Improving Literacy in the Transition Period: A Review of the Existing Evidence on What Works

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Authors' contributions

The work described here was carried out equally by both authors. Both have read and approved the final manuscript.

Original Research Article

ABSTRACT

Background: The transition from primary to secondary schools in England is marked by a concern over potential learning loss, and the realisation that a small number of students have not reached an expected or threshold level of literacy. The latter can then impact on progress in all areas of the secondary curriculum, and is reflected in subsequent qualifications. Very similar issues arise worldwide. In England, money has been made available via the Pupil Premium and the Catch-up schemes to deal with this. Several ameliorative strategies have been suggested and implemented, and several of these have claimed success even though the evidence for many is unclear. This paper presents the results of a review of all the available international evaluation evidence, to distinguish between those approaches that work, or might work and those that clearly do not.
Method: The review began with a search for all possible studies worldwide, focusing on those intervention programmes that have been rigorously evaluated.
Results: Forty-three studies met the barest minimum of design and quality standards for programme evaluation. The most promising single intervention programme was 'Response to Intervention' but even here the evidence was unclear.
Conclusion: Overall, these studies suggest that interventions to improve literacy for older children need to start earlier in the primary school years than current policy proposals in England intend. Successful interventions tended to be those that are clear and simple. They include teacher development at the outset, using new learning materials, and

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providing ongoing support focusing on those students clearly below the expected levels in literacy. However, there is still a range of interventions that could be effective but have not yet been tested. Large scale randomised controlled trials (RCTs) of these interventions could be conducted to establish their effects.

Keywords: School transition; literacy; literacy catch-up; interventions; secondary school.

1. INTRODUCTION

Concerns for student progress during transition from the primary to the secondary phase of schooling prompted much research in the UK from the 1970s onwards, with an emphasis at that stage on the observed dip in performance greater than the usual summer learning loss. Possible explanations put forward included a lack of communication between the two phases, stress caused by anxiety and adjustments to a new environment, a new set of unfamiliar teachers, different pedagogy, a subject-based curriculum taught by specialists and new sets of school rules and new routines [1]. Consequently schools now have a plethora of induction activities to facilitate smooth transition of students from one phase of schooling to another, which tend to focus on the social and emotional issues related to transition. One of the earliest projects looking into issues related to transition was the ORACLE (Observation Research and Classroom Learning Evaluation) project by Galton et al. [2]. They suggest that the decline in student progress at transition had more to do with curriculum continuity and teaching and learning than previously expected.

The National Curriculum (NC) was introduced in England on the understanding that learning would be continuous and the NC would ensure continuity of curriculum between the two phases, but this did not happen in practice. In the ORACLE project, Hargreaves and Galton [3] found that one of the reasons for the hiatus in student progress in literacy at transition was the change in emphasis from literacy skills, such as reading, writing and comprehension in primary school to an emphasis on response to literature in the secondary school. The National Literacy Strategy, which was first introduced in primary schools [4], was extended to include the secondary Key Stage 3 in September 2001 following a national pilot scheme. This was planned to ensure continuity and progress in students' literacy as they move to the secondary phase of schooling. Despite this, there was still evidence of a dip in students' literacy performance at transition. This was especially more so for those from disadvantaged backgrounds. In September 2011, as part of the Pupil Premium policy the government pledged £50 million for a Summer Schools programme to tackle the decline in achievement for disadvantaged students during the summer holiday. Although much research had been carried out to find the most effective literacy programme to counter this 'summer loss', the evidence was still unclear. For this reason, the Education Endowment Foundation commissioned a review in 2012 to find the most promising literacy catch-up programmes with the intention of funding large randomised controlled trials for such interventions. This was the background that formed the evidence for this paper.

Catch-up literacy projects are a set of educational interventions for students who are struggling to reach the age appropriate levels in literacy according to the standard norms in the UK. It is based on the existing evidence that struggling students entering secondary school are more likely to remain falling behind as compared to their peers [5]. In order to address the issue at a policy level the current government considered financial investment as one of the main solutions. On May 2012 the government announced an additional £10

million fund for the pupil premium children who enter secondary school with below Level 4 in literacy [6].

The target of this funding was students at risk of poor literacy, by narrowing down the teaching time, school space and resources specifically to the needs of the disadvantaged but obviously this is not done at the expense of other students. However, at a broader level recommendation of such a strategy is an indication of over-looking the existing evidence on strategies of improvement for disadvantaged students. Secondly there is also an assumption that the treatment is needed by the students and there is perhaps no problem with the schools, teachers and teachers' training practices. It is quite possible that the locus of any required intervention is not the children.

> "The support will be for pupil premium students who leave primary school without Level 4 literacy - the expected level. And we envisage that schools will want to use it for small catch-up classes, or one-to-one tuition, or vouchers for literacy tuition that parents can spend." [6]

> "I'm determined that the government does everything it can, through the Pupil Premium, to bring children up to speed in literacy as they make the transition from primary to secondary school. This money will be a huge boost to schools in giving extra support the children who need it."

