Evaluation of the Impact and Implementation of *Inspire Maths* in Year 1 Classrooms in England

Findings from a Mixed-Method Randomised Control Trial

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Executive Summary

Background to the study

Inspire Maths is the UK edition of *My Pals Are Here!* first launched in January 2015 by Oxford University Press. It consists of a textbook series and pedagogical approach that emphasises the teaching of mathematics through multiple representations of mathematical concepts – specifically the use of a Concrete, Pictorial, Abstract (CPA) approach. It is an example of the East Asian mastery-based approach to teaching mathematics that is gaining increasing international prominence in both research communities and in educational policies, and both within the UK as well as internationally.

Methods

This evaluation aimed to establish the effects of *Inspire Maths* via a clustered Randomised Control Trial (RCT) that followed 576 Year 1 pupils (aged 5-6 years) for one school year in the first schools to implement both *Inspire Maths* and the 2015 English National Curriculum. The RCT used a mixed methods approach and was driven by theories from the educational research fields of teacher effectiveness and school improvement. It used researcher-administered tests of children's mathematics attainment pre- and post- the introduction of *Inspire Maths*, but also obtained quantitative and qualitative evidence concerning the ways that schools and teachers adopted and responded to the materials and to the pedagogical approach.

Summary of Findings

What impact did Inspire Maths have on Year 1 pupils' attainment and progress in mathematics?

- Although all children progressed in mathematics throughout Year 1, significantly more progress[1] was made after two terms' use of *Inspire Maths* ,rather than after only one
    - This was a small but significant amount of extra progress; for the sake of comparison, this was twice the size of the gap found between boys and girls at the start of the year

What impact did Inspire Maths have on Year 1 pupils' attitudes towards mathematics?

- Pupils' attitudes towards mathematics remained largely positive throughout Year 1
    - This pattern was the same regardless of whether children were in classes that started using *Inspire Maths* in September 2015 or in January 2016

To what extent and in what ways did schools and teachers differ in their implementation of Inspire Maths?

- *Inspire Maths* promoted Year 1 teaching practices that are well known to be more effective for pupil progress in the long term
- At the start of the year, the classroom practices of teachers who had just started using *Inspire Maths* was already very different. They were demonstrating more effective classroom practices in many areas
    - These practices were observed following the OUP professional development workshop that teachers had attended over the summer
- After one term, the teachers who had been using *Inspire Maths* since September showed further improvements in the effectiveness of their classroom practice

[1] Note: 'Progress' is used in this report to mean pupil achievement at the end of two terms adjusted for pupil achievement at a baseline (i.e. September 2015).

  - Furthermore, the group who had begun using *Inspire Maths* after one term also showed improvements in their classroom practice following their OUP professional development
- After two terms, classrooms where teachers had been using *Inspire Maths* since September were observed to use increased *Differentiation* and *Inclusion*
  - By contrast, teachers had been using *Inspire Maths* since January were observed to be catching up in their use of high quality and effective classroom practices

What were teachers' views on and experiences of implementing Inspire Maths?

- Mixed ability grouping strategies
  - Most teachers were using mixed ability groups/pairs, but varied in the frequency with which they changed groupings, and some specifically avoided pairing pupils of especially high with especially low ability.
- Lesson structure
  - Some teachers established clear unit routines, scaffolding from more practical work on one day to use of practice books at the end of a unit. Others implemented a freer-flowing lesson structure and adjusted plans daily or during lessons based on pupils' progress.
- Use of print materials
  - Some teachers used practice books and textbooks daily at tables. Others preferred only to project textbook content, or to use some but not all practice book pages.
- Use of concrete resources
  - Some teachers were prescriptive about which resources pupils used in a given lesson, while others gave pupils a selection of resources from which to choose.
- Approach to ongoing assessment/intervention/extension
  - Some teachers marked pupil work and gave opportunities for correction in class, and/or brought small groups to the carpet for additional support in response to pupil struggles on the spot. Others marked work after a maths session and structured opportunities for corrections and/or intervention during a separate time in the school day.

What benefits do teachers associate with Inspire Maths?

- Benefits to teachers:
  - Boosted enthusiasm/confidence
  - Greater use of mathematical language and questioning
  - Increased subject knowledge
  - Better planning
    - While some teachers did find planning challenging, many found it useful to have the teachers' guides clearly laid out and to know 'what comes next'
- Benefits to pupils:
  - Boosted engagement and confidence
  - Greater depth/security of understanding
  - Development of language/vocabulary/verbal reasoning
  - Multiple ways of accessing/representing concepts
  - Multiple approaches to extension and extra challenge
- Benefits to schools:
  - In addition to benefits to individual pupils and teachers, and the implications of these as pupils moved up through the school, consistency across classrooms (within and across year groups) in terms of teaching approach and use of concrete resources was seen as a major benefit of rolling out *Inspire Maths*.

What challenges do teachers associate with Inspire Maths?

- Challenges for teachers:
  - Coverage of learning objectives
  - Management of resources, time, pupils, and materials
  - Difficulty demonstrating evidence of pupil progress
  - Time to adjust and adapt
- Challenges for pupils:
  - Sufficient reading skills to access content
  - Frustration levels for "low ability" pupils
    - Some teachers found that pupils who struggled tended to shut down during lessons involving more complex topics (e.g. structures for addition/subtraction).
  - Difficulty working both independently and with partners
  - Combinations of print materials and concrete resources could be distracting
- Challenges for schools:
  - Getting everyone on board
    - Some teachers experienced pushback from school leadership or teaching assistants regarding the approach and/or pacing.
  - Transitions for higher year groups
    - In two schools that had rolled out *Inspire Maths* in higher year groups, teachers remarked that their colleagues had experienced difficulty following transition documents that took up to half of the academic year to complete.
  - Coverage
    - Linked to the above, teachers worried about lack of within-year coverage putting pressure to cover even more within the following year. Coverage concerns also led to pressure from school leadership in several schools.
  - School policy
    - Teachers in schools in which timetables, physical space and resources were changed to accommodate *Inspire Maths* tended to find implementation more manageable. This suggested that school policy changes and support from school leadership might facilitate the successful implementation of *Inspire Maths.*

What were teachers' views on and experiences of OUP support and services for Inspire Maths? (Professional development and online resources)

- All teachers reported positive comments regarding the professional development workshops run by Oxford University Press
  - All teachers mentioned wanting to see videos or modelling of a full lesson
  - Some additionally wished there had been more specific focus on Year 1 practical activities
- Online offerings on Oxford OWL
  - Many teachers used the digital versions of textbook pages to display during lessons, but wanted to see more of the textbooks digitised and available online
  - Teachers who had used homework content found it useful, but found that topics were missing from what was available
  - Access issues and difficulty navigating prevented some teachers from using available online content

1. Introduction

1.1. The *Inspire Maths* Programme

Inspire Maths was launched in January 2015 by Oxford University Press and is the UK edition of *My Pals Are Here!* (Marshall Cavendish Education: Kheong et al., 2015). The programme adapts the mastery-based approach to teaching mathematics that is used in Singapore and consists of both a textbook series and a pedagogical approach. Like the mastery approach used in Singapore, *Inspire Maths* emphasises the teaching of mathematics through multiple representations of mathematical concepts – specifically the use of a Concrete, Pictorial, Abstract (CPA) approach. *Inspire Maths* focuses on developing pupils' mastery of fundamental mathematical principles and reasoning skills in order to provide a secure foundation for future learning. This solid grasp of the fundamentals is promoted by the frequent and varied use of manipulatives in lessons, an emphasis on depth over breadth, and teachers' use of a variety of questioning techniques (including higher-order questions). At the same time, *Inspire Maths* is also intended to promote inclusion within classrooms because it emphasises full-class instruction and mixed ability grouping. However, there has been no previous opportunity to develop evidence of the effectiveness of *Inspire Maths* textbooks and pedagogical approach in relation to the English primary maths curriculum introduced in September 2014.

1.2 Policy Context

The 2015 publication of *Inspire Maths* came at a time when East Asian mastery-based approaches to teaching maths were gaining international prominence in both the research community and in UK educational policies. The results of international assessments (such as TIMSS and PISA) have shown Singapore students to demonstrate excellent performance in mathematics (e.g. Mullis et al., 2012; OECD, 2010) and international research has demonstrated the educational effectiveness of programmes that follow the Singapore approach (e.g. Ginsberg et al., 2005; Goldman et al., 2009; Gross, 2002; Hoven and Garelick, 2007; Uribe-Zarain, 2010). At the same time, educational policies in both the UK and USA have been shifting toward promoting the use of mastery-based approaches to teaching and learning. In July 2016, the UK Government committed to invest £41M to support schools in adopting mastery approaches (Department for Education, 2016), and the USA now emphasises a curriculum in most states that may be seen as promoting mastery-based approaches to teaching in the form of the Common Core State Standards (Common Core State Standards Initiative, 2014).

Despite this shift in the educational policies of the UK and USA governments towards encouraging mastery-based approaches to teaching maths, evidence of the effectiveness of this approach is proportionally lacking. Those studies that have been conducted are few and have found at best modest effects on pupil achievement (e.g. Jaciw, Hegseth, Ma, & Lai, 2012; Jerrim & Vignoles, 2015, 2016) linked to improvements in problem solving and procedural skills (Jaciw et al., ibid). Furthermore, there is a lack of experimental studies that look beyond pupils' attainment in maths that consider additional effects such as an impact upon teachers' classroom practices and/or pupils' attitudes towards learning maths.

1.3. Aims of the Study

This evaluation aimed to establish the effects of *Inspire Maths* via a clustered Randomised Control Trial (RCT) that followed 576 Year 1 pupils (aged 5-6 years) for one school year in the first schools to implement both *Inspire Maths* and the 2014 English National Curriculum. The RCT used a mixed methods approach and was driven by theories from the educational research fields of teacher effectiveness and school improvement. It used researcher-administered tests of children's mathematics attainment pre- and post- the introduction of *Inspire Maths*, but also obtained

quantitative and qualitative evidence concerning the ways that schools and teachers adopted and responded to the materials and to the pedagogical approach using both observations and interviews.

1.4 Research Questions

Concerning Year 1 Pupils:

- What impact does *Inspire Maths* have on pupils' attainment and progress in mathematics?
- What impact does *Inspire Maths* have on pupils' attitudes towards mathematics?

Concerning the Implementation of *Inspire Maths*:

- To what extent and in what ways do schools and teachers differ in their implementation of *Inspire Maths*?
- What are teachers' views on and experiences of implementing *Inspire Maths*?
- What benefits or challenges (for teachers and schools) are associated with *Inspire Maths*?

Concerning OUP support and services:

- What are teachers' views on and experiences of OUP support and services (PD and online resources) for *Inspire Maths*?

2. Method

2.1 Sample

A random sample of primary schools was drawn from those that had expressed an interest to OUP in adopting *Inspire Maths*, and from those that were located in three geographical areas of England (London, the South, and the West Midlands). Twelve schools were purposively sampled and these comprised a mix of single-form (4) and two-form (8) entry schools. The resulting sample of twenty Year 1 classrooms contained 19 exclusively Year 1 classrooms, and 1 classroom that mixed pupils in Years 1 and 2 ("Key Stage 1" in England). These 20 classrooms included a total of 576 Year 1 pupils, who were given researcher-administered tests to investigate their understanding of maths and who filled in a simple 4-item questionnaire to investigate their attitudes towards maths.

Ethical permission for the evaluation was granted by the University of Oxford's Central University Research Ethics Committee. Schools and teachers were recruited via an opt-in informed consent procedure via emails and phone calls. Pupils were recruited via an opt-out informed consent procedure in which information leaflets and opt-out consent forms were sent to all parents of Year 1 pupils in participating classes. Ethical permission for the use of the opt-out recruitment procedure was granted because no activity was taking place with the children that lay outside normal classroom practice (assessments of pupils' understanding of, and attitudes towards, maths).

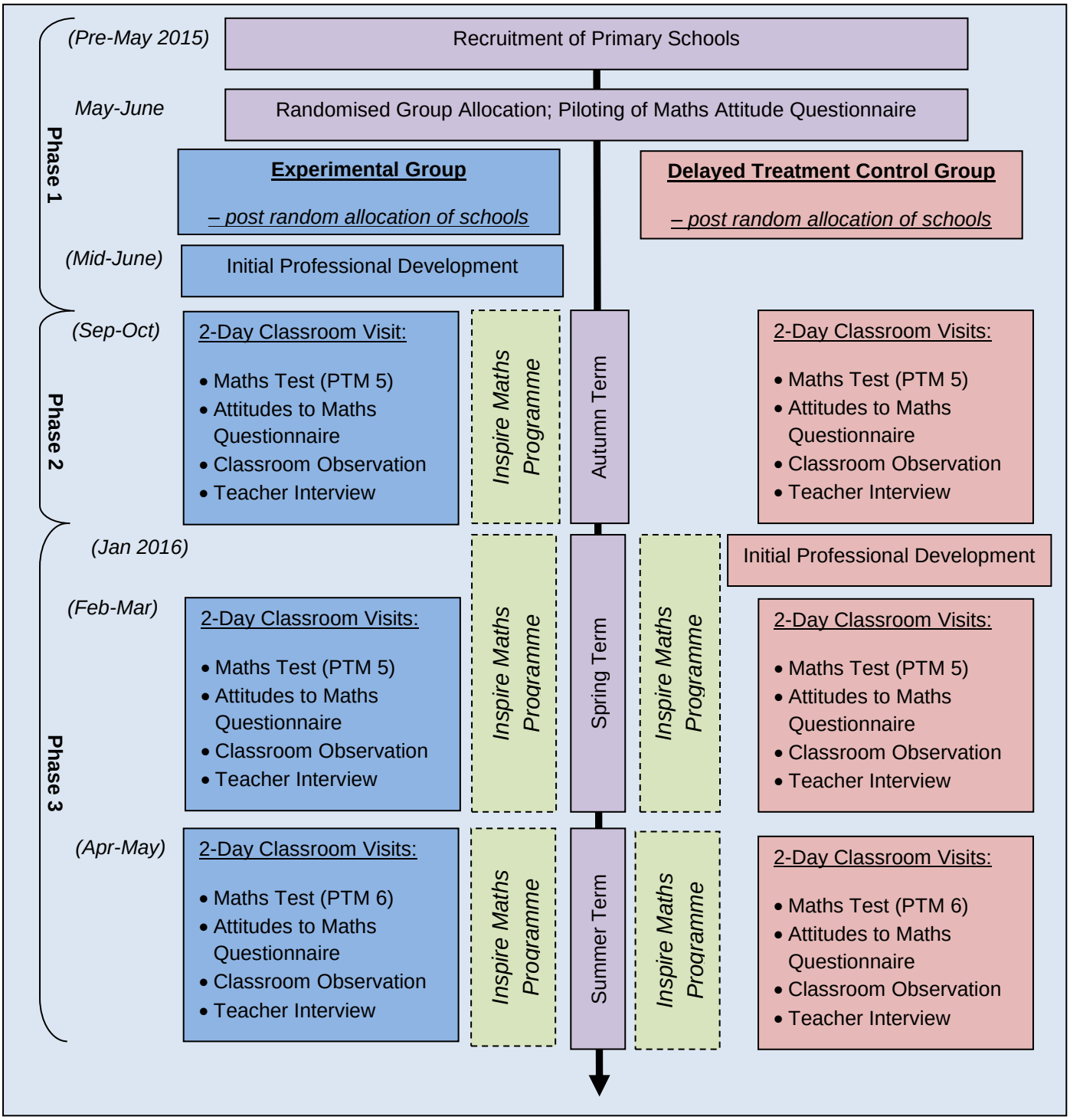
2.2 Design

The *Inspire Maths* programme was evaluated using the "gold standard" (e.g. Sullivan, 2011) scientific technique for demonstrating cause and effect: a (clustered) Randomised Control Trial. Work began in summer 2015 when the sampled twelve schools were randomly allocated into two groups: six that would start using the *Inspire Maths* programme in September 2015 (the "experimental group"; nine classrooms; 271 pupils), and six that would start in January 2016 (the "delayed treatment control group"; 11 classrooms; 305 pupils). The evaluation used a mixed methods approach and three waves of fieldwork were carried out across the 2015/16 school year – once during each of the three terms that make up a school year in England. At each wave of fieldwork, teachers were interviewed, classroom practice was observed, and all pupils were tested and surveyed to measure their understanding of, and attitudes towards, mathematics. All fieldwork was carried out by a single researcher who had co-developed the attitude questionnaire, and who had been trained on the classroom observation instruments and trained as a mathematics teacher. The researcher also held current QTS status – the professional recognition of teaching status in the UK. Each termly school visit lasted one day per teacher. Given the nature of the *Inspire Maths* programme it was not possible to conduct a blind trial (i.e. a trial in which researchers did not know to which group a particular school or teacher had been assigned), since the focus was on the use of *Inspire Maths* materials and approaches by the Intervention group.

In addition to the termly school visits, the standard professional development training days provided by OUP to support schools planning to use *Inspire Maths* were observed, and focus group interviews were conducted with teachers who participated in the initial training days. OUP professional development for *Inspire Maths* includes five working days per school, spread out over the course of two school terms. Teachers first took part in two training days before they started implementing *Inspire Maths* (Summer 2015 for the experimental group, January 2016 for the delayed treatment control group). A third professional development day then took place during the first term that each group started using *Inspire Maths*, followed by two more training days the term after.

