as part of STEM	25.0%

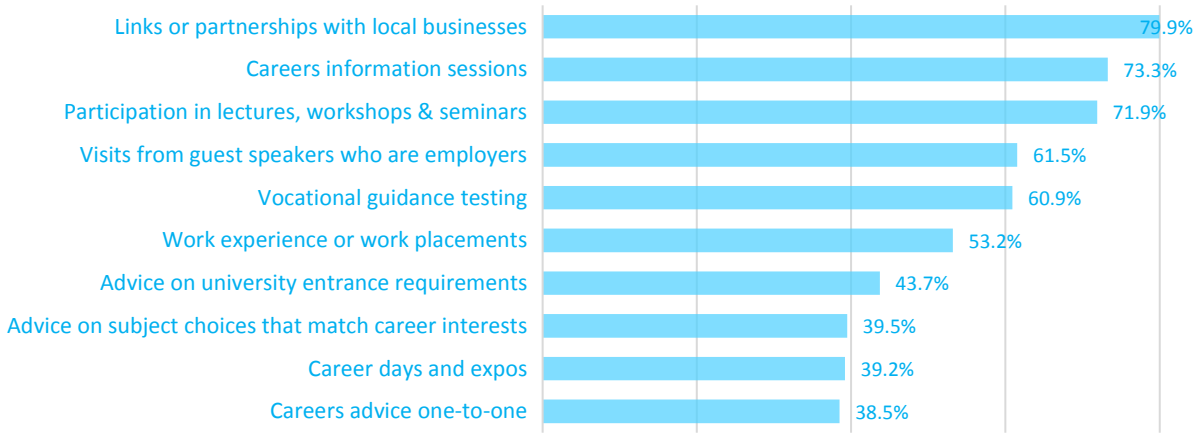
About 30 per cent of the principals thought CHOOSE**MATHS** events had facilitated more parent involvement in their children's mathematics learning and one quarter of the principals thought the program improved the focus on mathematics as part of STEM.

Teachers' Views on Related Issues

Career Advice and Encouragement for Participation in Mathematics

The Secondary Teacher Survey included a set of items on careers programs in school. The teachers were asked 'To what extent does your school offer the following career activities to students?' with a list of ten activities being presented, under the response options 'Never', 'Rarely', 'Sometimes', 'Always', and 'Don't know'. Figure 26 displays the proportion of teachers who indicated that their schools or classes 'Always' run these activities, in ascending order.

Figure 26. Career activities in school and reported percentage of availability



From the graph, about 80 per cent of the teachers reported that their schools had long-term links or partnerships with local business. Three quarters of teachers said that their schools always offered careers information sessions for students and their parents, and always participated in lectures, seminars and workshop run by various educational institutes such as universities and/or TAFE.

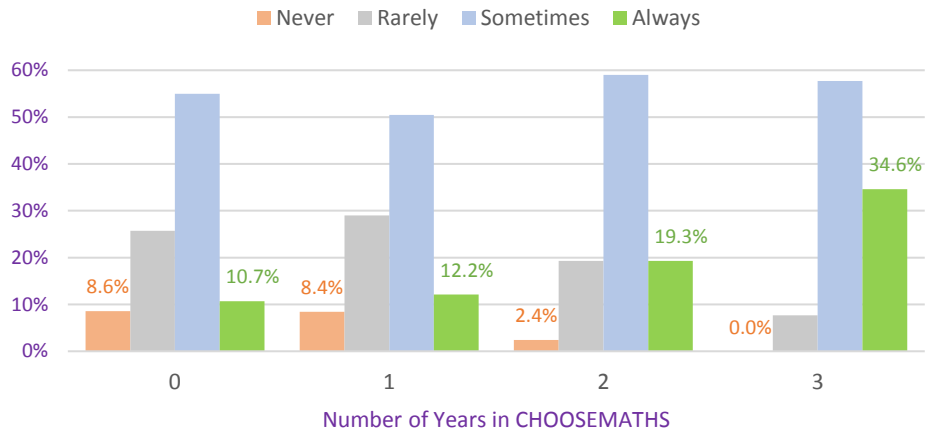
About 60 per cent of the teachers reported that their schools always provided vocational guidance testing for students and had visits from guest speakers who were employers in mathematics related areas. Approximately half of the teachers' schools always offered work experience or work placements to their students. About 40 per cent of the teachers' schools always offered subject choice advice, university entry requirements and career expos and provided one-to-one careers advice to their students.

KEY FINDING - An increasing proportion of teachers has provided opportunities for career-related learning within the mathematics curriculum

Teacher responses to the question 'To what extent are you involved in providing opportunities for career-related learning within the mathematics curriculum in your classes?' are grouped according to the number of years a teacher has participated in the CHOOSE**MATHS** program. For each group, the full distribution of responses is displayed in Figure 27. A total four distributions are displayed and the percentages within each distribution add up to 100 per cent. Among the respondents who never

participated in CHOOSE**MATHS** (displayed as 0 number of years in CHOOSE**MATHS** in the graph), there were 8.6, 25.7, 55.0, and 10.7 per cent of them responded with 'Never', 'Rarely', 'Sometimes', and 'Always' respectively to this question.

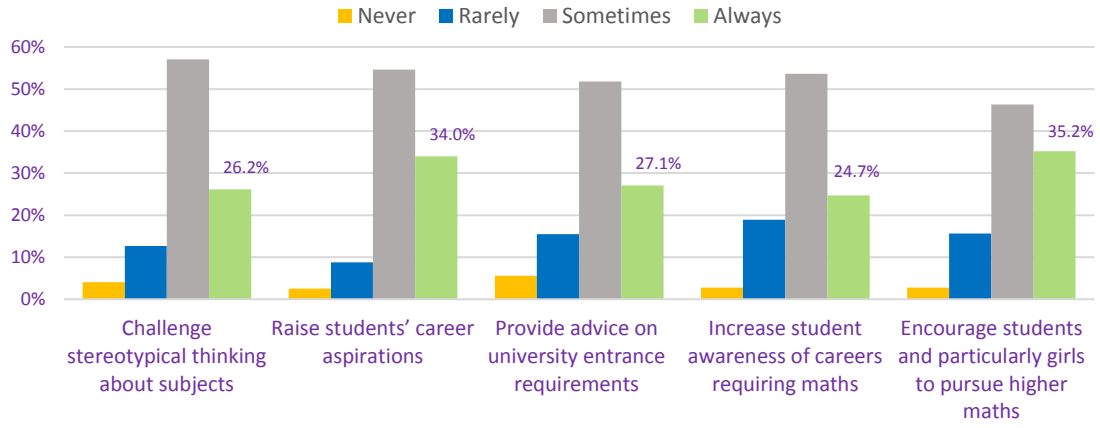
Figure 27. Response distributions as a function of the duration of participation



Focusing on the categories 'Never' and 'Always', we see in Figure 27 that the percentage of teachers never involved in providing opportunities for career-related learning has decreased with the number of years of participation in CHOOSE**MATHS**. Meanwhile, the percentage of teachers who were always involved in this activity has increased with the duration of participated in CHOOSE**MATHS,** from 10.7 percent monotonically to 34.6 per cent after the 3-year participation.

