Chapter 5
Pupils

This chapter examines characteristics of the pupils who took part in the two programmes, drawing on questionnaire and interview data. Pupil Questionnaires were administered to all pupils in September 2013 and at the end of May 2014. To ensure comparison within the same group of pupils, data are reported only for those who completed a questionnaire on both occasions. Interview data are drawn from interviews with subsets of pupils in December 2013 and May 2014. For the interviews, a total of 78 pupils (39 from each programme) were interviewed on each occasion. For each class, a group interview was conducted with three mixed-ability pupils. Pupils were selected by teachers, and in many cases, different pupils were selected in December and May. Thus, while the questionnaire data are derived from the same pupils on both occasions, the interview data relate to two different but overlapping sets of pupils.

Based on the 509 pupils who completed both Pupil Questionnaires, almost all pupils in each programme were either eight or nine years old, and there were slightly more boys than girls taking part, particularly in JUMP, where 58% of pupils were boys (Table 5.1).

Table 5.1: Summary gender and age information for pupils completing the Pupil Questionnaires

		% JUMP (N=271)	% IMPACT (N=238)
Gender	Boys	58.3	54.2
	Girls	41.7	45.8
Age	7	0.4	1.3
	8	56.7	48.9
	9	41.5	48.1
	10	1.5	1.7

Information on gender, but not on age, was collected from pupils who took part in the group interviews. Unlike the composition of the overall population of pupils, the gender split was slightly in favour of girls. During the first set of interviews, 40 of the 78 pupils spoken to (51.3%) were girls, as were 41 (52.6%) pupils who took part in the second set of interviews.

The rest of this chapter examines pupil attitudes and experiences under five main headings:

- Attitudes to school.
- Attitudes to mathematics.
- Confidence and anxiety in relation to mathematics.
- Experiences of classroom practice in relation to mathematics.
- Strategies used in mathematics lessons.

Attitudes to school

In both programmes, less than half of pupils indicated that they liked school, while approximately one third were unsure of their opinion (Table 5.2). In September 2013, a higher percentage of IMPACT than JUMP pupils indicated that they disliked school (27% versus 18%, respectively), a gap that remained largely unchanged in the May administration of the questionnaire.

Table 5.2: Percentages of pupils indicating if they liked school

	September 2013		May 2014	
	% JUMP (N=265)	% IMPACT (N=232)	% JUMP (N=268)	% IMPACT (N=231)
Like school	46.4	40.1	47.8	32.9
Not sure	35.1	33.2	32.8	39.8
Do not like school	18.5	26.7	19.4	27.3

For both programmes and on both occasions, boys were far more likely than girls to say they disliked school. For example, no more than 10% of girls in any programme on either occasion indicated that they did not like school. However, for boys in the IMPACT group, 41% surveyed in September indicated they did not like school, rising slightly to 43% in May.

Attitudes to mathematics

In the questionnaire, pupils were asked the extent to which they agreed with a number of statements relating to mathematics, using a four-point scale (*agree a lot, agree a little, disagree a little, disagree a lot*). Table 5.3 presents summary information on responses, showing combined *agree a lot* and *agree a little* responses. As can be seen, most pupils expressed positive attitudes to mathematics, irrespective of programme. Many attitudes changed little across the two time points. In particular, the percentages who believed that they were good at maths were almost identical on both occasions, while there was minimal change in the percentages who worried about being asked questions in class. There were, however, slight increases in the percentages indicating that they liked maths (by 6% in both JUMP and IMPACT), who learned interesting things in maths lessons (by 8% in JUMP and 3% in IMPACT), and who believed everyone could be good at maths (a 5% increase among JUMP pupils and a 7% increase among IMPACT pupils).

