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Bug Club

Efficacy Research Report

Pearson

Contents

Product Summary

Bug Club is an online and in-print reading scheme that is designed to help children learn to read by providing carefully levelled books that 'children would choose themselves'. It is targeted at ages 4-11 and the 350+ books follow a well defined, phonically based progression of small steps, aligned with the National Curriculum for England (2014). Bug Club and its sister product Phonics Bug are based on the outcomes of an independent 7 year study into the efficacy of systematic synthetic phonics known as the Clackmannanshire study (Johnston & Watson, 2005), the findings of which show that systematic synthetic phonics is an effective way to teach children to read, and which provided the basis of subsequent UK Government' policies for teaching reading and informed the the 2014 curriculum.

Bug Club's printed books feature inside cover notes to advance learning and to aid parents/ teachers reading with children. The online books can be assigned to children by their teacher and feature automatically marked quizzes linked to comprehension skills which assess children's understanding of the text. Additional features of the online books include a "read to me" functionality (at Key Stage 1, 4-7 years).

Bug Club works alongside Phonics Bug which comprises a set of 135 phonically decodable books along with whole class teaching software for the interactive whiteboard which provides lessons to deliver phonics teaching. Phonics Bug books are also available online and feature the same online quizzes as Bug Club books, however with a primary focus on assessing phonic knowledge.

Bug Club and Phonics Bug are supported by professional development courses which provide information on navigating the service and the pedagogical principles which underpin it.

Product Market

Bug Club is used in over 40 countries and has helped over a million children learn to read. Its primary customer base is the UK, Australia and countries in the Middle East. Currently in the UK over 5,000 schools are using Bug Club and/or Phonics Bug services.

Bug Club was launched to market in digital and print formats in 2010 to the Key Stage 1 age group (4-7 years), with Key Stage 2 (8-11 years) following in 2011. Since then we have extended the number of titles available and made improvements to the service. These include moving from a Bug Club specific flash platform to a general primary platform called ActiveLearn Primary which is built in HTML5 and therefore is accessible on iPads and other mobile devices.

Intended Outcomes

The following are learner outcomes that have been agreed for the product based on internal research and validated with Bug Club customers. Our efficacy impact evaluation work (outlined in "Product Research" below) aims to evidence Bug Club's impact on these outcomes.

The intended outcomes focus on the four areas of the learner outcomes framework. Equity and access are very important for Bug Club as a reading programme that includes both print books and eBooks for children in primary schools. Moreover, since reading is one of the most important life skills, factors of learner engagement, attitudes, motivation and independent reading are also crucial. Finally, Bug Club intends to prepare learners for the next stages of their reading experiences and schooling.

Intended Outcome 1: Learner access is enabled.

Bug Club is available on PC, laptop, iPad and selected Android devices. Children are becoming increasingly exposed to, and interested in, reading via online electronic books. As with printed texts, electronic texts have been found to aid the development of language and literacy skills such as phonological awareness, word recognition, comprehension and fluency (Ciampa, 2012). Studies have also shown that children often prefer electronic to printed texts. For example, in the UK, the National Literacy Trust (2013) found that whilst 39% of children and young people read daily using electronic devices, only 28% read printed texts daily.

Intended Outcome 2: Contributes to positive learner (attitudinal) behaviours to reading (engagement and enjoyment).

Bug Club has been designed to engage learners through a wide range of reading characters, formats, genres and topics spanning all levels. Having thoroughly researched what engages children in reading, the Bug Club team worked with and continue to work with teachers and pupils who use Bug Club to improve the service. Bug Club was initially trialled in 12 schools with 36 teachers and 360 pupils. The Bug Club team gathered systematic feedback via school visits, questionnaires and interviews to inform the development of Bug Club every step of the way.

Intended Outcome 3: Learners achieve the appropriate reading standard according to age and aptitude.

The focus here is the age related reading standard achieved by learners, and the progress made by all learners. We look at the value added for all pupils, including boys and girls as subgroups, those on Free School meals (FSM) / Pupil Premium (PP) and those who have English as an additional language (EAL).

All books are levelled to a fine grain and matched to the primary curriculum, which supports learners to achieve the appropriate reading standard for their age. The structure around vocabulary introduction, sentence structure, line breaks, image support etc. is what helps a child work their way up through the levels in a reading programme, moving from 'learning to read' to 'reading to learn'. Furthermore, the Bug Club product team worked to ensure the layout and font supported readers with dyslexia.

Intended Outcome 4: Readiness for the next reading phase

The emphasis here is on the learners' readiness for the next phase of their reading (Key Stage 2) and also the next stage of their schooling.

Foundational Research

Bug Club has been designed to appeal to a generation of 'technology savvy' children with high expectations of engagement and a familiarity with online games and services. It brings together printed books with an online reading world and is underpinned by a rigorous pedagogy and fine grained levelling to support progression for all children.

Bug Club's pedagogy is built on the seven-year Clackmannanshire study (Johnston & Watson, 2005), the findings of which show that systematic synthetic phonics is an effective way to teach children to read, and which provided the basis of subsequent UK Government' policies for teaching reading. Synthetic phonics is an accelerated form of phonics that begins instruction with teaching letter sounds and then quickly moves to how sounds can be blended. Students sound out each letter in turn and "synthesize" the sounds together to generate pronunciation of the word. This stands in contrast to analytic phonics in which letter-sound correspondence is not taught until after children begin to learn some words by sight. In this approach, letter sounds are taught with by emphasizing sounds in words already known. The Clackmannanshire study randomly assigned students to either synthetic phonics or one or two versions of analytic phonics. The students in the synthetic phonics group outperformed the other two groups in both reading and spelling at the end of 16 weeks. After the control groups were also given synthetic phonics instruction, they too began reading at above average levels for their age group and that gain persisted over six more years.

There is clear support for phonics instruction generally. Two major meta-analyses (statistical reviews of all the research studies available) concluded that programs with systematic phonics instruction are more effective than programs without (National Institute of Child Health and Human Development, 2000; Torgerson, Brooks, & Hall, 2006). Looking across research studies, the benefits of one type of phonics instruction over another is not as clear, but they all clearly outperform no phonics instruction. Both meta-analyses support the use of balanced literacy instruction, combining phonics instruction with exposure to books and reading, as is the case in the design of Bug Club.

Furthermore, Bug Club was created in consultation with reading experts and practitioners, in line with a nationally recognised progression system, created by the University College London Institute of Education (Baker, Bickler, & Bodman, 2007), known as book bands (Book Banding is a national scheme that grades children's reading books according to the difficulty of the text. Each level of books is given a colour.), and is aligned to the 2014 UK National Curriculum. This program includes guided reading, in which teachers work with small groups of similar-ability children reading aloud and prompt for strategies, particularly around using multiple strategies to decode and comprehend (Iaquinta, 2006). Guided reading has been shown in randomised control trials to result in better reading outcomes than reading while listening and a control that did not involve independent reading (Reitsma, 1988).