Figure 1 illustrates the research design that was used in this evaluation as a timeline divided into three 'Phases': Pre implementation of *Inspire Maths* (Phase 1), the experimental group implementing *Inspire Maths* (Phase 2), and both groups implementing *Inspire Maths* (Phase 3).

Figure 1. The research design used to evaluate the efficacy of the *Inspire Maths* programme in Year 1 English classrooms: A clustered Randomised Control Trial with a delayed treatment control group



2.3 Measures

Maths attainment in Year 1 pupils: The age-appropriate versions of the *Progress Test in Maths* (PTM)[2] tests (GL Assessment, 2015) were used to assess children's attainment and progress in maths during Year 1 in English primary schools. The PTM tests are designed to align with the English National Curriculum that was introduced in September 2014, and so were especially appropriate for this evaluation. *PTM Level 5* was used for the first two waves of fieldwork (Autumn 2015 and Spring 2016), while *PTM Level 6* was used in the third (Summer 2016). The switch to *PTM Level 6* was carried out following the protocol given by the test publisher and reflected children's increased age and experience of formal schooling. The use of *PTM Level 6* also helped to mitigate risks to the evaluation stemming from test familiarity. Assessments were administered in full-class format.

The PTM tests provide an age-standardised measure of pupils' mathematical skills and knowledge from the early years through to secondary school. Each level of the test assesses those aspects of the 2014 English National Curriculum for Mathematics[3] appropriate to a particular age of pupil while also assessing key process skills.[4] Thus, *PTM Levels 5* and *6* were used in this evaluation as the sample of Year 1 pupils were 5-6 years of age.

Attitudes towards mathematics in Year 1 pupils: Pupils' attitudes towards maths were measured using a questionnaire that was developed by the research team and which featured a response format adapted from the work of Barber and Houssart (2011). However, unlike the questionnaire of Barber and Houssart, the questionnaire developed for this study was designed to be age-appropriate for Year 1 pupils in English classrooms. The final questionnaire consisted of four items on a 5-point response scale, plus two warm-up items that were used to familiarise pupils with the format and procedures of the questionnaire (see Appendix 1). Pupils responded to each question by ticking one of five faces, which varied in their emotional expression from 'very happy' to 'very sad' in five stages (0 being very sad, 2 being neutral, 4 being very happy). The four items were then totalled in order to measure each pupil's general attitude towards mathematics. The four areas of maths that the items addressed were:

1. Pupils' attitudes towards 'Doing sums (or number sentences) and numbers'
2. Pupils' attitudes towards 'Counting things'
3. Pupils' attitudes towards 'Using manipulatives in lessons'
4. Pupils' attitudes towards 'Learning about shapes and patterns'

Piloting of this new questionnaire took place before the intervention began, and was conducted in a Primary School (and Year 1 classroom) that did not participate in this evaluation. That school, its Year 1 teacher, and the 30 pupils within the class were recruited following the same ethical procedures outlined above for the main study. Twenty-eight pupils provided scores across all four of the questionnaire items. Scores were achieved that varied across all 5 points of the scale and across all four of the questionnaire items (means varying between 2.7 and 2.9). A Cronbach's alpha of 0.58 (indicating item reliability) was then calculated for a scale based on all four items (rising higher only

[2] More information on the *PTM* test series can be found at:
http://www.gl-assessment.co.uk/products/progress-test-maths

[3] At *PTM Level 5*: "Number", "Shape, space and measures"; at *PTM Level 6*: "Number", "Measurement", "Geometry"

[4] At *PTM Level 5* and at *PTM Level 6*: "Fluency in facts and procedures", "Fluency in conceptual understanding", "Mathematical reasoning", "Problem solving"

if attitudes towards using manipulatives was excluded, and even then only rising to α=0.59).[5] These values suggest modest but sufficient reliability for a new instrument (Nunnally & Bernstein, 1994). Higher values of Cronbach's alpha were subsequently found for the full sample of pupils to whom the questionnaire was administered in the first, second and third terms (α=0.64, α= 0.68, and α=0.69, respectively) indicating higher, though still modest, reliability.

Lesson observations: An observation of a full maths lesson was carried out for each teacher once every term. These visits involved both structured and unstructured observations, with the structured observations involving the use of three internationally validated schedules designed to rate teacher practices, behaviours, and effectiveness subscales (presented in Appendices 2, 3, and 4). These three observation schedules were:

- Lesson Observation Form for Evaluating the Quality of Teaching (QoT; van de Grift et al., 2007)
- International System for Teacher Observation and Feedback (ISTOF; Teddlie et al., 2006)
- Mathematics Enhancement Classroom Observation Record System (MECORS; Schaffer, Muijs, Reynolds, & Kitson, 1998)

There is precedent for the combined use of structured observation schedules and qualitative field notes as they were used in this evaluation (Sammons, Lindorff, Ortega, & Kington, 2016) in order to account for those features of effective teaching practice that are well established in the relevant knowledge base as well as capturing features of teaching practice not included in the structured observation schedules. The MECORS instrument was included because of its particular relevance to the teaching of mathematics, as it was developed to evaluate a UK primary mathematics programme (Muijs & Reynolds, 2000, 2011) and has been since used in additional studies focusing on various aspects of classroom practice and associations with pupil outcomes (e.g. Muijs & Reynolds, 2003). We do not endeavour to provide a comprehensive review of the teacher effectiveness literature here, but previous reviews by other authors provide thorough overviews of the field (e.g. Ko, Sammons, & Bakkum, 2013; Muijs et al., 2014).

Semi-structured interviews with Year 1 teachers: Interviews with the Year 1 teachers implementing *Inspire Maths* were carried out termly on a one-to-one basis. Focus group interviews were also conducted following the first two-day professional development training sequence for each group of teachers. Information on teachers' professional backgrounds was requested in these interviews and was subsequently integrated into the statistical findings of the evaluation. The majority of interview questions were more open-ended, designed to elicit information on:

1. Teachers' views on the *Inspire Maths* materials
2. Teachers' views on the professional development and support available alongside *Inspire Maths*
3. Teachers' confidence in implementing *Inspire Maths* and teaching maths more generally
4. Comparative thoughts regarding *Inspire Maths* versus materials and approaches teachers had used previously
5. Any perceived changes in children's motivation, engagement and knowledge/skills as a result of taking part in *Inspire Maths*
6. Any challenges and areas for future development
7. Feedback on the process of adopting the *Inspire Maths* materials for use in teaching

[5] The purpose of calculating Cronbach's alpha for a questionnaire instrument is to assess whether the items are interrelated, which they must be in order to measure an underlying construct (in this instance, attitudes towards mathematics).

2.4 Analytic Strategy

Numeric data from tests of pupil attainment in maths, their attitude towards maths, and from observations of classrooms were analysed statistically. Appendix 5 presents details of the statistical analytic strategy that was used. A series of statistical analyses were carried out to estimate the impacts of *Inspire Maths* and these looked at differences between the experimental and delay treatment control groups over the course of the school year, at three testing points:

- At the beginning of the school year
- After one school term (Autumn)
- After two school terms (Autumn and Spring)

Text data from interviews with teachers and observations of classrooms were analysed thematically.

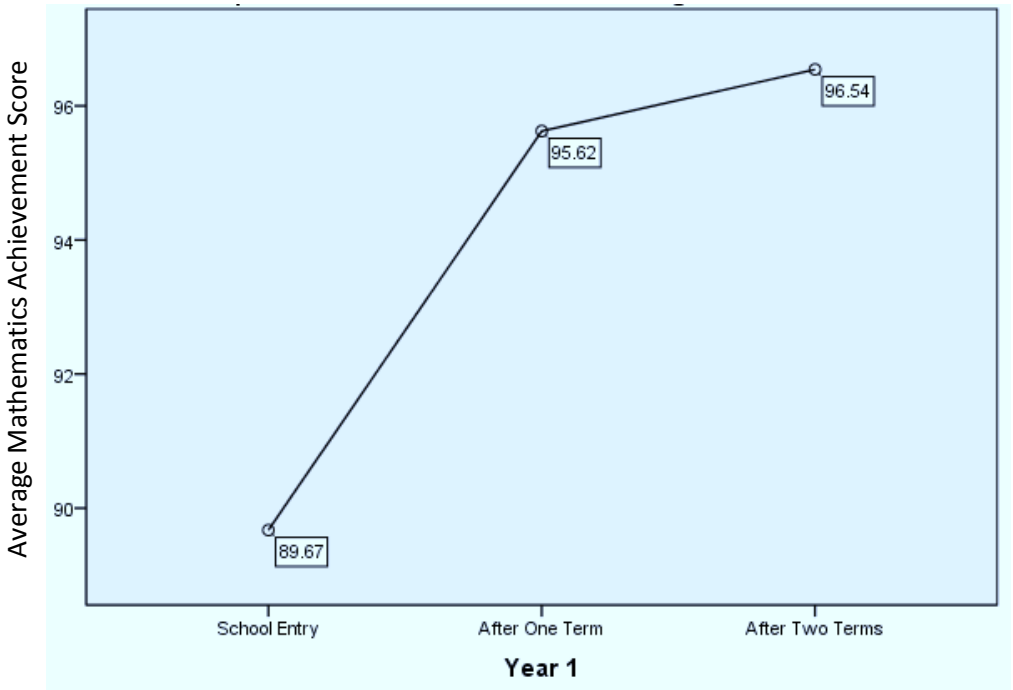
Results from both the statistical analyses and the thematic analyses are presented that address each of the research questions explicitly and each in turn.

3. Results

3.1 Pupil progress in, and attitudes towards, mathematics

What impact does Inspire Maths have on pupils' attainment and progress in mathematics?
Figure 2 reveals how the Year 1 pupils progressed in mathematics during the 2015/16 academic year. The average Year 1 pupil made just shy of seven points of progress in mathematics during the two terms – an amount of progress that was very unlikely to be due to chance.[6]

Figure 2. Average Year 1 pupil progress in mathematics during the 2015/16 academic year



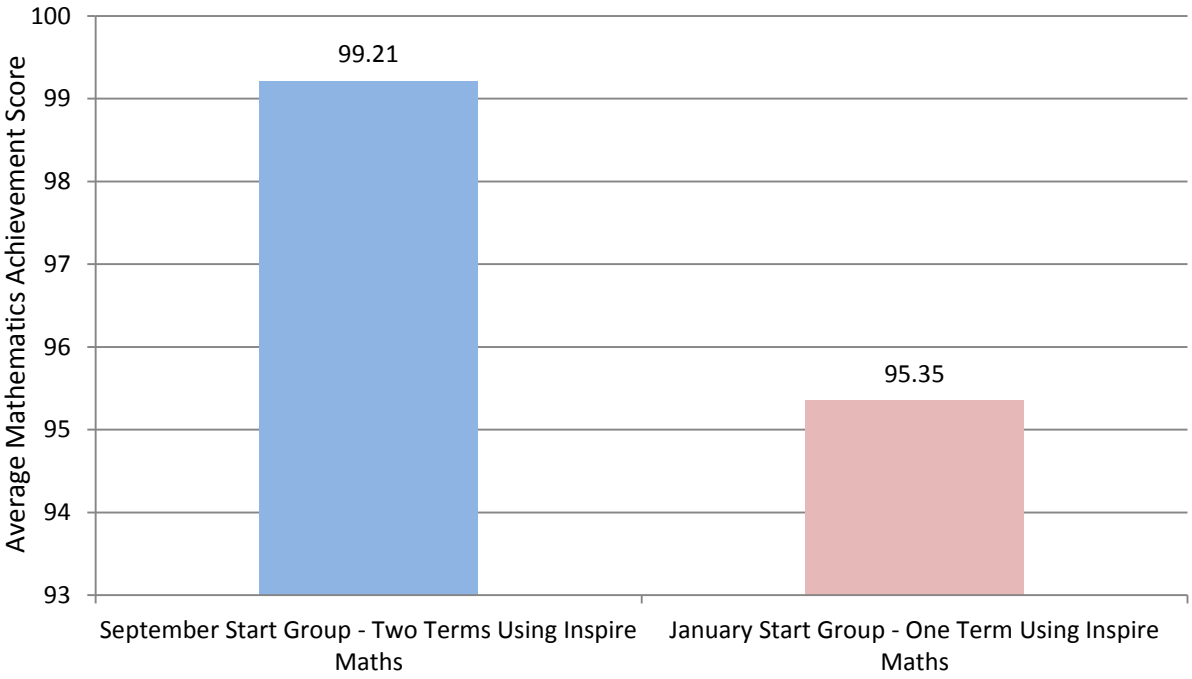
At the start of the year (Autumn 2015), the Year 1 pupils whose classes had just started to use *Inspire Maths* showed equivalent attainment in mathematics to those pupils whose classes would begin using these materials one term later (in January 2016; see Appendix 6). This is to be expected given that no children had received teaching yet and because the children's classes were randomly allocated into either a group that would begin using the materials from September 2015 or into a group that would begin using these materials from January 2016.

Over the course of the 2015 Autumn Term, both groups of children demonstrated equivalent progress in maths (see Appendix 6). In other words, the children in classes where *Inspire Maths* was being used demonstrated no greater or lesser progress in mathematics (on average) than did the children whose teachers were using their regular teaching materials and approaches. This does not imply a negative effect from the introduction of the *Inspire Maths* programme. Rather, when schools adopt a new teaching method, it may take time to embed new approaches and for these to show any detectable effect on pupil outcomes (e.g. Hannover Research Group, 2014).

[6] $F=28.85$; $p<0.001$; $n_p^2=0.06$. Controlling for differences linked to: term test dates, pupil gender differences, teachers' experience (years teaching), teachers' Year 1 experience (proportion of years spent teaching Year 1)

During the second term of the year, the pupils who had been using *Inspire Maths* since September (for two terms) were found to make a small[7] amount more progress in mathematics (see Appendix 6) than did the pupils who had been using it since the start of January (for one term) – although this was also an amount that was very unlikely to be due to chance. Putting this finding into context, for the sake of comparison in order to understand the size of the difference between groups at the end of the second term was approximately twice the size of the gap in attainment found between boys and girls at the start of the school year.[8] Figure 3 illustrates this small difference in progress by showing the average mathematics attainment of the two groups at the end of the second term. The difference in pupil progress during the second term of the year shows that *Inspire Maths* can have a significant positive impact on Year 1 pupils' progress in mathematics. Small but significant gains in pupil progress in mathematics were identified after using *Inspire Maths* for just two terms.

Figure 3. The average mathematics attainment of Year 1 pupils in the two experimental groups after two terms of the 2015/16 academic year



What impact does Inspire Maths have on pupils' attitudes towards mathematics?

Figure 4 shows how the Year 1 pupils' attitudes towards mathematics changed during the 2015/16 academic year. Although the average Year 1 pupil's attitude towards mathematics slightly declined during the year[9], the sample maintained a largely positive attitude towards mathematics throughout the period of the evaluation. This consistent positivity is shown in Figure 4 by the solid line (the line

[7] Multilevel Effect Size = 0.42 (SE=1.80, p=0.046) standard deviation representing the average difference in the mean scores of the two groups after controlling for attainment at the start of the second term and differences linked to: term test dates, pupil gender differences, teachers' experience (years teaching), teachers' experience spent teaching Year 1 (proportion of years). A 0.42 standard deviation difference between two groups is a, "small" difference according to the effect size criterion of Cohen (1988).

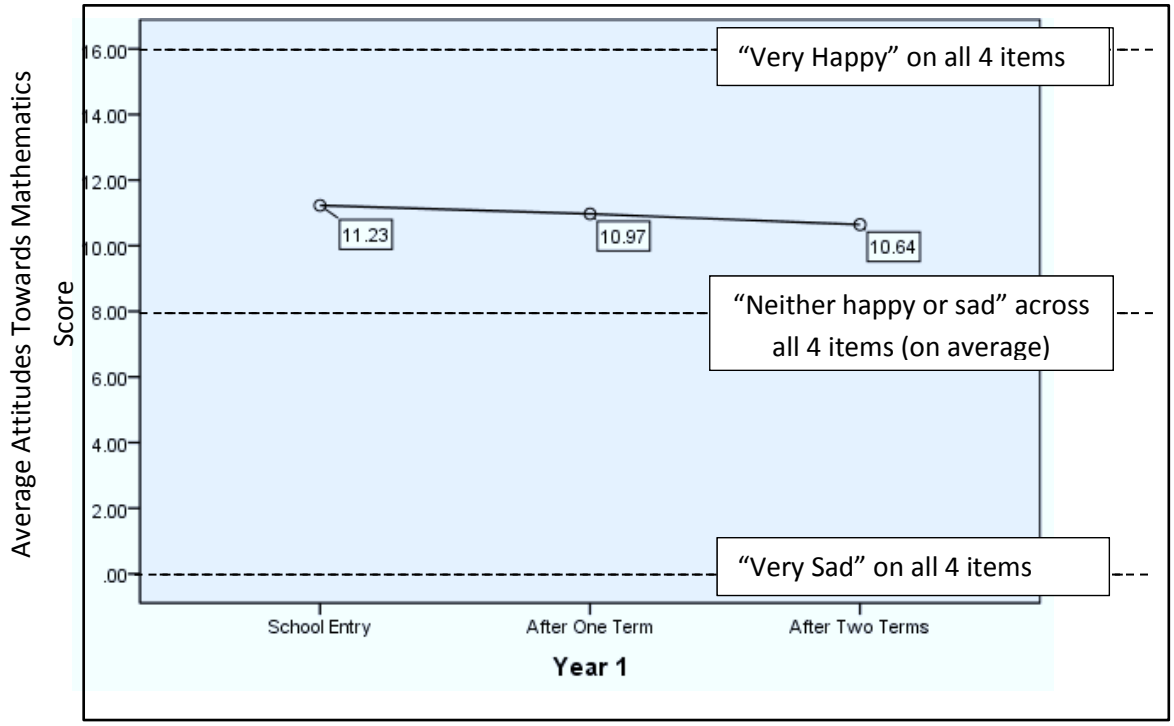
[8] Multilevel Effect Size=0.42 (SE=1.80, p=0.046) versus Effect Size=0.22 (SE=1.03, p=0.013). See Appendix 6.

