Evaluation of *Renaissance Learning* mathematics and reading programs in UK Specialist and feeder schools

Final Report 2006

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Executive summary

Introduction and methods

This summary presents the key findings from an independent evaluation, carried out in the school year 2005-6 by the National Foundation for Educational Research (NFER), of the implementation of Renaissance Learning mathematics and reading programs in selected Specialist and feeder schools in London. The research was conducted within a quasi-experimental framework which involved matching schools implementing the programmes ('treatment' schools) with similar schools where the program was *not* being implemented ('comparison' schools). In order to evaluate the impact of the programs the following three-fold methodology was used:

- standardised tests administered in two sweeps
- questionnaire surveys to assess pupils attitudes and motivation, also in two sweeps
- face-to-face interviews with teachers responsible for implementing the programs.

Trends in pupil attainment

Standardised tests were carried out at two points, one early on in the school year (November 2005) and another later in the year (June-July 2006). This pre-test post-test approach allowed comparisons over time (approximately an eight-month period) and across program and non-program schools. It should be stressed that, although the test data can be seen as being indicative of the general progress made (or not made) by the pupils, it may not be possible to attribute causality to the Renaissance programs. Sufficient test papers for analysis were returned from 21 schools: 14 treatment and seven comparison schools. The main findings regarding average standardised test scores can be summarised as follows:

- **Mathematics in primary schools**: average standardised test scores for mathematics *improved* in two out of four treatment schools; in the three comparison schools, one saw a decline in average score and two saw improvements.
- **Mathematics in secondary schools**: two treatment secondary schools returned their tests, in both cases the average standardised score *improved* from sweep 1 to sweep 2. One comparison secondary school returned their mathematics tests: the average standardised score in this school also *improved*, but not to the extent that was evident in the treatment schools.
- **Reading in primary schools**: average standardised test scores for reading improved in five out of six treatment schools; in the two comparison schools, one saw a decline in average score and one saw an improvement.

- **Reading in secondary schools**: two treatment secondary schools returned their tests, in both cases the average standardised score *declined* from sweep 1 to sweep 2. One comparison secondary school returned their reading tests: the average standardised score in this school also *declined*.

Based upon the average standardised scores, the key finding regarding pupil attainment was that the most significant improvements occurred in **primary reading** and **secondary mathematics** schools. In primary mathematics and secondary reading schools, the findings are less conclusive, though there are many reasons, unconnected with the use or non-use of the Renaissance programs, as to why this might be so. In addition to these broad trends, there are some individual schools which achieved notable successes in a short space of time: these successes are discussed in more detail in the full report.

Survey findings: progress over time

The Renaissance programs, through the use of regular built-in assessment and testing, enable pupils and teachers to see what progress is being made in attainment. The programs are also designed to meet individual learning requirements and to encourage and motivate pupils in reading and mathematics. For this reason, questionnaire surveys were issued to the same groups of pupils taking the standardised tests.

The information collected from the surveys of pupils enabled the research team to identify any changes in attitudes, confidence or motivation in pupils in treatment schools over the academic year (the same questionnaire was completed twice), and also to compare the attitudes of pupils in program schools with those of pupils in non-program schools. Selected key findings from the surveys are presented below (complete figures for responses to individual questions are provided in the full report). All tables are based on sweep 1 and sweep 2 findings from pupils in **treatment schools** only.

Mathematics in primary schools

- Overall, there was little change in Year 4/5 pupils' perceptions over time as to how well they did in mathematics, although there was a more positive view of their own ability in relation to others (12 per cent of pupils in sweep 1 saying that 'Maths is harder for me than for any of my classmates', going down to nine per cent) and more pupils disagreeing that they were *not* good at mathematics (51 per cent increased to 55 per cent).
- Year 4/5 survey respondents expressed mixed feelings about their levels of enjoyment of recent mathematics lessons, with fewer pupils finding them 'very enjoyable' (58 per cent decreased to 51 per cent), but more finding them 'quite enjoyable' (32 per cent increased to 38 per cent).
- There were positive developments in attitudes to progress in mathematics, with more respondents believing that they had made a great deal of progress by the time of the sweep 2 survey (41 per cent increased to 48 per cent) and a fall in the percentage believing they had made 'no progress' (nine per cent decreased to five per cent).

Mathematics in secondary schools

Secondary school pupils (Year 7) were asked to complete questionnaires on their attitudes to mathematics at the same time as the primary schools, but it should be noted that the response rate of those who completed both sweep 1 and sweep 2 was much lower, with a total of 38 Year 7 pupils returning questionnaires.

- The responses across time were broadly positive, with a particular increase in pupils who agreed 'a lot' that they did well in mathematics (from 50 per cent to 61 per cent). Year 7 pupils' responses to the question of whether they enjoyed learning mathematics were more cautious: 47 per cent said that they enjoyed mathematics 'a lot' in sweep 1, but this decreased to 34 per cent in sweep 2.
- There was little change in Year 7 pupils' views of enjoyment of lessons, with the great majority (82 per cent) still finding mathematics 'quite' or 'very' enjoyable.
- There was a marked increase in the percentage of secondary pupils who thought they had made 'a great deal of progress' in mathematics over the course of the year (from 42 per cent to 63 per cent). The improved test scores for secondary Accelerated Maths schools reported above would support this perception of good progress made.

Reading in primary schools

- Attitudes to reading, in both sweeps of the survey, were positive, with the majority of Year 4 and 5 pupils agreeing that they enjoyed reading (around three-quarters) and did not find it difficult (around four-fifths). However, there was a downward trend between the two surveys in the percentages that agreed that they liked reading stories (from 76 to 70 per cent) and generally enjoyed reading (from 70 to 64 per cent).
- Whilst the percentage of pupils claiming to read every day decreased (from 30 to 22 per cent), there was an increase in those who said that they read most days (44 to 48 per cent) and no change in those who said that they did not often read at home.
- The proportion of pupils who found reading 'very enjoyable' decreased from 49 to 44 per cent, though this is counterbalanced by the fact that the proportion reporting reading 'quite enjoyable' increased by the same margin.
- Year 4/5 pupils' views on progress in reading were positive, with an increase in those saying that they had made 'a great deal' of progress (from 46 per cent to 52 per cent).

Reading in secondary schools

In general Year 7 pupils' attitudes towards reading seem to have become less positive over the course of the school year. For example, by sweep 2 of the questionnaire survey, Year 7 pupils:

- were less likely to like reading stories (74 per cent down to 65 per cent)

- still had the same likelihood of reading at home every day (17 per cent for both sweeps)
- were less likely to find reading 'very' or 'quite' enjoyable (85 per cent down to 73 per cent)
- less likely to report having made a great deal of progress (down from 43 per cent to 34 per cent).

It needs to be stressed, however, that the Year 7 pupils were still generally positive about reading: it was just that their enthusiasm appeared to have declined over this period. It may be that some of the 'novelty effect' of reading, and of being regularly tested on their comprehension of this reading, had worn off by the later part of the school year.

Survey findings: treatment and comparison schools

The information collected from the surveys of pupils also enabled the research team to compare pupils' attitudes, confidence and motivation across program and non-program schools. In other words, the sweep 2 survey responses help us to answer the question: 'Were pupils in the Renaissance schools better motivated towards mathematics and reading than those in schools where the programs were not being used?'

Mathematics in primary schools

On the whole, as at June 2006, Year 4 and 5 pupils in the program schools had more positive views of mathematics than pupils in comparable schools where the program was not being used.

- Whilst pupils using Accelerated Maths were slightly less confident about doing well in mathematics (44 per cent agreed 'a lot' that that they usually did well, compared to 52 per cent in comparison schools), for most other attitude items, a considerably greater proportion of pupils in treatment schools agreed 'a lot' with a positive statement than in comparison schools. For example:
  - Ø 54 per cent of Renaissance pupils would like to do more mathematics at school, compared to 39 per cent in non-program schools
  - Ø 65 per cent of Renaissance pupils enjoyed learning mathematics, compared with 56 per cent of pupils in non-program schools
  - Ø 62 per cent of Renaissance pupils said that the work that they did in mathematics was interesting, compared to 49 per cent in non-program schools.
- Over half of pupils using the Renaissance program found mathematics 'very enjoyable' compared with 45 per cent of non-program pupils.
- However, a larger proportion of comparison pupils felt that that they had made 'a great deal of progress' in mathematics (52 per cent of pupils in comparison schools and 46 per cent in treatment schools, though the figures are very evenly matched if the pupils indicating 'some progress' are also included (40 and 43 per cent respectively).

Mathematics in secondary schools

- Year 7 pupils in program schools had a lower perception with regard to 'doing well' in mathematics (35 per cent agreed 'a lot' that they 'usually do well in maths') than the same age group in comparison schools (where 64 per cent agreed 'a lot').
- In terms of perceived enjoyment of mathematics lessons, there was something of a polarisation of program pupils, with higher proportions finding mathematics 'very enjoyable' (26 per cent compared to 20 per cent) and 'not very enjoyable' (23 per cent compared to 14 per cent) compared with non-program pupils.
- The survey also revealed that pupils in program schools had a much lower likelihood of expressing a view that they had made 'a great deal of progress' in mathematics (39 per cent compared to 64 per cent). It should be noted, however, that all survey respondents in all schools reported making at least 'a little' progress.

Reading in primary schools

There is some evidence to suggest that Year 4/5 pupils in Accelerated Reader schools had more positive attitudes to reading than their peers in non-program schools. For example:

- were more likely to say that they liked 'reading stories' (73 per cent compared to 63 per cent), and that they enjoyed reading (69 per cent compared with 53 per cent).
- Year 4/5 pupils in Accelerated Reader schools were more likely to read every day than their peers in non-program schools, though the figures are very similar when pupils who read 'most days' are also considered.
- Likewise, although more pupils in program schools found reading lessons 'very enjoyable', the figures for treatment and comparison schools are very similar when the 'very' and 'quite' enjoyable categories are combined.
- Pupils in Accelerated Reader primary schools were slightly more likely to report 'a great deal of progress' in reading than those in non-program schools (53 per cent compared to 48 per cent).

Reading in secondary schools

There is also evidence that Year 7 pupils in Accelerated Reader schools had more positive attitudes to reading than their peers in non-program schools. For example:

- Pupils in program schools were more likely to say that they liked 'reading stories' (72 per cent compared to 46 per cent), and that they enjoyed reading (64 per cent compared with 46 per cent) (Table 26).
- As was the case with primary school participants, Year 7 pupils in Accelerated Reader schools were considerably more likely to read every day than Year 7 pupils in non-program schools (19 per cent compared to

three per cent), though the figures are very similar when pupils who read 'most days' are also considered.

- Year 7 pupils using the Renaissance program were much more likely to enjoy reading (79 per cent indicating that reading was 'very' or 'quite' enjoyable, compared with 56 per cent in non-program schools), and the former group were also more likely to express the opinion that they had made 'a great deal of progress' with their reading (38 per cent compared with 28 per cent).