Information regarding teachers' activities in encouraging students to pursue mathematics as a career pathway was also collected and displayed in Figure 28 based on the pooled data from all waves.

Figure 28. Data distribution on questions related to mathematics as a career pathway



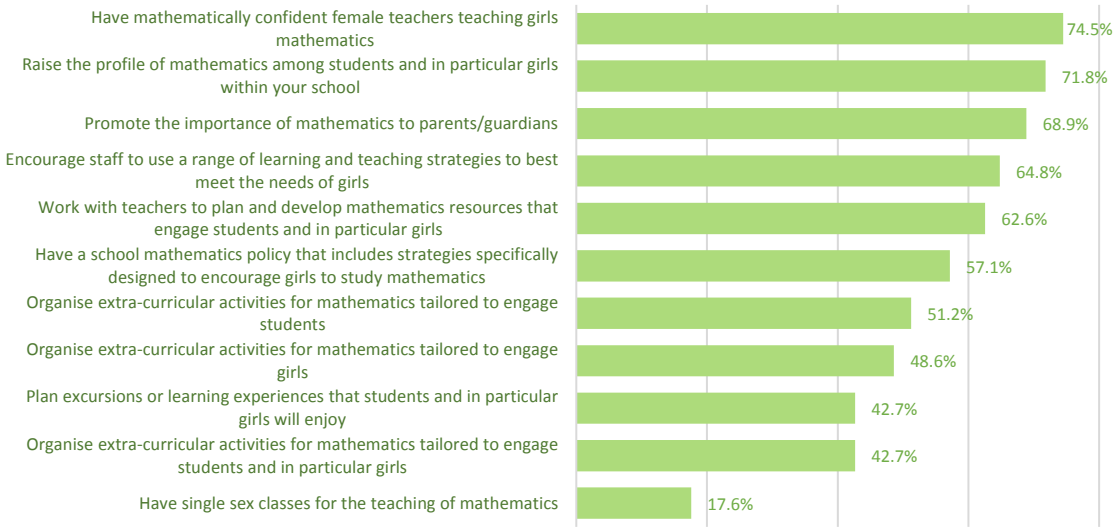
Loosely, one quarter of the teachers always challenged stereotypical thinking about mathematics subjects, provided advice on university entrance requirements, and increased student awareness of mathematics related careers in their classes. Approximately one third of the teachers always tried to raise students' career aspirations and encourage them, particularly girls, to pursue higher level mathematics. From these data seem to reveal that most teachers had been involved in activities to promote mathematics to students in their teaching.

Influential Factors to Student Decisions to Continue Mathematics

KEY FINDING - Having mathematically confident female teachers teaching girls mathematics was rated by most teachers as 'Very Important', while having single sex classes for mathematics teaching was rated by fewest teachers as 'Very Important'

CHOOSE**MATHS** survey participants rated the extent of importance on a list of activities that aim to promote mathematics among students, by selecting 'Not Important' or 'Somewhat Important' or 'Very Important'. Figure 29 displays the percentage of teachers selecting 'Very Important' to each activity.

Figure 29. Percentage of 'Very important' responses in activities to promote mathematics



From Figure 29, the activity perceived to be very important by most teachers was having mathematically confident female teachers teaching girls mathematics. This was followed by the activities to raise the profile of mathematics among students and in particular girls within school, to promote the importance of mathematics to parents/guardians, to encourage staff to use a range of learning and teaching strategies to best meet the needs of girls, to work with teachers to plan and develop mathematics resources that engage students and in particular girls, and to have in place a school mathematics policy that includes strategies specifically designed to encourage girls to study mathematics. Half of the teachers considered it very important to organise extra-curricular activities tailored for students. Only 18 per cent of the teachers agreed that a single sex classes for mathematics teaching was very important in the promotion of mathematics to students.

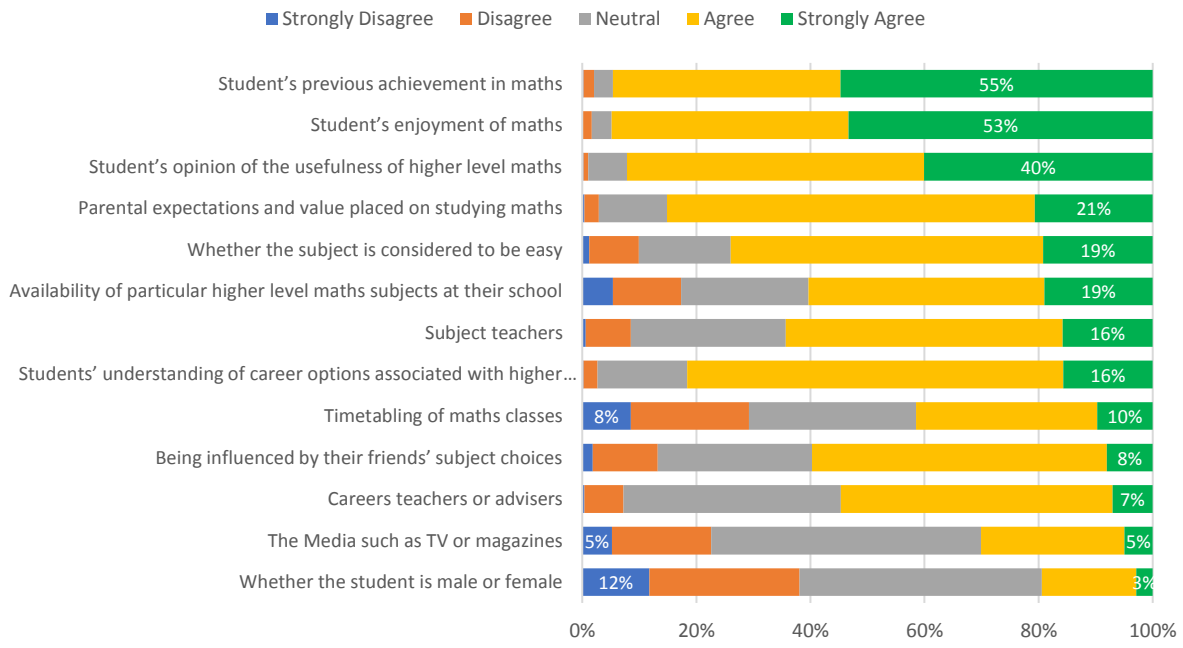
KEY FINDING – Student previous achievements in mathematics and enjoyment of mathematics were the most influential factors to student decisions to continue studying mathematics, according to the teachers

Teacher opinions on factors that potentially affect student decisions to continue or discontinue studying mathematics in Years 11 and 12 were sought after in the surveys. Responses were measured by a 5-point Likert scale from 'Strongly Disagree' to 'Strongly Agree'. The responses are quite consistent between male and female teachers, consistent across age groups, consistent over time, and consistent between the in-field and OOF teachers. Based on the pooled data, Figure 30 displays for each factor how the teacher responses are distributed over the 5 categories. For easy viewing, the

group of items were sorted in descending order according to the share of 'Strongly Agree', coloured in green in the graph.