[9] F=4.72; p=0.010; n_p^2=0.01. Controlling for differences linked to: term test dates, pupil gender differences, teachers' experience (years teaching), teachers' experience spent teaching Year 1 (proportion of years)

showing the average pupil's attitude towards mathematics) never falling below the value of eight, this value indicating an average attitude towards mathematics that was neither positive nor negative.

The tendency for the average Year 1 pupil to retain a positive attitude towards mathematics throughout the course of the evaluation was found equally across the two experimental groups. In other words, Year 1 teachers' use of *Inspire Maths* was not associated with any change in their pupils' attitude towards mathematics. Thus in contrast to attainment and progress, the study did not detect any significant impact of the *Inspire Maths* intervention on Year 1 pupils' attitudes towards mathematics.

Figure 4. Average Year 1 pupils' attitude towards mathematics during the 2015/16 academic year



3.2 Implementation of *Inspire Maths*

To what extent and in what ways do schools and teachers differ in their implementation of Inspire Maths?

Evidence regarding the ways in which schools and Year 1 teachers both implemented *Inspire Maths* and differed in this implementation was obtained through observations of classroom practice and through interviews with teachers over the course of the 2015/16 academic year (for details see Figure 1 in the Method section). The interviews with teachers produced qualitative information regarding implementation while the observations of classroom practice produced evidence that was both statistical and qualitative.

Teachers' classroom practices were first observed at the beginning of the academic year (Autumn 2015). At this point, the group of teachers and schools who were randomly chosen to start using *Inspire Maths* from September had already received two days of professional training towards the use of this programme. This was not the case for the group of teachers and schools who would go on to use the programme from January 2016 – they received this training in between the first and second terms.

At the start of the school year, large differences were found between the two experimental groups on seventeen out of the twenty four areas of classroom practice that were measured through structured observations yielding statistical evidence. These systematic observation instruments were designed to identify aspects of effective and high quality classroom practice. Taken together with the qualitative evidence from both observations and interviews, the differences between the two groups provide evidence that teacher practices, their behaviours and the effectiveness of these for children's progress in mathematics had already changed to a large extent following the professional development workshop that these teachers had attended over the summer. These seventeen areas are presented below in Table 1 and full statistical evidence can be found in Appendices 8, 9, and 10.

Table 1. Seventeen areas of teacher behaviour and teaching practice where large differences were observed between the two experimental groups at the start of the 2015/16 academic year

Structured Observation	**Teacher behaviour or teaching practice**	**Evidence concerning how the implementation of *Inspire Maths* was related to altered teaching practice at the start of the 2015/16 academic year**
The Lesson Observation Form for Evaluating the Quality of Teaching (QoT)	Stimulating Learning Climate	These teaching behaviours and teaching practices were *more strongly evident* in classrooms that were led by teachers who had just starting using *Inspire Maths*
	Clear Instruction	
	Activating Pupils	
	Effective Classroom Organisation	
	Effective Classroom Layout	
	Adaptation of Teaching	By contrast, this teaching practice was *much less evidenced* by those teachers who had just starting using *Inspire Maths*
International System of Teacher Observation and Feedback (ISTOF)	Assessment and Evaluation	These teaching behaviours and teaching practices were *much more readily apparent* in classrooms that were led by those teachers who had just starting using *Inspire Maths*
	Clarity of Instruction	
	Instructional Skills	
	Promoting Active Learning and Developing Metacognitive Skills	
	Classroom Climate	
	Classroom Management	
Mathematics Enhancing Classroom Observation Recording System (MECORS)	Uses classroom management techniques	These teaching behaviours and teaching practices were *much more consistently used* by those teachers who had just starting using *Inspire Maths*
	Maintains appropriate classroom behaviour	
	Focuses on and maintains attention on lesson	
	Provides pupils with review and practice	
	Demonstrates skills in questioning	
	Demonstrates MEP strategies	
	Establishes a positive classroom climate	

Note: 'Those teachers who had just started using Inspire Maths*' refers to the teachers in the experimental group (as compared to the delayed treatment group).*

Regarding the differences in classroom practice noted at the beginning of the year via the structured observations shown in Table 1, two areas of classroom practice stand out as particularly different in those classrooms whose teachers had just started implementing *Inspire Maths*. First, the teaching practice that was most strongly differentiated across the two experimental groups – and most strongly differentiated than at any other point in the year – concerned the *Effective Classroom Layouts* that were apparent in classrooms. Teachers who had just started implementing the *Inspire Maths* programme were observed to use much more effective classroom layouts. Second, teachers who had just started implementing the *Inspire Maths* programme were also much less likely to show *Adaptation of Teaching*. This speaks particularly to one of the features of *Inspire Maths*: The use of non-differentiated whole-class teaching that emphasizes inclusion.

Over the course of the 2015 Autumn Term, additional large changes towards more effective teacher practices were then observed in six out of the twenty four areas where statistical evidence was gathered (see Appendices 8, 9, and 10). The teachers who had started using *Inspire Maths* in September were observed to further increase the extent to which their classrooms provided *Stimulating Learning*, developed even *Clearer Instruction* (as rated by both the QOT and ISTOF observation schedules) and showed further improvements in their *Instructional Skills*. It was also during this first term using *Inspire Maths* that these Year 1 teachers were found to be more clearly *Promoting Active Learning and Developing Metacognitive Skills*.

However, the same classrooms that were observed to show these large first term changes in classroom organisation, teaching practice and teacher behaviours, were also found to demonstrate lower scores for *Safe and Orderly Classroom Climates* by the end of the first term. Furthermore, this was again found when looking at changes in teacher practices over the course of the second term. Looking at the information provided by teachers when they were interviewed provides a basis for understanding why this might be. For teachers who are new to *Inspire Maths*, to start using this mastery-based approach (with its new practices and materials) with a Year 1 class *in September* can prove to be extra challenging. Not only must a teacher become familiar with the new approach and materials, but this is occurring simultaneously with their pupils being introduced to the very idea of sitting in a formal lesson as opposed to learning in the play-based contexts that are common in Reception classes. By contrast, when teachers who are new to *Inspire Maths* take up the programme *in January* then their pupils are both older and have a greater chance of already being familiar with sitting at tables, working independently or in pairs or groups, and using concrete resources in a structured way.

During the second term of the year, large changes were also observed in three further areas of classroom practice when comparing the classrooms that had used *Inspire Maths* since September 2015 against those that had started in January 2016 (see Appendices 8, 9 and 10). Those classrooms that had taken up the programme in January demonstrated greater change towards more *Effective Classroom Practice* and more consistent use of *Classroom Management Techniques* over this period. These were also two areas found change positively during the first term that the September starters used *Inspire Maths,* suggesting that these second term effects are indicative of catch-up and of areas of classroom practice that can be most easily observed to change following a switch to the use of *Inspire Maths*. The third area of classroom practice where there was a large change during the second term of the year towards more effective teacher practice concerned *Differentiation and Inclusion* in the classroom. Previously equivalent across the two groups, by the end of the second term, the differentiation and inclusion that was apparent in classrooms was much more evident in those which had been using *Inspire Maths* since September. Despite *Inspire Maths* strongly emphasising this aspect of teaching practice, it is possible that it takes teachers more than one term for this to be fully implemented in classrooms in observable ways.

The findings presented so far in this section reflect statistical results from structured observation schedules. Findings from researcher qualitative field notes serve to further elaborate on some of the observed differences in implementation between classrooms.

Mixed ability grouping strategies
Most of the participating teachers in the September start group were using mixed ability grouping in keeping with the *Inspire Maths* approach. Within this broader strategy, there was considerable variation in the strategies for establishing specific groups. In most of the classes, pupils were working in pairs, and there were not apparent differences in perceived ability level by table or by group. In three of the classrooms, while most pupils were in mixed ability pairs or groups, small groups of pupils had been separated out and were working with adult support (usually a TA or a support teacher). In two of the classes, there were visibly ability-based groups at the beginning of the year; by the middle and end of the year, this was only the case in one (September start) class.

Lesson structure
Differences in lesson structure were apparent both across schools and between lessons within individual classrooms, which suggested that teachers were likely varying lesson structure according to the content being covered or the placement of a particular lesson within a broader unit. At the beginning of the year, most classes in both September and January start groups were following some version of the traditional input-activity-plenary lesson format, but the *Inspire Maths* lessons taught by the September start group tended to have shorter inputs and more time spent using practical resources and textbooks and/or practice books. In the middle of the year, both September and January starters were using more of a mixture of carpet and table time, with less of an input-activity-plenary format. At this stage, more of the September start teachers were seen to adapt lesson structure on the spot; for example, six of the September start teachers stopped pupils during independent or group work to provide further teacher-led guidance and input in response to misconceptions, whereas this behaviour was seen in two of the January start classes. By the end of the year, this type of adjustment to lesson structure as a responsive process was observed in 16 of the 20 classrooms overall, with two from each of the September and January start groups appearing to adhere to a more rigid lesson structure. This progression may have been due to teachers gaining confidence in their implementation over time before becoming more flexible about lesson structure within their implementation of *Inspire Maths*.

Use of print materials
In all but one of the schools that participated in the evaluation, teachers were using the *Inspire Maths* content regularly. However, there was a clear difference between schools regarding how textbook content was presented. In 16 of the 20 classrooms (9 of 12 participating schools), rather than using the physical textbooks and having pupils look at these individually or in pairs, teachers projected pages from the textbook and led whole class discussions to introduce pupils to topics and problems from the text.

Similarly, while every teacher either used practice books in observed lessons or alluded to practice books in speaking to their pupils, routines for using practice books varied. Most of the teachers had established routines involving all pupils completing practice book work either daily or weekly. In classrooms where the practice books were used daily, the most common format was for all pupils to be directed to a common starting page and then work independently at their tables but with the option to discuss with partners as needed, after which ‘quick graspers’ often progressed through a greater volume of written work than those who were taking longer to understand concepts or needing additional support

Differences in approaches to using textbooks and practice books changed over time in some classes, but there were no clear patterns according to September versus January start group nor specific time of year. Rather, based on observations alone, the ways of using materials appeared to be particular to teachers and schools rather than based on amount of time spent using *Inspire Maths*.

Use of concrete resources

Concrete resources were used in every classroom. The amount of time spent and the approach to the use of concrete objects was variable, and like lesson structure, some aspects of this were different not only between classrooms but also within classrooms for separate lessons. For example, in one September start two-form entry school, the lessons observed midway through the year in both participating teachers' classrooms involved using only multilink cubes to support activities focusing on number bonds to twenty, while lessons observed in these same classrooms at the end of the year involved having bins of various resources (multilink cubes, Numicon shapes, Cuisenaire rods, laminated part-part-whole model sheets, and counters) on each table and allowing pupils to choose whichever objects they wanted to support an addition task. On the whole, teachers just beginning to implement *Inspire Maths* were mostly seen using one type of concrete resource at a time in lessons. For the majority of teachers and classrooms, the longer a teacher had been implementing *Inspire Maths*, the more pupil choice and variety of resources immediately available during a lesson were observed.

Ongoing assessment

Teachers used several main approaches to ongoing assessment. In several September start schools, there were daily routines in place from the start of the year that included having pupils complete work in practice books that teachers marked during the lesson, followed by opportunities for pupils to correct their errors. Several other teachers apparently did not have daily written assessment routines in place, but circulated as pupils engaged in practical tasks in groups or pairs, and used questioning to check for understanding. Similar strategies were observed in the January starters' lessons beginning mid-year, whereas at the beginning of the year these classes had mostly involved tasks differentiated by ability level and thus a different assessment task for teachers.

A few classrooms seemed, even by the end of the year, not to have consistent assessment approaches in place, and there were individuals or groups that had not had feedback on their maths learning by the end of a given observed lesson. However, these teachers' accounts of their practice in interviews at the end of the year suggested that they might be implementing ongoing assessment and intervention routines in ways that were not observable in the particular lessons for which the researcher was present; this is addressed in Section 3.3 below.

Teachers and schools not implementing Inspire Maths consistently

Two schools, one from each group (September and January start schools) were not using the *Inspire Maths* materials regularly nor following the sequencing of content in them.

In the two form entry January start school, it was apparent from observed lessons that teachers were emphasising child-initiated learning. This involved having a brief period of teacher-led input and discussion on the carpet, after which pupils scattered and were able to choose between activities available to them around the room. These activities were often linked to an overarching theme (e.g. dinosaurs or magic) but not limited to the topic or to maths. This lesson structure was visible in both of these classrooms throughout the year, with the main change over time being that at the end of the year teachers were more formally working with groups they had selected during 'choosing time' to reinforce a particular maths concept. In the third round of lesson observations, one teacher had a pile of *Inspire Maths* practice books (Book 1A) that pupils could choose as one of

their activities, while the other had assigned a selected section of the practice book to a group of pupils.

In the one form entry September start school, the teacher was using *Inspire Maths* materials, but it was apparent that the sequence of topics had been changed. Whereas most other schools in this group were working on topics ranging from addition to measurement in the final round of observations, this teacher's class was studying shape and pattern. Pupils were sat in what appeared to be ability groups based on the expectations expressed to them, work assigned and work completed. However, features of the *Inspire Maths* approach were apparent; pupils were in pairs at their tables, there was some emphasis on 'why' and 'how' questions, and the lesson content was drawn from the *Inspire Maths* textbook.

Teacher interviews elaborated on why implementation was not taking place or not happening consistently in these schools. In the January start school, teachers expressed that they were bound to the school's existing pacing guide for maths learning objectives in Year 1, and felt like the *Inspire Maths* approach didn't fit with their ethos or the needs in their school and classes.

"They [the pupils] didn't seem to mind doing it, but we found it quite dry, and not really, erm, enhancing what they knew, really…It just doesn't really fit in with how we teach." (Teacher 15, School D, January start, mid-year)

"On account of what we, as a school, our kind of maths ethos… so in terms of having those resources out all the time and getting them to use them, that's kind of part and parcel of what we do anyway. I suppose it is nice having the teacher handbooks to refer to…but I can also see how it would be very easy to just teach from those handbooks and not necessarily think as a teacher, you would just say and do what was in those handbooks, and I don't want to do that." (Teacher 14, School D, January start, end of year)

In the September start school, the teacher felt pressure to work according to the school's pre-established pacing guide for National Curriculum learning objectives, and pressure to demonstrate how she was differentiating.

"I think overall we could do with some more differentiation, I think, especially if, kind of, SLT are keen to move some of the higher children on, rather than keeping them at -- I think we've just gone back to adding, and it's adding within twenty, and a lot of them, I mean obviously you've got to kind of master it, but, they can do kind of more than that." (Teacher 1, School K, September start, mid-year)

"There's a lot more targets to hit, and we need to be doing this, need to be doing this…so although I've gotten more used to Inspire Maths, I've also got to fit it in with lots of other things, and so we have used it, more so for the place value and things, but yeah, we've kind of mixed it in with some other things still, to make sure I'm hitting all those other targets… I would like to just continue working on the basics and get them really strong, but we've got so many other bits to cover, and yeah, just the way that the Inspire Maths sets it out, and it covers a lot of things and then it moves up, but then there's also the way the school likes it to be set out, so you've got to do certain things each term, so to kind of put them together, I just want to get all the things ticked off in the computer program, really." (Teacher 1, School K, September start, end of year)

3.3 Teachers' views and experiences of *Inspire Maths* implementation

What are teachers' views on and experiences of implementing Inspire Maths?
Teachers were interviewed three times over the course of the evaluation, normally on the same day on which pupils were assessed and surveyed in each teacher's classroom. The interviews followed a semi-structured format that focused on the following:

- Accounts of teachers' own practice, whether and how this changed during the evaluation
- Views on and accounts of using the *Inspire Maths* approach and materials
- Perceived impact on pupils' engagement and motivation
- Perceived benefits and challenges of implementing *Inspire Maths* for teachers as well as for their schools and pupils
- Views on the professional development provided by Oxford University Press (OUP)
- Views on and accounts of using Oxford OWL offerings complementing the *Inspire Maths* materials

Accounts of classroom practice in maths lessons: Differences between groups and changes over time
When the first round of interviews took place, September start teachers had begun using *Inspire Maths* and January start teachers were conducting business as usual in their classrooms. At this point in time, the marked contrasts between groups that emerged from teachers' accounts of their practice consisted of strategies for differentiation and grouping of pupils, lesson structure, and emphasis on mathematical language use.