Interview data: teacher perspectives

In order to collect complementary qualitative data, the research team visited four case-study schools (primary mathematics, primary reading, secondary mathematics, secondary reading) and interviewed two teachers involved with the programs in each school (in one school, only one teacher was involved with using the program, so a total of seven teachers were interviewed).

In all the schools the staff interviewed had a positive attitude about using the Renaissance Learning programs. In the primary school using the mathematics program, there was seen to be a particular advantage in 'the fact that the computer does the marking, which frees teachers to deal with pupils who are having difficulties'. The point about the appeal of using computers and the 'instant feedback' they gave was repeated in all the schools and was reflected in this view: 'The students like it because they get feedback, they get reports and it makes them independent'.

The two schools using the mathematics program agreed that it was a useful addition to the strategies they already used, for, as one teacher explained: 'It does not replace the teaching, but enables teachers to pinpoint who needs help and on what topic'. The secondary reading school was particularly positive about the program's contribution to personalised learning and its effectiveness in helping a situation where there was a huge variation in reading ages at the beginning of Year 7. Pupils could work on the program in their own time and many did, because 'it has motivation built into it with the points system' and this was reinforced with their own school awards.

In two of the schools (one primary mathematics and one secondary reading), staff felt that using the Renaissance Learning program had strengthened links with parents. In the primary school, the program had helped to involve parents more closely with their children's work:

> *The marked tests go home and so parents get to see how their children are doing and they are given directions to help the children with their work. Parents do come in and talk about their children's progress and what they are doing.*

In one of the secondary schools, the use of the reading program was reported as having made an important contribution to the school's family learning programme: 'the parents now understand why their children bring books home and they can support them'.

Staff in all four schools said that they had been faced with technological problems when they first started using the Renaissance Learning programs. This was the only type of negative comment made about using the programs. Issues such as 'constant crashing', 'the printer not working', an unreliable pass word system and 'some answers were correct, but the software flagged them up as wrong', had caused irritation. This situation had improved considerably after a time, so that all the schools agreed that: 'It is better now as I have a telephone link with Renaissance Learning. They are helpful in that way'.

The extent of the staff training necessary to run the programs was referred to by all the school interviewees, as was the need for a 'fair bit of commitment from one or two teachers to start with, in order to get really familiar with it'. If a school had high staff turnover, as one in particular did, this could cause problems.

All the interviewees agreed that one of the most significant strengths of the Renaissance Learning programs was that they motivated pupils. Pupils on both the Mathematics and Reading programs responded well to being in charge of their own rate of progress and seeing that progress confirmed. From the teachers' point of view too, one of the main advantages was the personalised learning aspect of the programs, which in the words of one interviewee, 'addresses the difficult issue of differentiating teaching and learning in very widely mixed ability classes'.

From a practical point of view, the way the programs worked was seen in all the schools as aiding monitoring and target setting and therefore also reporting. In the primary mathematics school, it was pointed out that they 'can print out the diagnostic tests so the teacher can see very clearly in which areas they are not getting on and need extra support'. It also meant that 'the marked tests and scores go home with the children at the end of every week'. Similarly, in the secondary reading school, the interviewee explained that the program helped the school to 'use support and intervention more effectively', and that 'the monitoring and intervention are real strengths'.

As a final question, the interviewees were asked if they would recommend the use of the Renaissance Learning program to colleagues in their own and other schools and *all* said that they would.

1. Introduction

1.1 Background

Renaissance Learning programs are designed to help improve pupils' reading, mathematics and writing skills. With the aid of computer software, teachers are able to devise personalised learning programmes for pupils that allow them to develop at a pace suitable for the individual. The programs are also thought to be helpful for professional development in that they can improve teachers' instructional practices and assist with assessment and diagnosis.

The Renaissance programs have been widely used in the United States and, in the academic year 2004-5, the reading and mathematics programs were piloted in a small number of Specialist Schools (and their feeder schools) in London. In the pilot year, the Reading programme was implemented in three Specialist Schools (and seven feeder schools) and the mathematics programme was implemented in two Specialist Schools (and four feeder schools). The phased introduction of these programmes continued in 2005-6, in both Specialist secondary schools and primary feeder schools, and was overseen by the Specialist School and Academies Trust's Regional Coordinator for London and the South-East.

It was in this context that Renaissance Learning commissioned the National Foundation for Educational Research (NFER) to carry out a rigorous, independent evaluation of the implementation of these programs in 2005-6. This report presents the findings from this evaluation, including:

- analysis of pupils' **progress over time** (over the academic year 2005-6) based on the use of 'before and after' reading and mathematic tests in the schools using the programs
- **comparative analysis** of pupil progress and attitudes in: (i) schools using the Renaissance programs ('treatment' schools); and (ii) schools *not* using these programs ('comparison' schools).

Renaissance Learning recommends a set of teaching techniques that use the Accelerated Reader program (www.renlearn.com). The Accelerated Reader is based on the principal that practice improves reading skills. Pupils read books

based on their instructional reading level, and then complete an Accelerated Reader quiz on the computer that matches the book. All the books used are in line with the requirements of the national curriculum for English at the relevant key stages. The Accelerated Reader provides teachers with information to be able to monitor and guide each pupil's reading practice and develop a learning program suitable to the personal needs of the pupil. This has been shown to improve students' reading achievement and reading attitudes.[1]

Accelerated Maths follows a similar strategy, using a combination of computer software and teaching methods recommended by Renaissance Learning to assess pupils' skills and competencies. The strategy is thought to help teachers develop assignments for students that are pitched at the appropriate level and that allow pupils to develop at their own pace. In this respect the strategies fit with current moves towards 'personalised' and 'blended' learning, and the increasing use of e-assessment.

Some initial evaluation work was completed between November 2004 and January 2005. This involved participating schools completing a round of tests and student questionnaires. These provided useful information, but the evaluation was not progressed into the second half of the academic year because it became apparent that, in the pilot stages, there was much variation in implementation, depending upon curriculum requirements, staff availability and logistical circumstances (for example, some schools were awaiting the installation of broadband technology). For these reasons, Renaissance Learning and the NFER agreed that the full one-year evaluation should not take place until the second year of implementation of the Renaissance Programs. The main aims of the evaluation are outlined in the next section.

1.2 Aims

The central aim of the study was: to evaluate the effectiveness of *Accelerated Reader* and *Accelerated Maths* in selected Specialist and feeder schools in London. 'Effectiveness' is defined, based on an initial research specification put together by Renaissance Learning, as: 'accelerating students' acquisition

1 Holmes, T. and Brown, C. (2003). *A Controlled Evaluation of a Total School Improvement Process, School Renaissance.* Paper presented at the National Renaissance Conference, Nashville, TN, February 7, 2003.

of reading and maths skills, improving their motivation to read and perform maths tasks, and improving the teachers' instructional practices'.

Relating to this broad aim, there were a number of more specific research questions. The evaluation sought to:

- examine the differences in performance in standardised reading and mathematics tests between pupils participating in Renaissance Programs and those who were not
- assess, as far as possible, within the methodological approaches selected, the extent to which any gains in pupil performance could be attributed to Renaissance program implementation
- to examine pupil perceptions and experiences of the Renaissance Programs, along with their views on how these programs compare with other forms of learning reading and mathematics.

The next section of this report sets out details of the methodological approaches that were used to address these project aims.

1.3 Methodology

The research was conducted within a quasi-experimental framework, as required by the research specification. This involved matching Specialist and feeder schools implementing the programs ('treatment' schools) with similar schools where the program was not being implemented (referred to as 'comparison' schools).

Samples of schools, classrooms and students

In all, 21 schools assisted with the research: 14 of these were schools using the Renaissance Programs and seven were schools not using the programs, but which were similar to the treatment schools in other respects. All of the schools using the programs were using ***either*** the Mathematics programme ***or*** the Reading program. Further details of the sample schools are provided in Table 1.1 below.

Table 1.1 Treatment and comparison school samples

	Treatment Schools Using a Renaissance Program		Comparison Schools Not using a Renaissance Program	
Mathematics	2 Specialist Schools	4 feeder schools	1 Specialist School	3 feeder schools
	112 pupils	220 pupils	37 pupils	133 pupils
Reading	2 Specialist Schools	6 feeder schools	1 Specialist School	2 feeder schools
	101 pupils	225 pupils	66 pupils	41 pupils

Total number of schools in sample	**21**
Total number of pupils in sample (based on Sweep 1 test returns)	**935**

The sample of **treatment schools** was determined by school participation in the Renaissance programs, based upon information supplied by Renaissance Learning. The selection of **comparison schools** was based upon details of school characteristics obtained from the NFER's National Register of Schools Database. This enabled the research team to match schools with broadly similar characteristics, including proportions of pupils eligible for free school meals (FSM), which can be seen as a proxy indicator of the socio-economic circumstance of a school.

Information provided by Renaissance Learning indicated that the Renaissance programmes were, in most cases, being delivered to at least two classes of pupils in each school. The target **classroom sample** therefore consisted of two participating classes from each treatment and comparison school. In some cases, however, the program was being piloted with just one class in the year group.

Within this sampling framework, the evaluation had two main methodological elements: (1) standardised testing; and (2) pupil surveys. Details of the tests used are provided in Chapter 2 and the pupil surveys are included as Appendix 2. The tests and surveys were completed twice by the same groups of pupils, firstly in November 2005 and secondly, towards the end of the school year, in June 2006. Face-to-face interviews were also conducted with teachers in four of the schools using the Renaissance programs (see below).

Student questionnaire surveys

In addition to obtaining student attainment data, the research team also made an assessment of pupil experiences of using the Renaissance programs, or other forms of mathematics/literacy learning, both in the treatment and the comparison schools. This was done through the use of pupil attitudinal questionnaire surveys which were conducted, in Years 4/5 and 7, at two points in time. Most of the individual questions used in these surveys had featured in previous NFER evaluations relating to numeracy and literacy so, to an extent, their reliability had already been established.

This approach enabled comparisons to be made of pupils' attitudes and perceptions both across time and across program and non-program schools. Since the survey sample was the same as the test sample, it was possible to examine the survey findings alongside the performance data for the pupils. The scale of the project did not allow for the use of individual matched pupil data, but the survey and test approach meant that attitudes and motivational factors could be captured, as well as any changes in attainment in reading and mathematics.

Teacher interviews

The evaluation also included consideration of teacher satisfaction and experiences with the programs. To obtain this information the research team conducted semi-structured interviews with a sample of teachers in the treatment schools. The rationale behind this was as follows:

- the numbers of teachers involved (even if comparison schools were included) would have been relatively small – certainly not large enough for a questionnaire survey to produce meaningful statistical analyses
- teachers in the comparison schools, whilst being able to comment on their mathematics and literacy teaching, would not have been able to have said anything about the Renaissance programs
- teachers in the treatment schools *were* able to comment on both their experiences of the Renaissance programs, and their experiences of other frameworks/schemes for reading and mathematics (which they would have used prior to the implementation of the Renaissance programs).

The aim was to interview two teachers involved in implementing the programs in each of four schools, giving a total of eight teacher interviewees.[2] The interview data provided useful additional qualitative/perceptual information to complement the quantitative data collected via the tests and pupil questionnaire surveys.