> *The Deputy Prime Minister's speech - "Delivering Education's Progressive Promise: Using the Pupil Premium to Change Lives." - was hosted by the National Education Trust and delivered at New North Academy, Islington.*

The aim of this paper is to identity what works to improve primary:secondary transition for disadvantaged students with lower than expected literacy, and the key features of successful interventions.

2. METHODS

The search for potential studies worldwide focused on nine key educational, psychological and sociological databases. These were ASSIA, ERIC, Social Services Abstracts, Sociological Abstracts, PsycInfo, International Bibliography of the Social Sciences, ProQuest Dissertations and Theses, British Education Index and Australian Education Index. These were supplemented by literature suggested by previous work in this area as well as those from online search engines such as Google Scholar. The focus of the search was on studies that used an appropriate design to evaluate an intervention or programme to improve literacy for students in the age of transition. Hence the keywords included secondary transition, Key Stage 2, Key Stage 3, Year 6, Year 7, grade 5, grade 6, and literacy, reading, writing, English, and randomised controlled trials, trials, interventions, propensity scoring, instrumental variable, experiment and their synonyms. The search was limited to studies reporting from 2001 to May 2012, in the English language. Pioneering works that were relevant and validated by the What Works Clearing House were also considered even if they fell outside the specified time scale.

The searches picked up 3,975 studies of which only 158 were judged on inspection to be relevant to the topic and not duplicates of each other. Of these 115 were excluded for various reasons, such as not being relevant to the right age group, not about improvement in literacy (e.g. an intervention to improve awareness of literacy strategies), not primary

research (e.g. reviews) or not empirical (e.g. teaching instructional manuals or guidance sheets and opinion pieces). Some were specifically about teaching English as a second language, and some were not about literacy but about school transition in general. Eventually, only 43 studies were included for detailed analysis and synthesis. These were supplemented by a further similar number of studies picked out from references in the 43 or suggested by colleagues. As with any review there will be studies that have been missed, and the findings may be biased if their inclusion would substantially alter the review conclusions. The latter seems unlikely as this study is the largest and most up-to-date review on this topic, and it is hard to envisage it missing predominantly the largest or best studies.

These studies were then classified into three groups: intervention programmes that have reasonable evidence of positive effects, those that have weak or inconsistent evidence of effects, and those with reasonable evidence that they do not work. There were not enough robust studies with the same characteristics in each of these areas for a formal meta-analysis. All of the studies were classified based on judgements about what works and what does not, partly informed by the studies themselves, partly by the quality of the evidence presented and by prior reviews such as those by the What Works Clearing House.

3. OVERVIEW OF FINDINGS

A number of intervention programmes had looked promising for improving literacy gains over and just after the summer vacation at the start of secondary school. Unfortunately, some of these have been shown to be ineffective, and some have mixed or unclear evidence of effectiveness. These are dealt with in turn in the next two sections of the paper, before a section describing those that remain promising even after evaluation. Knowledge of what does not work, however, can be almost as useful for policy and practice, since it helps avoid wasted resources and opportunities.

3.1 Interventions with No Evidence of Effect

3.1.1 Summer schools and summer activities

There is no clear evidence that getting students involved in summer activities has been effective in preventing summer loss. Two studies on summer literacy programmes suggested that summer school made no difference to the literacy gain scores of those who went to summer school compared to those who did not.

In a large scale matched comparison study involving 2,000 students, both control and Summer School students demonstrated a similar decline between pre- and post-test [7]. It seems that the reason for the summer decline had nothing to do with whether literacy teaching and practice took place or not during summer.

A second study involved giving students 10 books, including postcards and letters to read during the summer holiday [8]. Intervention students reported reading on average three more books than the control students, but there was no difference in literacy performance between the groups after the vacation. What these two studies show is that it is not enough just to make books available to children in the summer or providing more school over summer. There is nothing directly effective about summer schools as such, and the key issue is not the timing.

3.1.2 Technology and software

As with summer schools, the use of technology by itself during the transition period did not help improve the literacy performance of those who used it compared to those who did not. Several studies relating to the use of computer software designed to improve literacy for students in the transition years have failed to show any positive impact. In fact, a number found the use of technology actually slowed down students' progress. For example, Khan and Gorard [9] compared the performance of students using a technology-based approach with those using an alternative approach to literacy learning. This study involved 672 students in 23 initial Year 7 literacy classes randomised to use the commercial software or to standard treatment. The alternative treatment group made greater progress than the group using the commercial software (effect size of -0.4). In another study Brooks et al. [10] also found no beneficial effects of the use of computer on students' spelling and reading. If anything, the use of computer had a negative impact on students' reading. Brooks et al. examined the effects of learning literacy where students received one hour of literacy delivered via the computer every day for 10 days. This study involved 155 Year 7 students in one school. Both these studies suggest that the use of software may be detrimental to literacy development.

Johnson and Howard [11] compared the reading and vocabulary achievement of 755 students in the 3rd, 4th and 5th grades before and after they used a software package (Accelerated Reader). The paper claimed that 'high' users of the software showed greater gains than 'low' users, although no improvement scores were reported. As there was no comparison group and no randomization it is hard to say whether high usage was the cause or the effect of literacy gains. It is possible that skilled readers enjoy reading more and thus use the computer more frequently.