More than half of the teachers strongly agreed that student's previous mathematics achievement and student's enjoyment of mathematics were influential. The second strongly agreed up on influential factor was student's opinion of the usefulness of higher-level mathematics. About 20 per cent of the teachers strongly agreed that parental expectations and value placed on studying mathematics, whether the subject was considered easy, and the availability of a particular higher-level mathematics subject at the school were also influential.

Figure 30. Opinions on factors influencing students' decisions to continue studying mathematics



The factors of subject teachers and student's understanding of career options associated with higher-level mathematics were strongly considered by 15 per cent of the teachers as influential. Opinions regarding the influence of media was most diverse, with an equal percentage of teachers holding opposite opinions of either 'Strongly Disagree' or 'Strongly Agree'. While 3 per cent of the teachers strongly agreed that student's gender was an influential factor, 12 per cent of the teachers strongly disagreed with that.

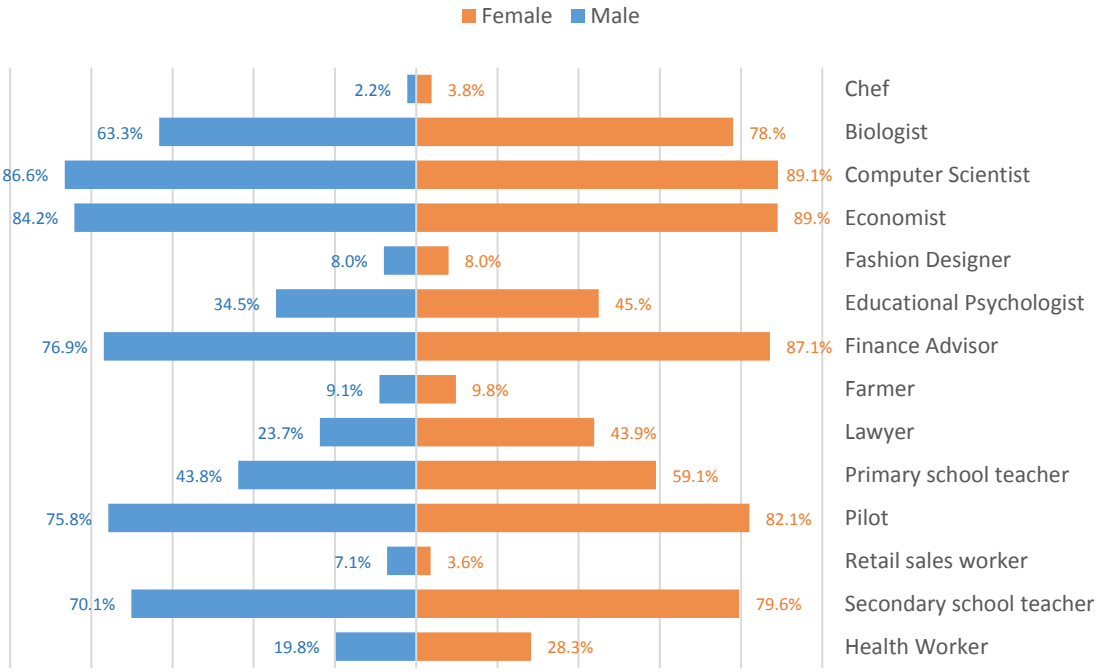
Level of Mathematics Required by Occupation

Participants in the CHOOSE**MATHS** Teacher Survey rated the perceived importance of mathematics in 14 occupations that are listed in Figure 31, by indicating the level of mathematics they think is required for each occupation. The response options are 'University Mathematics', 'Year 12 Mathematics', 'Year 10 Mathematics', and 'Only Basic Mathematics Skills'. Figure 31 displays the proportion of teachers selecting 'University Mathematics' in each occupation.

Consistent among male and female teachers, the occupations that were perceived to require the highest level of mathematics were computer scientist, economist, finance advisor, pilot, secondary school teacher, and biologist. The least mathematically demanding occupations, according to the teachers, were chef, fashion designer, farmer, and retail sales worker. The level of mathematics

required for educational psychologist, lawyer, primary school teacher, and health worker were perceived to lie between the two extremes.

Figure 31. Percentage of teachers who think the occupation requires university mathematics



Notably in Figure 31, a higher percentage of female teachers than male teachers assigned the top level 'University Mathematics' to every occupation in the list, except for retail sales workers. In 12 occupations out of the 14, female teachers valued mathematics higher than male teachers. This may indicate that female teachers placed a higher value on mathematics for these occupations. Between male and female teachers, the biggest difference in assessment of what level of mathematics is required in an occupation was for Lawyer, where 20 percentage points more female teachers than male teachers assigned 'University Mathematics'.

Also interesting is that a higher proportion of primary teachers than secondary teachers assigned 'University Mathematics' to every single occupation surveyed. For every occupation in the list, the proportion of primary teachers who assigned 'University Mathematics' to the occupation was statistically significantly higher than that of the secondary teachers.

Appendix

The CHOOSEMATHS school survey (primary) 2019 questionnaire items

The CHOOSEMATHS teacher survey (primary) 2019 questionnaire items

The CHOOSEMATHS school survey (secondary) 2019 questionnaire items

The CHOOSEMATHS teacher survey (secondary) 2019 questionnaire items

CHOOSE**MATHS** Program

Mathematics Teacher Survey

Primary School

2019

About your school ...

Q 1 What is the type of school you teach at?

Primary ☐ Combined Primary Secondary ☐ Other ☐

Other, please tell us ☐

About you ...

Q 2 What is your position in your school?
Tick all that apply

Classroom teacher	☐	Teacher's aide	☐
Mathematics coordinator	☐	Numeracy coach	☐
Head of curriculum	☐	Deputy Principal	☐
Principal	☐	Other	☐
Other, please tell us	☐		

Q 3a Did you personally participate in the CHOOSE**MATHS program in 2016?**

Yes ☐ No ☐

Q 3b Did you personally participate in the CHOOSE**MATHS program in 2017?**

Yes ☐ No ☐

Q 3c Did you personally participate in the CHOOSE**MATHS program in 2018?**

Yes ☐ No ☐

Q 3d In 2019 are you personally participating in the CHOOSE**MATHS program?**

Yes ☐ No ☐

Q 4 What is your gender? Male ☐ Female ☐ Prefer not to provide / Other ☐

Q 5 How old are you?

20-24 years ☐ 25-29 years ☐ 30-34 years ☐ 35-39 years ☐ 40-45 years ☐

46-49 years ☐ 50-54 years ☐ 55-59 years ☐ 60+ years ☐

Q 6 Do you teach …

Full-time ☐ Part-time ☐

Q 7 What is your time fraction in per cent?

☐ %

Q 8 Which year level(s) are you teaching mathematics to this year?

Foundation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
☐	☐	☐	☐	☐	☐	☐

Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
☐	☐	☐	☐	☐	☐

Q 9a How many years have you been teaching?

☐ years

Q 9b How many years have you been teaching mathematics?

☐ *years*

Q 9c How many years have you been teaching in your current school?

☐ *years*

Q 10 How many hours a week do you teach mathematics?

☐ *hours*

Teacher's background in mathematics

Q 11 Are you trained to teach mathematics at the following levels?