Intended Product Implementation

Bug Club is intended for use as a main school reading programme in the classroom, for home reading, and for and assessment activities. Schools do not always purchase all elements together or use all materials as suggested therefore Bug Club is often used in conjunction with other materials such as other learning websites, other reading schemes and self-made teacher materials. The Bug Club and Phonics Bug materials can be used as follows:

Bug Club for Guided Reading

Every book is accompanied by a comprehensive set of teacher notes which enable the teacher to run a guided reading session. Typically 6 children who are reading at the same level will join the teacher in a reading and discussion of the text, with their discussion guided by the notes provided. This typically lasts for 20-30 minutes and enables children to unpick the text and develop their comprehension. Photocopiable activities are also provided for each book which the teacher can use if they wish as a follow-up to the guided reading session. During the guided session each child will have a copy of the text either in print or digitally via a tablet or laptop. Typically each child would have one session in a group with the teacher per week where they worked through anything from a chapter to a book depending on text length.

Bug Club & Phonics Bug for Independent Reading

Within Bug Club and Phonics Bug a teacher can assign a book digitally to a child's account for them to read at home, or provide the child with a print book to read at home which is at the correct level. If teachers assign the digital version of the text, then the child is delivered comprehension/phonics questions through the text which help to build understanding while reading independently. The results of these questions are reported to the teacher for formative assessment purposes. If the child is using a printed copy they do not benefit from the quizzes, however both print and digital copies include notes for parents to support their children in independent reading. Typically at least a book a week would be sent home for independent reading, either online or in print.

Bug Club & Phonics Bug for Whole Class Teaching

The interactive whiteboard lessons in Phonics Bug are designed to be delivered daily throughout reception and year 1 (4-6 years old) and follow a structured progression of phonic sounds to build children's reading fluency. Each lesson examines in turn the sound, reading, spelling, writing and follow-up activities supported by video and audio to demonstrate and deliver the lesson. Each lesson is supported by a suite of games which can be played by the class on the interactive whiteboard to help embed and formatively assess knowledge of phonic sounds.

Product Research

The following section presents two studies: an exploratory study and a Randomised Control Trial (RCT) that focus on the impact of Bug Club on learners after five-and-a-half months and twelve months. The exploratory study was conducted with 18 primary schools in 2014 to understand the implementation of Bug Club resources in schools and also to inform the research questions and the methodology of the main study.

The main study is made up of an RCT in 36 primary schools and a process evaluation in 10 of the intervention schools. The main study was carried out in primary schools between January 2015 and July 2016. The interim findings after five-and-a-half months and twelve months suggest that, in the intervention schools, Bug Club is having a positive impact on learners on all four learner outcomes.

Research Studies

Bug Club Exploratory Study

Study Citation	Bodman, S., Ahtaridou, E., Franklin, G., and Dunn, K. (2014) Bug Club Exploratory Study, Internal Draft, UCL Institute of Education and Pearson.
Research Study Contributors	International Literacy Centre, UCL Institute of Education: • Dr. Sue Bodman • Glen Franklin Efficacy and Research team, Pearson UK: • Elpida Ahtaridou • Krystina Dunn
Type of Study	Structured telephone interviews with experienced Bug Club users.
Sample Size	18 schools (30 interviews with headteachers and literacy coordinators).
Description of Sample	The sample was drawn at a school level. A nationally representative sample for each of the Ofsted categories, used in national school inspections, was achieved. The composition of the sample is given in the method.
Outcomes Measured	• Pupil access is enabled. • Contributes to positive pupil reading (attitudinal) behaviours (engagement and enjoyment). • The majority of learners achieve the appropriate reading standard according to age and aptitude. • Readiness for the next reading phase.

Introduction

The aim of the exploratory study was to support the design of the Bug Club Randomized Control Trial (RCT) and gather evidence on the level of school engagement with Bug Club and its perceived usefulness in supporting learner outcomes. Furthermore, it aimed to provide robust evidence to the Bug Club team that could support the ongoing development and design of Bug Club products and services offered.

To achieve the above aims, the study sought to:

- Explore engagement with Bug Club and perceptions of its quality, usefulness and effectiveness (content, materials, the ActiveLearn Primary (ALP) platform and professional development), including whether Bug Club matches pupil, teacher, and school needs across different circumstances, and if products are adapted (and, if so, how).
- Understand what is perceived to work well and support learning, as well as areas for improvement and how improvements can be made.
- Gather suggestions on potential areas for further exploration through surveys, questionnaires, interviews, and observation schedules.

Methodology

Between April and July 2014, members of the Pearson UK team carried out 30 telephone interviews with 12 head-teachers and 18 literacy coordinators across 18 schools. The structured interview schedule was designed in partnership with academics from the International Literacy Centre of UCL Institute of Education, in preparation for the planned RCT. The schedule featured a series of statements for interviewees to agree or disagree with and a discussion was developed from their responses.

The sample was drawn at a school level. A nationally representative sample for each of the Ofsted categories was achieved. The respondent sample was comprised of:

- **Experienced Bug Club users:** defined as schools which have received some form of professional development or support, both free and paid, set up support and materials; and have been using Bug Club, both print and online, for more than one year.
- **Purposive sampling from existing Bug Club users:** using Maximum Variation Sampling strategy in order to include extreme and typical cases. To avoid a convenience sample and therefore erode the purpose of this phase of research activity, we followed a sequenced sampling framework, which included:
  - Ofsted judgement: schools falling under the categories of Outstanding; Good; and Requires Improvement.[1]
  - Size of school: <200 pupils; >200 pupils.
  - Free School Meals (FSM) indicator: <15% of pupils; >25% of pupils.

  To note, the findings within this report are based on qualitative evidence, and as a result, conclusions regarding the causal effect of Bug Club cannot be drawn. Statements can only be interpreted as teacher perceptions of student learner outcomes using the product. Furthermore, as the results are based on a sample of only 18 schools, findings should be interpreted with care, and teachers' insights and feedback on the product should not be generalized to other settings.

1 Ofsted Inspection Framework 2016 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/461767/The_common_inspection_framework_education_skills_and_early_years.pdf

Findings

The following findings outline interviewees' perceptions of Bug Club's usefulness in supporting learner outcomes

Pupil access is enabled

The majority of interviewees agreed that **Bug Club encourages equality of access to learning for pupils.** Specifically, 22 out of 30 interviewees agreed with the statement that use of Bug Club was *"promoting greater equality through digital access"*.

Schools spoke with high enthusiasm about online reading and its potential to support learning; they found the access and flexibility of the online capacities to assign books for reading or rereading, home reading, and the comprehension quizzes of high value. Schools also identified a potential for social learning. They suggested that families come together to read when using eBooks and that counting the number of books read via the home access facility supports purposeful competition amongst parents, pupils and siblings which ultimately leads to more books being read by pupils.