1.4 Report structure

The following chapter examines trends in attainment, in both primary and secondary schools, based upon the two sets of test returns, over the duration of the evaluation. In the next part of the report, **Chapters 3 and 4** present the findings from the pupil questionnaire survey, reporting on attitudinal and motivational changes relating to mathematics and reading, respectively. **Chapter 5** presents the findings from the interviews with teachers. Finally, **Chapter 6** pulls the data together and summarises the main findings from the evaluation, including the key issues and benefits arising from use of the programs. This chapter also offers a number of recommendations relating to the possible future development of the programs. Copies of the surveys and interview schedule used are included as appendices to the report.

[2] In practice, only one teacher was available in one of the schools, so a total of seven teachers were interviewed.

2. Pupil attainment

2.1 The standardised tests

In order to make an assessment of progression in pupil performance, standardised tests were carried out at two points in the school year, one early on (by November 2005, sweep 1) and another later on in the year (June 2006, sweep 2). These were carried out with Year 4 or 5 (depending on the target group in the primary schools and Year 7 pupils in both 'treatment' and comparison schools. The pre-test post-test approach allowed comparisons over time (approximately an eight-month period) and across program and non-program schools.

It should be stressed that, where there are any differences in pupil performance over time or across participating and non-participating schools, it may not be possible to attribute causality to the Renaissance Programs. The reasons for this include the following:

- Firstly, although the **sample sizes** as a whole are relatively large - sufficient test papers for analysis were returned from 21 schools and 935 pupils were tested in sweep 1 and 894 in sweep 2 – the sub-samples are smaller, especially for the comparison groups, and caution needs to be exercised when these are used.
- Secondly, the **time period** for the evaluation, consisting of approximately eight months between the tests, was relatively short.[3] This means that any improvements in attainment are likely to be limited, because there has only been a relatively short period of time for the programs to have an impact. In addition, the research literature in the areas of pupil self-efficacy and motivation show that it can take some considerable time for improvements in these areas to become manifest.[4]
- Thirdly, the quasi-experimental approach applied to schools cannot overcome the effects of **multiple variables**. In other words, although the use of comparison schools enabled a degree of 'control' of certain influential factors, there were many others factors that could have affected pupil attainment other than the use (or non-use) of the Renaissance Programs. These could have included the effects of individual teachers,

[3] In addition there were school holidays in this period, so the amount of time that teachers and pupils actually had to implement the Renaissance Programs was somewhat less than six months.

[4] See, for example: Husman, J., Brem, S. and Duggan, M.A. (2005). 'Student goal orientation and formative assessment', Academic Exchange Quarterly, 9, 3, 355-359.

changes in staff, and the impact of other initiatives to do with reading and mathematics.

- Finally, it is worth emphasising that it was not possible for this research to take full account of variations in the **levels of implementation** of the Renaissance programs. The implementation and monitoring of the programs are very much teacher-centred, meaning that the teacher has the defining influence in how the programs are used in his/her classroom. Implementation levels vary and therefore pupils in treatment schools will have had different levels of experience of the Renaissance programs.

The point about varying implementation levels has been emphasised in previous studies of the use of the Renaissance programs. Over the past twenty years Renaissance Learning has identified the "best classroom practices" for these programs and has used these as a basis for making recommendations about the use of the programs.[5] The training of teachers is based upon these practices and recommendations and has been developed and modified on the basis of analyses of pupil performance data and a number of evaluations. The findings from previous evaluations provide evidence that, when schools implement the Accelerated Reader or Accelerated Mathematics programs according to these recommendations, they tend to experience better than average pupil attainment gains. Topping, for example, in a study of the use of the Accelerated Reader program in a very similar sample of schools to the one used here, concluded that the impact of the program was 'remarkably successful' and, furthermore, 'had the schools implemented Accelerated Reader stringently, the outcomes would have been even better'.[6]

Despite these qualifying comments, it needs to be stressed that the use of a combination of test data, survey data, and teacher perspectives has made the evaluation stronger and allowed for the triangulation of findings and data sources. The test data can be seen as being **indicative of the general progress made** (or not made) by the pupils and provide a useful overall picture of attainment trends for this school year. In addition, the use of standardised tests means that any improvements in attainment identified have occurred over and above what would be expected given the expected age-related progress of the pupil samples.

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5 Details of Renaissance Learning's best practice recommendations and figures on implementation levels for individual schools are presented in Tables 2.2 and 2.5.

6 Topping, K. (2006). Accelerated Reader in Specialist Schools. Unpublished report.

The tests were 'off the shelf' tests which are widely used for measuring the reading/mathematics skills of pupils in these year groups. The tests were purchased from NFER-Nelson and were teacher administered, but NFER-Nelson and the NFER handled the scoring of the assessments, using experienced markers. The mathematics tests were from the new NFER-Nelson Progress in Mathematics 4-14 series. These were different tests for each age group (Years 4/5 and 7) and for each time of the year. A sentence completion test, the Suffolk Reading Scale, Second Edition, was used as the reading test. This is a comprehensive and flexible measure of pupils' reading ability and is one of the most commonly-used reading tests in the UK.

2.2 Pupil attainment in mathematics

Table 2.1 below summarises trends in pupil attainment in mathematics, based on standardised test scores, on a school-by-school basis. Schools A to F[7] are the treatment schools, where the Accelerated Maths program has been in use. Schools G-J are the non-program, comparison schools. The main findings from this table can be summarised as follows:

- primary schools: average standardised test scores for mathematics improved in two out of four treatment schools; in the three comparison schools, one saw a decline in average score and two saw improvements
- secondary schools: two treatment secondary schools returned their tests, in both cases the average standardised score improved from sweep 1 to sweep 2. The improvements were considerable, over eight points in each case. One comparison secondary school returned their mathematics tests: the average standardised score in this school also improved, but not to the extent that was evident in the treatment schools.

As noted in the previous section, it is important to bear in mind that the degree to which Accelerated Maths has been implemented in the treatment schools will vary. Information about the quantity and quality of implementation is collected by Renaissance Learning, and indicators of these are provided in Table 2.2, which needs to be considered alongside Table 2.1. Current best practice implementation recommendations for *Accelerated Maths* are that: (i) pupils should work to master two to four objectives per week, depending on their year group; and (ii) they should average above 85 per cent on their tests.

7 Schools agreed to complete the tests and the surveys on the basis of confidentiality and anonymity.

Table 2.1 Attainment in mathematics: individual schools

Mathematics	Sweep	Year	Pupils	Total	Average	Change
School A	Sweep 1	Yr 7	55	4706	85.56	
Maths Treatment	Sweep 2	Yr 7	58	5459	94.12	8.56
School B	Sweep 1	Yr 7	57	5542	97.23	
Maths Treatment	Sweep 2	Yr 7	28	2951	105.39	8.16
School C	Sweep 1	Yr 4	58	5674	97.83	
Maths Treatment	Sweep 2	Yr 4	58	5703	98.33	0.50
School D	Sweep 1	Yr 4	52	4882	93.88	
Maths Treatment	Sweep 2	Yr 4	39	3561	91.33	-2.55
School E	Sweep 1	Yr 5	58	5666	97.69	
Maths Treatment	Sweep 2	Yr 5	56	5455	97.41	-0.28
School F	Sweep 1	Yr 5	52	4939	94.98	
Maths Treatment	Sweep 2	Yr 5	56	5667	101.20	6.22
School G	Sweep 1	Yr 7	37	3836	98.36	
Maths Comparison	Sweep 2	Yr 7	44	4525	102.84	4.48
School H	Sweep 1	Yr 4	26	2579	99.19	
Maths Comparison	Sweep 2	Yr 4	24	2000	83.33	-15.86
School I	Sweep 1	Yr 5	54	5428	100.52	
Maths Comparison	Sweep 2	Yr 5	58	6077	104.78	4.26
School J	Sweep 1	Yr 5	53	5225	98.58	
Maths Comparison	Sweep 2	Yr 5	57	5668	99.44	0.86

Table 2.2 Implementation data for Accelerated Maths: individual schools

Mathematics	Year	No. of pupils [8]	Implementation (Quantity)	No. of pupils	Implementation (Quality)
School A	Yr 7	65	34.9	149	82 %
School B	Yr 7	60	4.6	60	77 %
School C	Yr 4	125	24.1	241	85 %
School D	Yr 4	85	0	85	---
School E	Yr 5	60	39.6	60	86 %
School F	Yr 5	58	2.1	58	84 %

Implementation quantity: this figure is the average number of objectives achieved by pupils

Implementation quality: this figure is the average percentage of correct answers for total tests

Source: Implementation data provided by Renaissance Learning

[8] Schools A-F correspond with schools A-F in Table 2.1. The number of pupils varies because Renaissance Learning collected information for all pupils involved, whereas the NFER tests were taken by one or two classes of pupils in each school.

Table 2.3 below provides an aggregated analysis of mathematics test scores for treatment and comparison schools. It can be seen that, taking all the schools using Accelerated Maths, the average standardised pupil score (N=332 in sweep 1) increased by three points from 94.61 to 97.61; in the comparison schools (not using the program) the average standardised pupil score (N=170) decreased from 100.40 to 99.84.

Table 2.3 Attainment in mathematics: treatment and comparison schools

Accelerated Maths	**Sweep 1**		**Sweep 2**	
	Pupils	**Average**	**Pupils**	**Average**
Treatment primary schools - maths	220	96.19	209	97.54
Treatment secondary schools - maths	112	91.50	86	97.79
Comparison primary schools - maths	133	99.49	139	98.88
Comparison secondary schools - maths	37	103.68	44	102.84
All treatment schools - maths	332	94.61	295	97.61
All comparison schools - maths	170	100.40	183	99.84

2.3 Pupil attainment in reading

Table 2.4 below summarises trends in pupil attainment in reading, based on standardised test scores, on a school-by-school basis. Schools K to R are the treatment schools, where the Accelerated Reading program has been in use. Schools S-U are the non-program, comparison schools. The main findings from this table can be summarised as follows:

- **primary schools**: average standardised test scores for reading improved in five out of six treatment schools; in the two comparison schools, one saw a decline in average score and one saw an improvement
- **secondary schools**: two treatment secondary schools returned their tests, in both cases the average standardised score *declined* from sweep 1 to sweep 2. One comparison secondary school returned their reading tests: the average standardised score in this school also *declined*.

As with the mathematics scores, account needs to be taken of the reported implementation levels of the Accelerated Reader in these schools. Information about the quantity and quality of implementation is collected by Renaissance Learning, and indicators of these are provided in Table 2.5, which needs to be considered alongside Table 2.4. Current best practice

implementation recommendations for *Accelerated Reader* are that: (i) pupils should average above 85 per cent on the book quizzes (above 90 per cent for secondary pupils), and (ii) they should read for 30 minutes a day (20 minutes for secondary).