- Primary school level ☐
- Secondary school level ☐
- Both Primary and Secondary school level ☐
- Neither Primary nor Secondary school level ☐

Q 12 What qualifications do you have that are specific to mathematics content or teaching of mathematics?

Please tick all that apply.

a. Bachelor of Education in teaching of primary mathematics	☐
b. Bachelor of Education with primary mathematics content	☐
c. Bachelor of Education in teaching of secondary mathematics	☐
d. Bachelor of Education with secondary mathematics content	☐
e. Diploma of Education in teaching of primary mathematics	☐
f. Diploma of Education with primary mathematics content	☐
g. Diploma of Education in teaching of secondary mathematics	☐
h. Diploma of Education with secondary mathematics content	☐
i. Bachelor degree – Major in mathematics	☐
j. Bachelor degree – Minor in mathematics	☐
k. Bachelor degree without a major or minor in mathematics	☐
l. Masters degree in teaching of primary mathematics	☐
m. Masters degree in teaching of secondary mathematics	☐
n. Masters degree in teaching primary and secondary mathematics	☐
o. Masters degree in mathematics	☐
p. Other	☐
Please tell us	

Q 13 Do you think your degree(s) prepared you adequately for the mathematics you are required to teach this year?

Yes ☐ No ☐

Where are the gaps? ☐

Teacher confidence and competence in mathematics

Q 14 To what extent do the following apply to your teaching of mathematics?
Please tick one box between 0 and 10 on each row.

Where 0 = Never applies *10 = Always applies.*

a. Enjoy teaching mathematics

0 1 2 3 4 5 6 7 8 9 10

b. Feel tense when teaching mathematics

0 1 2 3 4 5 6 7 8 9 10

c. Teach mathematics well

0 1 2 3 4 5 6 7 8 9 10

d. Feel knowledgeable about and on top of the mathematics content you teach

0 1 2 3 4 5 6 7 8 9 10

e. Feel confident integrating new technologies such as spreadsheets and dynamic software

0 1 2 3 4 5 6 7 8 9 10

f. Feel confident when teaching mathematics

0 1 2 3 4 5 6 7 8 9 10

g. Focus on the thinking process to get the right answer, rather than the answer itself

0 1 2 3 4 5 6 7 8 9 10

h. Prefer developing your own material

0 1 2 3 4 5 6 7 8 9 10

i. Include practical mathematics activities

0 1 2 3 4 5 6 7 8 9 10

j. Relate mathematics to real life examples and activities

0 1 2 3 4 5 6 7 8 9 10

k. Put off teaching topics you find difficult

0 1 2 3 4 5 6 7 8 9 10

l. Give specific, purposeful and timely feedback on students' learning

0 1 2 3 4 5 6 7 8 9 10

Q 15 Do you feel confident when teaching the following areas of mathematics?

Please tick one box on each row.	Not confident	Somewhat confident	Confident	Very confident
a. Number and algebra	☐	☐	☐	☐
b. Measurement and geometry	☐	☐	☐	☐
c. Statistics and probability	☐	☐	☐	☐
d. Incorporating proficiencies, fluency, understanding and/ or communicating into the Australian curriculum: Mathematics content areas	☐	☐	☐	☐
e. Incorporating proficiencies, problem solving and reasoning in to content areas	☐	☐	☐	☐

Q 16 How confident do you feel you are regarding the following?

Please tick one box on each row.	Not confident	Somewhat confident	Confident	Very confident
a. Planning mathematics programs appropriate to the year level(s) you teach	☐	☐	☐	☐
b. Building a bank of mathematics teaching resources and rich tasks	☐	☐	☐	☐
c. Assisting and supporting colleagues in teaching mathematics	☐	☐	☐	☐
d. Developing mathematics assessment tasks	☐	☐	☐	☐
e. Responding to questions in class about maths concepts in a way that students will understand	☐	☐	☐	☐
f. Catering for differentiation in my mathematics teaching	☐	☐	☐	☐
g. Differentiate teaching practices and curriculum to ensure all students can develop to their potential in mathematics	☐	☐	☐	☐

Mathematics and gender

Q 17 Have you ...

Please tick one box on each row.	Yes	No
a. been involved in motivating girls' interest in mathematics as part of your mathematics teaching?	☐	☐
b. developed any material that may help in motivating girls' interest in mathematics?	☐	☐

If yes, please list some material you have developed

c. developed teaching approaches or teaching modules for encouraging and motivating girls in the study of mathematics?	☐	☐

If yes, please tell us for which age group(s)

Q 18 Do you think you are a good mathematics role model for your students?

Yes ☐ No ☐

Professional Development in Mathematics

Q 19 For each of the following PD options indicate their importance and helpfulness to you in your teaching of mathematics at the year levels you teach.

Please tick one box on each row.	Very important	Somewhat important	Not important
a. Assistance in using the Australian mathematics curriculum: Mathematics content areas in your planning	☐	☐	☐
b. Assistance in planning at the year levels you teach	☐	☐	☐
c. Assisting other staff especially new graduates	☐	☐	☐
d. Mentoring of girls to encourage them to develop an interest in mathematics	☐	☐	☐
e. Development of assessment tasks	☐	☐	☐
f. Consolidating mathematical pedagogy	☐	☐	☐
g. Consolidating mathematical content knowledge	☐	☐	☐

Q 19 (cont.) For each of the following PD options indicate their importance and helpfulness to you in your teaching of mathematics at the year levels you teach.

Please tick one box on each row.	Very important	Somewhat important	Not important
h. Assisting with research and building a bank of teaching resources	☐	☐	☐
i. Lesson observations and targeted feedback	☐	☐	☐
j. Networking opportunities with other teachers	☐	☐	☐
k. Making use of assessment data to support improvement in teaching and learning	☐	☐	☐
l. Open access to a wide variety of resources for teachers and students	☐	☐	☐
m. Team teaching/modelled lessons with targeted planning and evaluation	☐	☐	☐
n. Materials and information on careers in mathematics and mathematics in careers	☐	☐	☐
o. Tools and information for teachers, parents and students to increase awareness of mathematics and mathematics related fields as careers for students and in particular girls	☐	☐	☐

Q 20 Name <u>one</u> PD topic that would best help you in teaching mathematics at the year levels you teach.

Expected benefits from the CHOOSE**MATHS program**

Q 21a How useful do you think the CHOOSEMATHS program is to you?**

Very useful ☐ Useful ☐

Somewhat useful ☐ Not at all useful ☐

Q 21b What are the main benefits you have gained from the CHOOSEMATHS program in 2016, 2017 or 2018?**

If you have not participated in 2016, 2017 or 2018, please write N/A.

Q 22 What are the main benefits you hope to gain from the CHOOSE**MATHS program this year?**

Q 23 Is there anything about the CHOOSE**MATHS program that has surprised you in a good or bad way?**

Q 24 How important is mathematics in the following occupations?
Please tick one box on each row to indicate the level of mathematics required for each occupation.