Table 5.3: Percentages of pupils who *agreed a lot/little* with various written statements about mathematics

	September 2013		May 2014	
	% JUMP (N=271)[1]	% IMPACT (N=238)	% JUMP (N=271)	% IMPACT (N=238)
I like maths	69.4	63.8	75.7	69.7
I wish I didn't have to study maths	45.9	48.0	43.3	44.7
I learn interesting things in maths	74.2	78.4	82.5	81.2
I am good at maths	81.0	76.2	81.2	76.7
I think everyone can be good at maths	80.1	67.7	85.4	74.9
I worry that I won't be able to answer questions in maths class	47.7	49.8	45.9	49.8

[1] To facilitate simplified presentation of data, *N*s shown are the maximum number in each programme who responded to a statement. Actual *N*s vary slightly by statement (ranging from one to 15 missing responses).

When interviewed, the first question pupils were asked was if they had a favourite subject, and if yes, was it mathematics. In the December interviews, slightly more than half of the pupils in each programme agreed that mathematics was their favourite subject (Table 5.4). However, in May, only 29% of JUMP and 26% of IMPACT pupils interviewed agreed this was true – a sizeable drop. Nonetheless, JUMP pupils interviewed were more positive about liking mathematics than the questionnaire responses suggested. During both the December and May interviews, 87% of JUMP pupils said that they liked maths, and no pupils said they did not like the subject. In contrast, between the December and May interviews, the percentage of IMPACT pupils liking mathematics dropped from 79% to 66%, with 29% expressing ambivalence during the May interviews.

Table 5.4: Percentages of pupils who agreed, disagreed or were unsure if they liked maths or it was their favourite subject

			Yes	Unsure	No
Is maths your favourite subject?	Dec 2013	JUMP (N=37)	56.8		43.2
		IMPACT (N=31)	51.3		48.7
	May 2014	JUMP (N=39)	29.0		71.0
		IMPACT (N=38)	26.3		73.7
Do you like maths?	Dec 2013	JUMP (N=39)	86.8	13.2	0.0
		IMPACT (N=39)	79.5	12.8	7.7
	May 2014	JUMP (N=37)	86.5	13.5	0.0
		IMPACT (N=38)	65.8	28.9	5.3

Pupils were asked if they preferred mathematics when they were in Second class or if they preferred it at the time of interview. During the December interviews, a large majority (89% in JUMP AND 82% in IMPACT) preferred their current experience of mathematics. However, when interviewed towards the end of the school year, only 54% of IMPACT pupils preferred their current mathematics lessons, with 72% indicating that they felt mathematics lessons were more fun in Second class. Most JUMP pupils remained positive, with 82% preferring their current mathematics lessons to those in Second class.

Gender differences in attitudes to mathematics

In both start- and end-of-year Pupil Questionnaires, girls in both programmes were more likely than boys to report liking maths (Table 5.5). The percentages that liked maths increased for both genders from September to May (almost identically for girls and boys in JUMP, and just 2% more for boys than girls in IMPACT). However, there was a comparatively large increase (10%) in the percentage of JUMP boys reporting they learned interesting things in maths (compared to 6% for JUMP girls, and 3% for girls and boys in IMPACT). The slight overall drop in percentages of pupils wishing they didn't study maths is mainly attributable to JUMP boys (a decrease of 4%) and IMPACT girls (a decrease of 9%).

In September, percentages of pupils agreeing that they were good at maths were similar for girls and boys in JUMP, and 7% higher for boys than girls in IMPACT.[2] In May, the percentages agreeing they were good at maths increased for JUMP boys and IMPACT girls (4% in each case), while they decreased for JUMP girls (5%) and IMPACT boys (2%). Percentages agreeing that everyone could be good at maths increased across all groups, but the largest

[2] However, in both programmes and on both occasions, higher percentages of boys than girls *agreed a lot* (as opposed to *a little*) with this statement.

increases were for JUMP boys (7%) and IMPACT girls (14%). There was little change for any group in percentages worrying about being asked questions in class.

In sum, the Pupil Questionnaires suggest that positivity towards mathematics and confidence in mathematical ability increased more substantially for boys than girls in JUMP, and for girls than boys in IMPACT. However, most of these percentage differences remain small.