Meyer et al. [12] compared the effects of a web-based tutoring system on different measures of reading comprehension. The participants were 111 grade 5 and 7 students. They were stratified by their composite reading scores and then randomised to receive either elaborated or simple feedback, choice or no choice and other measures of reading comprehension. There were 12 treatment and control conditions. Children receiving elaborated feedback made substantial progress in reading comprehension (d = 0.55) compared to those receiving simple feedback (d = 0.15). It made no difference whether students had choice or not in the practice lessons. Weaker students also made greater progress between pre- and post-test (d = 0.73) compared to more competent readers (d = 0.27), although this could be result of regression to the mean. However, the results of this study have to be taken with caution because of the small sample size in proportion to the large number of strata, meaning that there were on average only four students per grade and treatment condition. There was also no control group.

3.1.3 Financial incentives

There is also no evidence that offering financial incentives for results to students, families, teachers or schools can improve literacy skills for disadvantaged students. For example, Bettinger [13] evaluated the Coshocton financial incentive programme where students received gift certificates for every good result in five core subjects. In each school two grades of students from grades 3 to 6 were randomised to take part in the study. These students were then compared with students in other grades in the same school and with similar grades in other schools. Altogether there were 24 control and 24 treatment grades. Using teacher rated assessments, Bettinger, found that the incentives made no difference to

students' literacy grades, although it did show effects on maths scores. It is surmised that literacy learning involves a certain level of skills that extrinsic motivation like financial incentives alone cannot help to improve. While students may be able to prepare for other tests by memorising facts or formulae, they cannot do the same for reading or writing. A similar study of 38,000 students from 260 schools in the US [14] also found that the use of monetary incentives did not improve attainment in maths and reading. Financial incentives or extrinsic motivation may improve students' attitude, behaviour, attendance and completion of homework, but could not improve attainment as an outcome. For example, rewarding students with money may encourage students to read more books, but this does not necessarily improve performance in reading comprehension.

There was only one study involving the use of financial incentives which suggested impact on improving test scores [15]. In this study financial rewards were given to schools that improved performance above the expected level based on the previous cohort's threshold. Using a regression discontinuity design, the study found that schools that missed out on the previous year's threshold achieved higher test scores between grades 4 and 5 in reading (last two years of primary school). However, it has to be noted that the previous cohort and current cohort of students differed, and also improvements were seen only for the highest achieving students. This suggests that offering financial rewards to schools can push able students to realise their potential, but has no effect on low achievers.

3.1.4 Project CRISS

Project CRISS (Creating Independence through Student-owned Strategies) is a programme where teachers model learning strategies for students to help develop independent learning. It is aimed at improving reading, writing and learning for 3rd to 12th grade students age 8 to 18). The strategies used by teachers include monitoring learning and building on prior knowledge with new information. The emphasis is on active learning through lots of discussions, writing, organising information and analysing structure of text. This programme has been the basis of extensive research [16]. However, only two studies out of 31 met WWC minimal evidence standards.

The first evaluation by Horsfall and Santa [17] reported a positive effect on comprehension for students in grades 4 and 6 (age 9/10 and age 11/12), but only using a teacher-developed 'free recall' comprehension test. There is therefore a question concerning the validity of the test used. There was also a dropout of around 20% from each class. This was a randomised controlled trial in three schools. Teachers were randomly assigned either to Project CRISS and received training, or to regular instruction. In total, the sample included 120 students in six intervention classrooms and 111 students in six control classrooms in grades 4 and 6 (the only years considered for this review). The duration of the programme was for 18 weeks.

James-Burdumy et al. [18] examined the impact of Project CRISS together with a number of other reading programmes, including Read About, Read for Real and Reading for Knowledge. A total of 6,350 grade 5 students from 89 schools were randomly assigned to one of the four intervention or control groups. Only the findings for the 1,155 students attending the 17 Project CRISS schools, and 1,183 students in control schools are considered here. The study found no impact from Project CRISS on a standardised norm-referenced diagnostic test (GRADE), or on the science or social studies reading comprehension assessments. In fact, the combined intervention effect for all the four

programmes was negative, with the control group outperforming intervention students on both the GRADE assessment and the composite test.

In short the evidence of beneficial impact from Project CRISS is weak. The largest and most recent study based on standardised norm-referenced assessments found no effect. The only study that reported a positive effect was conducted by the programme producer themselves, and only with a specially created test of free recall. It is possible that the ideas of the programme have now become a part of teacher training since 1994.

3.1.5 Other studies with no evidence of effects

There were several individual studies that have apparently been evaluated only once, many of which did not demonstrate any convincing evidence of effect.

Writing Wings, a structured writing programme, was evaluated using 3,000 students in the 3rd, 4th and 5th grades in 39 schools across the US [19]. No positive effect of the programme was found on the writing ability of disadvantaged students.