	University mathematics	Year 12 mathematics	Year 10 mathematics	Only basic mathematics skills
a. Chef	☐	☐	☐	☐
b. Biologist	☐	☐	☐	☐
c. Computer Scientist	☐	☐	☐	☐
d. Economist	☐	☐	☐	☐
e. Fashion Designer	☐	☐	☐	☐
f. Educational Psychologist	☐	☐	☐	☐
g. Finance Advisor	☐	☐	☐	☐
h. Farmer	☐	☐	☐	☐
i. Lawyer	☐	☐	☐	☐
j. Primary School Teacher	☐	☐	☐	☐
k. Pilot	☐	☐	☐	☐
l. Retail Sales Worker	☐	☐	☐	☐
m. Secondary School Teacher	☐	☐	☐	☐
n. Health Worker	☐	☐	☐	☐

Q 25 Are you a Mathematics/Numeracy Coordinator?
Yes ☐ No ☐

IF Yes Please continue.

IF NO "Thank you for your help in completing this survey"

Additional questions for Mathematics/Numeracy Coordinators

Q 26 How important are the following activities for you as the Mathematics/ Numeracy Coordinator?

Please tick one box on each row.	Not important	Somewhat important	Very important
a. Raise the profile of mathematics among students and in particular girls within your school	☐	☐	☐
b. Organise extra-curricular activities for mathematics tailored to engage students and in particular girls	☐	☐	☐
c. Organise extra-curricular activities for mathematics tailored to engage students	☐	☐	☐
d. Work with teachers to plan and develop mathematics resources that engage girls	☐	☐	☐
e. Have a school mathematics policy that includes strategies specifically designed to encourage students to study mathematics	☐	☐	☐
f. Promote the importance of mathematics to parents/guardians	☐	☐	☐
g. Have mathematically confident female teachers teaching girls mathematics	☐	☐	☐
h. Encourage staff to use a range of learning and teaching strategies to best meet the needs of girls	☐	☐	☐

Q 27 How can the CHOOSE**MATHS program help you best to promote the participation in and enjoyment of mathematics amongst your female students?**

Thank you for your help in completing this survey

CHOOSE**MATHS** Program

Mathematics Teacher Survey

Secondary School

2019

About your School

Q 1 What is the type of school you teach at?

Combined Primary Secondary ☐ Secondary ☐ Other ☐

Other, please tell us ☐

About you ...

Q 2 What is your position in your school?
Tick all that apply

Classroom teacher	☐	Teacher's aide	☐
Head of Mathematics Department	☐	Numeracy coach	☐
Head of curriculum	☐	Deputy Principal	☐
Principal	☐	Other	☐
Other, please tell us	☐		

Q 3a Did you personally participate in the CHOOSE**MATHS program in 2016?**

Yes ☐ No ☐

Q 3b Did you personally participate in the CHOOSE**MATHS program in 2017?**

Yes ☐ No ☐

Q 3c Did you personally participate in the CHOOSE**MATHS program in 2018?**

Yes ☐ No ☐

Q 3d In 2019 are you personally participating in the CHOOSE**MATHS program?**

Yes ☐ No ☐

Q 4 What is your gender? Male ☐ Female ☐ Prefer not to provide / Other ☐

Q 5 How old are you?

20-24 years ☐ 25-29 years ☐ 30-34 years ☐ 35-39 years ☐ 40-45 years ☐

46-49 years ☐ 50-54 years ☐ 55-59 years ☐ 60+ years ☐

Q 6 Do you teach …

Full-time ☐ Part-time ☐

Q 7 What is your time fraction in per cent?

☐ %

Q 8 Which year level(s) are you teaching mathematics to this year?

Foundation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
☐	☐	☐	☐	☐	☐	☐

Year 7	Year 8	Year 9	Year 10	Year 11	Year 12
☐	☐	☐	☐	☐	☐

Q 9a How many years have you been teaching?

☐ years

Q 9b How many years have you been teaching mathematics?

☐ *years*

Q 9c How many years have you been teaching in your current school?

☐ *years*

Q 10 How many hours a week do you teach mathematics?

☐ *hours*

Teacher's background in mathematics

Q 11 Are you trained to teach mathematics at the following levels?

Primary school level ☐

Secondary school level ☐

Both Primary and Secondary school level ☐

Neither Primary nor Secondary school level ☐

Q 12 Are you teaching mathematics as 'teaching out of area'?

(You are teaching out of area if you are teaching a subject or year-levels outside your field of qualification or expertise. For example you are trained to teach history but are teaching mathematics)

Yes ☐ No ☐

If Yes, please tell us.

Q 13 What qualifications do you have that are specific to mathematics content or teaching of mathematics?

Please tick all that apply.

a. Bachelor of Education in teaching of primary mathematics	☐
b. Bachelor of Education with primary mathematics content	☐
c. Bachelor of Education in teaching of secondary mathematics	☐
d. Bachelor of Education with secondary mathematics content	☐
e. Diploma of Education in teaching of primary mathematics	☐
f. Diploma of Education with primary mathematics content	☐
g. Diploma of Education in teaching of secondary mathematics	☐
h. Diploma of Education with secondary mathematics content	☐
i. Bachelor degree – Major in mathematics	☐
j. Bachelor degree – Minor in mathematics	☐
k. Bachelor degree without a major or minor in mathematics	☐
l. Masters degree in teaching of primary mathematics	☐
m. Masters degree in teaching of secondary mathematics	☐
n. Masters degree in teaching primary and secondary mathematics	☐
o. Masters degree in mathematics	☐
p. Other	☐
Please tell us	☐

Q 14 Do you think your degree(s) prepared you adequately for the mathematics you are required to teach this year?

Yes ☐ No ☐

Where are the gaps? ☐

Q 15 Do you feel comfortable and confident teaching the following levels of mathematics?

Please tick one box on each row.	Yes	No
a. Lower level secondary mathematics (Year 7 and 8)	☐	☐
b. Middle level secondary mathematics (Year 9 and 10)	☐	☐
c. Upper level secondary mathematics (Year 11 and 12)	☐	☐
d. Specialist mathematics / Extension 1 and 2 / Maths C	☐	☐

Teacher confidence and competence in mathematics

Q 16 To what extent do the following apply to your teaching of mathematics?
Please tick one box between 0 and 10 on each row.

Where 0 = Never applies *10 = Always applies.*

a. Enjoy teaching mathematics

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

b. Feel tense when teaching mathematics

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

c. Teach mathematics well

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

d. Feel knowledgeable about and on top of the mathematics content you teach

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

e. Feel confident integrating new technologies such as spreadsheets and dynamic software

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

f. Feel confident when teaching mathematics

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

g. Focus on the thinking process to get the right answer, rather than the answer itself

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

h. Prefer developing your own material

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

i. Include practical mathematics activities

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

j. Relate mathematics to real life examples and activities

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

k. Put off teaching topics you find difficult

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

l. Give specific, purposeful and timely feedback on students' learning

☐0 ☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10

Q 17 Do you feel confident when teaching the following levels of mathematics?

Please tick one box in each row.	Not confident	Somewhat confident	Confident	Very confident
a. Year 7 mathematics curriculum	☐	☐	☐	☐
b. Year 8 mathematics curriculum	☐	☐	☐	☐
c. Year 9 mathematics curriculum	☐	☐	☐	☐
d. Year 10 mathematics curriculum lower level	☐	☐	☐	☐
e. Year 10 mathematics curriculum all levels	☐	☐	☐	☐
f. Year 11 mathematics curriculum lower level	☐	☐	☐	☐
g. Year 11 mathematics curriculum all levels	☐	☐	☐	☐
h. Year 12 mathematics curriculum lower level	☐	☐	☐	☐
i. Year 12 mathematics curriculum all levels	☐	☐	☐	☐

Q 18 How confident do you feel you are regarding the following?