September start teachers were intentionally using mixed ability pairs or groups, with one exception (a teacher who had not yet begun in the teaching post at the time of the initial professional development days in July 2015). As teachers in one September start teacher related,
"Personally I'm very much into…mixed ability, and higher ability children helping lower ability children…making sure that there's lots of language and lots of talk, erm, I'm a big fan of partner talk…yeah, I think that's probably the main, the main thing." (Teacher 6, School C, September start, start of year).

"This year now, what we're doing is mixed ability, and I think that's working really well, from what I can see, in Inspire Maths." (Teacher 5, School C, September start, start of year)

There were, however, some concerns about mixed ability groupings and the challenge of shifting away from more familiar approaches to differentiation:
"I suppose in Year 1 it isn't….it's a new thing for them anyway, so for them to be working independently...But when we go around and correct, it's, I feel like it's just taking days to come back on the corrections, it is …I just find that it's taking lots and lots of time." (Teacher 3, School B, September start, start of year)

Most January start teachers were either using ability based groups or differentiating by task (i.e. assigning different work to pupils according to ability level). A January start teacher pointed to the challenge of this type of differentiation, referring to,
"the gap between the ones that don't get it and the ones that do get it, you have to keep extending the ones who do get it, you have to keep pushing them to the point where you're teaching a completely different thing to those who are higher than to those who are lower…" (Teacher 11, School H, January start, start of year).

In terms of lesson structure, January start teachers mostly described using a traditional input-activity-plenary format, with a few explaining their use of play-based lessons with a short input and longer 'choosing time' in which pupils could select from a range of activities tied to different subjects

and not necessarily related to the input content. All of the September start teachers, on the other hand, discussed teaching lessons that involved more movement between tables and the carpet, and many pointed to the fact that their lesson structure varied from day to day based on what they thought best suited a particular topic and how pupils were progressing.

"I suppose in maths it's a bit more free flow than the other subjects…and like it's, I expect it to be noisier, because they've got resources out, and, like – yeah, sometimes it's more, like, you do interventions sometimes within the lesson, so if children aren't getting it, I pull them to the carpet for a quick intervention, so it's like, to see if they can do it with me, and then send them back." (Teacher 4, School B, September start, start of year)

The use of mathematical language, specifically an emphasis on vocabulary, full sentences, explanation and proof, was mentioned by about half of the September start teachers as a focus of their teaching approach related to implementing *Inspire Maths*. Some teachers in the January start group indicated that promoting talk in maths lessons was a feature of their practice, but the strategies for doing so were less clearly defined than those of the September start group.

"It's trying to really target those areas, trying to make the children have rich vocabulary experiences." (Teacher 7, School E, September start, start of year)

"Definitely the language based stuff…definitely, and I think that's why our school has gone the route of Inspire, it sings the same tune as ours." (Teacher 20, School L, September start, start of year)

Almost all of the September start teachers noted differences in their teaching approach using *Inspire Maths* compared to the teaching they had done before. This included the introduction of mixed ability groups or pairs, more flexible lesson structure, and emphasis on mathematical language as noted above. Additionally, although all of the teachers in this group said in their initial interviews that they used concrete resources, and many felt this had always been an emphasis in their approach to teaching maths, the majority noted changes in the ways in which they used these resources in the classroom or else felt that *Inspire Maths* maximised the use of these resources. Some said they were using resources more often in lessons, while others articulated shifts in their thinking about when and how these could be used.

"I'd like to use resources more, and I – sort of, like, expressing things in different ways, but I haven't done that too much myself, so I'm kind of trying to find out more about which different resources to use which work best for them." (Teacher 1, School K, September start, start of year)

By the time of the second interview, most of the September start teachers indicated that their approach to teaching maths had not changed substantially since the start of the year. However, some noted that they were more confident and comfortable implementing *Inspire Maths*. A few additionally described strategies that they had put in place or adapted since the first interview to ensure that their use of the materials and approach was best suited to their specific contexts and pupils.

"We do use the practice books, but I don't worry about using them religiously and making sure we do every single page. We're kind of using it as to what the children need, and what suits us, really, so it's, it – using the scheme and the resources is brilliant as it is, but not, kind of worrying about it and kind of letting it dictate us, kind of thing. We're kind of using it to benefit us…But it all, it all works, it's all useful." (Teacher 8, School A, September start, mid-year)

Some teachers in the September start group expressed concern midway through the year that not grouping pupils by ability was making it less manageable to target especially high and low ability pupils for intervention or extension. A variety of strategies for intervention and extension were described, some of which took place within lessons while others took place later in the school day or the following day depending on individual schools' timetables. Some, although fewer, of the January start teachers expressed similar concerns in the middle and at the end of the year.

"Ms and I just recently sort of came together and said, right, how are we making sure that everybody is making, is meeting the learning objectives, so it's kind of affected how we move around the class. We're moving around the room quite quickly between groups, and sort of just…like we might work with a pair, and realize that one of them's got it, one of them is struggling with it, so we have decided to write down their name, like…on a chart that we've got, and at the end of the day, like, in choosing time, we get the group together, anybody that didn't, that seemed to sort of struggle with the concept, get them together and do a little bit of a focus group with them." (Teacher 5, School C, September start, mid-year)

Several September start teachers, in mid-year interviews, also suggested that they had become increasingly willing to adapt the more 'free-flowing' lesson structure with more moving between carpet and tables and differences in structure depending on both lesson content and how pupils were doing within a lesson. Many teachers said they felt that they were comfortable adjusting timing and techniques on the spot if they saw that their classes were struggling or needed particular kinds of support (e.g. having a wordy question read to them on the carpet before returning to individual or group work).

"in terms of the lesson, it tends to be a good bit freer, not every lesson is, like the one that you observed…this afternoon, quite often it's a lot, like, more moving between the carpet and the table, and back to the carpet again..." (Teacher 5, School C, September start, mid-year)

Some teachers said they had made changes to the physical space of the classroom, including getting rid of furniture that they felt was getting in the way of movement between the carpet and tables, or moving tables around to allow pupils to see the interactive white board when they were off working in groups.

"I mean, we've had a big shift around in the classroom, to [pause] kind of maximize and hope it's got the opportunity to work as much as, as much as we can, we had a massive sort out of the classroom at the end of the last academic year, threw a lot of stuff out, got rid of a lot of furniture that we didn't need, so we had the space to put the tables where we've got them, and so we could arrange the chairs around the table in a horseshoe shape so they can all see the board when we do do stuff on the board." (Teacher 8, School A, September start, mid-year)

January start teachers' accounts of their practice and changes since the beginning of the year were markedly similar to the accounts of September starters at the beginning of the year. That is, the major themes in terms of how January start teachers' approaches had changed involved the use of mixed ability groups or pairs, a more flexible lesson structure, and a greater emphasis on the use of mathematical language to explain and prove.

"I would say that an emphasis on…children using mathematical language and reasoning, talking through, explaining their problems, rather than pacing through to get the answer right, so I think that's kind of a different approach." (Teacher 4, School B, September start, mid-year)

"The resources and things that they use, you know, beforehand, I think it wouldn't, we wouldn't have had quite as much out on the tables for the children to use, but… I think it's really good to have a range of resources for them." (Teacher 5, School C, September start, mid-year)

"[I'm] having the objects on the table now, and having them free to play with them." (Teacher 18, School G, January start, mid-year)

At the time of the mid-year interviews, there were some concerns from both groups about management of resources, materials and ongoing assessment. These were less pronounced in the September group. Several teachers explained that they had struggled somewhat to juggle books and concrete resources while helping pupils to maintain a focus on the concept and task at hand and checking in to see how each pupil was progressing, but at this point in the year most were either exploring or had established strategies to make this more manageable.

In the January group, many teachers also found the management aspect of having textbooks, practice books and practical resources in lessons challenging. Several commented that this would have been more difficult at the beginning of the year when pupils were not used to being in formal lessons.

By the end of the year, September and January start teachers were, for the most part, quite similar in their accounts of their practice. The majority of September starters felt that they had not changed what they were doing substantially since mid-year, but several noted improved or additional strategies that they had taken up to address prior concerns. For example, in many schools teachers had established different routines for grouping or intervention and extension since mid-year, and some had changed the way they were using textbooks or practice books.

"I think what we've tried to do is even within the differentiated pairs, sort of swap more your sort of average achievers through progress around, so that sometimes they're with more able children and they're getting that, exactly that from them, that explanation, and that is supportive to the more able children, and then you've got your more, you've also got some of your averages with your less able children, so it's not such a big gap." (Teacher 20, School L, September start, end of year)

The January start group, with the exception of the two teachers in one school not consistently implementing *Inspire Maths*, also described having established routines and structures particular to their classrooms to support their implementation, or being more confident with the approach.

"I think I'm getting a bit more comfortable with questioning…I'm kind of knowing when's the right time to dip in, and when to stretch the more ables, if you like, just to maybe set that extra little challenge but at that same level, where they're still accessing that and still getting that conceptual understanding but not pushing them on." (Teacher 16, School F, January start, end of year)

"I feel like these ones [Inspire Maths lessons] are open to being more, I'm, I'm more open as a teacher to, you know, keeping it quite flexible in a lesson about what happens." (Teacher 10, School H, end of year)

The majority of January start teachers, in their third and final interviews, focused particularly on the use of vocabulary, language and explanation and how this had changed as an emphasis in maths lessons since they had started using *Inspire Maths*, as well as increased use of concrete resources.

"We're using a lot more of the manipulatives to prove and solve our answers." (Teacher 18, School G, January start, end of year)

"It's very important that they really talk through the process of what they are doing, rather than…giving their answer." (Teacher 12, School I, January start, end of year)

A few also noted that despite their initial concerns about starting mid-year with quite basic concepts, they had found this revisiting useful because they discovered that pupils they had regarded as more able still struggled to explain their thinking around these concepts, or that their judgments of ability in general had shifted as a result of the practices they adopted in order to implement *Inspire Maths*.

"The children in my class that have, you know, in previous [years], would be more the ones that we would say were struggling, they are shining though, because they are, that's their way of thinking, they break everything down, and they have to rely on the concrete to support what they're trying to say…and the ones that, you know, just know the answer, and they don't like to explain it, they actually find it more complicated. Those – at first, they say, oh, it's easy, and then you say, well, prove it to me, and they don't want to use any of the manipulatives on their table, and they can't see it in the real world." (Teacher 19, School G, January start, end of year)

"Sometimes with the more able, they're so trying to do it quickly that they don't always do it accurately." (Teacher 17, School F, January start, end of year)

At this stage, more of the September starters spoke about teaching *Inspire Maths* in ways that reflected confidence and a high level of comfort adapting the approach to fit their classrooms and the needs of their pupils. Many January starters had also done this, but largely expressed that they were still working toward figuring out what worked best for them and for their pupils.

Use of, and comments on, Inspire Maths materials

The majority of teachers said that they were quite happy with the content presented in *Inspire Maths* in terms of how it encouraged pupils to think and speak about mathematics, especially with regard to concepts of number.

However, all teachers expressed some measure of concern about coverage. This was more pronounced in the January start group, as even teachers who felt that it was useful for pupils to revisit earlier topics when starting from the beginning of *Inspire Maths* part-way through the year also worried that they couldn't cover the National Curriculum learning objectives for Year 1 sufficiently by the end of the summer term. Most September starters also had coverage concerns, and concerns about National Curriculum alignment. Some schools' policies around maths teaching further underscored this concern by requiring teachers to use assessment series or to adhere to school pacing guides that conflicted with the sequencing of content in *Inspire Maths*.

Some specific lessons caused confusion or concern. For example, several teachers mentioned a lesson on 3D shape in the Year 1 *Inspire Maths* textbooks, noting that after covering 2D shape, there was a lesson in which 3D solids were used to explore patterns but that there was no lesson to teach the names of these solids.

A more general content issue concerned the sequence and content of early lessons, where several teachers mentioned they would have liked to see more reinforcement of number recognition and formation.

"My main priority I think is getting those real low, low ability children to a stage where I think they need to be to fully access the Inspire Maths expectations, and when say that the basic things of being

able to recognize a number, and being able to count one to one correspondence, and I think…I think it would be really good to have a few weeks a unit that did some pre-teaching, to just ensure the basics were there for all children." (Teacher 7, School E, September start, start of year)

Additionally, many felt that a lesson involving matching numerals to the words for numbers came too early, particularly in the September start group, because the pupils' reading and spelling skills were not sufficiently developed for that lesson so early in Year 1.

As noted in Section 3.2 above, while most of the teachers regularly used textbook content, there were three distinct ways in which this was done according to teachers' accounts. Despite all participating classrooms having been provided, as part of the evaluation, with full sets of student textbooks, only a few of the teachers found that they preferred to use these as intended, with students looking at the books either independently or in partners at their tables. Those that were using them, however, had highly positive comments to share.

"And the textbooks, they love them. So before we didn't have the textbooks and the practice books. I think where they're so visual, and it shows them exactly where they need to put the answer, and they have a clear example, they find it better than having, say, a worksheet with just a selection of number sentences on, or random shapes, they find it a lot clearer." (Teacher 18, School G, January start, end of year)

Instead, the majority of teachers stated that they preferred to display relevant pages from the textbook and look at these in a whole class format.

"I find it particularly difficult with all the textbooks, because talking about …it's just so hard to expect, even if they're sharing one between two, I mean generally children at this age don't sit at a table for the beginning of a maths lesson, it would be on the carpet. So even if they're at the carpet, trying to get them to find the right page, keep it open, look at the book, then look up to you, then use a resource, I find that that's too much for them, so we've just decided that we'll use what's in the textbook but use our interactive whiteboard so that everybody's focus is in the same place." (Teacher 20, School L, September start, start of year)

"I don't always let them go and look at their text, but I tend to put it on the visualizer a lot rather than them all going to it." (Teacher 11, School H, January start, end of year)

A few further said that while they were using the wording and activities from the textbooks, they had modified these slightly to present using their own images; two of these teachers (both in the same school) explained that this was done because they wanted to use pictorial representations that matched the unit themes in their classrooms (e.g. fairy tales), while one other teacher said that practical considerations made it easier for her to recreate textbook representations on her white board by hand.

Several teachers mentioned particularly liking the challenging activities in the texts. They described using these either for all pupils toward the end of a particular unit, or particularly for pupils who had mastered a concept and needed a little more 'stretching'.

"It's nice to have the challenging activities and the 'Put on your thinking caps' activities, they're really useful at the end of a unit, or at the end of a section." (Teacher 8, School A, September start, start of year)

It was not always apparent from lesson observations alone how the practice books were being used in each classroom, as in some cases this involved weekly rather than daily routines. Many teachers said they used and liked the practice books. However, many found that the level of reading required for pupils to understand the instructions and questions made it difficult for them to work independently. Some teachers made the decision not to try to cover every page in the practice books, instead picking and choosing those they found most important for pupils to gain a secure understanding, and engaging in purely practical lessons with no practice book work for some lessons. On the whole, like the textbooks, the teachers who were using practice books regularly were quite positive about how they and the children were finding them by the end of the year.

"They thoroughly enjoy using the textbooks and the practice books." (Teacher 18, School G, January start, end of year)

Assessment books were not mentioned by every teacher when asked about the *Inspire Maths* materials, which suggests that these, too, were being used to varying extents. Those teachers who did say that they were using the assessment books mostly found them useful, but some expressed confusion regarding why questions were presented in assessment books that were formatted or phrased quite differently in practice books and textbooks.

"We've used the assessment books, and that's been helpful." (Teacher 8, School A, January start, end of year)

Of the various *Inspire Maths* materials, the teacher's guides were the most universally positively regarded. Even one of the teachers in the school that ultimately was not using *Inspire Maths* materials said that they found the content in the teacher's guides useful.

"It is nice having the teacher handbooks to refer to." (Teacher 14, School D, January start, end of year)

Do teachers' perceptions of their students' motivation and engagement change as a result of adopting Inspire Maths?

At the beginning of the year, most of the teachers felt that their pupils were engaged in maths lessons. Four teachers (two each from the September and January start groups) noted that some pupils were reluctant to attempt their maths work for fear of getting the answer wrong, or that some were difficult to keep on task due to frustration with the task's difficulty or general concentration issues.