Table 2.4 Attainment in reading: individual schools

Reading	Sweep	Year	Pupils	Total	Average	Change
School K	Sweep 1	Yr 7	57	5659	99.28	
Reading Treatment	Sweep 2	Yr 7	46	4521	98.28	-1.00
School L	Sweep 1	Yr 7	44	3896	88.55	
Reading Treatment	Sweep 2	Yr 7	44	3738	84.95	-3.60
School M	Sweep 1	Yr 4	12	1071	89.25	
Reading Treatment	Sweep 2	Yr 4	12	1088	90.67	1.42
School N	Sweep 1	Yr 4	28	2691	96.11	
Reading Treatment	Sweep 2	Yr 4	25	2421	96.84	0.73
School O	Sweep 1	Yr 4	50	4587	91.74	
Reading Treatment	Sweep 2	Yr 4	46	4239	92.15	0.41
School P	Sweep 1	Yr 4	47	4093	87.09	
Reading Treatment	Sweep 2	Yr 4	46	4057	88.20	1.11
School Q	Sweep 1	Yr 4	55	5035	91.55	
Reading Treatment	Sweep 2	Yr 4	51	4950	97.06	5.51
School R	Sweep 1	Yr 4	33	3275	99.24	
Reading Treatment	Sweep 2	Yr 4	42	3811	90.74	-8.50
School S	Sweep 1	Yr 7	41	3948	96.29	
Reading Comparison	Sweep 2	Yr 7	39	3664	93.95	-2.34
School T	Sweep 1	Yr 4	30	2809	93.63	
Reading Comparison	Sweep 2	Yr 4	25	2486	99.44	5.81
School U	Sweep 1	Yr 4	36	3434	95.39	
Reading Comparison	Sweep 2	Yr 4	40	3810	95.25	-0.14

Table 2.5 Implementation data for Accelerated Reader: individual schools

Reading	Year	No. of pupils [9]	Implementation (Quantity)	Implementation (Quality)
School K	Yr 7	130	3.2	67 %
School L	Yr 7	235	9.5	66 %
School M	Yr 4	25	13.3	83 %
School N	Yr 4	66	40.9	80 %
School O	Yr 4	52	16.4	83 %
School P	Yr 4	133	3.0	71 %
School Q	Yr 4	55	9.1	79 %
School R	Yr 4	109	3.2	64 %

Implementation quantity: this figure is the average of pupil estimated minutes spent reading
Implementation quality: this figure is the average of pupil average percentage correct answers
Source: Implementation data provided by Renaissance Learning

Table 2.6 below provides an aggregated analysis of reading test scores for treatment and comparison schools. It can be seen that, taking all the primary schools using the Accelerated Reader program, the average standardised pupil score (N=225 in sweep 1) increased marginally from 92.23 to 92.64; in the comparison primary schools (not using the program), however, the average standardised pupil score (N=66) also increased, and by a bigger margin.

Table 2.6 Attainment in reading: treatment and comparison schools

Accelerated Reader	Sweep 1		Sweep 2	
	Pupils	Average	Pupils	Average
Treatment primary schools - reading	225	92.23	222	92.64
Treatment secondary schools - reading	101	94.60	90	91.77
Comparison primary schools - reading	66	94.59	65	96.86
Comparison secondary schools - reading	41	96.29	39	93.95
All treatment schools - reading	326	92.97	312	92.39
All comparison schools - reading	107	95.24	104	95.77

2.4 Overall attainment

Taking all the schools returning tests for this evaluation, in both mathematics and reading, it was found that in the 14 schools using Renaissance Programs

[9] Schools K-R correspond with schools K-R in Table 2.4. The number of pupils varies because Renaissance Learning collected information for all pupils involved, whereas the NFER tests were taken by one or two classes of pupils in each school.

the average standardised pupil score (N=658 in sweep 1) increased by nearly half a point from 93.79 to 94.23, whereas in the seven comparison schools the average standardised pupil score (N=277) decreased very slightly, from 98.41 to 98.36 (Table 2.7).

Table 2.7 Attainment in mathematics and reading: treatment and comparison schools

Accelerated Maths & Accelerated Reader	Sweep1		Sweep 2	
	Pupils	Average	Pupils	Average
All treatment primary schools	445	94.19	431	95.02
All treatment secondary schools	213	92.97	176	94.71
All comparison primary schools	199	97.86	204	98.24
All comparison secondary schools	78	99.79	83	98.66
All treatment schools	658	93.79	607	94.23
All comparison schools	277	98.41	287	98.36

Average standardised score for pupil using Renaissance	**up from:**	**93.79 to 94.23 (+0.46)**
Average standardised score for pupil *not* using Renaissance	**down from:**	**98.41 to 98.36 (-0.05)**

Summary

The key overall finding regarding pupil attainment was that the most significant improvements occurred in primary reading and secondary mathematics schools. In primary mathematics and secondary reading schools, the findings are less conclusive though, as noted in Section 2.1 above, there are many reasons, unconnected with the use or non-use of the Renaissance programs, as to why this might be so. In addition to these broad trends, there are some individual schools which achieved notable successes in a short space of time.

3. Pupil attitudes: mathematics

The Renaissance Programs, through the use of regular built-in assessment and testing, enable pupils and teachers to see what progress is being made in attainment. The programs are also designed to meet individual learning requirements and to encourage and motivate pupils in reading and mathematics. For this reason, questionnaire surveys were issued to the same groups of pupils taking the standardised tests. The information collected from the surveys of pupils enabled the research team to identify any changes in attitudes, confidence or motivation in pupils in treatment schools over the academic year (the same questionnaire was completed twice), and also to compare the attitudes of pupils in program schools with those of pupils in non-program schools.

This chapter examines the findings from the pupil attitude questionnaire relating to mathematics. Sections 3.1 and 3.2 look at changes in pupil attitudes over time by comparing sweep 1 and sweep 2 findings from all the schools, dealing with primary schools and secondary schools respectively. Sections 3.3 and 3.4 compare attitudes to mathematics in program and non-program schools. Chapter 4 takes a similar approach in relation to the findings concerning attitudes towards reading.[10]

3.1 Mathematics: progress over time – primary schools

Table 3.1 below shows that, overall, there was little change over time with respect to Year 4/5 pupils' views of how well they were doing in mathematics, although there were slightly more pupils disagreeing that they were *not* good at mathematics (51 per cent in sweep 1 increased to 55 per cent in sweep 2).

[10] For reasons of space and clarity, Chapters 3 and 4 report only the findings from selected questionnaire items. In the main, these are items where some change in attitudes has occurred, or where there was a noticeable difference in attitudes across program and non-program schools.

Table 3.1 Years 4 and 5: Levels of agreement with statements about learning maths

Views about Mathematics	Agree a lot %		Agree a little %		Disagree a little %		Disagree a lot %		No response %	
	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
I usually do well in maths	46	47	43	42	5	6	3	2	2	3
I would like to do more maths at school	56	48	22	26	11	14	5	6	5	5
Maths is harder for me than for many of my classmates	12	9	21	20	30	28	33	37	4	6
I enjoy learning maths	68	63	20	22	4	6	3	3	5	6
I am just **not** good at maths	8	6	18	14	17	18	51	55	5	7
I learn things quickly in maths	38	39	37	38	15	12	6	4	3	7
The work I do in maths lessons is interesting	65	58	21	28	6	5	4	4	3	7
N =	**330**	**330**								

S1 and S2 refer to Sweep 1 and Sweep 2
A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

Year 4/5 respondents expressed mixed feelings about their levels of enjoyment of recent mathematics lessons (see Table 3.2 below), with fewer pupils finding them 'very' enjoyable by the end of the year (58 per cent decreased to 51 per cent), but more finding them 'quite' enjoyable (32 per cent increased to 38 per cent).

Table 3.2 Years 4 and 5: Level of enjoyment of most recent maths lessons

Level of enjoyment of most recent maths lesson	Sweep 1 %	Sweep 2 %
Very enjoyable	58	51
Quite enjoyable	32	38
Not very enjoyable	5	6
Not at all enjoyable	2	2
No response	2	3
N =	**330**	**330**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

There was, however, a positive development in attitudes to progress in mathematics (Table 3.3), with more Year 4/5 respondents believing that they had made a 'great deal' of progress by sweep 2 (41 per cent increased to 48 per cent) and a slight fall in the percentage believing they had made 'no progress'.

Table 3.3 Years 4 and 5: Perceived progress in maths over last six months

Progress made in maths over the last six months	Sweep 1 %	Sweep 2 %
A great deal of progress	41	48
Some progress	48	43
A little progress	9	5
No progress	2	1
No response	1	3
N =	**330**	**330**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

3.2 Mathematics: progress over time – secondary schools

Secondary school pupils were asked to complete questionnaires on their attitudes to mathematics at the same time as the primary schools, but it should be noted that, partly because there were fewer secondary schools using Accelerated Maths, the response rate of those who completed both sweep 1 and sweep 2 was much lower, with a total of 38 pupils returning questionnaires. The responses across time, to questions about learning mathematics, were broadly positive (Table 3.4), with a particular increase in pupils who agreed 'a lot' that they did well in mathematics (for 50 to 61 per cent).

Table 3.4 Year 7: How much do you agree with these statements about learning maths?

Views about mathematics	Agree a lot %		Agree a little %		Disagree a little %		Disagree a lot %	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
I usually do well in maths	50	61	45	37	5	3	0	0
I would like to spend more time studying maths at school	16	11	39	58	34	21	11	11
Maths is more difficult for me than for many of my classmates		8	18	18	26	34	55	39
I enjoy learning maths	47	34	37	50	13	11	3	5
Sometimes, when I do not understand a new topic in maths straightaway, I know that I will never really understand it	11	5	11	16	26	34	53	45
Maths is not one of my strengths	8	8	26	29	34	37	32	26
I learn things quickly in maths	37	26	47	58	16	13	0	3
N =	**38**	**38**						

A series of single response items
Due to rounding, percentages may not always sum to 100
There were no non-responses to this question
Source: NFER Year 7 Mathematics Survey 2005/6

There was little change in Year 7 pupils' views of enjoyment of lessons (Table 3.5), with the great majority still finding mathematics 'quite' or 'very' enjoyable.

Table 3.5 Year 7: Think about your recent maths lessons. Please tick the box which best describes this lesson.

Level of enjoyment of most recent maths lesson	Sweep 1 %	Sweep 2 %
Very enjoyable	21	21
Quite enjoyable	63	61
Not very enjoyable	13	13
Not at all enjoyable	3	5
N =	**38**	**38**

A single response item
Due to rounding, percentages may not sum to 100
There were no non-responses to this question
Source: NFER Year 7 Mathematics Survey 2005/6

Table 3.6 below shows that there was a marked increase in the percentage of secondary pupils who thought they had made 'a great deal of progress' in mathematics in the previous six months. The improved test scores for secondary Accelerated Maths schools reported above (in Chapter 2) would support pupils' perceptions of progress.