Table 5.5: Percentages of pupils who *agreed a lot/little* with various written statements about mathematics, by gender

	September 2013				May 2014			
	JUMP		IMPACT		JUMP		IMPACT	
	Girls (N=113)	Boys (N=158)	Girls (N=109)	Boys (N=129)	Girls (N=113)	Boys (N=158)	Girls (N=109)	Boys (N=129)
I like maths	72.0	67.6	66.6	61.5	78.3	73.8	71.3	68.3
I wish I didn't have to study maths	44.1	47.1	51.4	45.2	44.3	42.6	42.2	46.9
I learn interesting things in maths	74.1	74.2	81.0	76.2	80.2	84.1	83.5	79.2
I am good at maths	81.6	80.5	72.1	79.5	77.0	84.2	76.0	77.3
I think everyone can be good at maths	86.9	75.2	65.3	69.7	90.0	82.2	79.5	70.7
I worry that I won't be able to answer questions in maths class	55.1	42.6	55.7	44.8	54.9	39.4	56.9	43.8

Favourite and least favourite aspects of mathematics

Interviewers asked pupils to name "one best thing and one worst thing about learning maths". Table 5.6 shows the most popular pupil responses supplied. A large number of answers focused on specific strand units or elements thereof (e.g., "*I don't like doing division*" or "*I love doing multiplication sums*"). Across the two set of interviews, pupils in the JUMP programme were more likely to cite mathematics as being fun or to say they liked being challenged or stretched by a topic. For example, 28% of JUMP pupils interviewed in May mentioned being able to complete difficult tasks as a positive aspect of learning mathematics, but only 5% of IMPACT pupils did so.

Pupils in both groups also mentioned that they liked that mathematics was important for everyday life. This was particularly true of the second set of interviews, where the real-life relevance of mathematics was mentioned by 18% of JUMP and 13% of IMPACT pupils. Although not cited by any pupil in the first interviews, 10% of IMPACT pupils interviewed in May said that there were *no* best things about mathematics lessons.

The most commonly cited "worst thing" was that mathematics could be too hard or that a pupil was not able to answer the questions in class. Thirty-one percent of IMPACT pupils listed this as their worst thing in December, while 21% of JUMP pupils cited it in May. Mathematics being boring or doing too much repetitive work in class was another common negative aspect of mathematics, cited by 18% of JUMP pupils during the December interviews and 15% in May. While 15% of IMPACT pupils also mentioned the repetitive or boring aspect of mathematics during the December interview, only 3% did so at the end of the school year. Homework was not mentioned by any pupils in December, but was mentioned by 29% of

IMPACT pupils in May. Interestingly, one pupil – in a JUMP class – mentioned having to revise for "the Drumcondras" (i.e., the achievement tests used as part of the evaluation) as the worst thing about mathematics. Finally, at least 10% in each set of interviews indicated that there were no "worst things" about mathematics lessons.

Table 5.6: Percentages of pupils who identified various factors as the best/worst thing about learning mathematics

		December 2013		May 2014	
		JUMP (n = 39)	IMPACT (n = 39)	JUMP (n = 39)	IMPACT (n = 38)
Best	Specific topic	48.7	51.3	23.1	50.0
	Fun	17.9	5.1	7.7	2.6
	Games	2.6	20.5	2.6	2.6
	Important for life	5.1	5.1	17.9	13.2
	Being 'stretched'	12.8	7.7	28.2	5.3
	Are no best things	0.0	0.0	0.0	10.5
Worst	Specific topic	51.3	25.6	28.9	39.5
	Boring/repetitive	17.9	15.4	13.2	2.6
	Too hard/not being able to answer	15.4	30.8	21.1	18.4
	Homework	0.0	0.0	7.7	28.9
	Are no worst things	12.8	20.5	15.4	10.5

Being asked questions in class

Interviewers asked pupils if their teacher asked questions in class (all did, as expected) and followed up by asking how they felt when they were asked a question. In December 2013, a large majority of JUMP pupils (79%) indicated it was a wholly positive experience for them while the remaining 21% expressed mixed feelings. None felt it was a wholly negative experience (Table 5.7). By May 2014, only 45% indicated wholly positive feelings, 42% expressed mixed feelings, and 13% felt it was a wholly negative experience. In contrast, on both occasions slightly more than half of IMPACT pupils interviewed felt positive about being asked questions.