The Rainbow Repeated Reading programme was found to have no added effect on reading skills [20]. This was an add-on to an existing programme, MULTILIT (Making Up for Lost Time in Literacy). The programme emphasised repeated reading of short sections of texts, which were graded, to increase accuracy and fluency. This was carried out over nine weeks. Forty students from Years 2 to 7 who were enrolled on the MULTILIT programme in two sites were randomly assigned to receive this additional programme. Two tests were used to assess impact. One showed no difference, while the other showed a positive impact in only one site, indicating a possibility of inconsistency in administration.

Another bespoke programme involved instruction on the *learning environment* using video-taped lessons with 5th grade students in Belgium taken from four experimental classes (n=79) and eight control classes (n=149). It showed that although the intervention encouraged students to use reading comprehension strategies, it did not improve comprehension skills [21].

3.2 Interventions with Mixed or Unclear Results

These are interventions that have been evaluated once with unclear results or repeatedly with mixed results, some due to issues relating to implementation and many due to flaws in their design making their findings untrustworthy.

3.2.1 Literacy acceleration

Literacy Acceleration is a 50-minute daily small group literacy programme where students are engaged in individual reading while also receiving individual help with phonics, writing and a structured spelling programme [22]. This programme is aimed at students in the first two years of secondary school who have difficulties with literacy. It was trialled with two cohorts of students (15 in first cohort, and 23 in the second cohort) in one secondary school in the UK. Students on the programme made improvements in reading, but not for spelling. This study had several issues. First, the comparison groups were not equivalent in that intervention students were those below Level 3 at Key Stage 2, while those in the comparison groups were those above Level 3. As the samples were not random and the

groups not randomised the use of significance tests was not valid. The sample size was very small.

Rider [23] evaluated a reading programme which used a combination of direct instruction and supposedly effective strategies which were embedded in the content using diverse texts and intensive writing. The study involved 52 grade 8 students (age 13 to 14). Although it was reported that the treatment group showed improvement in reading achievement, there were no details about the comparison group or about how the participants were selected or assigned. There was also no information about attrition. Given the small sample size and the lack of crucial information about the study design, the findings of this study are therefore questionable.

3.2.2 Concept-oriented reading instruction (CORI)

A study of the two-week *Concept-Oriented Reading Instruction* (CORI) programme claimed that it was effective in improving the reading test scores of 156 low achieving grade 5 (age 10 to 11) students [24]. Participants were from three schools (two intervention and one comparator). CORI students outperformed traditionally taught students on the Gates-MacGinitie Reading post-test, scoring higher on word recognition speed and reading comprehension. This study, however, had a number of serious flaws. First, the intervention and comparator students were not drawn from the same school, and no baseline equivalence was established for both groups. CORI students had higher grades than control students at the outset. There were also more students identified as having special educational needs in the control group (22%) compared to only 7% in the intervention group.

3.2.3 Read 180

Read 180 is a small group reading programme designed for both primary and secondary students not achieving the expected level of proficiency. The programme involves a combination of tracking students' progress via the computer, reading practice using a computer program, reading of story books and direct instruction on reading, writing and vocabulary in two 90-minute sessions. It has been evaluated in 111 studies listed by What Works Clearing House (WWC) [25]. Many of these did not meet WWC standards for evidence and those that did, were not able to provide clear evidence of impact.

A number of studies portrayed positive effects, but the evidence is not always clear due to compromises made in the research. For example, Interactive Inc. [26] reported mixed results, but a re-analysis by WWC found no clear differences. Assignment to groups was violated as parents/caregivers and students were allowed to request inclusion or exclusion even though the treatment was meant for those who the school believed would most benefit from it. In a large trial involving 16 schools in the US, READ180 was offered to 617 grade 4 to 8 students who were not achieving the expected grade level in literacy [27]. Results on standardised English Language Arts and Reading tests showed that the treatment group made greater progress in reading compared to a comparator group of 4,619 students from the same schools. However, the average effect across the three grades was not large enough to be considered important. The use of significance testing was also misplaced as the sample was neither randomly selected nor randomly allocated.

Another evaluation of READ180 involving 384 grade 6 to 8 students from one middle school found no intervention effect in the first year, although greater gains were reported for the intervention group compared to the control group in the second and third year [28]. A

smaller study by Caggiano [29] involving 120 grade 6 to 8 (age 11-14) students found no clear differences between groups in all the three grades on standardised tests in reading. However, differences between groups were reported for grade 6 only on the Scholastic Inventory Reading Comprehension Assessment, a test designed by the developer of the programme. One study conducted by Scholastic Research [30] the same organization who created and marketed the intervention, reported clearly different results in general literacy for 285 students in grades 6, 7, and 9 after one year of READ180, compared to 285 matched students. All were considered to be struggling readers, and a majority had English as a second language. The outcome measure was the gain score in the English Language Arts subtest of the California Standards Test.