"The children that haven't been as confident, have got swept away with it in a nice way, in a positive way." (Teacher 8, School A, September start, start of year)

"I think it's really important down the school that they develop as learners, and that they can have the freedom to do that through structured play. I actually did come to the [Inspire] maths a little bit sceptical for that reason, because it's so structured, however, they do seem to be really enjoying it." (Teacher 2, School E, September start, start of year)

By the mid-year, about half of the teachers who had been using *Inspire Maths* since September expressed concerns about engagement specific to children struggling with reading, which teachers felt was impeding their ability to access and engage with the content, and those deemed to be 'quick graspers' or 'high ability'. On the other hand, these September start teachers almost all felt that the majority of children were highly engaged and motivated by the frequent use of concrete resources, and several felt that the textbooks were helping to engage pupils and give them a sense of

ownership and responsibility for their materials and their learning. Amongst the January starters, most still felt that the majority of their pupils were engaged and motivated. However, there were some similar concerns about reading ability interfering with engagement for some pupils, and several teachers also noted that because they were starting at the beginning of the *Inspire Maths* content part-way through the year, they felt pupils were finding the concepts too easy and losing interest or rushing through.

While concerns about the motivation and engagement of struggling readers did persist through to the end of the year for both groups of teachers, some of the other issues raised at the mid-year point seemed to have been resolved by the third round of teacher interviews.

"A couple of weeks ago, I said it was maths time, they all cheered." (Teacher 11, School H, January start, end of year)

All teachers described the majority of their pupils as engaged and motivated, and some mentioned that even their 'lower ability' pupils had gained confidence and independence through the use of concrete resources and mixed-ability pairs.

"I'd say in general, it appeals to perhaps children that struggle with written work, because it is so practical, so that side of things…really appeals to, to those children." (Teacher 6, School C, September start, end of year)

Several who had previously worried about 'high ability' pupils not being challenged enough, rushing through or losing interest, were at this point seeing these children engaging in higher-order questioning of their peers and enjoying being, as one teacher described it, 'mini teachers'.

What benefits or challenges (for pupils, teachers and schools) do teachers attribute to Inspire Maths?

Almost all of the teachers (apart from one of the two in the only school not implementing the materials and approach) said that they saw benefits to using *Inspire Maths*, although they differed as to what specific benefits they emphasised.

In terms of potential or realised benefits to themselves as teachers, key themes included:

- Confidence and enthusiasm: Most of the teachers said they were enjoying using *Inspire Maths* or being excited about seeing what their pupils were able to do as a consequence of implementing it. A few also said that they felt more confident about teaching maths in general by the end of the year, or that they were enjoying teaching the subject more.

"Certainly seeing what Inspire Maths *is all about, it's quite exciting." (Teacher 5, School C, start of year)*

"It is like the way I've been taught myself, but not in the way that I've ever taught it." (Teacher 3, School B, start of year)

"Seeing your lower children have that experience of using the manipulatives to help them with their understanding and learning, and using it to prove and showing it, I think has been a better way of approaching my teaching, rather than just showing them an example on the board and, oh, then go and do it. For them having the first-hand experience has been, I think it's been really good for them…" (Teacher 18, School G, January start, end of year)

- Use of mathematical language and questioning: Several teachers felt that they were asking higher-order questions more effectively, and about half mentioned either improving their own vocabulary use in the classroom or their strategies for encouraging pupils' use of vocabulary and explanations.

"Using the equipment, and asking them questions that I may not have ordinarily asked, is giving me some very creative answers, and I'm finding that really interesting." (Teacher 2, School E, start of year)

- Subject knowledge: Several teachers in each of the September and January start groups said that their own subject knowledge had improved as a result of the professional development they had received alongside *Inspire Maths*, the experience of implementation itself, or a combination of both.

- Planning: A few teachers across the two groups said that having the teacher's guides and pupil materials made it clear what to do and what was coming next in terms of content.

Teachers also listed a number of benefits of using *Inspire Maths* for pupils. These included:

- Development of language, vocabulary and verbal reasoning: Many teachers felt that *Inspire Maths* had helped pupils to express and explain their ideas in maths.

"Everyone's saying the use of mathematical language, and that sort of side, is a positive across the school." (Teacher 4, School B, September start, end of year)

- Depth and security of understanding: Almost all of the teachers felt that pupils' knowledge and understanding were deeper and more secure because of the use of *Inspire Maths*. A few, however, were still concerned that this applied to 'middle ability' children while those in need of extension and remediation might not benefit equally.

"We're not whisking over things that children don't understand because we've got to get ahead, and really spending the time to revisit things, that are not secure yet." (Teacher 20, School L, September start, end of year)

"It's been really interesting to see which children are getting that good understanding and which didn't before." (Teacher 18, School G, January start, end of year)

- Confidence-building: Over half of the teachers across both groups suggested that the use of mixed ability grouping and other strategies associated with *Inspire Maths* had led pupils who were otherwise hesitant or reluctant to feel like 'they could do it'.

- Multiple ways of accessing and representing concepts: Many teachers found that those pupils who struggled with written work were still able to access mathematical concepts by using concrete resources, and several teachers found that these pupils were more able than they had previously thought when given the opportunity to represent and demonstrate their understanding in a variety of ways.

"They're finding that really beneficial, the use of manipulatives and that's giving them the confidence then to put that into the abstract." (Teacher 19, School G, end of year)

- Multiple approaches to extension and extra challenge: While some teachers still had concerns about meeting the needs of the 'most able' by the end of the year, many were finding that the available challenge activities were useful as extension material. Further, in mid- and end-of-year interviews, some of the teachers in both the September and January start groups reflected that having to explain their thinking was proving to be a meaningful challenge for those pupils who appeared most able because they could answer quickly but struggled to answer 'how' or 'why' questions.

Specifically for pupils with special educational needs and English as an additional language, several teachers mentioned that the use of mixed ability pairs was empowering in that it provided a safe space to discuss answers as well as help with reading wordy instructions and problems.

"There's been a huge improvement in the children that haven't been as confident, because they've had a chance to talk to somebody who's not threatening." (Teacher 8, School A, September start, mid-year)

Perceived benefits to schools were, for the most part, framed in terms of benefits to pupils as outlined above, but taking into account the implications of having students move up through the school while building upon these. In other words, teachers felt that there would be cumulative benefits to whole groups of pupils based on the individual benefits surrounding mathematical language use and depth and security of understanding. So, for example, teachers found it 'interesting' and 'exciting' to think about what pupils might know and be able to do in Year 6 as a cohort after having had access to the *Inspire Maths* materials and approach since the beginning of Year 1.

"Everybody does seem to be very on board with it, I think they're all keen to find out more about it." (Teacher 5, School C, September start, end of year)

"Everyone seems really pleased with it, and I know…the maths lead, is really pleased with how everyone's taking it on board and running with it. So yeah, it's good." (Teacher 8, School A, September start, end of year)

Additionally, several teachers across both the September and January start groups cited consistency of the pedagogical approach and shared emphasis as a potential benefit for their schools. All of the teachers who mentioned this were working in schools that had either rolled out *Inspire Maths* in multiple year groups or were planning to continue rolling it out in the following year.

The main challenges for pupils associated with the implementation of *Inspire Maths*, according to the teacher interviews, included:

- Reading: The level and amount of reading required to understand instructions and questions in the textbooks, practice books and assessment books was mentioned by almost all of the teachers across both September and January start groups, and this persisted throughout the year. Reading was a particular concern for pupils seen as 'low ability' and those with English as an additional language, whom teachers felt were less able to access textbook content (despite being able to engage in practical activities) and more difficult to assess because of the conflation of reading skills with maths understanding.

"Without an adult, adult guidance, they would not be able to access this type of, of, I mean Inspire Maths, because it's very wordy in the workbooks, so some children can't catch up with others." (Teacher 12, School I, January start, end of year)

- Frustration levels: Some teachers found that in certain topics, children with less secure basic knowledge had difficulty accessing more complex methods (e.g. addition and subtraction structures) and were likely to shut down.

- Partner work and copying: Linked to the above issues, a few teachers mentioned struggling to get 'lower ability' pupils to work independently as they tended to copy from 'more able' partners.

"It's trying to get them to work together as a partner and to know what that looks like and what that even means. So that you don't end up – because I, I can see how it may be easy to get, like, a couple of months in, and find that one or two children have literally done nothing, because they've just let their partner do all the work." (Teacher 2, School E, September start, start of year)

"I found out that sometimes those children who are less able, they tend just to follow those who are more able, and, and copy." (Teacher 12, School I, January start, end of year)

- Distractions: The use of the combination of books and resources, and the moving between teacher-led and independent work, was seen by some teachers to be distracting pupils. This concern was evident across groups earlier in the year, but was still evident from some of the January start group's interviews at the end of the year.

The main challenges that teachers said they found for themselves in implementing *Inspire Maths* were:

- Coverage: All of the teachers mentioned coverage as a challenge, and many worried that they would not be able to get through all of the *Inspire Maths* topics and still have time to teach concepts that were in the National Curriculum but not covered in the textbooks (although they were aware of documentation was available online to cover topics not in the texts). This was of particular concern to January starters who had 'gone back' to earlier concepts when they began implementing *Inspire Maths* starting with numbers to ten in the middle of the year.

"By this point in the year, in previous years, we would've been working within a hundred, and have covered different units in terms of, we probably would've already done time, and money, and we haven't done any of that yet, so the fact that we're still working within twenty, it can feel a little bit alarming." (Teacher 20, School L, September start, mid-year)

- Management: Linked to the issue of distraction above, many teachers found it tricky, particularly when they were just starting to implement *Inspire Maths*, to maintain pupils' focus while managing the movement between carpet and tables, shifting between teacher-led, group and independent work, facilitating discussions between pupils, circulating to check for understanding, and managing resources and books all at once. Many of the September start group seemed less concerned about this by the end of the year, but for the vast majority of teachers, this was articulated as a considerable challenge through the first term of implementation.

- Evidence: Several teachers from each group mentioned that they were finding it difficult to demonstrate evidence of pupil progress, because work in the practice books did not sufficiently show individual knowledge if pupils had copied others or written a random answer. As a result, some felt they were struggling to fit in time to get evidence recorded in maths journals along with the other aspects of *Inspire Maths*.

"It's difficult sometimes to show, you know when like parents will come in and look at the books, or when…senior management come in and look at the books, it's difficult to show progress." (Teacher 11, School H, January start, end of year)

- Time to adjust: Several teachers in both groups acknowledged, at the end of the year, that 'getting their heads round' the *Inspire Maths* approach took time. Some reflected that where they had concerns about particular units or the approach and materials as a whole these had been resolved simply by proceeding and being willing to 'give the scheme a good go'.

Two of the September start schools had rolled out *Inspire Maths* across multiple or all year groups during the same year in which the evaluation took place, while all but one of the other schools in this group were considering either full rollout across year groups or year-by-year rollout following the evaluation. Of the January start schools, only one was definitely not planning to roll out *Inspire Maths* in future years, while the remaining schools were all considering rolling out whole-school implementation either year by year or across key stages. With potential or actual rollout across the school in mind, teachers listed a number of challenges at the school level. These included:

- Getting everyone on board: The importance of buy-in from school leadership, parents, and teaching assistants was mentioned by several teachers. As one January start teacher commented, there were some concerns that establishing consistency across classrooms would be a potential challenge, and this teacher felt that there would be pressure on those who had taught *Inspire Maths* in Year 1 to act as experts and convince others of the value of the materials and approach. Other teachers mentioned experiencing some pushback or tension from their school leadership teams because of coverage concerns and worries about how to demonstrate evidence of progress to school governors, while three teachers specifically in the January start group remarked that they had encountered some difficulty getting their teaching assistants on board with the new methods and materials.

- Transitions for higher year groups: In the two schools that had already rolled out *Inspire Maths* above Year 1, teachers noted that their colleagues had found that the transition plans provided by OUP took a great deal of time to cover and included expectations that pupils complete large amounts of practice book work that teachers found were not always feasible. This, in turn, meant that teachers of these higher year groups were left with very little time to cover grade level learning objectives with year-appropriate texts.

- Coverage: Linked to within-year coverage concerns, some teachers expressed a worry that they would be sending pupils on to the next year missing some of the knowledge and skills they need based on National Curriculum learning objectives, or indeed having been unable to cover some of the content in the textbooks themselves. This was anticipated to become an issue the following year, as it would put pressure on Year 2 and subsequent teachers to catch up and cover new concepts in anticipation of Key Stage assessments.

- School policy: Several schools, particularly those that were committed to rolling out *Inspire Maths* across the school or had already done so, had made considerable changes and investments in order to support the scheme more broadly school-wide. These changes included making adjustments to timetables (e.g. organising assembly to fall after morning maths lessons so that teachers could immediately mark pupil work before a follow-up or 'fix-it' session), purchasing resources and equipment (notably visualisers recommended in professional development sessions and packs of concrete objects such as Numicon shapes), and allowing room for the sequence of concepts in *Inspire Maths* rather than enforcing pre-existing school

pacing policies and structures for maths. Several teachers expressed that having support from school leadership had been essential to support their implementation of *Inspire Maths* in their classrooms. Teachers in schools where these types of changes were not broadly implemented or supported expressed experiencing tensions related to pre-existing school expectations regarding pacing, evidence of pupil progress, and differentiation.

3.4 OUP support and services

What are teachers' views on and experiences of OUP support and services (professional development and online resources) for Inspire Maths?

Professional development programme
The professional development programme provided to teachers implementing *Inspire Maths* as part of the evaluation consisted of five days spaced out over several months. The first two (consecutive) full-day sessions took place before teachers began using *Inspire Maths* in their classrooms; this was in July for the September starters and in December for the January starters. The second full-day session was offered approximately one to two months after teachers had started implementing *Inspire Maths* (early October for September starters, early March for January starters), and the final two (consecutive) full-day sessions took place two to three months after that (late January for September starters, late May for January starters).

The sessions included coverage of the theory behind *Inspire Maths* and background on primary maths in Singapore and the Singapore education system more generally, practical sessions involving looking at lesson content and engaging in the pupil activities from the textbooks, and some time devoted to discussing practice and planning in and across school groups.

Most schools arranged for participating teachers and maths coordinators or maths leads to attend. However, one school in the September start group only sent a maths coordinator to the professional development programme, while two other schools in the January start group sent additional teachers who were implementing *Inspire Maths* but not participating in the evaluation.

Teachers were asked in interviews about what was useful, what could be improved, and what they wished had been covered in the professional development they had attended for *Inspire Maths*. Focus groups were also held at the end of the first two-day block of training sessions with each group of teachers.

All of the teachers from both September and January start groups expressed feeling positive about the professional development overall, although the aspects they emphasised finding useful varied somewhat. Common themes in what teachers found most useful included the opportunity to engage in practical activities as though they were pupils, the chance to discuss best practice and challenges with other teachers implementing the programme, the presentation of the theory behind *Inspire Maths*, perceived improvements to their own subject knowledge and pedagogy, the knowledgeability and supportiveness of the individual who had led the sessions, and the fact that the training days were 'nicely spaced out'.

"I think it was all really positive, it was good to have. I think more people should have access to it." (Teacher 5, School C, September start, end of year)

"I mean, the courses were brilliant. The best thing about them was, like, all the little tips." (Teacher 16, School F, January start, end of year)

"I think all the practical activities were useful, and the, kind of the theory behind Inspire Maths, which, like, you wouldn't really have got if you just got, like, in a year group, just got the textbooks. So the explanation of how the textbooks were set out, and like…the how to use manipulatives in each lesson, that was quite eye opening." (Teacher 4, School B, September start, end of year)

"It was really useful, I found them really, really useful. Especially discussions around mathematical language, I found really, really interesting and really useful." (Teacher 10, School H, January start, end of year)

"I thought it was really good. I thought, erm, what was good was, you could sort of see where it was going, the bigger picture." (Teacher 11, School H, January start, end of year)

"It was quite interactive, quite informative, I really enjoyed it, actually, all the sessions were good. I think the, the practical part was the most useful…" (Teacher 12, School I, January start, end of year)

With regard to what could be improved or what they wished had been covered, all teachers said that they would have liked to see a full lesson taught. Some mentioned the possibility of watching a video, others specifically wanted to see an entire lesson modelled with themselves role-playing as pupils. A few teachers also suggested that it would be useful to have someone with knowledge of *Inspire Maths* come to observe them teaching in their own classrooms. The overarching theme across these comments seemed to be that teachers wanted to have a way of knowing whether they were 'doing it right', or whether they were 'on track'. Although these areas for improvement were raised in interviews throughout the year and repeatedly, many of the teachers in both groups also commented, by the end of the year, that they had realized there was no single correct way to teach using *Inspire Maths*, and there seemed to be less emphasis on concerns about implementing it 'the right way'.

"I was quite – not worried, but apprehensive, because I hadn't seen a full lesson." (Teacher 8, School A, September start, start of year)

"The only thing, and it's what we keep saying at the training sessions as well, is we'd just love to see a, like an ideal lesson in action, and I know that it's, every teacher teaches differently and things like that, but it's, you know, even an example of one, just showing how to use, the, how a teacher that's, follows Inspire Maths, or one of the writers of it even, they would be able to show us how they use the resources, and, erm, the textbooks, and things like that, because it's just – to begin with it was quite hard to juggle it." (Teacher 3, School B, September start, end of year)

"I wish we could have had a bit more of just how it looks in the classroom, going through maybe the book, picking out some genres, some concepts, and going for it, okay, this is what a lesson would look like on here." (Teacher 19, School G, January start, end of year)

"I'd like to see different, you know, if there is to be this breadth of ways in which you can teach, I'd like to see lots of different lessons, different styles of lessons, so that we can see, well, that's considered to be the most effective way, and that's considered to be the least effective way." (Teacher 9, School J, January start, end of year)

Another comment on potential areas for improvement in the professional development programme concerned the specific practical activities and the level at which they were pitched. Although most of the teachers explicitly stated that they enjoyed the practical activities and using the resources or putting themselves in the mindsets of pupils, several wished that they had focused more on activities aimed at Year 1 pupils rather than a mixture of tasks intended for higher age groups.