Table 5.7: Percentage of pupils indicating how they felt about being asked questions in their mathematics class

	December 2013		May 2014	
	JUMP (n = 38)	IMPACT (n = 39)	JUMP (n = 39)	IMPACT (n = 39)
Positive	78.9	56.4	44.7	53.8
Mixed	21.1	38.5	42.1	33.3
Negative	0.0	5.1	13.2	12.8

Examples of positive responses include "*Yes, cos I like telling the others how I did it*" and "*Yes, I really want to say it out and when I know it I feel better*". Ambivalent responses tended to focus on the distinction between the good feeling of knowing the correct answer and nervousness that it might be wrong: "*It's good if you know it. Otherwise, oh dear. But you have to try*" and "*I like questions when I know the answer but it's hard with everyone listening if I don't know it*". Negative responses focused largely on nervousness (sometimes mentioning additional pressure from the observer's presence): "*I get worried about getting things wrong,*

specially today [being recorded]" or "*Not really, I'd be afraid I'd be wrong*". A number of pupils who expressed discomfort about being asked questions in front of the class mentioned that they preferred writing answers in their copybook or workbook.

Experience of mathematics instruction

To gauge pupils' perceptions of what activities typically occurred in mathematics lessons, the Pupil Questionnaire listed six teacher behaviours and asked pupils if these happened in their mathematics lessons. Table 5.8 summarises responses, showing the percentages of pupils who *agreed a lot* or *agreed a little* with the statements presented. Almost all pupils agreed that their teacher always explained what to do and asked if pupils understood the lesson. Between September and May, the percentage of pupils in JUMP classes agreeing with both statements increased by just over 5%, slightly higher than the 1% to 3% increase amongst IMPACT pupils. Thus, by May, 97% of JUMP pupils felt that their teacher always explained what they are expected to do and 95% agreed they always asked if pupils understood.

Roughly four in five pupils agreed that their teacher gave them fun things to do in maths lesson, with little difference by programme or by time of questionnaire completion. At the time of the first questionnaire, 80% of pupils in JUMP classes but only 68% of those in IMPACT classes agreed that their teacher let them play games in maths lessons. However, by the second questionnaire, just over three-quarters of pupils in each group agreed that they were let play games.

Table 5.8: Percentages of pupils who *agreed a lot/little* that various activities occurred during mathematics lessons, by time and programme

	September 2013		May 2014	
	% JUMP (N=271)	% IMPACT (N=238)	% JUMP (N=271)	% IMPACT (N=238)
My teacher always explains what we are expected to do	91.4	89.2	96.7	90.3
My teacher always asks do we understand stuff	89.8	87.2	95.2	90.3
My teacher often praises me	80.1	73.4	75.2	73.7
My teacher gets me to practice lots of examples	68.4	69.1	72.7	68.1
My teacher gives us fun things to do	78.9	78.4	80.4	78.4
My teacher lets us play games	79.8	67.5	77.2	76.4

Pupils were also asked about repeated practising of examples. In September 2013, similar percentages in each group agreed that this happened in maths lessons. By May 2014, an additional 4% of JUMP pupils and 1% fewer IMPACT pupils agreed that their teacher got them to practice lots of examples. Pupils were also asked if their teacher often praised them. IMPACT data remained quite static, with 73-74% agreeing this was true. However, there was a 5% drop in the number of JUMP pupils saying that their teacher often praised them.