Schools saw the value in integrating electronic reading resources into classroom reading programmes, with many schools reporting a specific use for children becoming disaffected with reading – especially boys. Respondents noted particularly that Pearson are at the forefront of e-reading in schools and valued the 'uniqueness' of the product in this area. Many comments referred to market-leading, innovative resources that enable children to develop 21st century reading skills.

Interviewees reported common issues regarding ensuring access for all learners, including:

- Pupils owning a computer at home.
- Enabling all pupils to use the Bug Club online version individually and at the same time in the school (this was not always possible due to the lower number of computers per pupil and at times due to technical issues).

Schools reported that the above issues could be solved if iPad compatibility was available, and could also further support pupils' IT skills, especially those who were identified as computer illiterate. Since this research was carried out, all eBooks, quizzes, functionality and online reading world are now fully iPad compatible and accessed via the iPad compatible ActiveLearn Primary platform.

Contributes to positive pupil reading (attitudinal) behaviours (engagement and enjoyment).
All interviewees agreed that **Bug Club provides enjoyment and motivation to pupils.** Specifically, all 30 interviewees agreed with the statement that use of Bug Club was *"providing enjoyment and motivation"* to pupils.

Bug Club was considered to support pupils' enjoyment and engagement in Key Stage 1 especially. Overall, interviewees were keen to stress the quality of the books and how they were highly valued in supporting learning through:

- **Choice:** a wide range of texts are available that have the potential to support different pupil interests.
- **Enjoyment and motivation:** books are current and relevant to pupils, supporting motivation to read and enjoyment. The design of the books was also praised and was perceived to motivate pupils to read and reread them.

The majority of learners achieve the appropriate reading standard according to age and aptitude and readiness of the next reading phase.
The majority of interviewees agreed that:

- **Bug Club products support pupil achievement:** specifically, 29 interviewees (out of 30 responding to the question) agreed with the statement that use of Bug Club is "raising reading standards".
- **Bug Club supports pupil progression:** specifically, of the 29 interviewees responding to the question, 20 agreed with the statement that the use of Bug Club is *"maintaining age-appropriate progress".*
- **Bug Club products narrow the attainment gap:** specifically, of the 29 interviewees responding to the question, 27 agreed with the statement that use of Bug Club is *"narrowing the attainment gap".*

Bug Club products were perceived to be helpful in achieving high standards generally and with particular pupil groups. Responses were focused on Reception and Key Stage 1 resources. In particular, they were perceived to support:

- **All ability groups, especially lower and middle attainment bands:** responses point to the read-aloud function and the comprehension questions being particularly useful for these groups of pupils. The differentiation provided through the book bands was perceived to be robust and to support pupil progression, as were the comprehension quizzes, also highly valued by teachers.
- **Reluctant readers and especially boys:** respondents view Bug Club as supportive of reluctant readers for a number of reasons, including its use of technology, relevant and up-to-date books, the sense of play when children are actually learning, and the competitive element built in the platforms through the rewards.
- **Children with English as an Additional Language (EAL):** a particular benefit is seen for this group, due to the speak-aloud and read-aloud functions, even more so if their parents have limited English.
- **Children with Special Educational Needs (SEN):** the guided reading programme is seen as being particularly helpful for dyslexic children.

Conclusion

Interviews with 30 headteachers and literacy coordinators in 18 schools provided useful insights into the perceived usefulness of Bug Club in supporting the Learner Outcomes. Overall, Bug Club was considered by those interviewed to be a high-quality resource that supports pupil engagement and motivation to read as well as literacy achievement and progression for all.

Bug Club Randomized Control Trial and Process Evaluation:
Interim Findings from five-and-a-half months of Implementation

Study Citation	Findings are based on two interim reports, as below: • Hurry, J., Ahtaridou, E., Carroll, C., Dunn, K., and Grima, G. (2015) *Interim Evaluation of Bug Club*, Internal Draft, UCL Institute of Education and Pearson. • Bodman, S., Ahtaridou, E., Franklin, G., Dunn, K., Grima, G., and Greene, V. (2015) *Beginning to be a Bug Club School: Exploring Impact, Usage and Implementation*, Internal Draft, UCL Institute of Education and Pearson.
Research Study Contributors	Department of Psychology and Human Development, UCL Institute of Education: • Professor Jane Hurry • Dr. Catherine Carroll International Literacy Centre, UCL Institute of Education: • Dr. Sue Bodman • Glen Franklin Efficacy and Research team, Pearson UK: • Associate Professor Grace Grima • Elpida Ahtaridou • Krystina Dunn • Vanessa Greene
Type of Study	RCT and process evaluation
Sample Size	• **1,510 pupils are participating in the RCT.** For this five-and-a-half month period, this includes 757 girls and 753 boys, 719 Year 1 pupils and 791 Year 2 pupils, 748 pupils experienced Bug Club and 762 pupils made up the control group. • **36 schools in total are participating in the RCT, with RCT pupil findings drawn from 30 schools. The final sample of 1,510 pupils was drawn from 30 schools** (15 intervention and 15 control). An additional six intervention schools were only included in analysis on level of teacher implementation of Bug Club. Six control schools withdrew from the study, leaving these six intervention schools without a match. • **10 case study schools**, as part of the process evaluation, were drawn from the intervention group. Interviews were carried out with 164 Year 1 and Year 2 pupils, 113 teachers and 41 parents.

Description of Sample	The RCT sample was drawn at a school level, including only schools that did not use Bug Club during that scholastic year. It was designed to represent the broad range of characteristics of schools using Bug Club but not to be proportionately representative of the target population overall. Schools were chosen to give a range of each of the following characteristics: • Geographical location and urban/rural setting • Class size • Ofsted rating • Total percentage uptake of Free School Meals • Total percentage of English as an Additional Language pupils • Percentage of pupils achieving Level 2 at KS1 Case study schools in the process evaluation were purposefully selected to ensure that a range of implementation contexts were included in the sample. Criteria were developed to be able to discriminate between the intervention schools using: • School means scores and standard deviations deriving from the RCT pupil assessments. • Survey responses of usage and implementation in order to identify high, medium and low usage patterns. • Each school's ratings of the professional development for initial setup taken from evaluation forms and feedback from Pearson session facilitators. • School contextual data. • Information regarding full or partial implementation of Bug Club at Key Stage 1.
Outcomes Measured	• Pupil access is enabled. • Contributes to positive pupil (attitudinal) behaviours to reading. (engagement and enjoyment). • The majority of learners achieve the appropriate reading standard according to age and aptitude. • Readiness for the next reading phase.

Introduction

The evaluation of Bug Club, comprising a randomized control trial (RCT) and process evaluation, spans January 2015 – July 2016 over five scholastic terms. This longitudinal mixed-method study was designed to explore the impact and implementation of Bug Club, in particular:

- The impact of Bug Club on pupils' literacy learning, their attitudes to reading, school and their reading activity.
- The wider impact of Bug Club on pupil, teacher, school and parent outcomes.
- How Bug Club was implemented by schools and how schools, in the future, might be guided to ensure the very best outcomes from using Bug Club.