Table 3.6 Year 7: Perceived progress in maths over last six months

Progress made in maths over the last six months	Sweep 1 %	Sweep 2 %
A great deal of progress	42	63
Some progress	55	34
A little progress	3	3
No progress	0	0
N =	**38**	**38**

A single response item
Due to rounding, percentages may not sum to 100
There were no non-responses to this question
Source: NFER Year 4/5 Mathematics Survey 2005/6

The survey included a question asking for pupils' views about school in general. Amongst secondary pupils there was an increase in the proportions who agreed that they enjoyed being at school (from 63 to 74 per cent) and that a reason for enjoyment was getting on with others (from 53 to 68 per cent). There was greater uncertainty about whether work going well was a reason for enjoyment (Table 3.7).

Table 3.7 Year 7: Views about school in general

Level of agreement that…	Agree %		Not sure %		Disagree %		No response %	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
I like the subjects that I know I can do well in	79	87	11	13	11	0	0	0
When I enjoy my day at school it's usually because I've got on well with the other pupils	53	68	37	26	8	5	3	0
I enjoy being at school	63	74	18	18	16	8	3	0
When I enjoy my day at school it's usually because my school work has gone well	76	63	18	32	5	5	0	0
N =	**38**	**38**						

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

3.3 Mathematics: comparing primary schools

In order to be able to compare attitudes across program and non-program schools, pupil questionnaire surveys were sent to a number of comparison schools as well as to pupils in treatment schools. In relation to mathematics there were six treatment schools (two secondary schools and four primary schools) and four comparison schools (one secondary and three primaries).

Pupils in all of these schools completed both sweep 1 and sweep 2 of the questionnaire survey. The tables in this and the next section present comparisons of program and non-program school responses from the sweep 2 survey: these findings are the most relevant because this second survey was completed at the end of the 'treatment' period, when any differences in attitudes between the pupils in the two school types would have been most evident. It was also useful, however, to look at changes between the sweep 1 and sweep 2 findings, so as to look at the different starting points for the program and non-program samples, as well as the outcomes or end points towards the end of the school year. For this reason, any major differences in findings between sweep 1 and sweep 2 are also reported at the relevant points.

The figures presented in Table 3.8 below show that Year 4/5 pupils in the comparison schools perceived themselves as doing better in mathematics, but in other respects pupil attitudes were more positive in the treatment schools. Here, more pupils agreed that they enjoyed learning mathematics, that they learnt more quickly and that they found their lessons interesting. There was also a higher percentage (54 per cent compared to 39 per cent) who agreed that they would like to do more mathematics.

With respect to the self-perception in relation to the first item in this table, 'I usually do well in mathematics', there were contradictory historical patterns across the treatment and comparison samples. In the treatment sample, 50 per cent of pupils in sweep 1 said that they usually did well in the subject, but by sweep 2 this proportion had declined to 44 per cent. In the comparison sample the reverse happened: only 40 per cent of pupils said that they did well in sweep 1, but this increased to 52 per cent by sweep 2.

It is not really possible to identify any single cause for these trends, but one possibility is that the regular testing required in the Accelerated Maths scheme may have made pupils more self-critical about their progress in the subject. The comparison pupils (or teachers) may not have been 'quantifying' progress

in mathematics in quite the same way and may therefore have been more positive in their perceptions.

Table 3.8 Years 4 and 5: Levels of agreement with statements about learning mathematics

Views about mathematics	Agree a lot %		Agree a little %		Disagree a little %		Disagree a lot %		No response %	
Sweep 2	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
I usually do well in maths	44	52	42	42	7	5	2	1	5	1
I would like to do more maths at school	54	39	22	33	14	16	6	8	4	6
Maths is harder for me than for many of my classmates	10	9	22	16	25	33	37	36	6	6
I enjoy learning maths	65	56	20	27	6	9	3	2	6	6
I am just **not** good at maths	5	9	16	10	19	19	53	57	6	5
I learn things quickly in maths	44	29	31	50	14	11	5	3	7	7
The work I do in maths lessons is interesting	62	49	26	33	3	9	4	4	5	5
N =	**219**	**129**								

T = Treatment school; C = Comparison school

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

As Table 3.9 shows, more than half the pupils from primary treatment schools described their most recent mathematics lesson as ‘very enjoyable’ (54 per cent), compared with 45 per cent in the comparison schools. Only two per cent of pupils, in either comparison or treatment schools, said that mathematics was ‘not at all enjoyable’.

Table 3.9 Years 4 and 5: Level of enjoyment of most recent maths lessons

Level of enjoyment of most recent maths lesson Sweep 2	Treatment schools %	Comparison schools %
Very enjoyable	54	45
Quite enjoyable	36	43
Not very enjoyable	5	8
Not at all enjoyable	2	2
No response	3	3
N =	**219**	**129**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

Although the pupils from program schools enjoyed their mathematics lessons more, a slightly greater proportion of respondents from non-program schools thought that they had made 'a great deal of progress' over the last six months (Table 3.10). The proportions of pupils expressing a view that they had made a great deal of progress increased for both samples between sweep 1 and sweep 2, though the increase was greater for comparison pupils. As noted above, however, it is possible that the pupils from treatment schools had a more realistic view of their progress because they were tested more frequently as part of the program.

Table 3.10 Years 4 and 5: Perceived progress in maths over last six months

Progress made in maths over the last six months Sweep 2	Treatment schools %	Comparison schools %
A great deal of progress	46	52
Some progress	43	40
A little progress	6	5
No progress	0	1
No response	4	2
N =	**219**	**129**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Mathematics Survey 2005/6

3.4 Mathematics: comparing secondary schools

Generally, attitudes towards mathematics among the secondary school pupils was more positive in the comparison schools, except that a greater proportion

of pupils in the treatment schools agreed ‘a lot’ that they would like to spend more time studying mathematics (Table 3.11).

Table 3.11 Year 7: How much do you agree with these statements about learning maths?

Views about mathematics	Agree a lot %		Agree a little %		Disagree a little %		Disagree a lot %		No response %	
Sweep 2	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
I usually do well in maths	35	64	51	34	11	2	0	0	4	0
I would like to spend more time studying maths at school	21	9	32	55	30	27	14	9	4	0
Maths is more difficult for me than for many of my classmates	16	7	16	18	32	34	37	41	0	0
I enjoy learning maths	30	34	47	48	14	14	7	5	2	0
Sometimes, when I do not understand a new topic in maths straightaway, I know that I will never really understand it	16	5	18	14	26	34	37	48	4	0
Maths is not one of my strengths	16	9	26	27	25	34	30	30	4	0
I learn things quickly in maths	25	25	37	61	25	11	12	2	2	0
N =	**57**	**44**								

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 7 Mathematics Survey 2005/6

Treatment school pupils were more prepared to describe their most recent mathematics lesson as very enjoyable, but more had also found it not very enjoyable (Table 3.12).

Table 3.12 Year 7: Think about your recent maths lessons. Please tick the box which best describes this lesson.

Level of enjoyment of most recent maths lesson	Treatment schools %	Comparison Schools %
Sweep 2		
Very enjoyable	26	20
Quite enjoyable	49	61
Not very enjoyable	23	14
Not at all enjoyable	2	5
N =	**57**	**44**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Mathematics Survey 2005/6

Comparison school pupils perceived their recent progress in mathematics more positively than the treatment school pupils, although these percentages are based on quite small numbers (Table 3.13).

Table 3.13 Year 7: Perceived progress in maths over last six months

Progress made in maths over the last six months Sweep 2	Treatment schools %	Comparison Schools %
A great deal of progress	39	64
Some progress	53	34
A little progress	9	2
No progress	0	0
N =	**57**	**44**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Mathematics Survey 2005/6

Summary

The use of the pupil questionnaire survey allowed the research team to track any changes in pupil attitudes towards mathematics over the course of the school year 2005-2006.

With respect to the **primary pupils,** overall, there was very little evidence of changed attitudes towards mathematics, towards school in general, or towards ways of working, over this time period. There were only a few exceptions to this general pattern. One of these was an important positive finding, relating to progress made in mathematics: the proportion of pupils reporting 'a great

deal of progress' made in the last six months increased from 41 per cent to 48 per cent.

In analysing the findings from the mathematics survey of **secondary pupils** more caution needs to be exercised because of the smaller numbers involved. That said, the perspectives of these Year 7 respondents generally seem to have become more positive than those of their Year 4/5 counterparts. Examples of positive developments include the following:

- the proportion of pupils expressing a view that they usually did well in mathematics increased from 50 per cent to 61 per cent
- the proportion of pupils reporting making 'a great deal of progress' increased from 42 per cent to 63 per cent
- the proportion of pupils who 'enjoyed being at school' increased from 63 to 74 per cent

To some extent these findings match with those from the analysis of the test scores (see Chapter 2). Over the period in question both primary and secondary pupils using Accelerated Maths experienced improved average standardised test scores, but there was a larger improvement for the secondary sample.

Overall, the questionnaire survey findings do not provide evidence of any significant differences in pupil attitudes to mathematics across treatment and comparison schools. For some questions the comparison pupil sample has slightly more positive attitudes and for others the treatment pupils have a slightly more positive outlook. These differences may reflect the influence of a number of factors, including teacher styles, quality of mathematics departments within the school, school culture and parental attitudes, as well as Renaissance versus non-Renaissance modes of delivery of mathematics.

4. Pupil attitudes: reading

This chapter examines the findings from the pupil attitude questionnaire relating to reading. Sections 4.1 and 4.2 look at changes in pupil attitudes over time by comparing sweep 1 and sweep 2 findings from all the sample schools, dealing with primary schools and secondary schools respectively. Sections 4.3 and 4.4 compare attitudes to reading in program and non-program schools.

4.1 Reading: progress over time - primary schools

Attitudes to reading, as shown in the responses in Table 4.1 below, were positive, with the majority of Year 4/5 pupils (in sweep 2) agreeing that they enjoyed reading and did not find it difficult. However, there was a downward trend between the two sweeps in the percentage that agreed that they liked reading stories (from 76 to 70 per cent) and generally enjoyed reading (from 70 to 64 per cent). Most pupils disagreed that reading was boring, although there was very little change in attitude between the two sweeps.

The majority disagreed with the statement that they were not interested in books, but more agreed than disagreed that they liked watching TV better than reading and the trend here was slightly up. There was a downward trend in the percentage of pupils who liked reading with an adult (from 41 to 32 per cent) and this may have been related to an increase in self-sufficiency encouraged by the reading program, or it could have been related simply to the increase in the age of respondents between the two sweeps.

Table 4.1 Years 4 and 5: Levels of agreement with statements about reading

Views about reading	Agree %		Not sure %		Disagree %		No response	
	S1	**S2**	**S1**	**S2**	**S1**	**S2**	**S1**	**S2**
I like reading stories	76	70	9	18	9	11	6	1
I am not interested in books	17	10	14	23	62	64	7	3
I like reading comics or magazines	63	65	17	18	14	14	7	3
I like reading poems	57	56	18	23	16	17	8	3
I think reading is difficult	20	14	27	27	45	54	8	5
I like reading silently by myself	68	64	16	15	9	16	7	4
I like watching television better than reading books	41	42	23	28	32	26	5	4
I like reading with a grown-up to help me	41	32	19	21	34	41	7	6
I enjoy reading	70	64	12	18	10	13	8	4
I think reading is boring	15	15	13	15	64	65	7	5
N =	**271**	**271**						

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

While the percentage of pupils claiming to read every day at home decreased from 30 percent to 22 percent, there was an increase in those who said that they read most days and no change in those who said that they did not often read at home (see Table 4.2).