Please tick one box on each row.	Not confident	Somewhat confident	Confident	Very confident
a. Planning mathematics programs appropriate to the year level(s) you teach	☐	☐	☐	☐
b. Building a bank of mathematics teaching resources and rich tasks	☐	☐	☐	☐
c. Assisting and supporting colleagues in teaching mathematics	☐	☐	☐	☐
d. Developing mathematics assessment tasks	☐	☐	☐	☐
e. Responding to questions in class about maths concepts in a way that students will understand	☐	☐	☐	☐
f. Preparing students and in particular girls for further tertiary studies in mathematics	☐	☐	☐	☐
g. Differentiate teaching practices and curriculum to ensure all students can develop to their potential in mathematics	☐	☐	☐	☐

Mathematics and gender

Q 19 Have you ...

Please tick one box on each row.	Yes	No
a. been involved in motivating girls' interest in mathematics as part of your mathematics teaching?	☐	☐
b. developed any material that may help in motivating girls' interest in mathematic?	☐	☐

If yes, please list some material you have developed

c. developed teaching approaches or teaching modules for encouraging and motivating girls in the study of mathematics?	☐	☐

If yes, please tell us for which age group(s).

d. been involved in encouraging female students to consider careers involving mathematics in any formal way?	☐	☐

If yes, please specify activities

Q 20 Do you think you are a good mathematics role model for your students?

Yes ☐ No ☐

Professional Development in Mathematics

Q 21 For each of the following PD options indicate their importance and helpfulness to you in your teaching of mathematics at the year levels you teach.

Please tick one box on each row.	Very important	Somewhat important	Very important
a. Assistance in using the Australian mathematics curriculum: Mathematics content areas in your planning	☐	☐	☐
b. Assistance in planning at the year levels you teach	☐	☐	☐
c. Assisting other staff especially new graduates	☐	☐	☐
d. Mentoring of girls to encourage them to develop an interest in mathematics	☐	☐	☐

Q 21 (cont.) For each of the following PD options indicate their importance and helpfulness to you in your teaching of mathematics at the year levels you teach.

Please tick one box on each row.	Very important	Somewhat important	Very important
e. Development of assessment tasks	☐	☐	☐
f. Consolidating mathematical pedagogy	☐	☐	☐
g. Consolidating mathematical content knowledge	☐	☐	☐
h. Assisting with research and building a bank of teaching resources	☐	☐	☐
i. Lesson observations and targeted feedback	☐	☐	☐
j. Networking opportunities with other teachers	☐	☐	☐
k. Making use of assessment data to support improvement in teaching and learning	☐	☐	☐
l. Open access to a wide variety of resources for teachers and students	☐	☐	☐
m. Team teaching/modelled lessons with targeted planning and evaluation	☐	☐	☐
n. Materials and information on careers in mathematics and mathematics in careers	☐	☐	☐
o. Tools and information for teachers, parents and students to increase awareness of mathematics and mathematics related fields as careers for students and in particular girls	☐	☐	☐

Q 22 Name <u>one</u> PD topic that would best help you in teaching mathematics at the year levels you teach.

Expected benefits from the CHOOSE**MATHS program**

Q 23a How useful do you think the CHOOSEMATHS program is to you?

☐ Very useful ☐ Useful

☐ Somewhat useful ☐ Not at all useful

Q 23b What are the main benefits you have gained from the CHOOSEMATHS program in 2016, 2017 or 2018?

If you have not participated in 2016, 2017 or 2018, please write N/A.

Q 24 What are the main benefits you hope to gain from the CHOOSE**MATHS program this year?**

Q 25 Is there anything about the CHOOSE**MATHS program that has surprised you in a good or bad way?**

Mathematics as a career pathway

Q 26 To what extent are you involved in the following activities in your classes?

Please tick one box on each row.	Never	Rarely	Sometimes	Always
a. Challenge stereotypical thinking about subjects	☐	☐	☐	☐
b. Raise students' career aspirations	☐	☐	☐	☐
c. Provide advice on subject choices and university entrance requirements in areas that require mathematics	☐	☐	☐	☐
d. Increase student awareness of careers requiring mathematics and promote such careers	☐	☐	☐	☐
e. Encourage students and particularly girls to pursue higher level mathematics	☐	☐	☐	☐
f. Provide opportunities for career-related learning within the mathematics curriculum	☐	☐	☐	☐

Q 27 To what extent do you think the following factors influence students' decisions to continue studying mathematics in Year 11 and 12 at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
a. Student's previous achievement in mathematics	☐	☐	☐	☐	☐
b. Student's enjoyment of mathematics	☐	☐	☐	☐	☐

Q 27 (cont.) To what extent do you think the following factors influence students' decisions to continue studying mathematics in Year 11 and 12 at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
c. Student's opinion of the usefulness of higher level mathematics	☐	☐	☐	☐	☐
d. Availability of particular higher level mathematics subjects at their school	☐	☐	☐	☐	☐
e. Timetabling of mathematics classes (e.g., clashes with other preferred subjects)	☐	☐	☐	☐	☐
f. Whether the student is male or female	☐	☐	☐	☐	☐
g. Being influenced by their friends' subject choices	☐	☐	☐	☐	☐
h. Parental expectations and value placed on studying mathematics	☐	☐	☐	☐	☐
i. Students' understanding of career options associated with higher level mathematics	☐	☐	☐	☐	☐
j. Whether the subject is considered to be easy	☐	☐	☐	☐	☐
k. Subject teachers	☐	☐	☐	☐	☐
l. Careers teachers or advisers	☐	☐	☐	☐	☐
m. The Media such as TV or magazines	☐	☐	☐	☐	☐

Q 28 How important is mathematics in the following occupations?
Please tick one box on each row to indicate the level of mathematics required for each occupation.