This report presents interim findings from research conducted over the first five-and-a-half months of the study. It seeks to answer the following questions:

- Does Bug Club have an impact on pupils after five-and-a-half months of implementation?
  - Do pupils following Bug Club make more progress in literacy compared to children in a control group?
  - Do pupil (year group and gender) and school level factors (e.g. Free School Meals (FSM), English as an Additional Language (EAL)) influence the impact of Bug Club on literacy progress (i.e., is Bug Club more effective for some pupils than others)?
  - Do pupils following Bug Club show more positive attitudes to reading and school and engage in more reading activity compared to children in a control group?
  - How do Bug Club materials support pupil outcomes?
- Does Bug Club have an impact on teachers and schools after five-and-a-half months of implementation?

Method

Research design

The most robust design for measuring impact was adopted for the study: a randomized clustered control trial (RCT) (Bloom et al, 2008; Robson, 2011). To evaluate the implementation process, a number of complementary data collection strategies were used to answer the research questions including interviews and observation data from 10 case study schools to explore in more detail the findings from the surveys and pupil assessment data.

Sample

Telephone calls and emails were used to invite schools that were not using Bug Club as their main reading scheme to participate in the study. Schools were then randomly allocated to one of the following groups:

- **Intervention group:** 21 (15 +6) schools following Bug Club January 2015 – July 2016. All intervention schools were provided with Bug Club KS1 readers (in print and digital form), Phonics Bug whole class teaching software and readers (in print and digital form) and Grammar and Spelling Bug (online spelling and grammar materials). All programmes were supplied with teacher support materials. Schools received the usual offering of technical support and a professional development session.
- **Control group:** 15 schools that did not follow Bug Club from January 2015, but received the same resources as the intervention group January – July 2016.

The final sample of 1,510 pupils (757 girls and 753 boys, 719 Year 1 pupils and 791 Year 2 pupils, 748 pupils in intervention schools and 762 pupils in control schools), on which this report's findings are based, were drawn from 30 schools. These 15 intervention and 15 control schools were based across England and Northern Ireland, and were matched in pairs on the basis of: percentage achieving Level 2 at KS1; geographical location (urban and rural); class size and percentage of Free School Meals (FSM) and English as an Additional Language (EAL).

An additional six intervention schools were only included in the analysis of teacher implementation of Bug Club (those without matched control schools).[2] Six control schools withdrew from the study, leaving these six intervention schools without a match.

2 21 intervention schools had a control school pair initially until 6 control schools withdrew from the study.

Attrition between number of pupils at baseline (January 2015) and the first follow up (June/July 2015) was small (pupils in intervention schools 3.8%, n=23, pupils in control schools 4.6%, n=34). Overall, intervention and control samples were well matched at baseline on:

- Demographics with no significant differences in gender, age, year group, EAL or FSM.
- Reading, developed ability and attitudes to reading and school with no significant differences.
- Reading activity: intervention pupils were more likely than control pupils to have read a book at home in the last week but there was no significant difference with how often they reported reading a book at home.

During the spring term, 10 case study schools were identified within the intervention group. The case study schools included 164 Year 1 and Year 2 pupils, 113 teachers and 41 parents. Criteria for selection was systematically applied to purposively select a range of schools in a range of geographic and economic contexts.

Data collection

The University of Durham InCAS standardized assessments were collected at baseline (January 2015) and at first follow-up (June 2015) from all intervention and control schools.[3] In addition, a pupil self-report to measure the impact of Bug Club on pupils' literacy learning, attitudes to reading and school and their reading activity and data relating to implementation and usage of literacy materials and attitudes to teaching and learning were gathered. Teacher surveys of usage to investigate the implementation of Bug Club were collected monthly. These data were collected in 30 schools randomly allocated to either an intervention or control group. The experiences of 10 case study schools as they implemented Bug Club were investigated in depth.

3 To note, two further follow-up assessments will take place throughout the study (at 12 and 18 months of implementation).

Table 1 presents an overview of data collection methods in both strands of the study for the different participants and the specific data collected from the intervention and control schools.

Table 1: Overview of data collection at five-and-a-half months of implementation

	Approach	Description	Data collected at five-and-a-half months
Data collected in all 36 intervention and control schools			
InCAS assessments	Standardized assessments	• Reading • Spelling • Developed ability • Attitudes	Data collected twice: baseline (January 2015) and June/July 2015
Pupil surveys	Self-reports	• Home reading activities	
Teacher Surveys	Self-reports	• School and home reading • Confidence (practice and pedagogy)	
Teacher surveys of usage	Self-reports	• Implementation approaches • Literacy activities • Usage of Materials • Frequency	Five weeks of implementation (one week a month for five months)
Data collected in 10 intervention case study schools			
School interviews [4]	Semi-structured one-to-one	• Implementation approaches • Views on materials • Perceptions of impact	113 interviews
Classroom observations	Pre-coded observations	• Materials used • Planning and usage of teacher resources • Pupil engagement	25 classes observed
Pupil interviews	Semi-structured groups	• Attitudes to reading (overall and Bug Club)	164 pupils
Parent Interviews	Focus Group	• Home reading activities • Perception of impact • Views on materials	41 parents

4 Head Teachers, Literacy Coordinators and class teachers from each case study school

Measuring impact

Three measures were used to assess impact:

- The computerised InCAS assessment programme.
- Online pupil survey.
- Teacher surveys of usage.

The first two were collected at baseline in January 2015 and at follow-up in June/July 2015. Teacher usage was reported monthly throughout this period. Data were analysed using descriptive and inferential statistics.

The computerised InCAS assessment programme

The InCAS assessment for 5-11 year olds, developed by the Centre for Evaluation and Monitoring at the University of Durham, was used to test the pupils' performance at baseline and at the first time of testing. InCAS is a widely used computerised assessment with age standardised norms and satisfactory reliability and validity (Merrell & Tymms, 2007). The following elements of assessment were used:

- Reading standardised score (subtests: word recognition, word decoding, reading comprehension).
- Spelling.
- Developed ability standardised score (subtests: picture vocabulary, nonverbal ability).
- Attitudes to reading and school.

Online pupil survey

At both testing points, pupils also completed an online survey of their reading activity at home, devised by the research team and based on The Reading Activities Inventory (Guthrie & Wigfield, 2000). The pupils were asked:

- Whether they had read a book at home in the last week?
- How often they read a book at home?
- To select from a list the types of materials they read at home.

Teacher survey of usage

Teachers completed surveys of their activities for the first week of every month from February to June 2015. A full set of surveys were provided by 21 intervention schools and 68 Bug Club classes. Teachers were asked to report on:

- Frequency of usage over the previous week.
- Context of usage.
- Use of non Bug Club materials.