"If we're all just teaching Year 1, I was a little unsure why we were looking at things for the older children and not just focusing on Year 1 things." (Teacher 9, School J, January start, end of year)

Online content on Oxford OWL

The majority of teachers in the September start group had neither used nor looked at the online materials available to complement *Inspire Maths* by the times of their first and second interviews. Similarly, most of the January start group had not used or looked at Oxford OWL by the end of the year. Two main reasons for this emerged from teachers' responses. For some, they experienced issues with access to Oxford OWL, either because they did not know how to log on or had done so and could not find items that they had heard about in professional development sessions. For others, they felt that in implementing *Inspire Maths* they were taking on board new ways of teaching, planning and/or assessing, and engaging with the online content seemed like an extra task that they preferred to put off until they had had time to get used to their new routines, pedagogy and books.

"We've, we feel like we've been supported quite well through all that, erm…I could probably be using Oxford OWL online a bit more, but there's so much in the teacher guides anyway, that it's almost like, erm, we don't really need to." (Teacher 6, School C, September start, end of year)

By the end of the year, about half of the teachers (mainly September starters, but also a few of the January starters) had used some content from Oxford OWL. The majority of these were mainly using the digital versions of textbook pages to project or display during lessons either in place of or alongside using hard copy textbooks. Teachers liked having access to these digital images, but many expressed that they would have preferred for more of the textbooks to have been available in this manner.

Homework for *Inspire Maths* was being used in three of the schools, two of which were September start schools and one of which was a January start school. The teachers who were using homework from Oxford OWL said that this was helping to engage parents and that both they and the parents were quite positive about the homework that was available.

"Things like the homework, the lesson starters, or the unit starters are all super." (Teacher 9, School J, January start, end of year)

However, the teachers in one of these schools commented that because the amount of available homework content was limited and only extended up to a particular topic and then stopped, they were encountering some confusion and dissatisfaction from parents after having established the expectation of regular homework activities.

"There was quite a lot, there was maybe like three or four good chunks, in a row, and then it's gone, now, maybe for this past two months, two months' worth of things." (Teacher 3, School B, September start, end of year)

Some teachers were still experiencing access issues or finding Oxford OWL difficult to navigate by the end of the year, which prevented them from making use of the online content. One teacher specifically wanted to use an assessment tool that she remembered hearing about in professional development, but 'couldn't find it anywhere'. Another had experienced problems with the school login information and had not received a satisfactory response or resolution when she tried to follow up with a contact at OUP. Still another had logged in and was able to find some content, but found that the school seemed to have limited access despite having been promised full access.

"Last time I was there [in PD] they were saying you could upload the assessments, and I was hoping that would generate something that would, do you know what I mean, that would show stuff, but I couldn't get on. When I went into it, I couldn't find the links anywhere to put the data into." (Teacher 7, School E, September start, end of year)

"Someone said to me, oh, there's loads of online resources, I can't find any of them, the only thing I could find was the long term plan." (Teacher 11, School H, January start, mid-year)

On the whole, however, most teachers felt well supported and positive about the rollout of Inspire Maths. As one articulated it,

"We've had comprehensive training in how to deliver the program, and we've had advice, and we've had access to, to people who've used it previously, and people who have been using it…and people, and people who created the sort of program, so we've, you know, we've had quite a lot of access and information and a lot of support and help." (Teacher 11, School H, January start, end of year)

4. Conclusions and Next Steps

4.1 Key Findings

- *Inspire Maths* can help Year 1 pupils make significantly more progress in mathematics
    - We observed small but significant gains in progress after two terms' use of the programme
        - In context: After two terms, the gap in mathematics attainment was twice the size of the gap found between boys and girls when they started school

- *Inspire Maths* promotes Year 1 teaching practices that are well known to be more effective for pupil progress in the long term
    - Benefits to classroom practice were noted immediately following initial professional development training workshops
    - Secondary benefits were then observed over the course of the year

- Teachers were generally very positive about the *Inspire Maths* materials and approach

- Teachers noted a number of key benefits and challenges to themselves, pupils and schools when implementing *Inspire Maths*
    - For example, teachers reported that *Inspire Maths* increased both their and their pupils' confidence and subject knowledge in mathematics
- These were quite consistent regardless of whether a teacher began implementing Inspire Maths in September or in January

4.2 Findings in the context of past research

In order to better understand what can be expected when *Inspire Maths* is implemented by schools and teachers, we compare the findings from this evaluation against the evidence base that exists regarding the effects of mastery-based approaches for teaching and learning.

In August 2016, the UK Educational Endowment Foundation (EEF) produced a document that summarised existing scientific knowledge concerning the impacts and implementations of mastery-based learning approaches (prior to the release of the evaluation on which this report focuses). They concluded that existing evidence regarding effects on pupil progress suggested a "*Moderate impact for very low cost, based on moderate evidence*" (Educational Endowment Foundation, 2016). Past research evidence is moderate because it was dated and because it has produced inconsistent findings. The EEF also noted that the implementation of mastery-based programmes can be challenging such that "*Professional development and additional support for staff is recommended, particularly in the early stages of setting up a programme*". However, the provision of such support for teachers and schools is an integral part of *Inspire Maths*. Moreover, we found that the support offered through *Inspire Maths* promoted classroom practices that are known to be more effective for pupil progress.

Our finding that *Inspire Maths* can boost Year 1 pupils' progress in mathematics is therefore a conclusion in keeping with existing evidence of the impacts of mastery-based approaches to teaching. However, because teaching policies, practices and curricula change over time and differ between cultures (Hargreaves, 1994) we also compare the findings from this evaluation against two other recent evaluations of similar mastery-based programmes. We present this comparison in order to demonstrate the rigour and trust-worthiness of our findings via consistency in what was found, and how this was found. The two recent evaluations and programmes are:

1. The evaluation of the 'Maths Mastery' programme delivered in England by the academy chain ARK (Jerrim & Vignoles 2015, 2016; Vignoles, Jerrim, and Cowen, 2015)
2. The evaluation of the 'Math in Focus (MIF)' curriculum used in the USA delivered by Houghton Mifflin Harcourt and published by Marshall Cavendish Education (Jaciw, Hegseth, Ma, & Lai, 2012).

All three evaluations were one-year Randomised Control Trials that studied whether the introduction of a mastery-based approach to teaching mathematics[10] in Primary (USA: elementary) schools could boost children's progress. Further, all three used the same approaches to conclude whether or not an impact was observed.[11] However, the design of these three evaluations also differed in a number of ways. The evaluation of *Inspire Maths* was distinct in assessing pupil progress *within* a year (not just at the beginning and end), by evaluating impacts both upon pupils' attitudes towards mathematics and upon teachers' classroom practices.[12] This evaluation of the impact and implementation of *Inspire Maths* benefits from the existence of these two previous evaluations because their common design means that their impacts on pupil progress in maths can be compared. All three found 'small' boosts to pupil progress within the first year of implementing a mastery approach within primary schools. However, *Inspire Maths* was observed to have additional impacts beyond pupil progress. Our finding that *Inspire Maths* promoted certain classroom practices indicates a possible mechanism by which *Inspire Maths* might boost pupil progress. Impact was first observed upon teacher practices (see Table 1, p.17) and we speculate that this may have facilitated secondary impacts on pupil progress. However, it is beyond the scope of this evaluation to produce rigorous evidence as to whether this is the case; an issue that is returned to in Section 4.5.

4.3 Findings in the context of current educational policy in England

Educational policy in England has undergone substantial changes in recent years, and given the transition to a new UK Prime Minister as well as ministers in charge of the Department for Education in 2016, it is likely to continue to change in the foreseeable. Recent changes in educational policy have direct relevance to findings regarding the impact of *Inspire Maths* identified in this evaluation. Our evidence of impact upon pupil progress comes three months after the UK Government announced a commitment to invest £41M over four years (until 2020) in order to support schools in adopting mastery-based approaches to teaching maths (Department for Education, 2016). On the whole, educational policy is outpacing the publication of educational evidence. For example, the evaluation of a mastery-based programme carried out by Jerrim and Vignoles (2015) provided the first evidence of the impact in England of an approach based upon a combination of materials and teaching practices used in Singapore. Although both their evaluation and ours were carried out in England, theirs took place prior to full implementation of a slimmed-down national curriculum across all years in maintained schools in England in September 2015 (Department for Education, 2013). Consequently, our evaluation of *Inspire Maths* (conducted during the 2015/16 school year) represents the first evidence (to our knowledge), using an RCT design as well as qualitative approaches to explore teachers' perspectives, as to whether a Singapore-inspired teaching approach to mathematics can boost pupil progress in mathematics along with teachers' experiences of using

[10] One emphasising a Concrete Pictorial Abstract Approach (CPA) that sees content covered more thoroughly and which therefore progresses at a slower pace than teachers might otherwise be accustomed to.

[11] 'General linear modelling' that controlled for the effects of pupils being nested within classes, the calculation and reporting of effect sizes, and the calculation and reporting of the probability that observed differences may have been due to chance.

[12] The use of a delayed-treatment control group (who implemented Inspire Maths one term later than the 'experimental group') helped to reduce the likelihood of erroneous group differences due to the Hawthorne Effect (where a person's behaviour changes because they are being observed) because both groups were observed.

the approach, within the context of the current national curriculum and broader education policy trends emphasizing mastery in England.

As with the evaluation by Jerrim and Vignoles and as mentioned above, we found a small but significant effect on Year 1 pupil progress following a sample of schools' implementation of a mastery-based approach to teaching mathematics. However, small boosts are not to be discounted when it comes to policy considerations in education. This is particularly the case for *Inspire Maths* given the current policy context in England, because the evidence of a small boost to pupil progress coincides with the UK Government's investment of £41M to introduce programmes of this type into schools across England. The result of this investment is that schools, head teachers, and the 35 school-led maths hubs (which will train teachers in this approach) will soon be faced with decisions regarding whether and how best to use this funding. Although our evaluation does not provide evidence as to impacts associated with East Asian mastery-based teaching methods more generally, it does provide schools and policy-makers with a small yet timely piece of evidence to support them in their deciding whether *Inspire Maths* in particular is appropriate for their schools' needs. However, further research is required to more fully understand the impact of *Inspire Maths* (e.g. beyond Year 1), as well as the impact of mastery-based teaching approaches more broadly within the context of the current English curriculum and the current English educational system (recommendations towards this are made below; Section 4.5).

4.4 Limitations

As with every empirical investigation, this evaluation has a number of limitations and these must be taken into account when interpreting the key findings, making recommendations, and considering acting upon these recommendations. First, this evaluation was designed with a limited scope. Only Year 1 pupils were studied in this investigation, implementation and impact were only tracked for one school year, and it was not possible to study the potential for different impacts upon specific groups of pupils (e.g. those in receipt of Free School Meals) due to the use of opt-out consent procedures.[13] The consequence of this limited scope is that there remain many areas where the impact of *Inspire Maths* is yet to be evaluated and this limits the utility of the evaluation. We make recommendations for obtaining further evidence of impact below. Second, the sample studied in this evaluation was limited in size (12 primary schools) and employed a purposive (rather than random) sampling strategy. The consequence of these design features is that this evaluation is limited in statistical power and conclusions are limited in external validity. Combined, these limitations oblige us to discuss what impacts *Inspire Maths can* have in schools, rather than what *Inspire Maths has*, or *can be expected* to have.

4.5 Implications for schools and further research directions

Contextualised against the backdrop of past evidence and current educational policy, the findings of this study – considered together with some of its limitations discussed above – serve to inform several implications for policy and practice in schools:

- Recommendations for schools: The findings from our evaluation suggest that successful implementation of *Inspire Maths* requires the support of school leadership teams as well as revisiting of and selective changes to school policy. In particular, successful implementation of *Inspire Maths* in classrooms may require changes in timetables, resources, and management of physical space that must be accommodated by school-wide adjustments (e.g. to assembly schedules) in order to be sustainable. Moreover, as Year 1 teachers may

[13] Opt-out consent was considered likely to lead to larger proportions of pupils in each classroom taking part in the study, and the priority was to include full classes to the greatest extent possible rather than to obtain confidential student information.

need to progress at a slower pace to facilitate a more secure grasp of the fundamentals, buy-in from school leadership teams and flexibility in policy relevant to the pacing of learning objective coverage help to avoid putting competing pressures on teachers. *Inspire Maths* is designed for coverage by Key Stage rather than by year. In schools where this is understood and supported consistently by school leaders and by teachers across multiple year levels, teachers reported more positive perspectives on implementation and the intention to continue using *Inspire Maths*.

- Recommendations for obtaining further evidence of the impact of *Inspire Maths*: The findings from this evaluation suggest a number of areas where the impacts of *Inspire Maths* might be further investigated. For example, we still lack answers to the following questions:

    1. Do the effects on pupil progress and classroom practice persist after Year 1?
        a. Does *Inspire Maths* help to boost pupils' scores on National Curriculum Tests?
        b. Is improved classroom practice maintained by teachers with subsequent classes?
        c. Do subsequent classes of Year 1 pupils demonstrate similar gains in progress?

    2. Can *Inspire Maths* help narrow gaps in attainment that exist for certain groups of pupils? For example:
        a. Pupils eligible for Free School Meals?
        b. Pupils with Special Educational Needs?
        c. Pupils who speak English as an Additional Language?

    3. Are the positive effects on pupil progress and classroom practice replicated when *Inspire Maths* is implemented:
        a. In school years other than Year 1?
        b. In schools located in other parts of the UK?

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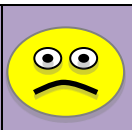
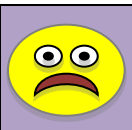
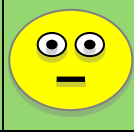
Appendices

1. Questionnaire items used to assess Year 1 pupils' attitudes towards maths

Practice items:

Playing games makes me feel…					
Having to sit quietly makes me feel…					

Items assessing pupils' attitudes towards maths:

Doing numbers and sums makes me feel…					
Counting things makes me feel…					
Using things like *these* in lessons makes me feel…					
Learning about shapes and patterns makes me feel…					

2. **The Lesson Observation Form for Evaluating the Quality of Teaching (QoT)** Areas of Classroom Practice (van de Grift et al., 2007)

No.	**Item Wording.** 4-point rating scales: *1=Predominantly weak; 2=More weaknesses than strengths; 3= More strengths than weaknesses; 4=Predominantly strong*
1	Safe and orderly classroom* climate (sum of four items)
2	Stimulating learning climate (sum of four items)
3	Clear objectives (sum of two items)
4	Clear instruction (sum of three items)
5	Activating pupils (sum of two items)
6	Adaptation of teaching (sum of two items)
7	Teaching learning strategies (sum of three items)
8	Effective classroom organisation (sum of four items)
9	Effective classroom layout (sum of two items)

Note: * The original word used is actually, “school”, but here the QoT was only used to observe classrooms

3. International System of Teacher Observation and Feedback (ISTOF) Areas of Classroom Practice (Teddlie et al., 2006)

No.	**Item Wording.** 5-point Likert rating scales: *1=Strongly disagree; 2=Disagree somewhat; 3=neutral; 4=Agree somewhat; 5=Strongly agree*
1	Assessment and evaluation (sum of four items)
2	Differentiation and inclusion (sum of four items)
3	Clarity of instruction (sum of six items)
4	Instructional skills (sum of six items)
5	Promoting active learning and developing metacognitive skills (sum of ten items)
6	Classroom climate (sum of eight items)
7	Classroom management (sum of seven items)

4. Mathematics Enhancing Classroom Observation Recording System (MECORS) Areas of Classroom Practice (Schaffer, Muijs, Reynolds, & Kitson, 1998)

No.	**Item wording.** 5-point rating scales: *1=Behaviour rarely observed; 2=Behaviour occasionally observed; 3=Behaviour often observed; 4=Behaviour frequently observed; 5=Behaviour consistently observed.*
1	Uses classroom management (sum of five items)
2	Maintains appropriate classroom behaviour (sum of five items)
3	Focuses on and maintains attention on lesson (sum of eight items)
4	Provides pupils with review and practice (sum of six items)
5	Demonstrates skills in questioning (sum of fourteen items)
6	Demonstrates Mathematics Enhancement Programme (MEP)[14] strategies (sum of eight items)
7	Demonstrates a variety of teaching methods (sum of three items)
8	Establishes a positive classroom climate (sum of eight items)

[14] Refers to a set of strategies related to problem-solving, use of mathematical language, and connecting material to prior learning and other areas of mathematics.