	University mathematics	Year 12 mathematics	Year 10 mathematics	Only basic mathematics skills
a. Chef	☐	☐	☐	☐
b. Biologist	☐	☐	☐	☐
c. Computer Scientist	☐	☐	☐	☐
d. Economist	☐	☐	☐	☐
e. Fashion Designer	☐	☐	☐	☐
f. Educational Psychologist	☐	☐	☐	☐
g. Finance Adviser	☐	☐	☐	☐
h. Farmer	☐	☐	☐	☐
i. Lawyer	☐	☐	☐	☐

Q 28 (cont.) **How important is mathematics in the following occupations?**
Please tick one box on each row to indicate the level of mathematics required for each occupation.

j. Primary School Teacher	☐	☐	☐	☐
k. Pilot	☐	☐	☐	☐
l. Retail Sales Worker	☐	☐	☐	☐
m. Secondary School Teacher	☐	☐	☐	☐
n. Health Worker	☐	☐	☐	☐

Additional questions for Head of Mathematics

Q 29 **Are you the Head of a Mathematics Department?**

Yes ☐ No ☐

IF Q29 Yes Please Go to Q30

IF No "Thank you for your help in completing this survey"

Q 30 **How important are the following activities for the Mathematics Department in the promotion of mathematics?**

Please tick one box on each row.	Not important	Somewhat important	Very important
a. Raise the profile of mathematics among students and in particular girls within your school	☐	☐	☐
b. Have single sex classes for the teaching of mathematics	☐	☐	☐
c. Organise extra-curricular activities for mathematics tailored to engage students and in particular girls	☐	☐	☐
d. Work with teachers to plan and develop mathematics resources that engage students and in particular girls	☐	☐	☐
e. Plan excursions or learning experiences that students and in particular girls will enjoy	☐	☐	☐
f. Have a school mathematics policy that includes strategies specifically designed to encourage girls to study mathematics	☐	☐	☐
g. Promote the importance of mathematics to parents/guardians	☐	☐	☐
h. Have mathematically confident female teachers teaching girls mathematics	☐	☐	☐
i. Encourage staff to use a range of learning and teaching strategies to best meet the needs of girls	☐	☐	☐

Careers program or classes in your school

Q 31 To what extent does your school offer the following career activities to students?

Please tick one box on each row.	Never	Rarely	Sometimes	Always	Don't know
a. Careers advice one-to-one	☐	☐	☐	☐	☐
b. Advice on subject choices and university entrance requirements	☐	☐	☐	☐	☐
c. Advice on subject choices that match career interests	☐	☐	☐	☐	☐
d. Work experience or work placements	☐	☐	☐	☐	☐
e. Career days and expos	☐	☐	☐	☐	☐
f. Visits from guest speakers who are employers	☐	☐	☐	☐	☐
g. Careers information sessions for students and their parents	☐	☐	☐	☐	☐
h. Participation in lectures, workshops and seminars by various educational institutions i.e., university or TAFE	☐	☐	☐	☐	☐
i. Links or partnerships with local businesses	☐	☐	☐	☐	☐
j. Vocational guidance testing	☐	☐	☐	☐	☐

Q 32 Does your school ...

Please tick one box on each row.	Yes	No
a. stream students in Year 9 mathematics?	☐	☐

If yes, please specify how many levels and how students are selected for the different levels

b. stream students in Year 10 mathematics?	☐	☐

If yes, please specify how many levels and how students are selected for the different levels

Q 33 How can the CHOOSE**MATHS program help you best to promote the participation in and enjoyment of mathematics amongst your female students?**

Thank you for your help in completing this survey

CHOOSE**MATHS** Program

School Survey

Primary School

2019

About Your School

Q 1 Is your school a …

Primary ☐ Combined Primary Secondary ☐

Other, please tell us ☐

Q 2 Is your school …

Co-educational ☐ Girls only ☐ Boys only ☐

Q 3 How many students are enrolled at your school?

☐

Q 4 How many of your teachers have some knowledge of mathematics as part of their teacher training?

☐

Q 5 What is the main reason your school became involved in the CHOOSEMATHS program?

Please tick all applicable boxes.

a. Improve teachers' skills to teach mathematics	☐
b. Help to support and build teacher development in mathematics both in their own school and externally	☐
c. The cost-effective way of increasing teacher content knowledge, content and pedagogy	☐
d. Up-skilling teachers and improving student outcomes in mathematics	☐
e. Supporting staff professional growth in developing skill in mathematics	☐
f. Increasing teacher confidence in teaching mathematics	☐
g. Providing access to up-to-date teaching resources	☐
h. Other	
If Other, please specify	☐

Teaching of Mathematics in Your School

Q 6 Is your school's capacity to teach mathematics hindered by any of the following?

Please tick one box on each row.	Strongly disagree	Disagree	Agree	Strongly agree
a. A shortage of teachers with adequate mathematics knowledge	☐	☐	☐	☐
b. Shortage or inadequacy of maths textbooks	☐	☐	☐	☐
c. Shortage or inadequacy of technology (e.g., computers, calculators, smartboards)	☐	☐	☐	☐
d. Shortage or inadequacy of teaching aids (e.g, games, rulers, protractors)	☐	☐	☐	☐
e. Low student interest in maths	☐	☐	☐	☐
f. The morale of teachers regarding mathematics teaching	☐	☐	☐	☐

Participation in Mathematics Activities in Your School

Q 7 To what extent do the following teacher and or school based factors contribute to students' interest in mathematics at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
a. Teachers are enthusiastic about teaching maths	☐	☐	☐	☐	☐
b. Teachers have access to quality resources	☐	☐	☐	☐	☐
c. The school promotes the importance of students learning maths	☐	☐	☐	☐	☐
d. The maths teachers' skills and knowledge	☐	☐	☐	☐	☐
e. The way maths is taught at our school	☐	☐	☐	☐	☐

Q 8 To what extent do the following student and or parent based factors contribute to students' interest in mathematics at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
a. Students highly value being good at maths	☐	☐	☐	☐	☐
b. Student's parents/guardians promote maths as being an important subject	☐	☐	☐	☐	☐
c. Students feel maths is important to their life and career	☐	☐	☐	☐	☐
d. Students feel they are good at maths	☐	☐	☐	☐	☐
e. Whether maths classes are in the morning or afternoon	☐	☐	☐	☐	☐

Focus on girls in mathematics related careers

Q 9 What do you see as the main gains your school will get out of the CHOOSEMATHS program?

Please tick all applicable boxes.

- a. Improvement in the teaching of mathematics ☐
- b. Improvement in teacher quality, understanding and knowledge of mathematics ☐
- c. Building teacher confidence in teaching mathematics effectively ☐
- d. Improved consistency of strategies across schools in the teaching of mathematics ☐
- e. Improved focus on mathematics as part of STEM ☐
- f. Capacity building of teachers ☐
- g. Improved competence in the planning of the mathematics curriculum ☐
- h. Improved competence in curriculum documentation ☐
- i. Student engagement and ability in mathematics ☐
- j. Enhanced student learning (g. as a consequence of some of the above) ☐
- k. Improved student learning outcomes ☐
- l. More parent involvement through CHOOSE**MATHS** events ☐
- m. Other, *please specify one or more* ☐

Participation in CHOOSEMATHS

Q 10 Has the CHOOSEMATHS program …

Please tick one box.	Yes	No
a. been effective in increasing the engagement and enjoyment of mathematics among students in your school?	☐	☐
b. been effective in increasing teacher confidence and competence in teaching mathematics?	☐	☐
c. enhanced the understanding of the importance of mathematics in your school?	☐	☐
d. increased female students' confidence toward mathematics?	☐	☐
e. increased female students' attitude toward mathematics?	☐	☐

Q 11 What have been the main benefits and or difficulties your school has experienced with the CHOOSEMATHS program?

.....

.....

.....