Two fairly large studies using standardised assessments found no positive effects of READ180 on students' literacy. For example, Kim et al.'s [31] evaluation of READ180 offered to 264 grade 4 to 6 (age 9 to 12) students identified as struggling readers found no effects on all outcome measures, including reading fluency, reading comprehension and vocabulary, using norm-referenced and standardised tests. The study involved randomly assigning poor readers from three elementary schools to READ180 or an alternative non-literacy focused after-school programme. Both groups scored below the proficiency level at the end of the intervention period. In a most extensive evaluation of the READ180 programme covering five sites in different states of the US [32], no differences were found in all the sites apart from one, and then only in the middle school (not high school). This site had a very high dropout rate of 55% which was not addressed by the complex analyses used by the authors. This finding is important as it is one of the largest studies of READ180 involving 5,551 students from grade 6 to grade 10 (age 11 to 16). In this study, students identified as achieving below their grade level were randomly assigned to either READ180, Extreme Reading (alternative reading programme) or 'business as usual' where they received regular instruction. The outcome measures in all sites were the standardised, state level assessments.

The overall evidence for READ180 is therefore inconclusive. It is shown to work chiefly with assessments designed by the developers but not on standardised assessments and only with younger children (age 11). It did not work in the few randomised controlled trials nor for those most at risk. One explanation for the mixed effects could be the inconsistency in the implementation of the programme. In some cases, instruction was for 60 minutes rather than 90 minutes, and in another study it was carried out every other day, rather than on a daily basis. There may also be differences between schools in the amount of training that teachers received.

3.2.4 Peer assisted learning

Peer-Assisted Learning Strategies (PALS) is a peer-tutoring programme where students work in pairs on reading activities. The aim is to improve reading accuracy, fluency and comprehension. Students read aloud and listen to each other providing feedback, taking turns to be tutor and tutee. WWC [33] evaluated 97 such studies, but only one met the minimum standards for evidence and design.

Fuchs et al. [34] reported 'significant' gains in reading comprehension for PALS' students. A reanalysis by WWC which takes into consideration the clustering in the sample found no 'significant' difference, despite a reasonable effect size. There were a few issues with this study. The baseline scores of the PALS and control group students were not equivalent. A sample size of 60 in each arm, where teachers (n=20 in each arm) rather than individual

cases were randomised, is not large enough for convincing results. Given the small sample size, the high and uneven (between groups) dropout rate of 45% is sufficient to render the results unreliable. It is also worth noting that the evaluation was conducted by the developer of PALS.

In another study, Van Keer [35] compared different models of peer tutoring: teacher-led whole class peer tutoring, same-age peer tutoring and cross-age peer tutoring in 19 Dutch schools. This study reported gains for both whole-class and cross-age peer tutoring compared with the control group. No differences were detected for same-age peer tutoring. This study used a matched control group design across a school year. Although the students were reportedly from 9 to 12 years old, the results were only reported for one age group without specifying which age group that was. Also with three age groups, three conditions and a control, it is not clear that 22 teacher clusters is sufficient. Therefore, while there are suggestions that peer mentoring could assist, the evidence is not strong, not based in the UK, and not specific to disadvantaged and struggling Year 6 and 7 students.

3.3 Studies with More Promise

Very few interventions for literacy catch-up have been rigorously evaluated at scale and 'survived' in terms of providing evidence of benefit. Those uncovered by this review are summarised here.

3.3.1 Response to intervention

Response to Intervention (RTI) is a tiered intervention process originally designed to identify students with learning disabilities, and is targeted at the specific needs of students in the form of a whole class approach as preventive teaching (Tier 1), followed by small group remediation (Tier 2) for those who needed more attention and one-to-one tutoring for those who do not respond to the small group instruction (Tier 3). It works in two ways. One is identifying the needs of the students via a case-by-case analysis and tailoring instruction based on these needs. Another way is the use of a standard treatment protocol (STP) to determine the most appropriate research-based practice to tackle these problems. RTI is delivered in three tiers of increasingly intensive instruction.

The evidence for RTI is mixed and incomplete, with small samples or samples unknown and in different contexts. Graves et al. [36] evaluated the Tier 2 or small group intervention for 6th graders (age 11/12) in a large urban school. Students received instruction for 30 hours over 10 weeks. The study reported that the treatment was more efficacious for students with learning disabilities and for oral reading fluency, but less so for reading comprehension.

Faggella-Luby and Wardwell [37] examined the effects of the Tier 2 intervention which randomly assigned 86 at-risk students in the 5th and 6th grades (age 10-12) to three treatments – Story Structure (SS), Typical Practice (TP) and Sustained Silent Reading (SSR).Only 6th grade students on SS and TP outperformed those in SSR in all three tests (standardise curriculum-based test; Strategy-Use test and Gates-MacGinitie Reading Comprehension). The impact on 5th grade students was not clear. The Strategy-Use test assessed strategies that were taught only to students in the SS group, and is not a test of general comprehension or reading. So using this test may not be valid for comparison. Also, the study compared only post-test results without establishing whether the three groups were similar to start with. The small sample divided into three treatment groups and two

grade levels suggests that there were fewer than 20 in each group. This is too small for conclusive evidence.