Table 4.2 Years 4 and 5: Frequency of reading at home

How often do you read at home?	Sweep 1 %	Sweep 2 %
Every day	30	22
Most days	44	48
Not often	19	19
Never	4	5
No response	4	5
N =	**271**	**271**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

Table 4.3 below shows that there was a slightly negative trend in reported levels of enjoyment of lessons involving reading, although this was based on the most recent individual lesson, rather than in general.

Table 4.3 Years 4 and 5: Level of enjoyment of most recent lesson involving reading

Level of enjoyment of most recent reading lesson	Sweep 1 %	Sweep 2 %
Very enjoyable	49	44
Quite enjoyable	30	35
Not very enjoyable	11	12
Not at all enjoyable	4	7
No response	6	3
N =	**271**	**271**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

Views on progress in reading, however, were positive, with an increase in those saying that they had made 'a great deal of progress' from 46 to 52 per cent (Table 4.4).

Table 4.4 Years 4 and 5: Perceived progress in reading over last six months

Progress made in reading over the last six months	Sweep 1 %	Sweep 2 %
A great deal of progress	46	52
Some progress	37	34
A little progress	10	8
No progress	3	3
No reponse	4	3
N =	**271**	**271**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

Levels of confidence in using computers showed a very positive development, with an increase from 56 to 66 per cent in those feeling very confident and a decrease in those who felt worried and who only 'got by' in their use (Table 4.5). Although this may not all have been attributable to the use of the reading program, there is a strong possibility that regular use of the program contributed to this increase in confidence.

Table 4.5 Years 4 and 5: Level of confidence about using computers.

Level of confidence about using computers	Sweep 1 %	Sweep 2 %
I feel very confident	56	66
I feel quite confident	15	15
I feel I get by	7	3
I feel a bit unsure about using computers	6	6
I feel worried about using computers	4	1
No response	11	9
N =	**271**	**271**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

4.2 Reading: progress over time – secondary schools

The secondary school pupils gave rather mixed responses to the general question on their views on reading (see Table 4.6 below). There was a decline in the numbers who liked reading stories and who said that they enjoyed reading and an increase in those who thought that reading was boring (from 9 to 14 per cent). However, there was also a decrease in the percentage who agreed that they were not interested in books (from 16 to 8 per cent).

There was a negative trend among the secondary pupils on reading at home, with the minority indicating that they read everyday staying the same at 17 per cent, but a decline from 52 to 35 per cent of those who read most days and an increase from 27 to 40 per cent of those who said that they did not read very often (Table 4.7).

Table 4.6 Year 7: Levels of agreement with statements about reading

Views about reading	Agree %		Not sure %		Disagree %		No response %	
	S1	S2	S1	S2	S1	S2	S1	S2
I like reading stories	74	65	13	21	13	12	0	2
I am not interested in books	16	8	20	24	63	66	1	2
I like reading comics or magazines	73	74	18	19	8	5	1	2
I like reading poems	56	48	28	35	16	15	1	2
I think reading is difficult	8	6	21	23	70	69	0	3
I like reading silently by myself	77	66	13	24	9	6	1	5
I like watching television better than reading books	55	53	31	36	14	9	0	2
I like reading with a grown-up to help me	18	12	19	19	63	66	1	3
I enjoy reading	71	59	15	28	11	10	3	3
I think reading is boring	9	14	19	23	71	61	1	2
N =	**108**	**108**						

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 7 Reading Survey 2005/6

Table 4.7 Year 7: Frequency of reading at home

How often do you read at home?	Sweep 1 %	Sweep 2 %
Every day	17	17
Most days	52	35
Not often	27	40
Never	4	6
No response	1	2
N =	**108**	**108**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

There was also a negative trend in levels of enjoyment of a recent lesson involving reading, with a decrease from 29 to 23 per cent of those who had found it 'very enjoyable' and from 56 to 50 per cent of those who had found it 'quite enjoyable' (Table 4.8). Twice as many pupils claimed to have found the lesson 'not very enjoyable' by the time of the second survey, although they were still the minority. As with the primary schools, it may be that the response was affected by the reference to the most recent lesson, rather than to lessons involving reading in general.

Table 4.8 Year 7: Level of enjoyment of most recent lesson involving reading

Level of enjoyment of most recent reading lesson	Sweep 1 %	Sweep 2 %
Very enjoyable	29	23
Quite enjoyable	56	50
Not very enjoyable	9	18
Not at all enjoyable	6	7
No response	0	2
N =	**108**	**108**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

There was a decreased perception of having made 'a great deal of progress' in reading among the secondary pupils than had been the case with the primary respondents (Table 4.9). There was an increase in those who considered that they had made some progress (from 48 to 55 per cent), but a decrease from 43 to 34 per cent of those who reported 'a great deal' of progress.

Table 4.9 Year 7: Perceived progress in reading over last six months

Progress made in reading over the last six months	Sweep 1 %	Sweep 2 %
A great deal of progress	43	34
Some progress	48	55
A little progress	8	8
No progress	1	1
No response	0	2
N =	**108**	**108**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

As with the primary pupils, there was a very positive trend in levels of confidence about using computers, with a five per cent increase in those who felt very confident and a decline in the small numbers who felt unsure or worried about using them (Table 4.10).

Table 4.10 Year 7: Level of confidence about using computers

Level of confidence about using computers	Sweep 1 %	Sweep 2 %
I feel very confident	68	73
I feel quite confident	21	17
I feel I get by	6	7
I feel a bit unsure about using computers	3	1
I feel worried about using computers	1	0
No response	1	2
N =	**108**	**108**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

Summary

Primary school respondents' attitudes towards reading were very mixed by the time of sweep 2 of the survey. In some instances attitudes seem to have become slightly more negative: for example, the percentage stating that they enjoyed reading declined from 70 to 64 per cent. However, even though levels of enjoyment seem to have decreased, there was evidence that pupils were still prepared to work hard and felt that they were making progress with their reading. For example, the proportion expressing the view that they had made 'a great deal of progress' with their reading increased from 46 to 52 per cent.

Overall the primary school responses to the survey show the development of rather more positive attitudes to English/reading lessons than those for the secondary schools, although in certain areas, such as confidence in using computers, there was a strongly positive trend across both age groups.

4.3 Reading: comparing primary schools

The majority of the following tables and commentaries are based on the second sweep of the pupil survey on attitudes to reading, received from a total of eight primary schools.[11] With respect to the first set of questions, based on statements about reading, the views of the treatment school pupils were

[11] As with the findings for mathematics, presented in Chapter 3, the tables in this and the next section present comparisons of program and non-program school responses from the sweep 2 survey, but in addition, any major differences in findings between sweep 1 and sweep 2 are also reported where these are deemed to be relevant.

considerably more positive than those of the comparison pupils (Table 4.11). Not only did higher percentages of treatment school pupils agree that they liked reading stories and enjoyed reading generally (73 per cent compared to 63 per cent and 69 per cent compared to 53 per cent), but fewer of them agreed that they liked watching television better (38 per cent compared to 53 per cent).

Table 4.11 Years 4 and 5: Levels of agreement with statements about reading

Views about reading	Agree %		Not sure %		Disagree %		No response %	
Sweep 2	**T**	**C**	**T**	**C**	**T**	**C**	**T**	**C**
I like reading stories	73	63	16	19	9	17	2	2
I am not interested in books	8	14	21	34	67	50	3	2
I like reading comics or magazines	63	73	20	13	14	13	3	2
I like reading poems	56	58	22	27	17	16	4	
I think reading is difficult	14	17	29	17	51	64	6	2
I like reading silently by myself	64	69	16	16	16	13	4	3
I like watching television better than reading books	38	53	28	27	29	19	5	2
I like reading with a grown-up to help me	34	31	22	20	38	47	6	2
I enjoy reading	69	53	16	23	10	20	4	3
I think reading is boring	12	25	16	13	66	59	6	3
N =	**232**	**64**						

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

The treatment school pupils' response to a question about how often they read at home was also more positive than that of the comparison pupils, with a quarter of the respondents claiming that they read every day, compared to 14 per cent of the comparison pupils (Table 4.12).

Table 4.12 Years 4 and 5: Frequency of reading at home

How often do you read at home? Sweep 2	Treatment Schools %	Comparison Schools %
Every day	25	14
Most days	47	55
Not often	18	20
Never	4	8
No response	6	3
N =	**232**	**64**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

Nearly half the respondents from the treatment schools had found their most recent lesson very enjoyable, compared to 38 per cent from the comparison schools (Table 4.13). On the negative responses ('not very enjoyable' and 'not at all enjoyable'), there was little difference.

Table 4.13 Years 4 and 5: Level of enjoyment of most recent lesson involving reading

Level of enjoyment of most recent reading lesson Sweep 2	Treatment Schools %	Comparison Schools %
Very enjoyable	47	38
Quite enjoyable	31	45
Not very enjoyable	12	9
Not at all enjoyable	6	8
No Response	3	
N =	**232**	**64**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

Comparison of sweep 1 and sweep 2 findings for the questionnaire items reported in Tables 4.12 and 4.13 suggest that the Accelerated Reader experience has provider a strong motivator for Year 4/5 pupils: whilst the proportion of treatment school pupils reading 'every day' dipped slightly (from 29 per cent to 25 per cent), the equivalent finding for comparison pupils indicated a significant decline in reading every day (from 35 to 14 per cent).

There was a similar pattern in the proportions of pupils finding the most recent reading lesson 'very enjoyable' (for treatment pupils this dipped slightly from

49 per cent to 47 per cent; and for comparison pupils the decline was much more significant, from 53 to 38 per cent). It seems that involvement with the Accelerated Reader program may have helped to stem a decline in reading motivation across the school year.

The figures given in Table 4.14 below show that pupil perceptions of how much progress they had made did not differ greatly, although more from the treatment schools described making 'a great deal of progress' (53 per cent compared to 48 per cent).

Table 4.14 Years 4 and 5: Perceived progress in reading over last six months

Progress made in reading over the last six months Sweep 2	**Treatment Schools %**	**Comparison Schools %**
A great deal of progress	53	48
Some progress	33	39
A little progress	8	8
No progress	2	5
No Response	3	
N =	**232**	**64**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 4/5 Reading Survey 2005/6

4.4 Reading: comparing secondary schools

The responses set out below are also based on the second wave of the pupil survey on reading, administered towards the end of Year 7. Three schools returned the survey, two were treatment schools and one was a comparison school.

Overall, secondary pupils' general views on reading were much more positive in the treatment schools than in the comparison schools (Table 4.15). The only areas where there were higher levels of agreement from the comparison pupils were that they liked reading comics, magazines and poetry. Reading with an adult had a negative response from pupils in both types of school.