Evaluation process

All intervention and control schools were involved in the process evaluation and survey of implementation conducted in the spring and summer terms of 2015. Key evaluation areas included impact on pupils, schools, teachers and parents in the intervention schools, pupil, parent and teacher perceptions, and patterns of usage and implementation. Questionnaires relating to attitudes to literacy learning and levels of confidence were collected for all Year 1 and Year 2 teachers in both intervention and control schools. The questions asked were general and provided comparison in perceptions of pupil and parent engagement and insights into how Bug Club may have impacted confidence and attitude more generally. The teacher usage survey was also drawn from all schools. In the 10 case study schools, further interview data were gathered from 164 Year 1 and 2 pupils, 113 teachers and 41 parents and observations of 25 teachers as they taught using Bug Club materials.
The data focused on:

- Self-reported impact on pupil, school, teacher and parent.
- Self-reported usage (parent and teacher).
- Teachers' perceptions of quality and usefulness.
- Parents' perceptions of quality and usefulness.
- Pupils' perceptions of quality.
- Patterns of contextual factors and attitudes which may influence implementation.
- Participants' reports of initial setup and professional development, first steps and moving to implementation.

Findings

Does Bug Club have an impact on learners after five-and-a-half months of implementation?

After five-and-a-half months of implementation, Bug Club made a statistically significant impact on pupils' reading, vocabulary and spelling performance particularly in schools with a high number of pupils who take Free School Meals (FSM). Pupils, parents and teachers reported greater engagement with reading, with pupils reading more and for longer. Bug Club materials were found to be motivating for pupils and were considered effective with the most reluctant readers. No similar RCTs have been identified to provide a direct comparison to these findings.[5] Whole class reading programmes that have been evaluated typically involve a much more intensive form of intervention than Bug Club.

To give the reader some sense of how much extra progress children made as a result of Bug Club, the size of the effect of Bug Club is expressed in a standardised form (Cohen's d), as outlined in Tables 3.1, 3.2 and 3.3 below. The tables can be read as follows:

- **Bug Club pupils average advantage gains compared to control pupils:** where a positive figure is reported, Bug Club pupils made greater gains than control pupils. In terms of interpreting the size of the difference, reading standardised scores are on the same scale as an IQ test, with an average score of 100. All the sub tests (including spelling) are reported as age equivalents, expressed below in months' progress. Attitudes to reading and school have a minimum score of -100 and a maximum of 100.
- **Statistical significance:** this indicates that a difference is unlikely to have occurred by chance and that we can be confident that there is a reliable difference between the groups on this measure.
- **Effect size(Cohen's d):** effect sizes of less than .2 are classified as small (Cohen,1988), but that is in comparison with every kind of intervention, irrespective of intensity or duration. For a classroom based reading programme, at the end of the intervention period, an effect size of .25 may be considered good (Hurry, Sylva, & Riley, 1999).

5 Three other RCTs look at the impact of reading programmes for whole class at Key Stage 1 (Tracey 2014, Frechtling et al. 2006, Borman et al. 2007). Only the Frechtling et al study (2006) provides comparable results to the present study in terms of outcomes, reporting an effect size of 1.32 for word decoding and an effect size of .23 for word reading. However, the reading programme is much more extensive than Bug Club, involving a wide range of instruction on phonics, comprehension and vocabulary, and including extra intervention for struggling readers, a summer school and so on. Also, pupils' progress was measured over one school year, rather the five months of Bug Club.

Pupil performance in literacy

Bug Club pupils made more statistically significant progress in reading, as measured by the InCAS standardised reading measure and all its subscales, in vocabulary and in spelling compared to pupils in the control group as shown in all of the assessments in Table 2.

The effect sizes were small, as to be expected, after just five-and-a-half months of implementation. Pupils in the intervention schools made 1.65 more points progress on the standardised reading measure than pupils in other schools, a small but significant effect. The effect on spelling might be anticipated at Key Stage 1, where spelling is very strongly influenced by phonics skills (Ehri, 1997; Frith, 1985; Hurry & Sylva, 2007).

Table 2: Summary of findings, comparing Bug Club and control pupils at outcome on literacy measures

Test	Bug Club pupils average advantage gains v control pupils	Statistical significance	Effect size (Cohen's d)
Reading standardised	1.65 standardised points	Yes	.11
Reading subtests			
- Word recognition	1 month	Yes	.06
- Word decoding	3 months	Yes	.13
- Comprehension	2 months	Yes	.06
- Spelling	3 months	Yes	.15
- Picture vocabulary	1.5 months	Yes	.08

The significantly greater progress of Bug Club pupils relative to children in the control group, was observed in both Year 1 and Year 2 pupils when compared with controls, with three exceptions: i) only Year 1 Bug Club pupils made significantly greater gains on picture vocabulary than control pupils; ii) only Year 2 Bug Club pupils made significantly greater gains on word reading than control pupils; iii) only Year 1 Bug Club pupils made significantly greater gains on reading comprehension than control pupils.

Pupil performance by characteristic (FSM, EAL and gender)

Bug Club had a greater impact (relative to control children) on pupils' reading and spelling gains in schools with a higher take up of FSM than in intervention schools with a lower take up of FSM. Table 3.2 summarises the findings when schools were split into two equal groups, those with a lower and those with a higher FSM proportion of pupils. In more socially disadvantaged schools (uptake of FSM greater than 11%), Bug Club children made significantly greater gains in a standardised reading than control children (6.5 points average gain compared to 2.1 points by control children). This was a medium effect size (Cohen's d=.31). In schools with 11% or less uptake of FSM (socially advantaged intake), the difference was not a statistically significant gain for Bug Club children compared to control children). An analysis of the sub tests showed statistically significant results for word recognition, word decoding and comprehension with a medium effect size for word decoding.

Table 3: Summary of findings, comparing Bug Club and control pupils on reading standardised at outcome by school uptake of FSM.

School % FSM uptake	Test	Bug Club pupils average advantage gains v control pupils	Statistical significance	Effect size (Cohen's d)
High FSM (more than 11%)	Reading standardised	4.64 standardised points	Yes	.31
Reading subtests				
	Word recognition	3 months	Yes	.17
	Word decoding	7 months	Yes	.40
	Comprehension	4 months	Yes	.15
	Spelling	3 months	Yes	.20
	Picture vocabulary	1 month	No	
Low FSM (11% or less)	Reading standardised	.40	No	
Reading subtests				
	Word recognition	0 months	No	
	Word decoding	1 month	No	
	Comprehension	0 months	No	
	Spelling	2 months	Yes	.12
	Picture vocabulary	1 month	No	

The impact of Bug Club was similar for boys and girls and for pupils in schools with high or low percentages of pupils with EAL.