Vaughn and Fletcher [38] summarised a series of studies conducted over the years involving a total of 1,867 students (1083 struggling readers and 784 typical readers) in grades 6-8 from seven middle schools. The findings suggest that secondary school students who received both Tier 1 (enhanced whole class instruction) and Tier 2 (small or large group) interventions made greater improvements in decoding, fluency and reading comprehension compared to those who received only Tier 1 intervention, but the effect was small (d = 0.16). There was no difference between the small and large group intervention. Vaughn and Fletcher believed that the key feature of an effective RTI programme was the enhanced classroom instruction. Interestingly, the study showed that individualised attention had no particular advantage over the standardised approach for students with learning difficulties. In fact it did more harm than good.

Leroux et al.'s [39] evaluation of the intensive Tier 2 (small group) intervention showed that there were significant differences between treatment and comparison groups on two of three of the outcome measures. However, the difference was largely due to the continuing decline of the Tier 1 students in the comparison group, rather than real gains by the treatment group. The small sample of only 30 students across three grade levels (grade 6 to 8) from three middle schools is not large enough to provide convincing results. These students were identified as those with severe reading difficulties. The intervention therefore helps prevent decline in performance, but does not offer 'catch-up' to normative 8th grade reading levels.

3.3.2 Individual studies with promise

There are also some specific intervention programmes which show promise but have only been evaluated once among the studies produced by the search.

Learning Strategies Curriculum (LSC) is a supplementary reading intervention to improve reading comprehension for 6th to 9th graders (age 11 to 15) where students received 50-60 minutes of LSC per day for the entire school year. Cantrell et al. [40] evaluated this intervention for 862 students in 12 middle and 11 high schools. The intervention was found to be effective in improving reading comprehension for 6th graders (effect size of 0.22), but not for 9th graders on both outcome measures. It has to be noted that there was a high attrition rate of 24%.

Contextualised grammar teaching is a writing intervention which focused on giving students pedagogical support and enhancing teachers' subject knowledge about grammar. Myhill et al. [41] examined the impact of this programme on 744 students aged 11 to 18 from 32 schools. Intervention students were given the pedagogical support while control students only had an outline scheme of work. Intervention students made greater improvements between pre- and post-test compared to control students. Given that the students were aged 11-18 from 32 schools, on average there can only have been about three students of each age in each school.

The question-answering programme is an intervention to enhance reading comprehension and vocabulary. Brown [42] evaluated this programme for 267 Year 5 students (age 9/10) taken from 10 classes across three schools. Students were assigned (in an unspecified manner) to question-answering programme or regular reading classes. Teachers volunteered either to take treatment or control classes. Three outcome measures on reading

comprehension, question-answering and vocabulary and reading fluency showed that experimental group made greater improvements than control group.

6+1 Trait Writing is a supplemental writing programme that complements the schools' existing writing curricula. Coe et al. [43] examined the impact of this programme on 4,461 (2,230 intervention students and 1,931 control students) in 74 schools in the US. Students' writing performance rated on the six core characteristics of the 6+1 Trait Writing Model's definition of writing quality was used as outcome measures in the pre- and post-tests. The results showed that experimental students increased their writing scores in a year, but only by a small overall effect size (0.12 to 0.14). Only three of the six outcome measures were reported as improved.

4. DISCUSSION

Despite the many interventions and programmes to improve literacy, those that specifically address literacy for students in transition to secondary school in mainstream settings are few. Those that do, have mostly shown little or no positive effects, and in some cases even negative effects. Some of the interventions were too complicated for easy implementation, some involved multiple strategies making it difficult to tease out the active ingredient, while some were too reliant on the competence of teachers and their ability to use the prescribed resources. Many involved a short-term and single application strategy. Those that reported positive effects had often only been evaluated once and on a small scale, or had no proper randomisation or no report of how assignment was carried out, high attrition or no report of attrition. There were also studies with a conflict of interest where the intervention was evaluated by the developers. There were some which reported positive effect using programme-developed tests, but not for standardised tests. Others targeted multiple components with mixed results, for example, showing impact for reading but not spelling. Consequently, there are no obvious interventions that can be recommended without further evaluations.

However, there are some valuable lessons that can be learnt from this review, First, strategies to tackle poor literacy for older students should probably start early in the primary school years. One year of intervention or intervening in one summer cannot make up for the many years of reading failure and inadequate support for learning. Early deficits in reading practices and skills accumulate over time. Second, the promising interventions tended to be those that are clearly structured and simple and can be easily implemented. Third, strategies should be focused targeting single issues, such as grammar, written or oral comprehension and asking and responding to questions. Fourth, there is also an indication that there is advantage in targeting students clearly below the expected level of competency rather than making the intervention applicable to all students in general. Fifth, to be effective intervention needs to be ongoing rather than a one-off treatment. Finally, adequate training and support for teachers in the implementation is essential especially if they are responsible for the delivery of the intervention.