Q 12 Which of the following CHOOSEMATHS activities did your school participate in in 2018?
Please tick all applicable boxes.

a. Family Night(s)	☐
b. CHOOSE**MATHS** Student Junior Video Competition (Years 5-7)	☐
c. CHOOSE**MATHS** Student Intermediate Video Competition (Years 8-9)	☐
d. CHOOSE**MATHS** Student Senior Video Competition (Years 10-12)	☐
e. Nomination of one of your teachers for the CHOOSE**MATHS** Teacher Awards	☐
f. CHOOSE**MATHS** Day at your school and organised by the Outreach Officer	☐
g. CHOOSE**MATHS** Day at a University in your city or region	☐

Thank you for your help in completing this survey

Please return your Consent Form and completed School survey in the accompanying Reply Paid envelope.

CHOOSE**MATHS** Program

School Survey

Secondary School

2019

About Your School

Q 1 Is your school a …

Secondary ☐ Combined Primary Secondary ☐

Other, please tell us ☐

Q 2 Is your school …

Co-educational ☐ Girls only ☐ Boys only ☐

Q 3 How many students are enrolled at your school?

☐

Q 4a How many of your teachers teach mathematics at your school? ☐

Q 4b What percentage of staff teaching mathematics are out-of-area teachers in 2019?

Please tick one box that represents your school's teachers of mathematics.

a. Less than 5%	☐
b. Between 5% and 10%	☐
c. Between 10% and 20%	☐
d. Between 20% and 30%	☐
e. Between 30% and 40%	☐
f. Between 40% and 50%	☐
g. More than 50%	☐

Q 5 Does your school have any of the following?

Please tick all applicable boxes.

a. Deputy Principal responsible for Mathematics Curriculum	☐
b. Head of Mathematics or equivalent position	☐
c. Other teacher responsible for Mathematics Curriculum	☐
If Other teacher, please specify	☐

Q 6 What are the main reasons your school became involved in the CHOOSEMATHS program?

Please tick all applicable boxes.

a. Improve teachers' skills to teach mathematics	☐
b. Provide assistance to teachers to be the best teachers they can be	☐
c. Provide staff with further professional development in teaching mathematics	☐
d. Provide staff with professional development in the promotion of mathematics to girls	☐
e. Provide an opportunity for staff to improve learning and to engage in collegiality and a sharing of ideas	☐
f. Provide an opportunity to improve teacher quality and student achievement and outcomes	☐
g. Cost-effective program that promotes mathematics to girls	☐
h. Improve mathematics skills of out-of-area teachers	☐
i. Increase teacher confidence in teaching mathematics	☐
j. Providing access to up-to-date teaching resources	☐
k. Other	☐
If Other, please specify	

Teaching of Mathematics in Your School

Q 7 Is your school's capacity to teach mathematics hindered by any of the following?

Please tick one box on each row.	Strongly disagree	Disagree	Agree	Strongly agree
a. A shortage of teachers with adequate mathematics knowledge	☐	☐	☐	☐
b. Shortage or inadequacy of maths textbooks	☐	☐	☐	☐
c. Shortage or inadequacy of technology (e.g., computers, calculators, smartboards)	☐	☐	☐	☐
d. Shortage or inadequacy of teaching aids (e.g, games, rulers, protractors)	☐	☐	☐	☐
e. Low student interest in maths	☐	☐	☐	☐
f. The morale of teachers regarding mathematics teaching	☐	☐	☐	☐
g. Under use of resources in a way that effectively promotes student engagement and growth in understanding of mathematical concepts	☐	☐	☐	☐
h. High staff turn-over	☐	☐	☐	☐

Participation in Mathematics Activities in Your School

Q 8 To what extent do the following teacher and or school based factors contribute to students' interest in mathematics at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
a. Teachers are enthusiastic about teaching maths	☐	☐	☐	☐	☐
b. Teachers have access to quality resources	☐	☐	☐	☐	☐
c. The school promotes the importance of students learning maths	☐	☐	☐	☐	☐
d. The maths teachers' skills and knowledge	☐	☐	☐	☐	☐
e. The way maths is taught at our school	☐	☐	☐	☐	☐

Q 9 To what extent do the following student and or parent based factors contribute to students' interest in mathematics at your school?

Please tick one box on each row.	Strongly disagree	Disagree	Do not know	Agree	Strongly agree
a. Students highly value being good at maths	☐	☐	☐	☐	☐
b. Student's parents/guardians promote maths as being an important subject	☐	☐	☐	☐	☐
c. Students feel maths is important to their life and career	☐	☐	☐	☐	☐
d. Students feel they are good at maths	☐	☐	☐	☐	☐
e. Whether maths classes are in the morning or afternoon	☐	☐	☐	☐	☐
f. Students have not yet met the creative side of studying mathematics but think it is a rule-driven subject	☐	☐	☐	☐	☐
g. Students need more motivation to want to learn or explore new mathematics	☐	☐	☐	☐	☐

Focus on girls in mathematics related careers

Q 10 Does your school have intentional or current strategies or programs for promoting mathematics to girls?

Please tick one box on each row.	Yes	No
a. That encourage girls to study higher-level maths subjects.	☐	☐
b. That encourage girls to pursue maths-relates career options.	☐	☐
c. Other (*if yes, please list)*	☐	☐

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Participation in CHOOSEMATHS activities

Q 11 What do you see as the main gains your school will get out of the CHOOSEMATHS program?

Please tick all applicable boxes.

a. Improvement in the teaching of mathematics	☐
b. Improvement in the mathematics skills and confidence of out-of-area teachers	☐
c. Improved teacher quality, understanding and knowledge of mathematics	☐
d. Building teacher confidence in teaching mathematics effectively	☐
e. Improved consistency of strategies across schools in the teaching of mathematics	☐
f. Improved focus on mathematics as part of STEM	☐
g. Capacity building of teachers	☐
h. Improved competence in the planning of the mathematics curriculum	☐
i. Improved competence in curriculum documentation	☐
j. Student engagement and ability in mathematics	☐
k. Enhanced student learning (g. as a consequence of some of the above)	☐
l. Improved student learning outcomes	☐
m. More parent involvement through CHOOSE**MATHS** events	☐
n. Other, *please specify one or more*	☐

Q 12 Has the CHOOSEMATHS program …?

Please tick one box.	Yes	No
a. been effective in increasing the engagement and enjoyment of mathematics among students in your school?	☐	☐
b. been effective in increasing teacher confidence and competence in teaching mathematics?	☐	☐
c. enhanced the understanding of the importance of mathematics in your school?	☐	☐
d. increased female students' confidence toward mathematics?	☐	☐
e. increased female students' attitude toward mathematics?	☐	☐

Q 13 What changes have you observed in teacher practice since your school has been involved in CHOOSEMATHS?

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Q 14 What have been the main benefits and or difficulties your school has experienced with the CHOOSEMATHS program?

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Q 15 Which of the following CHOOSEMATHS activities did your school participate in in 2018?
Please tick all applicable boxes.

a. Family Night(s)	☐
b. CHOOSE**MATHS** Student Junior Video Competition (Years 5-7)	☐
c. CHOOSE**MATHS** Student Intermediate Video Competition (Years 8-9)	☐
d. CHOOSE**MATHS** Student Senior Video Competition (Years 10-12)	☐
e. Nomination of one of your teachers for the CHOOSE**MATHS** Teacher Awards	☐
f. CHOOSE**MATHS** Day at your school and organised by the Outreach Officer	☐
g. CHHOSE**MATHS** Day at a University in your city or region	☐

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