Pupil outcomes in reading activity, motivation, attitudes to reading and school

Findings from the case studies showed that pupil engagement increased. Pupil, parent and teacher interviews reported that Bug Club materials, particularly in the online context, enhanced their engagement in reading. Pupils read more, teachers and parents reported that reading for pleasure increased during the course of Bug Club set-up and early implementation, and both parents and teachers reported children initiating reading activities, particularly with regard to the online element. Pupils were perceived to read for longer, and both parents and teachers reported that they perceived the length of time pupils chose to spend reading had increased after the implementation of Bug Club.

Findings from the pupil online survey showed no evidence of positive changes in pupils' self-reported reading activity as a result of Bug Club. However, it may be difficult to capture such changes in young children. Typically, measures of reading activity such as online surveys are only used with older children. However, an initial analysis of the level of agreement for the same questions asked in the case study interviews for 34 pupils and their online survey responses, indicated that the continued use of the measure of pupil reading activity is worth exploring. Similarly, there was no evidence of positive changes in attitudes towards reading and school as a result of Bug Club, based on the computerised InCAS measure (Table 4). This was true for both boys and girls, for schools with low and high percentages of pupils with EAL or taking FSM. However, this analysis will continue into Year 2 of the study to identify if changes do take place but require longer than five-and-a-half months.

Table 4: Summary of findings, comparing Bug Club and control pupils attitude to school and on reading standardised at outcome on attitude to school and reading.

Test	Bug Club pupils average advantage gains v control pupils	Statistical significance	Effect size (Cohen's d)
Attitude to reading	.36	No	N/A
Attitude to school	.15	No	N/A

Contribution of Bug Club materials towards pupil outcomes.

Table 5 summarises how the different elements and design features of Bug Club contributed to learner outcomes. Some of the key themes drawn from the data include:

- **Materials created a motivating and age appropriate context:** pupils reported enthusiasm for and enjoyment of nonfiction topics, story content and illustrative style. Parents reported that previously unmotivated boys were motivated by Bug Club materials, particularly the online reading world.
- **Bug Club materials were considered effective in motivating reluctant readers:** teachers and parents reported that a number of reluctant readers were newly motivated, particularly by the online element.
- **The online reading world platform was reported to support pupils to develop helpful and strategic approaches to monitoring their own comprehension:** many pupils reported approaches to engaging with online content that were beneficial to reading development. The online element provided an approach to assessing a range of reading skills, both decoding and comprehension, and was instrumental in motivating readers. The majority of pupils interviewed considered the online 'quizzes', with links to 'rewards' and the opportunity to collect and spend them enjoyable.

- **Bug Club was perceived to support inclusion:** pupil responses in the interviews indicated that Bug Club appealed to a range of learners, irrespective of gender, ability and age group (whether Year 1 or Year 2). Teachers reported that they observed all pupils finding Bug Cub materials appealing.

- **Teachers reported that they felt it was too early to say whether Bug Club implementation had an impact on pupil attainment:** one school (S3) perceived that middle ability children may be achieving more highly than expected, but they did not have school data to show this and considered it too early to be sure.

- **Most pupils were reported to be able to access the online reading world at home:** interview data indicated that in instances where home access was not possible, schools were aware of this and tried to provide access using school equipment, either during the school day or for the parents and pupils to use at prearranged times after school. Therefore, the digital component was not considered to disadvantage pupils without computer access at home.

- **Teachers report that they expect Bug Club to have an impact on learner outcomes:** many teachers reported that they have seen some impact on attainment achieved through increased reading mileage and increased engagement and motivation.

Table 5: Design features perceived by teachers to support impact across the Learner Outcomes.

Bug Club	Design feature
Print materials 	• High quality books that motivate children to read • Excellent story content and characterisation • Relevant topics for fiction and nonfiction • Illustrations and photography support reading for pleasure • The breadth of texts provides materials for a range of interests
Online reading world 	• Good functionality • An easy to use intuitive system • Inbuilt design features to support initial engagement and sustained motivation • Child-friendly interactivity
Teacher support	• Excellent initial IT support • Helpful set up and professional development at the start of the programme • Ways of monitoring reading mileage and reading comprehension via the ActiveLearn Primary platform

Does Bug Club have an impact on teachers and schools after five-and-a-half months of implementation?

The findings showed that after just five-and-a-half months of the programme it was possible to identify the positive impact of Bug Club for teachers and schools.

Teacher outcomes

Headteachers and teachers in case study schools reported the initial implementation of Bug Club served to motivate teachers to teach with renewed and increased enthusiasm. Many teachers reflected on how good-quality reading materials revitalised teaching practice and increased their repertoire of tools. Furthermore:

- **Interviews showed that Bug Club was acknowledged to provide a breadth of texts:** teachers and parents reported being satisfied that many genres of text were offered to young readers.
- **Materials were considered to provide support for a cross-curricular approach to teaching literacy:** teachers reported that the materials enabled them to teach thematically more easily than previous materials and programmes used by the schools.
- **Teachers were in general satisfied that Bug Club provides a useful resource that can be used as the core of a Key Stage 1 reading programme:** interviews showed that teachers felt Bug Club reading materials engaged learners and were of high quality.
- **Teachers perceived that Bug Club provides consistency of challenge and a good match to teaching purpose:** teachers considered that in general Bug Club supported the different activities taking place in the classroom such as guided reading, shared reading, phonics books and independent reading tasks.

School outcomes

Case study schools reported that, since implementing Bug Club, they were enabled to provide a greater emphasis on home-school reading partnerships. Not all schools set out to increase the amount of reading undertaken at home and the amount of parental engagement, yet this was an unplanned and welcome outcome reported in class teacher, headteacher and literacy coordinator interviews. Furthermore:

- **Interviews showed that reading was seen as a much broader activity following Bug Club implementation:** this was achieved through the provision of genres of many types and a high quality range of nonfiction texts.
- **Interviews reported greater inclusion achieved through Bug Club implementation:** pupils were thought to be reading more at home and those pupils who did not read at home were thought to be reading more at school.
- **The initial implementation of Bug Club increased collegiate working amongst staff:** some of the schools that had the opportunity to implement a range of materials from across Bug Club products reported in teacher interviews that they actively engaged with decisions about implementation and responded strategically around the order and timing of the implementation. This is a school characteristic that is likely to produce a more effective learning environment as it implies a focus on strategic response to pupil and parent need.