5. CONCLUSION

It appears that intervention programmes to address problems related to primary:secondary transition have hitherto been targeted at the symptoms rather than the source of the problems. Early identification of literacy problems and early intervention are one way forward. Intervening at the period of transition may be too late. Perhaps strategies to

address the poor performance of pupils in secondary school at transition should be conceived as a whole package starting in early primary school and should be ongoing. Why should we expect pupils who have not been able to read properly all through their primary school to suddenly reach their age appropriate reading competency in secondary school? Likewise, pupils who consistently perform at or above their age reading competency are less likely to suddenly fall behind at the transition phase. There may be issues pertaining to anxiety, stress and unfamiliar curriculum when a child moves to secondary school, but these affect all pupils alike, not only those from disadvantaged backgrounds. Gaps in attainment at transition are usually predicted early on in the child's school life. Interventions that show promise are worth further evaluation in new contexts, for example, Response-to Intervention, cross-age peer tutoring, Learning Strategies Curriculum, contexualised grammar and the question-answering programme.

Above all, there is an urgent need for research in education and its users and funders to demand a much higher quality of evaluation than those described here which are among the best to be found. Results of research can have a profound impact on children's future career, their future earnings and future happiness. Poor quality studies are not just a waste of money. Many people, including teachers, parents and children invested a lot of their time participating in these studies. Policy makers make decisions based on their findings. Research matters to all involved, from commissioning to rolling out the results for struggling students. However, despite considerable work and investment of public resource, it remains unclear whether many of these intervention programmes work or not.

ACKNOWLEDGEMENTS

COMPETING INTERESTS

We, the authors declare that we have no competing interests that would bias our work or the reporting here.

REFERENCES

1. Sainsbury M, Whetton C, Keith M, Schagen I. Fallback in attainment on transfer at age 11: evidence from the Summer Literacy Schools evaluation. Educational Research. 1998;40(1):73-81.
2. Galton M, Gray J, Ruddock J. The impact of school transitions and transfers on pupil progress and attainment. DfEE Research Report No. 131. Norwich: HM's Stationery Office; 1999.
3. Hargreaves A, Galton M. editors. Moving from the primary classroom: 20 years on. London: Routledge; 1999.
4. DfEE Transforming Key Stage 3: National pilot; 2000.
5. Galton M, Gray J, Ruddock J. The impact of school transitions and transfers on pupil progress and attainment. DfEE Research Report No. 131. Norwich: HM's Stationery Office; 1999.

6. DfE. Delivering education's progressive promise: using the Pupil Premium to change lives. 2012. Accessed 12 January 2014.
    Available:https://www.gov.uk/government/speeches/delivering-educations-progressive-promise-using-the-pupil-premium-to-change-lives.

7. Sainsbury M, Whetton C, Keith M, Schagen I. Fallback in attainment on transfer at age 11: evidence from the Summer Literacy Schools evaluation. Educational Research. 1998;40(1):73-81.

8. Kim JS. Effects of a voluntary summary reading intervention on reading activities and reading achievement, Journal of Educational Psychology. 2007;99(3):505-515.

9. Khan M, Gorard S. A randomised controlled trial of the use of a piece of commercial software for the acquisition of reading skills. Educational Review. 2012;64(1):21-35.

10. Brooks G, Miles JNV, Torgerson CJ, Torgerson DJ. Is an intervention using computer software effective in literacy learning? A randomised controlled trial. Educational Studies. 2006;32(2):33-143.

11. Johnson RA, Howard CA. The effects of the accelerated reader program on the reading comprehension of pupils in grades 3, 4, and 5.The Reading Matrix. 2003;3(3):87-96.

12. Meyer BJF, Wijekumar K, Middlemiss W, Higley K, Lei PW, Meier C, Spielvogel J. Web-based tutoring of the structure strategy with or without elaborated feedback or choice for fifth- and seventh-grade readers. Reading Research Quarterly. 2010;45(1):62-92.

13. Bettinger E. Paying to learn: The effect of financial incentives on elementary school test scores. NBER Working Paper No. 16333:National Bureau of Economic Research; 2010.

14. Fryer R. Financial incentives and student achievement: Evidence from randomized trials. NBER Working Paper No. 15898:National Bureau of Economic Research; 2010.

15. Lauen DL. The effects of school-wide bonuses on student achievement: regression discontinuity evidence from North Carolina. Paper presented at the Society for Research on Educational Effectiveness Conference. (no details about place and date of conference) Last updated on 15/09/2011. Accessed 20 June 2012.
    Available: http://www.eric.ed.gov/PDFS/ED518377.pdf.

16. WWC. Project CRISS® (CReating Independence through Student-owned Strategies). What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2010.

17. Horsfall S, Santa C. Project CRISS: Validation report for the program effectiveness panel. Unpublished manuscript. 1994. In WWC. Project CRISS® (CReating Independence through Student-owned Strategies).What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2010.

18. James-Burdumy S, Mansfield W, Deke J, Carey N, Lugo-Gil, J, Hershey A, Douglas A, Gersten R, Newman-Gouchar R, Dimino J, Faddi B. Effectiveness of selected supplemental reading comprehension interventions: impacts on a first cohort of fifth-grade students (NCEE 2009-4032). Washington, DC: National Center for Educational Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education; 2009.

19. Puma M, Tarkow A, Puma A. The challenge of improving children's writing ability: A randomised evaluation of Writing Wings. Washington DC: Institute of Education Sciences, US Department of Education; 2007.

20. Wheldall K. Does Rainbow Repeated Reading add value to an intensive literacy intervention programme for low-progress readers? An experimental evaluation, Educational Review. 2000:52(1):29-36.