5. Statistical Analytic Strategy

A series of statistical analyses were carried out to estimate the impacts of *Inspire Maths* and these were based upon differences between the experimental and delay treatment control groups over the course of the school year, at three *testing points*:

- At the beginning of the school year
- After one school term (Autumn)
- After two school terms (Autumn and Spring)

Multilevel regression models were used as the statistical technique for comparing pupils (on measures of attainment and progress in maths, plus changing attitudes towards maths). Multilevel effect sizes were calculated in order to allow effects to be compared in magnitude (calculated following the formulas presented in Elliot & Sammons, 2004). Differences between the two experimental groups were interpreted as meaningful when they crossed the standard academic threshold of α=0.05.

General linear models were used for comparing teachers and classrooms on measures of classroom practice. Effect sizes were again calculated, although these effect sizes differed to those that are presented in the multilevel regression models (though both serve the same purpose). For the general linear models, partial eta squared values (n_p^2) were calculated in order to allow effects to be compared in magnitude. These estimated what proportion of teachers' classroom practice could be attributed to differences between the experimental groups. Differences between the two experimental groups were interpreted as meaningful when they crossed the n_p^2 threshold that denoted a, "large" difference between the two experimental groups (in other words a, "large" effect size, $n_p^2 \geq 0.14$[15]; Cohen, 1988).

The use of two different statistical techniques rather than one, and the acceptance of two different thresholds for denoting when differences would be interpreted as meaningful, was carried out for two reasons. First, multilevel regression models allowed differences between children to be differentiated from differences between classrooms. This was important to the aims of the evaluation and would not have possible with the general linear modelling that was used to determine if there were differences in classroom practice. Second, the number of sampled classrooms was too low (n=20) for the standard academic threshold of α=0.05 to be safely used in judging whether group differences in classroom practice could be interpreted as meaningful (i.e. there was too little statistical power). Instead, we used a threshold that was based on the size of the observed effect and report where differences are "large" according to standard statistical criteria.

Finally, in order to obtain estimates of the impact of *Inspire Maths* that were as accurate as possible, a number of additional measures were included in all statistical analyses. These were included because they were considered likely to affect pupil attainment in maths, pupils' attitudes towards maths, and overall classroom practice. These additional measures were:

1. Score at previous testing point. Including these measures allowed the evaluation to determine the effect of *Inspire Maths* on pupil *progress* in maths, as well as *changes* in their attitude towards maths, and *changes* in classroom practice. This approach follows the "Value Added" approach to measuring pupil progress which was previously used by the UK Department of Education[16] and which is a standard technique used in research examining *Educational Effectiveness*.

[15] And where a, "small" sized difference is indicated by a $\eta_p^2 \geq 0.01$ but < 0.06; and a "medium" sized difference is indicated by a $\eta_p^2 \geq 0.06$ but < 0.14

[16] E.g. http://education.gov.uk/schools/performance/archive/schools_05/sec4.shtml

2. Pupil age. Our measure of math knowledge was created to allow children of different ages to be directly compared. This was not the case with our measure of pupils' attitude towards maths. As a result, we included pupil age in all our analyses of pupil attitudes because in doing so, we achieved the same type of comparison as when examining pupils' attainment and progress in maths. That is, an analysis of the impact of *Inspire Maths* that is equally fair for all children regardless of their ages.
3. Pupil gender (when comparing pupils) or proportion of girls in a class (when comparing teachers and classrooms).
4. Teacher experience (total years having taught).
5. Teacher experience spent teaching Year 1 (as a proportion of years having taught).
6. Days since the first test at that testing point (either pupil test or observation of classroom practice as appropriate). This measure and the one below were "statistical control" measures. Classes were tested at different times throughout the year. Including this information in our analyses of impact meant that our understanding of the impact of *Inspire Maths* would not be influenced by the different days at which testing was carried out across the school year.
7. Days since the first test at the previous testing point (either pupil test or observation of classroom practice as appropriate).

6. Statistical Results: Group differences in pupils' math knowledge during Year 1

	At school entry:					After one term:					After two terms:				
	Model 0	Model 1				Model 0	Model 1				Model 0	Model 1			
FIXED EFFECTS	B	B	SE	p	ES	B	B	SE	p	ES	B	B	SE	p	ES
Average Math Knowledge:	89.40	81.93				94.90	40.92				96.55	34.72			
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)		3.53	0.17	0.303	0.30		-0.40	2.47	0.872	-0.04		3.86	1.80	0.046	0.42
Pupil: Math knowledge at the beginning of this term							0.58	0.04	<0.001	1.61		0.67	0.04	<0.001	1.81
Pupil: Female?		2.57	1.03	0.013	0.22		0.98	0.86	0.255	0.11		-1.92	0.87	0.028	-0.21
Teacher: Years of experience		0.14	0.17	0.404	0.16		0.06	0.10	0.553	0.09		-0.09	0.11	0.401	-0.13
Teacher: Proportion of experience teaching Year 1		0.29	0.61	0.637	0.10		-0.63	0.37	0.104	-0.28		-0.46	0.34	0.191	-0.20
Control measure: Days since the first class received pupil tests, this testing point		0.26	0.17	0.148	0.42		0.15	0.10	0.172	0.30		0.10	0.07	0.160	0.23
Control measure: Days since the first class received pupil tests, last testing point							-0.03	0.11	0.814	-0.06		-0.30	0.10	0.006	-0.60
RANDOM EFFECTS															
Unexplained Child-level Variance	139.91	138.46				136.54	86.29				146.15	85.87			
Unexplained Teacher-level Variance	28.59	22.39				19.73	6.36				22.52	5.35			
Intra-Class Correlation (ICC)	0.17					0.13					0.13				
% of Child-level Variance explained		1%					37%					41%			
% of Teacher-level Variance explained		22%					68%					76%			

Notes: "Model 0": No predictors of math knowledge included; "Model 1": all predictors of math knowledge included; B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (Elliot & Sammons, 2004); Shading denotes those statistical differences and associations that were significantly unlikely to be due to chance

7. Statistical Results: Group differences in pupils' attitude towards maths during Year 1

	At school entry:					After one term:					After two terms:				
	Model 0	Model 1				Model 0	Model 1				Model 0	Model 1			
FIXED EFFECTS	B	B	SE	p	ES	B	B	SE	p	ES	B	B	SE	p	ES
Average attitude towards maths:	11.29	9.14				10.91	1.53				10.73	1.67			
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)		-1.38	0.53	0.009	-0.36		0.67	0.65	0.311	0.18		0.17	0.58	0.777	0.05
Pupil: Attitude towards maths at the beginning of this term							0.23	0.05	<0.001	0.48		0.36	0.04	<0.001	0.89
Pupil: Female?		0.97	0.35	0.006	0.26		0.54	0.36	0.137	0.14		0.99	0.31	0.001	0.31
Pupil: Age (at testing; days)		0.00	0.09	0.287	0.10		0.00	0.00	0.066	0.00		0.00	0.00	0.430	0.07
Teacher: Years of experience		-0.05	0.03	0.046	-0.18		0.00	0.03	0.976	0.00		0.08	0.03	0.023	0.33
Teacher: Proportion of experience teaching Year 1		-0.08	0.00	0.366	-0.09		-0.26	0.09	0.009	-0.29		-0.25	0.11	0.036	-0.32
Control measure: Days since the first class received pupil tests, this testing point		-0.07	0.03	0.015	-0.35		-0.04	0.03	0.126	-0.20		0.06	0.00	0.017	0.40
Control measure: Days since the first class received pupil tests, last testing point							0.01	0.03	0.825	0.05		-0.02	0.03	0.557	-0.11
RANDOM EFFECTS															
Unexplained Child-level Variance	15.08	14.42				15.49	14.07				13.16	10.53			
Unexplained Teacher-level Variance	0.23	0.00				0.65	0.01				1.63	0.49			
Intra-Class Correlation (ICC)	0.01					0.04					0.11				
% of Child-level Variance explained		4%					9%					20%			
% of Teacher-level Variance explained		-					99%					70%			

Notes: "Model 0": No predictors of attitude towards maths included; "Model 1": all predictors of attitude towards maths included; B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (Elliot & Sammons, 2004); Shading denotes those statistical differences and associations that were significantly unlikely to be due to chance

8. Statistical Results: Group differences in Classroom Practice during Year 1: As measured via The Lesson Observation Form for Evaluating the Quality of Teaching (QoT) measure (van de Grift et al., 2007)

8.1 Safe and Orderly Classroom* Climate	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	2.09	1.44	0.169	0.13	-1.39	0.66	0.060	0.29	-1.80	0.94	0.080	0.25
Class: Score at last testing point					1.02	0.12	<0.001	0.87	0.13	0.22	0.578	0.03
Class: Proportion of class female	-17.17	4.85	0.003	0.47	8.19	2.98	0.019	0.41	-6.95	4.64	0.162	0.17
Teacher: Years of experience	-0.18	0.07	0.030	0.30	<0.01	0.04	0.944	<0.01	-0.18	0.08	0.043	0.32
Teacher: Proportion of experience teaching Year 1	-0.27	0.27	0.327	0.07	0.13	0.12	0.302	0.10	-0.07	0.22	0.760	0.01
Control measure: Days since the first class was observed, this testing point	0.09	0.08	0.233	0.10	-0.05	0.02	0.037	0.34	-0.10	0.05	0.054	0.30
Control measure: Days since the first class was observed, last testing point					-0.06	0.04	0.14	0.19	0.08	0.04	0.059	0.29

Notes: * The original word used is actually, "school" but here the QoT was only used to observe classrooms; B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.2 Stimulating Learning Climate	At school entry:				After one term:				After two terms:			
	B	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	3.82	1.36	0.014	0.36	2.19	0.98	0.047	0.31	-0.06	1.38	0.967	<0.01
Class: Score at last testing point					0.06	0.18	0.744	0.01	0.56	0.48	0.266	0.11
Class: Proportion of class female	-7.86	4.55	0.106	0.18	-4.78	3.03	0.143	0.18	-9.92	5.68	0.109	0.22
Teacher: Years of experience	-0.02	0.07	0.804	0.01	0.16	0.04	0.002	0.59	-0.13	0.11	0.262	0.11
Teacher: Proportion of experience teaching Year 1	-0.29	0.25	0.263	0.09	-0.21	0.17	0.230	0.13	0.02	0.26	0.930	<0.01
Control measure: Days since the first class was observed, this testing point	0.04	0.07	0.585	0.02	0.01	0.03	0.761	0.01	-0.04	0.05	0.473	0.05
Control measure: Days since the first class was observed, last testing point					0.04	0.04	0.387	0.07	0.03	0.05	0.585	0.03

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.3 Clear Objectives	At school entry:				After one term:				After two terms:			
	B	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	1.68	1.22	0.188	0.11	-0.23	0.66	0.740	0.01	0.29	0.37	0.446	0.05
Class: Score at last testing point					0.25	0.14	0.101	0.23	0.50	0.19	0.024	0.38
Class: Proportion of class female	2.12	4.08	0.612	0.02	2.19	2.37	0.376	0.07	-6.72	1.85	0.004	0.55
Teacher: Years of experience	0.04	0.06	0.546	0.03	0.11	0.03	0.010	0.46	-0.12	0.03	0.006	0.51
Teacher: Proportion of experience teaching Year 1	<0.01	0.22	0.985	<0.01	0.03	0.12	0.798	0.01	0.20	0.08	0.034	0.35
Control measure: Days since the first class was observed, this testing point	0.01	0.06	0.859	<0.01	0.03	0.02	0.281	0.11	<0.01	0.02	0.832	<0.01
Control measure: Days since the first class was observed, last testing point					-0.01	0.03	0.849	<0.01	-0.01	0.02	0.500	0.04

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.4 Clear Instruction	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	1.38	0.69	0.066	0.22	1.57	1.07	0.170	0.16	0.30	1.09	0.786	0.01
Class: Score at last testing point					0.08	0.40	0.849	<0.01	0.27	0.39	0.499	0.04
Class: Proportion of class female	0.66	2.32	0.780	0.01	-2.93	3.67	0.443	0.06	-7.45	5.22	0.181	0.16
Teacher: Years of experience	0.01	0.04	0.878	<0.01	0.08	0.05	0.138	0.19	-0.15	0.08	0.096	0.23
Teacher: Proportion of experience teaching Year 1	-0.07	0.13	0.572	0.02	<0.01	0.18	0.993	<0.01	0.20	0.24	0.427	0.06
Control measure: Days since the first class was observed, this testing point	-0.05	0.04	0.153	0.14	-0.01	0.03	0.696	0.01	-0.01	0.05	0.795	0.01
Control measure: Days since the first class was observed, last testing point					0.07	0.05	0.213	0.14	-0.01	0.05	0.851	<0.01

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.5 Activating Pupils	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	2.03	0.41	<0.001	0.63	-0.11	1.25	0.933	<0.01	0.39	0.58	0.512	0.04
Class: Score at last testing point					0.53	0.50	0.319	0.09	0.43	0.25	0.112	0.21
Class: Proportion of class female	-2.09	1.39	0.153	0.88	-3.77	2.98	0.231	0.13	-3.92	3.07	0.228	0.13
Teacher: Years of experience	-0.03	0.02	0.189	0.12	0.02	0.04	0.693	0.02	-0.02	0.04	0.630	0.02
Teacher: Proportion of experience teaching Year 1	-0.11	0.08	0.191	0.12	0.24	0.16	0.152	0.18	-0.06	0.14	0.710	0.01
Control measure: Days since the first class was observed, this testing point	0.03	0.02	0.252	0.09	-0.03	0.03	0.243	0.12	-0.01	0.03	0.645	0.02
Control measure: Days since the first class was observed, last testing point					0.05	0.04	0.290	0.10	0.01	0.03	0.778	0.01

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.6 Adaptation of Teaching	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	-2.62	0.68	0.002	0.51	-0.49	0.99	0.629	0.02	-0.76	0.60	0.230	0.13
Class: Score at last testing point					-0.15	0.26	0.569	0.03	0.39	0.34	0.277	0.11
Class: Proportion of class female	1.72	2.29	0.465	0.04	0.55	2.52	0.830	<0.01	5.37	2.88	0.089	0.24
Teacher: Years of experience	0.01	0.04	0.804	0.01	0.04	0.04	0.299	0.10	0.03	0.04	0.573	0.03
Teacher: Proportion of experience teaching Year 1	<0.01	0.13	0.999	<0.01	-0.02	0.12	0.879	<0.01	-0.15	0.14	0.285	0.10
Control measure: Days since the first class was observed, this testing point	-0.04	0.04	0.274	0.09	-0.02	0.02	0.529	0.04	-0.02	0.03	0.576	0.03
Control measure: Days since the first class was observed, last testing point					-0.03	0.04	0.507	0.04	0.06	0.03	0.062	0.28

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.7 Teaching Learning Strategies	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	0.54	0.99	0.593	0.02	0.46	0.89	0.621	0.02	0.61	0.85	0.490	0.04
Class: Score at last testing point					-0.36	0.26	0.195	0.15	-0.49	0.36	0.194	0.15
Class: Proportion of class female	-6.29	3.33	0.080	0.20	-10.89	3.42	0.009	0.48	-0.60	4.93	0.906	<0.01
Teacher: Years of experience	0.02	0.05	0.776	0.12	0.11	0.05	0.045	0.32	0.05	0.06	0.489	0.05
Teacher: Proportion of experience teaching Year 1	0.07	0.18	0.728	0.01	0.06	0.17	0.729	0.01	-0.08	0.19	0.700	0.01
Control measure: Days since the first class was observed, this testing point	-0.01	0.05	0.803	0.01	0.01	0.03	0.784	0.01	-0.09	0.04	0.056	0.29
Control measure: Days since the first class was observed, last testing point					-0.03	0.05	0.481	0.05	0.06	0.04	0.103	0.22

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.8 Effective Classroom Organisation	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	4.74	1.15	0.001	0.55	0.52	1.25	0.687	0.02	-3.20	1.72	0.089	0.24
Class: Score at last testing point					0.49	0.20	0.034	0.35	0.94	0.47	0.068	0.27
Class: Proportion of class female	-5.83	3.86	0.153	0.14	-3.10	3.45	0.388	0.07	-5.37	0.73	0.477	0.05
Teacher: Years of experience	0.10	0.06	0.096	0.19	0.09	0.05	0.122	0.20	-0.24	0.12	0.072	0.27
Teacher: Proportion of experience teaching Year 1	-0.08	0.21	0.700	0.01	-0.16	0.16	0.353	0.08	0.39	0.32	0.252	0.12
Control measure: Days since the first class was observed, this testing point	0.04	0.06	0.492	0.03	-0.02	0.03	0.566	0.03	-0.03	0.06	0.678	0.02
Control measure: Days since the first class was observed, last testing point					0.03	0.05	0.560	0.03	0.09	0.06	0.151	0.18

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

8.9 Effective Classroom Layout	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	2.39	0.40	<0.001	0.72	-0.92	1.30	0.495	0.04	-0.53	0.47	0.279	0.11
Class: Score at last testing point					0.64	0.53	0.253	0.12	0.34	0.34	0.336	0.08
Class: Proportion of class female	3.39	1.35	0.025	0.31	-4.17	1.89	0.050	0.31	-0.95	2.54	0.716	0.01
Teacher: Years of experience	-0.03	0.02	0.208	0.11	0.07	0.03	0.022	0.39	0.04	0.04	0.347	0.08
Teacher: Proportion of experience teaching Year 1	-0.07	0.07	0.375	0.06	0.03	0.01	0.778	0.01	0.24	0.10	0.036	0.34
Control measure: Days since the first class was observed, this testing point	0.04	0.02	0.072	0.21	0.03	0.02	0.091	0.24	<-0.01	0.02	0.912	<0.01
Control measure: Days since the first class was observed, last testing point					0.01	0.03	0.792	0.01	0.04	0.02	0.105	0.22