Table 4.15 Year 7: Levels of agreement with statements about reading

Views about reading Sweep 2	Agree %		Not sure %		Disagree %		No response %	
	T	C	T	C	T	C	T	C
I like reading stories	72	46	16	36	10	18	2	0
I am not interested in books	7	23	26	23	65	54	2	0
I like reading comics or magazines	72	82	18	15	7	3	2	0
I like reading poems	49	54	33	36	16	8	2	3
I think reading is difficult	5	8	17	33	74	59	3	0
I like reading silently by myself	68	59	20	33	5	8	6	0
I like watching television better than reading books	51	69	35	28	12	3	2	0
I like reading with a grown-up	12	15	17	23	68	62	3	0
I enjoy reading	64	46	23	36	10	18	3	0
I think reading is boring	12	23	24	26	62	51	2	0
N =	**94**	**39**						

A series of single response items
Due to rounding, percentages may not always sum to 100
Source: NFER Year 7 Reading Survey 2005/6

Interestingly, comparison of sweep 1 and sweep 2 responses revealed that comparison pupils had become much more interested in television over this period (see item 7 in Table 4.15), whereas treatment pupils had developed less of a liking for television (though in both sweeps and in both samples more than 50 per cent liked watching television better than reading books). In sweep 1 just over half of the comparison sample (53 per cent) liked television better than reading books, but this had increased to over two-thirds (69 per cent) by sweep 2. The equivalent figures for the treatment sample were 56 per cent in sweep 1, declining to 51 per cent in sweep 2.

The percentage of pupils saying that they did not often read at home was quite high from both types of school, but higher in the comparison school (46 per

cent compared to 38 per cent) (Table 4.16). More treatment school pupils (19 per cent) read at home every day than comparison school pupils (3 per cent).

Table 4.16 Year 7: Frequency of reading at home

How often do you read at home? Sweep 2	Treatment Schools %	Comparison Schools %
Every day	19	3
Most days	34	46
Not often	38	46
Never	5	5
No Response	3	
N =	**94**	**39**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

Treatment school pupils were more positive about their recent lessons, with more describing them as 'very enjoyable' (27 per cent compared to 15 per cent) and fewer saying that they were not very or 'not at all enjoyable' (Table 4.17).

Table 4.17 Year 7: Level of enjoyment of most recent lesson involving reading

Level of enjoyment of most recent reading lesson Sweep 2	Treatment Schools %	Comparison Schools %
Very enjoyable	27	15
Quite enjoyable	52	41
Not very enjoyable	14	36
Not at all enjoyable	5	8
No Response	2	
N =	**94**	**39**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

As with the primary pupil responses, comparison of sweep 1 and sweep 2 findings for the questionnaire items reported in Tables 4.16 and 4.17 suggest that the Accelerated Reader experience has provider a strong motivator for the Year 7 pupils: whilst the proportion of treatment school pupils reading 'every day' increased (from 16 per cent to 19 per cent), the equivalent finding for

comparison pupils indicated a significant decline in reading every day (from 15 per cent to 3 per cent).

There was a similar pattern in the proportions of Year 7 pupils finding the most recent reading lesson 'very enjoyable' (for treatment pupils this dipped slightly from 29 per cent to 27 per cent; and for comparison pupils the decline was much more significant, from 38 to 15 per cent). It seems that, as with the younger pupils, involvement with the Accelerated Reader program may have helped to stem a decline in reading motivation across the school year.

The percentages given in Table 4.18 show that the majority of pupils in both types of school described their progress in reading as modest, but there was a higher percentage in the treatment schools who believed that they had made 'a great deal of progress'(38 per cent compared to 28 per cent).

Table 4.18 Year 7: Perceived progress in reading over last six months

Progress made in reading over the last six months Sweep 2	**Treatment Schools %**	**Comparison Schools %**
A great deal of progress	38	28
Some progress	51	64
A little progress	9	5
No progress		3
No Response	2	
N =	**94**	**39**

A single response item
Due to rounding, percentages may not sum to 100
Source: NFER Year 7 Reading Survey 2005/6

Summary

Pupil responses on reading were generally more positive from the treatment schools at both primary and secondary level, with greater enthusiasm for reading, better motivation and a more developed sense of having made progress in this area.

5. The teacher perspective

5.1 The experience of using Renaissance Learning

In order to collect complementary qualitative data, the research team visited four case-study schools (primary mathematics, primary reading, secondary mathematics, secondary reading) and interviewed two teachers involved with the programs in each school.[12] The reading program was used in the primary school as part of a guided reading programme with both year 4 classes and in the secondary school by the whole of year 7. The mathematics program was used by the primary school in special sessions, as an addition to normal maths lessons, and in the secondary school by two groups in two out of four of their weekly maths lessons.

In three schools, the Renaissance Learning program was described as being additional to existing activities. One of the teachers interviewed commented that their numeracy strategy had not changed and it would only be possible for the mathematics program to replace existing work 'if the objectives from the program could be matched up with the National Curriculum'.[13] She added that this could be done, but would be 'time-consuming'. In the remaining school (a secondary school), the Accelerated Reading program had largely replaced previous reading strategies, because it was regarded as more suitable for individualised learning and offered more information about individual progress and skills than the existing programmes.

In all the schools the staff interviewees had a positive attitude by about using the Renaissance Learning programs. In the primary school using the mathematics program, there was seen to be a particular advantage in 'the fact that the computer does the marking, which frees teachers to deal with pupils who are having difficulties'. The only drawback to using the programs took the form of occasional technical problems. These were an irritation, because,

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12 In one school, one of the teachers involved in implementing the program had left, and only one other teacher remained involved with using the program, so a total of seven teachers rather than eight were interviewed.

13 In fact, by the time the research was being carried out, Renaissance Learning had matched the Accelerated Mathematics objectives to those of the UK National Curriculum, but the interviewee was clearly not aware of this.

as one teacher pointed out, 'it takes time to solve these problems', even with technical support. The consequences of technical unpredictability were described by another interviewee: 'If a pupil is ready to do the questionnaire and then can't for some reason, they are stuck'.

5.2 Links with pupils and parents

The responses to a question about whether pupils liked using Renaissance Learning programs were strongly positive in all four schools. Staff in the primary school using the mathematics program, explained how, 'they often ask to do Renaissance Learning work and are disappointed if they can't. They like using computers and they like the instant feedback from the tests'. The interviewee in the secondary school using the reading program commented: 'They definitely enjoy using it – if they lose their pass words, they can get upset because they can't access it'.

The point about the appeal of using computers and the 'instant feedback' they gave was repeated in all the schools and was reflected in this view: 'The students like it because they get feedback, they get reports and it makes them independent'. The element of competition was also referred to by those using both the mathematics and the reading programs and was seen a motivating factor: 'They like the quizzes and many like the element of competition in getting good scores'. In both the schools using the reading program, there was a perception that boys especially had been encouraged to read more, with the primary teacher stating that, 'some boys have definitely tackled some fiction that they would probably not have touched before'.

In two of the schools (one primary mathematics and one secondary reading), staff felt that using the Renaissance program had strengthened links with parents. In the primary school, the program had helped to involve parents more closely with their children's work:

> *The marked tests go home and so parents get to see how their children are doing and they are given directions to help the children with their work. Parents do come in and talk about their children's progress and what they are doing.*

In the secondary school, the use of the reading program was reported as having made an important contribution to the school's family learning

programme. The school had many pupils from recently arrived immigrant families and had an outreach centre that offered parents courses in English, mathematics and IT. Work on building links with Somali and Roma families had been particularly useful, not only in assisting the children with mathematics and reading, because 'the parents now understand why their children bring books home and they can support them', but also the parents themselves were learning English and had a better understanding of how the education system worked, so, for example, they realised why it was necessary for their children to attend school regularly. A special section for parents was being set up in the school library to encourage the further development of family reading.

5.3 Issues with the programs

Interviewees in all four schools said that they had been faced with technological problems when they first started using the programs. Issues such as 'constant crashing', 'the printer not working', an unreliable pass word system and 'some answers were correct, but the software flagged them up as wrong', had caused irritation. At this early stage, technical support from Renaissance Learning was not always available, so schools had to rely on their own technical knowledge or other local support, and in one school it was claimed that they were given 'bad advice, because the adviser from Renaissance Learning was not properly trained'. This situation had improved considerably after a time, so that all the schools agreed that 'It is better now as I have a telephone link with Renaissance Learning. They are helpful in that way'. There was only one non-technical problem, reported by one school, which was that:

> *Most pupils were at level 3, but we did not have enough books for them and very little that was suitable for EAL students, so we had to give them simple books to read and then make up our own questions.*

However, this issue had also been dealt with as 'Renaissance Learning have provided us with a lot of books at level 3 to 4 and below, so it's much better'.

When they were asked about their perceptions of general weaknesses in the programs, all the interviewees referred to the issue of technical dependency, which meant that 'if one small thing goes wrong, the whole lesson falls apart'. One of the schools commented on the high level of support they had from

Renaissance Learning and the concern that when the pilot ended and they had less help, that it 'will be all right'. One school also commented on the 'enormous amount of paper, ink and toner' that they used, because 'the maths program is paper-based'.

Both the schools using the reading program had realised that 'the teacher has to be very aware of how the pupils are using it'. In the primary school, it was reported that care had to be taken in interpreting the test scores, because 'if some are coasting, they can appear to have very good test results, but aren't actually reading as much as some others'. In the secondary school, they had to 'log which pages they [the pupils] had read to stop them from cheating and then reward them when they have met their targets', as 'some were doing the quiz questions without reading the books'.

The extent of the staff training necessary to run the programs was referred to by interviewees in all the schools and the need for a 'fair bit of commitment from one or two teachers to start with, in order to get really familiar with it'. If a school had high staff turnover, as one in particular did, this could cause problems. One school had been left with only one trained teacher and the librarian 'holding it all together', although Renaissance Learning had assisted by sending a seconded teacher to help out.

In the secondary school using the mathematics program, one interviewee felt that the program was not for use with lower ability groups, but was 'designed for the upper groups, although they [Renaissance Learning] don't make this clear'.[14] An interviewee in the primary mathematics school commented on the difficulty of 'matching the content to the National Curriculum' and the fact that the program 'does not prepare pupils for Key Stage tests, which are a very different format'. In general, however, the schools accepted that the programs were not 'a cure-all' and by adaptation and addition to other schemes, they had a valuable part to play in developing numeracy and literacy.

[14] In fact Accelerated Maths is designed to be appropriate for pupils at all ability levels. Teachers are expected to use mathematics achievement tests (such as STAR Maths) and their professional judgement to decide the grade level of the Accelerated Maths library a pupil should work with. Low-achieving pupils can be placed in a lower library and are expected to be given extra tuition on the relevant mathematics topics. In addition, Accelerated Maths professional development seminars cover methods which teachers can use to help struggling pupils.

5.4 Effectiveness, impact and benefits

Staff in the two schools using the mathematics program agreed that it was a useful addition to the strategies they already used, for, as one teacher explained: 'It does not replace the teaching, but enables teachers to pinpoint who needs help and on what topic'. The primary school respondent using the reading program felt it was helpful when used alongside discussion about the books, because 'you can't just let them read and do the tests'.