Instruction during the observed lessons

During the course of pupil interviews, pupils were asked if the mathematics lesson just completed was similar to their normal lessons. By far the most common response (about two-thirds of pupils) was that the lesson was similar to their usual mathematics lesson, or similar apart from the presence of a camera. The next most common response was that the observed

lesson involved more games or activities than a typical lesson: "*Usually there're games just once in a while, not all the time*". During the first set of observations, 16% of pupils mentioned that the lesson had more games than normal, compared to 9% after the second observations.

About 6% of pupils indicated that different materials might be used in other lessons or that the lesson varied by the day of the week: "S*ometimes we use workbooks and sheets and base 10 blocks and some materials*" / "*On Fridays we do stations*". A wide variety of other comments were made by pupils, most of which were very specific to the lesson topic. During the first set of interviews, four pupils also commented that the lesson was easy because they had been doing it for a while – although it is unclear if they meant the general topic or if the lesson itself had been practiced.

Use of learning strategies

Tables 5.9 and 5.10 show data from the Pupil Questionnaire, outlining pupil responses to how often they used each of a variety of learning strategies. Since the September 2013 baseline data from pupils were gathered shortly after the initial professional development on respective programmes, some early programme effects may be apparent in the first table.

At the start of the year, the strategy most commonly used by pupils in both groups was to do a sum in their head (83% of JUMP and 72% of IMPACT pupils indicated that they did so in every class or most classes, with only 7% [JUMP] to 10% [IMPACT] reporting that they hardly ever did so). By May 2014, the pupils in each programme who did a sum in their head in every lesson dropped to just over 65% (JUMP) and 59% (IMPACT), with 13-15% hardly ever doing so.

The strategy of trying to understand new material by drawing on pre-existing knowledge was popular in both programmes and at both time points. In the September and May responses, roughly three-quarters of pupils indicated that they used the strategy in every class or most classes. To gauge use of repeat procedures and memorisation (key to JUMP), pupils were asked about learning by heart. Regular use of memorisation increased only marginally amongst JUMP pupils (from 74% to 77% doing so in most or all classes), with a larger increase evident amongst IMPACT pupils (from 70% to 79%). In a related vein, JUMP pupils might have been expected to show increased use of repetition of examples as a strategy. However, the percentages of JUMP pupils who went through repeated examples in most or all lessons were largely unchanged from September (57%) to May (58%). Overall, IMPACT pupils used repetition of examples at much the same frequency as JUMP pupils.

Solving problems with classmates and considering multiple solutions might be considered characteristics of adherence to IMPACT. At the outset, problem-solving with classmates was reasonably common in both groups – 47% of JUMP and 53% of IMPACT pupils reported doing so in most or all classes. However, by May, the percentages of pupils regularly solving problems with their classmates had dropped to 33% of JUMP and 45% of IMPACT pupils. For thinking of more than one way to solve a problem, the percentage of IMPACT pupils who did so regularly rose from 63% in September to 69% in May. In contrast, the percentage of JUMP pupils doing so dropped from almost 70% to 65%.

There were few notable changes in the extent to which pupils thought about using maths in everyday life, apart from an increase (from 18% to 25%) in the number of IMPACT pupils who hardly ever did so. The second administration of the Pupil Questionnaire in May 2014 included one additional question on learning strategies. 73% of JUMP pupils and 64% of IMPACT pupils reported working on their own on a problem in most or all classes, slightly

lower than might be expected given JUMP's emphasis on pupils working alone on examples in their workbooks.

Table 5.9: Percentages of pupils indicating various frequencies with which they engaged in learning strategies in mathematics lessons, **September 2013** responses