How materials may have supported pupil, teacher and school outcomes

- **Schools benefited from having a core programme that offers links to a range of reading contexts and instructional methodologies:** schools were enabled to offer a broad curriculum with reading materials appealing to a range of pupils. Teachers reported that the coherent and cohesive structure of Bug Club supported teachers in working together.
- **Assessing and tracking pupils' reading levels was felt to be supported effectively by the gradient of challenge expressed through book banding:** in general, banding and levelling of books was thought to be appropriate and to match IOE banding criteria (Baker et al, 2007; Bodman & Franklin, 2014). However, some comments indicated a perceived mismatch between some of the texts and the guidance notes and follow up activities provided. The Bug Club team has subsequently reviewed and updated, where necessary, all guidance and resources.
- **Teacher materials were perceived to be generally easy to follow and appropriate for newly qualified teachers in particular:** interview responses indicated that support materials may be particularly useful to support teachers who are new to the profession.
- **Teacher materials were thought to be supportive and timesaving:** during the interviews and debriefings after the lesson observations, many teachers said they were likely to use Bug Club materials since they viewed the materials as timesaving.
- **Teacher interviews showed that some teachers felt that Bug Club supported their teaching:** some teachers reported that Bug Club provided more formative assessment opportunities than they would otherwise create when working without the support of teacher materials and clear assessment guidance. These teachers felt it enabled them to deliver "better teaching" and increased their repertoire of teaching tools.
- **Bug Club was reported to provide consistency for teachers and pupils:** Bug Club was seen to support the carousel activities that happened in many of the classrooms.

Conclusion

The Bug Club evaluation reported here assesses the impact on pupils after five-and-a-half months of the programme and explores the experience of teachers, pupils and parents as they get to know the programme. After five-and-a-half months, Bug Club made a statistically significant impact on pupils' reading, vocabulary and spelling performance particularly in schools with a high number of pupils who take FSM. When interviewed, pupils, parents and teachers reported greater engagement with reading, with pupils reading more and for longer. Bug Club materials were found to be motivating for pupils and even the most reluctant readers.

In terms of pupil impact, this is one of the few RCTs of a whole school reading programme undertaken with pupils in Years 1 and 2 of primary school. The findings of this study indicate that implementation of Bug Club in schools was perceived to be effective and valuable in the greater majority of intervention schools and that it is already having a positive impact on pupils' reading performance, in particular, in schools with a high number of pupils who take FSM. On the basis of the current phase of the study, Bug Club would appear to be a practical and attractive addition to schools' reading and spelling curriculum.

The findings for pupil reading and spelling gains are more consistent across data collection methods than the findings for pupil engagement and reading activity; qualitative findings suggest a positive response to the programme, with teachers, parents and pupils self-reporting positive impact, but these were not measurable using quantitative techniques. Reading attitude and activity are hard to measure in such young children and self-reports may reflect positive perceptions rather than relate to positive and real advantages.

Bug Club (BC) Randomized Control Trial: Interim Findings from twelve months of Implementation

Study Citation	Findings are based on the interim report, as below: • Hurry, J., Carroll, C., Dunn, K., and Grima, G. (2016). *Interim Evaluation of the Bug Club Reading Programme II (A2).* Unpublished Report. UCL Institute of Education and Pearson.
Research Study Contributors	• Department of Psychology and Human Development, UCL Institute of Education: • Professor Jane Hurry • Dr. Catherine Carroll
Type of Study	RCT
Sample Size and type	• The final sample of 2200[1] pupils were drawn from 30 schools (15 BC and 15 control) across England and Northern Ireland, matched on the basis percentage achieving Level 2 at KS1; geographical location (urban and rural); class size and percentage of Pupil Premium (PP) and English as an Additional Language (EAL). • The first sample of 1510 pupils was recruited in January 2015 and were drawn from Year 1 (n = 719) and Year 2 (n = 791). • The Year 1 pupils were followed into Year 2 and re-assessed in January 2016 (n = 656) • A new cohort of Year 1 pupils (n = 690) was recruited in January 2016. • BC and control groups were well matched on demographics at baseline (January 2015 and January 2016), with no significant differences in gender, age, year group or FSM/PP. (In the January 2015 cohort there was a significant difference for EAL). • BC and control groups were well matched at baseline (January 2015 and January 2016) on reading, developed ability and attitudes to reading and school, with no significant differences. • Attrition between baseline and A2 was small in BC schools (1.4%), slightly larger but not excessive in control schools (15.8%).
Outcomes Measured	• Pupil access is enabled. • Contributes to positive pupil attitudinal behaviours to reading. • The majority of learners achieve the appropriate reading standard according to age and aptitude. • Readiness for the next reading phase.

[1] The total number of children assessed in January 2016 = 1784. For this report we have excluded: 1) children in the original six Bug Club schools for whom there were no matched control schools (N=314); 2) Year 2 children who were not assessed in 2015 (n=134 in matched schools).

The study aims to understand: the impact of Bug Club on pupils' literacy learning, their attitudes to reading and school and their reading activity. To achieve this aim, researchers implemented a randomised cluster control trial (RCT) with data collected at four different time points. Following on from the five-and-a-half months findings, this report presents the interim findings from the third phase of data collection (A2) conducted in January 2016, which is after twelve months of Bug Club implementation.

Research questions

This report presents the findings from the analyses conducted at baseline in January 2015 and the third phase of data collection in January 2016 (from here on described as Assessment 2 (A2)). A report of findings from the second phase of data collection in July 2015 (A1) has been published internally within Pearson. The research questions at A2 remain the same except that Pearson collected Pupil Premium (PP) and English as a Second Language (EAL) data at the pupil level that allowed for more rigorous analysis.

The purpose of the analysis was two-fold. Firstly, to evaluate the effects of BC after three terms of programme implementation (based on Year 1 pupils recruited in 2015 and followed up into Year 2). Secondly, to establish the robustness of the second sample of pupils at baseline on key characteristics. The second sample recruited new Year 1 pupils to the study in September 2015 combined with Year 2 pupils recruited as part of sample one in January 2015. The analysis of the January 2015 and January 2016 data was guided by three research questions:

1. Do pupils following the BC Reading Programme make more progress in literacy compared to children in a control group?
2. Do pupil (year group, gender, PP and EAL) factors influence the impact of the BC Reading Programme on literacy progress (is BC more effective for some pupils than others)?
3. Do pupils following the BC Reading Programme show more positive attitudes to reading and school and engage in more reading activity compared to children in a control group?

Method

Data collection

Two measures were used for this element of the evaluation, completed by the pupils in the final sample of 30 schools and also from the pupils in the six additional BC schools without matched controls:

1. The computerised InCAS assessment programme and
2. An online pupil survey.

Data was analysed using descriptive and inferential statistics.

1) The computerised InCAS assessment programme

The InCAS assessment for 5-11 year olds, developed by the Centre for Evaluation and Monitoring at the University of Durham was used to test the pupils' performance at baseline and A1. InCAS is a widely used computerised assessment with age standardised norms and satisfactory reliability and validity (Merrell & Tymms, 2007). The following elements of assessment were used:

- Reading standardised score (sub-tests: word recognition, word decoding, reading comprehension.
- Spelling.
- Developed ability standardised score (sub-tests: picture vocabulary, non-verbal ability).
- Attitudes to reading and school.