The secondary reading school interviewees were particularly positive about the program's contribution to personalised learning and its effectiveness in helping a situation where there was a huge variation in reading ages at the beginning of Year 7. Pupils could work on the program in their own time and many did, because 'it has motivation built into it with the points system' and this was reinforced with their own school awards. This school also built on the interest in reading encouraged by the program, by bringing writers in to speak to the pupils.

The case-study visits took place before the second wave of tests were completed, so staff had no data on which to base their views on possible effects on attainment. They were however, asked for their perceptions on what the impact of the programs might be on attainment. In the primary mathematics school, teachers thought that pupils' self-esteem in the subject had been raised and that their more positive attitude would affect their attainment. An interviewee at the secondary mathematics school said that she thought from the evidence of marking work, that the program was helping the pupils. In the secondary reading school, the evidence from internal tests suggested that the majority of pupils had made progress and that the program had made individual pupil assessment easier.

All the interviewees agreed that one of the most significant strengths of the Renaissance Learning programs was that they motivated pupils. Pupils using both the mathematics and the reading programs responded well to being in charge of their own rate of progress and seeing that progress confirmed. From the teachers' point of view too, one of the main advantages was the personalised learning aspect of the programs, which, in the words of one interviewee, 'addresses the difficult issue of differentiating teaching and learning in very widely mixed ability classes'. In addition to their value for

individualised learning, the programs could also encourage co-operation. As a teacher in the primary reading school explained:

> *the program works well with SEN children too – they can have a partner when they do the tests who can help read the questions, but they can answer if they have understood the books.*

This point was also taken up in the primary maths school, where the teacher described how the program:

> *encourages children to help each other, plus they get to know how it works and actually help the teacher troubleshoot and solve problems that their classmates might be having. It is quite empowering for the children.*

From a practical point of view, the way the programs worked was seen in all the schools as aiding monitoring and target setting and therefore also reporting. In the primary mathematics school, it was pointed out that they 'can print out the diagnostic tests so the teacher can see very clearly in which areas they are not getting on and need extra support'. It also meant that 'the marked tests and scores go home with the children at the end of every week'. Similarly, in the secondary reading school, the interviewee explained that the program helped the school to 'use support and intervention more effectively', and that 'the monitoring and intervention are real strengths'. In addition, both the reading schools felt that the scheme was a good way of testing comprehension and that it encouraged boys to read, because the books 'cover topics that are likely to encourage interest'.

Summary

As a final question, the interviewees were asked if they would recommend the use of the RL program to colleagues in their own and other schools and all said that they would. This was qualified in one school by a point about the cost, not just of the program, but of installing extra computers and in another by a reference to a previously raised point about the mathematics program's use with lower ability groups. In the other two schools, not only was the reaction positive, but the teachers involved had already begun promoting the program. In one case this was targeted at feeder primary schools and in the

other, the program's use was to be extended to Years 3 and 5 and would probably encompass the reading program too.

The schools' reactions to this last question were a good indicator of the predominantly positive view of the Renaissance Learning programs. Adaptation to the ways in which each school works also emerged as important. The other general message from the teachers interviewed was that the programs' use of IT was both a major strength in the individual flexibility it allowed, but also a potential weakness when it did not function effectively. Overall however, the advantages of use appeared, at this stage, to considerably outweigh any disadvantages.

6. Overview and recommendations

This report has drawn from three sources of data in order to assess the effectiveness of the Renaissance Learning programs in improving pupil achievement and motivation in a number of Specialist and feeder schools in London. The findings relating to standardised tests in reading and mathematics have been reported in Chapter 2, the responses to the pupil surveys have been detailed in Chapters 3 and 4, and Chapter 5 outlined teacher perspectives based on face-to-face interviews. This final chapter pulls these findings together in order to provide an overview of the key issues and benefits arising from the use of the programs, and also offers some initial recommendations for consideration.

6.1 Issues arising from the programs

Whilst the test data indicated overall improvements in average pupil standardised scores in both mathematics and reading in the Renaissance schools, and the questionnaire data indicated mostly no decline in attitudes and, in some cases, improvements in pupil perceptions, the data also point to a number of issues that are worthy of consideration with respect to the future implementation of the programs. These issues were mostly raised in the teacher interviews (even though the teachers were predominantly positive about the programs) and can be categorised under three headings: technical issues; support and professional development; and targeting pupils.

Technical issues

The Accelerated Maths and Accelerated Reader programs were introduced into schools which were mostly operating in challenging, inner-city, socio-economic circumstances, and school staff had many demands operating upon them in what were inevitably very busy institutions. In this context, it was not surprising that some of the school staff complained that, during the introductory period of using the programs, technical issues could be irritating and time consuming.

As noted in the previous chapter, interviewees in all of the four schools visited said that they had encountered technological problems when they first started using the programs. These had included computers crashing and printers not working. In some cases the problems may have been general technological issues and nothing to do with the Renaissance Program, but because they were part of the package of implementation they were associated with the new programs. In addition, all the teachers mentioned the problem of 'technical dependency'. The Renaissance Programs were very helpful in that they could be used to provide complete lessons with the setting and assessment of pupils' work all in one package, but if anything went wrong then the whole lesson (and the follow up) would be affected.

Support and professional development

It is clear that the successful implementation of the programs required a high degree of commitment from the teachers responsible for the mathematics and English/reading groups who were using the programs. Sufficient support in the early stages of the implementation of the programs, and the appropriate ongoing professional development for those involved in using them (including training from schools themselves and possibly from local authorities or the Specialist Schools and Academies Trust), may be necessary for maximising the success of the programs.

Teacher interviewees noted how, at the early stages of implementation, technical support from Renaissance Learning was not always available, so schools had to rely on their own technical knowledge or other local support, though this situation had improved considerably as the year went on. Additionally, the extent of staff training necessary to run the programs to maximum effect was referred to by interviewees in all the schools.

Targeting pupils

In Chapter 2 it was shown that the test results for secondary mathematics and primary reading improved more than those for primary mathematics and secondary reading. These findings lead to questions about policies for targeting pupils in these two subjects. Two of the teacher interviewees also raised questions about targeting pupils. As was noted in Chapter 5, one of the teachers felt that the secondary mathematics program was most appropriate for higher ability pupils or groups. Another felt that the Accelerated Reading

program was not linked closely enough with the National Curriculum targets.[15]

6.2 Benefits of the programs

The views expressed by the teacher interviewees were made in a constructive fashion and it should be stressed that they were predominantly positive about the impact of the Renaissance Programs on their teaching and on their pupils' achievements and attitudes. Three main benefits of using the programs can be identified from these comments and from the test and survey data:

Improvements in attainment

Bearing in mind all the qualifying comments made about sample sizes, the short timescale involved and the multiplicity of variables that can affect test scores (see Section 2.1) it does nevertheless need to be emphasised that there were improvements in average standardised test scores in the treatment schools for mathematics (both secondary and primary) and in the primary schools for reading. These were not spectacular improvements, but they can be seen as an important step in the right direction, progress that has occurred sometimes in schools where improvements are historically difficult to achieve because of the impact of external factors, such as population mobility, limited levels of parental support and high levels of socio-economic deprivation. Relevant key findings regarding the test data can be summarised as follows (see also Chapter 2):

- Taking all the schools using ***Accelerated Maths***, the average standardised pupil score (N=332 in sweep 1) increased by three points from 94.61 to 97.61; in the comparison schools (not using the program) the average standardised pupil score (N=170) decreased from 100.40 to 99.84.
- In primary schools using ***Accelerated Reader*** the average standardised pupil score (N=225 in sweep 1) increased marginally from 92.23 to 92.64; in the comparison primary schools (not using the program), however, the average standardised pupil score (N=66) also increased, and by a bigger margin.
- Taking all the schools returning tests for this evaluation, in **both mathematics and reading**, it was found that in the 14 schools using

[15] Since the basic aim of the Accelerated Reader program is to promote reading (generally), it could be argued that it need not be linked directly to the National Curriculum. The spring 2007 release of Accelerated Reading, however, will include the capacity for the provision of details of pupils' Estimated Reading Age and their National Curriculum Level scores.

Renaissance Programs the average standardised pupil score (N=658 in sweep 1) increased by nearly half a point from 93.79 to 94.23, whereas in the seven comparison schools the average standardised pupil score (N=277) decreased very slightly, from 98.41 to 98.36.

Improvements in attitudes

In general, the questionnaire data suggest that, with a few exceptions, there were no significant changes in pupil attitudes towards their subject (mathematics or reading), towards school in general, or towards ways of working, over the course of the school year. The exceptions, however, were mainly positive and were largely to do with working hard and making progress (rather than intrinsic enjoyment of the subject). Increased proportions of both Year 4/5 reading pupils and Year 7 mathematics pupils, in program schools, for example, expressed a view that they had made 'a great deal of progress' in these subjects over the eight-month period in question: the increases were from 46 to 52 per cent for the former and from 42 to 63 per cent for latter.

In addition, as noted previously, all the staff interviewees said that their pupils liked using the programs, to the extent that they could be disappointed if they discovered that a particular lesson did not involve the Renaissance program. All the interviewees agreed that one of the main strengths of the programs was that they helped to motivate students.

Flexible learning

Teacher interviewees were also enthusiastic about the contribution of the programs, alongside other forms of classroom activity, to flexible and 'personalised' learning. One respondent, for example, commented on the fact that the computer does the marking, 'which frees teachers to deal with pupils who are having difficulties'. The point about the appeal and usefulness of 'instant feedback' was repeatedly made by interviewees in all the schools. Additionally, in two of the schools, staff felt that using the program had strengthened links with parents, something which can be difficult to achieve in urban schools. The personalised learning aspects of the programs helped to address issues of differentiation for mixed ability classes, and of developing monitoring, intervention and support strategies.

6.3 Conclusions and recommendations

This was the first year of full implementation of these programs in any UK schools and this was effectively a pilot year for this initiative. In this context the research team offers the following recommendations for consideration regarding the further implementation of these programs:

- The main issues raised were to do with the **use of technology** in the very early stages of implementation, and all of these were subsequently resolved, but it may be worth giving further consideration to the question of how **early technical problems can be avoided and quickly resolved.**
- Another issue worth considering further is that of whether there should be any emphasis on a **particular program** (mathematics or reading) or **age group** (Years 4/5 or 7). The evaluation revealed that schools using the secondary mathematics and primary reading programs were achieving the best results - what implications does this finding have for the future development of these programs in a UK context? It also seems that the question of 'which age and ability groups would benefit most from using the programs?' is one that is worth considering further.
- The variations across program schools suggest that it would be useful to look at **good practice case studies**. For example, how were the two secondary mathematics schools able to achieve such positive test scores in just an eight-month period: is there anything that other schools could learn from the successes of these two schools?

There is already some evidence of success. In combination, the findings from this evaluation suggest that the use of the Renaissance Learning programs has contributed to steady progress in most of the schools using them. In some schools, particularly those using Accelerated Maths with Year 7 groups, progress has been beyond the levels that might have been predicted. If such examples can be replicated then the Renaissance Learning Programs have much potential for improving numeracy and literacy levels in UK schools.