		Every class	Most classes	Some classes	Hardly ever
I work out a sum in my head	JUMP (N=263)	59.3	23.6	9.9	7.2
	IMPACT (N=229)	50.7	21.4	17.5	10.5
I try to understand new stuff by thinking about what I already know	JUMP (N=263)	54.4	20.9	12.5	12.2
	IMPACT (N=223)	40.4	33.2	17.0	9.4
When we do new things, I learn as much as I can by heart	JUMP (N=258)	48.8	25.6	14.3	11.2
	IMPACT (N=225)	40.9	29.3	21.8	8.0
I think of more than one way to get the answer to a problem	JUMP (N=262)	36.3	33.2	17.9	12.6
	IMPACT (N=226)	32.7	30.1	24.3	12.8
I go through examples again and again to help me remember them	JUMP (N=257)	34.6	22.6	21.4	21.4
	IMPACT (N=221)	36.7	21.7	25.3	16.3
I think about how I can use maths in everyday life	JUMP (N=268)	28.7	28.4	26.1	16.8
	IMPACT (N=228)	25.9	25.9	30.3	18.0
I work with my classmates to solve a problem	JUMP (N=258)	31.0	16.3	25.2	27.5
	IMPACT (N=225)	25.3	28.0	28.0	18.7

Table 5.10: Percentages of pupils indicating various frequencies with which they engaged in learning strategies in mathematics lessons, **May 2014** responses

		Every class	Most classes	Some classes	Hardly ever
I work out a sum in my head	JUMP (N=267)	33.7	31.8	21.0	13.5
	IMPACT (N=233)	36.5	22.7	25.8	15.0
I try to understand new stuff by thinking about what I already know	JUMP (N=267)	41.2	36.0	16.9	6.0
	IMPACT (N=234)	39.7	36.3	19.2	4.7
When we do new things, I learn as much as I can by heart	JUMP (N=262)	53.8	23.3	16.0	6.9
	IMPACT (N=234)	44.0	35.0	15.4	5.6
I think of more than one way to get the answer to a problem	JUMP (N=268)	28.7	36.2	28.4	6.7
	IMPACT (N=234)	32.9	35.9	21.4	9.8
I go through examples again and again to help me remember them	JUMP (N=265)	29.4	28.7	25.3	16.6
	IMPACT (N=234)	25.2	28.2	27.8	18.8
I think about how I can use maths in everyday life	JUMP (N=268)	28.7	25.4	30.2	15.7
	IMPACT (N=236)	18.2	29.2	27.5	25.0
I work with my classmates to solve a problem	JUMP (N=264)	13.6	19.3	43.6	23.5
	IMPACT (N=229)	17.0	27.9	39.3	15.7
I work on a problem on my own	JUMP (N=269)	37.2	35.7	22.3	4.8
	IMPACT (N=237)	26.6	35.9	25.7	11.8

Summary

Many of the attitudes expressed by pupils varied little by programme or by time. For example, a large minority of pupils in both programmes indicated that they did not like school, while almost half said they wished they did not have to study mathematics. Boys were far more likely than were girls to dislike school (and slightly more likely to dislike mathematics). There were slight increases in the percentages of pupils in both programmes agreeing that they learned interesting things in mathematics classes and that everyone could be good at mathematics, but a marked drop in the percentage of pupils interviewed who said that mathematics was their favourite subject. Questionnaire responses suggested that, in JUMP, boys' attitudes to mathematics improved more than girls' attitudes during the evaluation, while the reverse was true for IMPACT. However, these changes were small.

Pupils were asked about the activities that they or their teacher performed in a typical mathematics class. Again, there were very few differences or changes apparent. Irrespective of time of year or programme, most pupils said that their teacher always explained what to do and checked their understanding. Repeated practising of examples was equally common in each programme in September, but slightly more common in JUMP classes in May. JUMP pupils were also more likely to report regularly working on a problem on their own in class.

In contrast to questionnaire data, the interviews did reveal some differences by programme. Pupils in JUMP classes were far more likely to mention (unprompted) that they enjoyed being challenged or stretched in their mathematics lessons. Also, JUMP pupils were overwhelmingly positive about enjoying mathematics and preferring their current mathematics lessons to those in Second class, whereas the IMPACT pupils interviewed in May were far less positive than those interviewed earlier in the year. However, it should be borne in mind that IMPACT pupils' views probably relate to a mixture of IMPACT and non-IMPACT maths lessons, since the manuals covered material from just two strands and many teachers did not treat the programme principles as transferable across strands.