21. De Corte E, Verschaffel L, Van De Ven A. Improving text comprehension strategies in upper primary school children: a design experiment, British Journal of Educational Psychology. 2001:71(4):531-559.

22. Lingard T. Literacy Acceleration and the Key Stage 3 English Strategy – comparing two approaches for secondary-age pupils with literacy difficulties. British Journal of Special Education. 2005:32(2):67-77.

23. Rider LM. The impact of direct reading instructional strategies on reading achievement in 8th grade students. Unpublished EdD dissertation. Baltimore: Walden University; 2010.

24. Guthrie JT, McRae A, Coddington CS, Lutz Klauda S, Wigfield A, Barbosa P. Impacts of comprehensive reading instruction on diverse outcomes of low- and high-achieving readers. Journal of Learning Disabilities. 2009:42(3):195-214.

25. WWC. READ 180.What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2009.

26. Interactive Inc. An efficacy study of READ 180, a print and electronic adaptive intervention program: grades 4 and above. New York, NY: Scholastic Inc.; 2002. Evaluated in WWC READ 180.What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2009.

27. White RN, Williams IJ, Haslem MB. Performance of District 23 students participating in Scholastic READ 180. Washington, DC: Policy Studies Associates; 2005. Evaluated in WWC READ 180. What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2009.

28. Woods DE. An investigation of the effects of a middle school reading intervention on school dropout rates. Unpublished doctoral dissertation. Blacksburg: Virginia Polytechnic Institute and State University; 2007.

29. Caggiano JA. Addressing the learning needs of struggling adolescent readers: The impact of a reading intervention program on students in a middle school setting. Unpublished EdD dissertation. Virginia: The College of William and Mary; 2007.

30. Scholastic Research. Desert Sands Unified School District,CA. New York, NY: Scholastic Inc.; 2008.

31. Kim JS, Samson JF, Fitzgerald R, Hartry A. A randomized experiment of a mixed-methods literacy intervention for struggling readers in grades 4-6: Effects on word reading efficiency, reading comprehension and vocabulary, and oral reading fluency. Reading and Writing: An Interdisciplinary Journal. 2010:23(9):1109-1129.

32. Sprague K, Hamilton J, Coffey D, Loadman W, Lomax R, Moore R, Faddis B, Beam M. Using randomized clinical trials to determine the impact of reading intervention on struggling adolescent readers: reports of Research from five nationally funded striving readers grants. Papers presented at the Society for Research on Educational Effectiveness Conference, (no details about place and date of conference). Accessed 20 June 2012.
Available: https://www.sree.org/conferences/2010/program/abstracts/208.pdf.

33. WWC. Peer-Assisted Learning Strategies. What Works Clearinghouse Intervention Report. Washington: US Department of Education, Institute of Education Sciences; 2012.

34. Fuchs D, Fuchs LS, Mathes PG, Simmons DC. Peer-Assisted Learning Strategies: making classrooms more responsive to diversity.American Educational Research Journal. 1997;34(1):174-206.

35. Van Keer H. Fostering reading comprehension in fifth grade by explicit instruction in reading strategies and peer tutoring. British Journal of Educational Psychology. 2004;74:37-70.

36. Graves AW, Brandon R, Duesbery L, McIntosh A, Pyle NB. The Effects of tier 2 literacy instruction in sixth grade: Toward the development of a Response-to-Intervention Model in middle school. Learning Disability Quarterly. 2011;34(1):73-86. (full paper not available, analysis based on abstracts)

37. Faggella-Luby M, Wardwell M. RTI in a middle school: Findings and ractical implications of a tier 2 reading comprehension study. Learning Disability Quarterly. 2011;34(1):35-49.

38. Vaughn S, Fletcher JM. Response to intervention with secondary school students with reading difficulties. Journal of Learning Disabilities. 2012;45(3):244-256.

39. Leroux A, Vaughn S, Roberts G, Fletcher J. Findings from a three year treatment within a Response to Intervention framework for students in grades 6 with reading difficulties. Paper presented at the Society for Research on Educational Effectiveness Conference, (no details about place and date of conference). Accessed 20 June 2012. Available: http://www.eric.ed.gov/PDFS/ED518866.pdf.

40. Cantrell SC, Almasi JF, Carter JC, Rintamaa M, Madden A. The impact of a strategy-based intervention on the comprehension and strategy use of struggling adolescent readers. Journal of Educational Psychology. 2010:102(2):257-280.

41. Myhill DA, Jones SM, Lines H, Watson A. Re-thinking grammar: the impact of embedded grammar teaching on students' writing and students' metalinguistic understanding. Research Papers in Education. 2012:27(2):139-166.

42. Brown G. The efficacy of question-answering instruction for improving year 5 reading comprehension, Unpublished PhD dissertation. Sydney, Australia: University of Western Sydney; 2004.

43. Coe M, Hanita M, Nishioka V, Smiley R. An Investigation of the impact of the 6+1 Trait Writing Model on grade 5 student writing achievement: Final Report. Washington DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, US Department of Education; 2011.