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9. Statistical Results: Group differences in Classroom Practice during Year 1: As measured via the International System of Teacher Observation and Feedback (ISTOF; Teddlie et al., 2006)

9.1 Assessment and Evaluation	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	4.92	1.06	<0.001	0.61	0.94	1.54	0.555	0.03	-0.74	1.35	0.596	0.03
Class: Score at last testing point					0.44	0.26	0.115	0.21	1.04	0.40	0.025	0.38
Class: Proportion of class female	6.36	3.55	0.095	0.19	2.41	3.86	0.546	0.03	-16.98	5.71	0.013	0.45
Teacher: Years of experience	-0.04	0.05	0.531	0.03	-0.05	0.05	0.369	0.07	-0.11	0.09	0.237	0.13
Teacher: Proportion of experience teaching Year 1	-0.42	0.20	0.049	0.25	0.23	0.22	0.319	0.09	0.16	0.27	0.573	0.03
Control measure: Days since the first class was observed, this testing point	0.10	0.06	0.081	0.20	-0.03	0.03	0.344	0.08	-0.02	0.06	0.770	0.01
Control measure: Days since the first class was observed, last testing point					0.02	0.06	0.685	0.02	-0.03	0.05	0.569	0.03

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.2 Differentiation and Inclusion	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	1.78	1.30	0.191	0.12	-0.24	1.33	0.860	<0.01	1.38	0.93	0.168	0.17
Class: Score at last testing point					<0.01	0.30	0.993	<0.01	-0.29	0.33	0.408	0.06
Class: Proportion of class female	-7.67	4.36	0.100	0.18	2.19	4.97	0.668	0.02	-6.62	4.43	0.163	0.17
Teacher: Years of experience	<0.01	0.07	0.996	<0.01	0.25	0.07	0.004	0.55	0.03	0.12	0.805	0.01
Teacher: Proportion of experience teaching Year 1	-0.13	0.24	0.591	0.02	0.05	0.25	0.832	<0.01	-0.06	0.21	0.770	0.01
Control measure: Days since the first class was observed, this testing point	0.20	0.07	0.011	0.38	0.04	0.05	0.419	0.06	-0.01	0.05	0.854	<0.01
Control measure: Days since the first class was observed, last testing point					-0.02	0.09	0.822	0.01	0.07	0.04	0.102	0.22

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.3 Clarity of Instruction	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	4.26	1.27	0.005	0.44	2.46	1.78	0.196	0.15	-1.51	1.80	0.420	0.06
Class: Score at last testing point					0.56	0.30	0.084	0.25	0.83	0.33	0.030	0.36
Class: Proportion of class female	-8.86	4.28	0.057	0.24	-4.46	5.57	0.440	0.06	-9.49	8.09	0.265	0.11
Teacher: Years of experience	0.06	0.07	0.412	0.05	0.14	0.08	0.094	0.23	-0.37	0.12	0.013	0.45
Teacher: Proportion of experience teaching Year 1	-0.13	0.24	0.580	0.02	0.06	0.26	0.827	0.01	0.02	0.35	0.967	<0.01
Control measure: Days since the first class was observed, this testing point	-0.01	0.07	0.941	<0.01	-0.10	0.05	0.058	0.29	-0.08	0.07	0.290	0.10
Control measure: Days since the first class was observed, last testing point					0.14	0.07	0.075	0.26	0.10	0.07	0.161	0.17

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.4 Instructional Skills	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	P	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	7.30	2.10	0.004	0.46	3.89	1.98	0.075	0.26	1.06	1.35	0.449	0.05
Class: Score at last testing point					0.05	0.23	0.849	<0.01	-0.07	0.29	0.813	0.01
Class: Proportion of class female	-3.92	7.05	0.587	0.02	-5.38	5.25	0.328	0.09	-16.29	6.34	0.026	0.38
Teacher: Years of experience	0.05	0.11	0.637	0.02	0.06	0.08	0.478	0.05	-0.08	0.09	0.421	0.06
Teacher: Proportion of experience teaching Year 1	0.05	0.39	0.905	<0.01	0.19	0.27	0.498	0.04	-0.54	0.30	0.104	0.22
Control measure: Days since the first class was observed, this testing point	0.08	0.11	0.467	0.04	-0.05	0.06	0.481	0.05	-0.04	0.06	0.563	0.03
Control measure: Days since the first class was observed, last testing point					0.17	0.08	0.042	0.33	0.09	0.06	0.127	0.20

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.5 Promoting Active Learning and Developing Metacognitive Skills	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	7.31	3.20	0.039	0.27	6.27	3.72	0.120	0.21	0.17	2.41	0.945	<0.01
Class: Score at last testing point					-0.14	0.31	0.666	0.02	0.13	0.26	0.622	0.02
Class: Proportion of class female	-13.67	10.76	0.224	0.10	-14.26	11.82	0.253	0.12	-6.31	11.90	0.607	0.03
Teacher: Years of experience	-0.03	0.16	0.849	<0.01	0.05	0.17	0.761	0.01	-0.24	0.16	0.169	0.17
Teacher: Proportion of experience teaching Year 1	-0.28	0.59	0.642	0.02	-0.32	0.62	0.619	0.02	-0.65	0.53	0.250	0.12
Control measure: Days since the first class was observed, this testing point	0.01	0.17	0.976	<0.01	-0.06	0.12	0.612	0.02	-0.15	0.11	0.192	0.15
Control measure: Days since the first class was observed, last testing point					0.21	0.17	0.231	0.13	0.18	0.10	0.096	0.23

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.6 Classroom Climate	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	8.83	3.77	0.034	0.28	0.84	2.10	0.697	0.01	-0.64	2.21	0.777	0.10
Class: Score at last testing point					0.22	0.13	0.126	0.20	0.33	0.45	0.476	0.05
Class: Proportion of class female	-10.82	12.65	0.407	0.05	-21.04	6.82	0.010	0.46	-24.49	13.32	0.093	0.24
Teacher: Years of experience	0.15	0.19	0.451	0.04	-0.06	0.10	0.586	0.03	-0.29	0.15	0.088	0.24
Teacher: Proportion of experience teaching Year 1	-0.69	0.70	0.340	0.07	-0.16	0.36	0.663	0.02	0.11	0.51	0.829	<0.01
Control measure: Days since the first class was observed, this testing point	0.10	0.20	0.622	0.02	-0.09	0.06	0.164	0.17	-0.13	0.11	0.289	0.10
Control measure: Days since the first class was observed, last testing point					0.01	0.10	0.941	<0.01	0.13	0.09	0.198	0.15

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

9.7 Classroom Management	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	6.60	2.14	0.008	0.40	2.41	5.03	0.641	0.02	-0.86	2.28	0.712	0.01
Class: Score at last testing point					0.08	0.51	0.875	<0.01	0.14	0.22	0.538	0.04
Class: Proportion of class female	-10.10	7.19	0.182	0.12	1.61	14.39	0.913	<0.01	-16.11	11.14	0.176	0.16
Teacher: Years of experience	0.11	0.11	0.352	0.06	0.09	0.20	0.660	0.02	-0.13	0.16	0.428	0.06
Teacher: Proportion of experience teaching Year 1	-0.17	0.40	0.676	0.01	-0.31	0.73	0.680	0.02	0.53	0.53	0.339	0.08
Control measure: Days since the first class was observed, this testing point	<-0.01	0.11	0.980	<0.01	0.02	0.13	0.867	<0.01	-0.11	0.11	0.304	0.10
Control measure: Days since the first class was observed, last testing point					0.15	0.20	0.468	0.05	0.19	0.10	0.087	0.24

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10. Statistical Results: Group differences in Classroom Practice during Year 1: As measured via the Mathematics Enhancing Classroom Observation Recording System (MECORS; Schaffer, Muijs, Reynolds, & Kitson, 1998)

10.1 Uses classroom management techniques	**At school entry:**				**After one term:**				**After two terms:**			
	B	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**	**B**	**SE**	**p**	**ES**
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	5.06	1.89	0.018	0.34	0.12	1.30	0.930	<0.01	-3.66	1.44	0.028	0.37
Class: Score at last testing point					0.55	0.16	0.007	0.50	1.45	0.32	0.001	0.65
Class: Proportion of class female	-10.59	6.36	0.118	0.17	-4.74	4.63	0.328	0.09	2.04	7.51	0.791	0.01
Teacher: Years of experience	<0.01	0.10	0.967	<0.01	0.19	0.06	0.005	0.52	-0.42	0.12	0.004	0.55
Teacher: Proportion of experience teaching Year 1	-0.21	0.35	0.557	0.03	-0.01	0.20	0.945	<0.01	0.37	0.30	0.242	0.12
Control measure: Days since the first class was observed, this testing point	0.07	0.10	0.478	0.04	0.06	0.04	0.172	0.16	-0.06	0.06	0.365	0.08
Control measure: Days since the first class was observed, last testing point					0.03	0.06	0.575	0.03	-0.04	0.06	0.591	0.03

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.2 Maintains appropriate classroom behaviour	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	5.50	1.55	0.003	0.47	-0.64	2.17	0.773	0.01	-1.64	1.65	0.342	0.08
Class: Score at last testing point					1.00	0.34	0.013	0.44	0.40	0.28	0.176	0.16
Class: Proportion of class female	-8.30	5.22	0.134	0.15	11.38	6.14	0.091	0.24	-8.84	8.15	0.301	0.10
Teacher: Years of experience	-0.03	0.08	0.704	0.01	0.01	0.08	0.900	<0.01	-0.15	0.11	0.211	0.14
Teacher: Proportion of experience teaching Year 1	-0.52	0.29	0.090	0.19	0.52	0.37	0.179	0.16	-0.01	0.37	0.983	<0.01
Control measure: Days since the first class was observed, this testing point	0.24	0.08	0.009	0.39	-0.11	0.07	0.141	0.19	-0.10	0.08	0.230	0.13
Control measure: Days since the first class was observed, last testing point					-0.03	0.11	0.817	0.01	0.11	0.07	0.167	0.17

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.3 Focuses on and maintains attention on lesson	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	P	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	7.85	2.63	0.010	0.39	1.17	2.31	0.622	0.02	-0.83	2.64	0.758	0.01
Class: Score at last testing point					0.15	0.19	0.439	0.06	0.68	0.50	0.200	0.14
Class: Proportion of class female	1.99	8.81	0.825	<0.01	0.13	6.82	0.985	<0.01	-19.53	12.35	0.142	0.19
Teacher: Years of experience	0.06	0.13	0.643	0.02	0.09	0.10	0.382	0.07	-0.30	0.19	0.141	0.19
Teacher: Proportion of experience teaching Year 1	-0.15	0.49	0.760	0.01	-0.23	0.34	0.518	0.04	0.51	0.59	0.410	0.06
Control measure: Days since the first class was observed, this testing point	0.12	0.14	0.396	0.05	-0.19	0.06	0.011	0.46	-0.09	0.12	0.447	0.05
Control measure: Days since the first class was observed, last testing point					0.05	0.10	0.609	0.03	0.13	0.14	0.380	0.07

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.4 Provides pupils with review and practice	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	P	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	5.90	2.24	0.019	0.33	-0.10	3.32	0.977	<0.01	-0.64	1.96	0.752	0.01
Class: Score at last testing point					0.58	0.36	0.131	0.20	0.28	0.23	0.245	0.12
Class: Proportion of class female	-8.21	7.51	0.292	0.08	-1.90	10.41	0.858	<0.01	-15.29	9.63	0.141	0.19
Teacher: Years of experience	-0.05	0.11	0.675	0.01	-0.03	0.15	0.836	<0.01	-0.35	0.14	0.029	0.36
Teacher: Proportion of experience teaching Year 1	-0.70	0.41	0.115	0.17	0.16	0.60	0.797	0.01	0.28	0.45	0.550	0.03
Control measure: Days since the first class was observed, this testing point	0.29	0.12	0.024	0.31	-0.15	0.10	0.159	0.17	-0.13	0.09	0.187	0.15
Control measure: Days since the first class was observed, last testing point					0.03	0.18	0.888	<0.01	0.02	0.09	0.805	0.01

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.5 Demonstrates skills in questioning	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	15.79	3.36	<0.001	0.61	-1.24	6.58	0.854	<0.01	1.57	5.30	0.773	0.01
Class: Score at last testing point					0.47	0.36	0.215	0.14	-0.07	0.51	0.899	<0.01
Class: Proportion of class female	-16.05	11.25	0.176	0.13	-5.92	14.14	0.684	0.02	-36.89	25.55	0.177	0.16
Teacher: Years of experience	0.11	0.17	0.547	0.03	-0.05	0.20	0.806	0.01	-0.69	0.37	0.091	0.24
Teacher: Proportion of experience teaching Year 1	-1.26	0.62	0.061	0.23	0.24	0.89	0.797	0.01	-0.28	1.21	0.823	0.0
Control measure: Days since the first class was observed, this testing point	0.42	0.17	0.031	0.29	-0.27	0.13	0.069	0.27	-0.35	0.26	0.219	0.13
Control measure: Days since the first class was observed, last testing point					-0.02	0.26	0.931	<0.01	0.07	0.24	0.776	0.01

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.6 Demonstrates MEP strategies	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	2.77	1.22	0.040	0.27	-1.49	2.21	0.514	0.04	-1.25	1.66	0.467	0.05
Class: Score at last testing point					0.61	0.45	0.209	0.14	0.10	0.36	0.790	0.01
Class: Proportion of class female	-1.89	4.11	0.652	0.02	0.81	7.18	0.913	<0.01	-6.67	7.92	0.418	0.06
Teacher: Years of experience	-0.01	0.06	0.930	<0.01	0.08	0.10	0.471	0.05	-0.21	0.11	0.086	0.25
Teacher: Proportion of experience teaching Year 1	-0.31	0.23	0.197	0.12	0.19	0.40	0.654	0.02	0.61	0.36	0.117	0.21
Control measure: Days since the first class was observed, this testing point	0.15	0.06	0.031	0.29	-0.18	0.07	0.028	0.37	-0.13	0.09	0.194	0.15
Control measure: Days since the first class was observed, last testing point					-0.06	0.12	0.662	0.02	-0.04	0.08	0.573	0.03

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.7 Demonstrates a variety of teaching methods	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	1.33	1.35	0.341	0.07	1.04	0.91	0.278	0.11	0.68	0.88	0.455	0.05
Class: Score at last testing point					0.31	0.19	0.138	0.19	-0.14	0.28	0.624	0.02
Class: Proportion of class female	-7.15	4.54	0.137	0.15	4.36	0.344	0.231	0.13	-4.39	3.67	0.257	0.12
Teacher: Years of experience	-0.06	0.07	0.412	0.05	0.12	0.05	0.026	0.37	0.08	0.06	0.252	0.12
Teacher: Proportion of experience teaching Year 1	0.19	0.25	0.470	0.04	-0.31	0.17	0.087	0.24	-0.02	0.19	0.933	<0.01
Control measure: Days since the first class was observed, this testing point	0.06	0.07	0.410	0.05	-0.02	0.03	0.567	0.03	0.05	0.03	0.176	0.16
Control measure: Days since the first class was observed, last testing point					-0.04	0.05	0.456	0.05	0.06	0.03	0.096	0.23

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)

10.8 Establishes a positive classroom climate	At school entry:				After one term:				After two terms:			
	B	SE	p	ES	B	SE	p	ES	B	SE	p	ES
Experimental Group: Teacher started using *Inspire Maths* in September? (vs. January)	5.64	3.16	0.096	0.19	-0.32	1.40	0.823	0.01	-0.42	2.04	0.841	<0.01
Class: Score at last testing point					0.26	0.12	0.052	0.30	0.64	0.43	0.164	0.17
Class: Proportion of class female	-17.95	10.62	0.113	0.17	-1.22	4.93	0.809	0.01	-18.18	8.72	0.061	0.28
Teacher: Years of experience	-0.16	0.16	0.333	0.07	-0.08	0.07	0.278	0.11	-0.22	0.15	0.149	0.18
Teacher: Proportion of experience teaching Year 1	-0.45	0.58	0.459	0.04	-0.31	0.25	0.244	0.12	0.33	0.44	0.476	0.05
Control measure: Days since the first class was observed, this testing point	0.33	0.16	0.067	0.22	0.03	0.05	0.496	0.0	-0.03	0.10	0.746	0.01
Control measure: Days since the first class was observed, last testing point					0.10	0.08	0.243	0.12	0.06	0.09	0.531	0.04

Notes: B: Unstandardised regression estimate; SE: Standard Error; p: probability that the difference or association is due to chance alone; ES: Effect Size (proportion of variance explained by this measure [partial eta squared; η_p^2]); Shading denotes those statistical differences and associations that were "large" in effect size ("large" meaning a η_p^2 Effect Size ≥ 0.14; Cohen, 1988)