Standardised scores (reading and developed ability) have a mean of 100 and a standard deviation of 15, similar to an IQ test in this respect. All the sub-tests (including spelling) are reported as age equivalents (eg. a spelling age of 6.5 years). Attitudes to reading and school have a minimum score of -100 and a maximum of 100.

2) Online pupil survey

At both testing points, pupils also completed an online survey of their reading activity at home, devised by the research term and based on The Reading Activities Inventory (Guthrie, McGough and Wigfield, 1994). Pupils were asked:

- Whether they had read a book at home last week.
- How often they read a book at home.
- To select from a list the types of materials they read at home.

Key findings Summary

BC pupils made significantly more progress in reading, as measured by the InCAS standardised reading measure and in vocabulary at A1 and A2 compared to pupils in the control group. Pupils in the BC schools made 1.65 more points progress on the standardised reading measure than pupils in other schools, a small but significant effect at A1 and 1.74 more points progress at A2, also statistically significant.

At A1, BC pupils made significantly more progress in all of the reading subscales, but at A2, in the subscales, this progress was only evident in word decoding.

Progress in the word decoding subscale was significantly greater for BC pupils compared to the control group at A1 and at A2. At A1, BC pupils made three months more progress than controls, at A2 they had made six months more progress than controls. The effect size had also increased from a small to medium effect.

Progress in vocabulary was greater for BC pupils compared to control groups at A1 and A2. At A1, BC pupils made 1.5 months more progress compared to three months at A2.

BC pupils in receipt of Pupil Premium funding (PP) performed better in reading than pupils in receipt of PP in the control group. However, this interaction effect was not found for the other pupil characteristics i.e. boys and girls, pupils in Year 1 and 2 and pupils with or without EAL. In other words, BC had similar effects for boys and girls, for Year 1 and Year 2 pupils and for pupils with and without EAL.

Key Findings

At A1 and A2, BC pupils made significantly more progress in reading from baseline, as measured by the InCAS standardised reading measure, word decoding and vocabulary compared to pupils in the control group (Table 4.16). From baseline to A1, pupils in the BC schools made 1.65 more points progress on the standardized reading measure than pupils in other schools, a small but significant effect. This trend continued at A2 where pupils in BC schools made 1.74 more points progress on the standardised reading score.

Table 1: Summary of findings, comparing BC and control pupils' literacy outcomes at A1 and A2 on literacy measures

Test	BC pupils average advantage gains v control pupils		Statistical significance		Effect size (Cohen's d)	
	A1	A2	A1	A2	A1	A2
Type of Study	1.65 standardised points	1.74 standardised points	Yes	Yes	.11 (small effect)	.11 (small effect)
Reading standardised						
Word recognition	1 month	3 months	Yes	No	.06 (small effect)	–
Word decoding	3 months	6 months	Yes	Yes	.13 (small effect)	.24 (medium effect)
Comprehension	2 months	–	Yes	No	.06 (small effect)	–
Spelling	3 months	–	Yes	No	.15 (small effect)	–
Picture vocabulary	1.5 months	3 months	Yes	Yes	.08 (small effect)	

At A2, the interaction effect for FSM and condition where the outcome was Reading standardised did not reach statistical significance ($t(4,634) = 1.503$, $\beta = .069$, $p = 0.113$) (Table 2). However, BC still had a greater impact (relative to the control children) on pupils' reading gains in schools with a higher take up of FSM than in BC schools with a lower take up of FSM. In more socially disadvantaged schools (uptake of FSM greater than 11%), BC children made significantly greater gains in standardized reading than control children (8.9 points average gain compared to 5.5 points by control children). This was a small effect size (Cohen's d=.23). In schools with 11% or less uptake of FSM (socially advantaged intake), the difference was not statistically significant (8.3 gain for BC children compared to an average gain of 7.6 points for control children). BC children in the high FSM schools showed a greater advantage (significant) over controls on: Word Decoding (10 months); Picture Vocabulary (7 months) and (not significant) Comprehension (5 months) (Table 1.2). The same differences were not evident comparing BC and Control in the low FSM schools.

Table 2: Summary of findings, comparing Bug Club and control pupils on literacy gains at A2 by school uptake of FSM. (Relative gains are calculated from baseline to A2).

School % FSM uptake	Test	Bug Club pupils average advantage gains v control pupils	Statistical significance	Effect size (Cohen's d)
High FSM (more than 11%)	Reading Standardised	3.53 standardised points	Yes	.23
Reading subtests				
	Word recognition	0 months	No	–
	Word decoding	10 months	Yes	.41
	Comprehension	5 months	Not quite (p=.058)	.24
	Spelling	0 months	No	–
	Picture vocabulary	7 months	Yes	.33
Low FSM (11% or less)	Reading Standardised	.489	No	–
Reading subtests				
	Word recognition	0 months	No	–
	Word decoding	0 months	No	–
	Comprehension	-2 months	No	–
	Spelling	0 months	No	–
	Picture vocabulary	0 months	No	–

At A2, a significant interaction effect was found for PP on the reading standardised assessment (t (4,630) = 2.41, β= .088, p =0.016) (Table 2). BC children on PP made significantly greater gains in a standardised reading than control children on PP (9.4 points average gain compared to 4.0 points by control children). This was a moderate effect size (Cohen's d=.34). For children not on PP, the difference between BC and controls was not statistically significant (8.4 gain for BC children compared to an average gain of 7.7 points for control children). At A2, BC children on PP showed a greater advantage (significant) over controls on: Word Decoding (12 months); Comprehension (8 months) and Picture Vocabulary (5 months) (Table 3).

Table 3: Summary of findings, comparing Bug Club and control pupils on literacy gains at A2 by whether or not children were in receipt of Pupil Premium. (Relative gains are calculated from baseline to A2)

Pupil Level Pupil Premium	Test	Bug Club pupils average advantage gains v control pupils	Statistical significance	Effect size (Cohen's d)
Children on Pupil Premium	Reading Standardised	5.62 standardised points	Yes	.34
Reading subtests				
	Word recognition	3 months	No	–
	Word decoding	12 months	Yes	.41
	Comprehension	8 months	Yes	.38
	Spelling	0 months	No	–
	Picture vocabulary	5 months	No	.22
Low FSM (11% or less)	Reading Standardised	.713	No	–
Reading subtests				
	Word recognition	0 months	No	–
	Word decoding	4 months	Yes	–
	Comprehension	-1 months	No	–
	Spelling	0 months	No	–
	Picture vocabulary	3 months	No	–

Discussion

This study sought to understand the impact of Bug Club on pupils' literacy learning, their attitudes in reading and school and their reading activity. To achieve this aim, a randomised control study was conducted with data collected at four different points in time. The results are summarised below, and the results related to each research question are explored in more detail.

Pupil factors and progress in literacy

BC had a greater impact (relative to control children) on reading gains for pupils in receipt of PP: Socially disadvantaged BC children (in receipt of PP) made significantly greater gains in a standardised reading test than socially disadvantaged control children (at A1 5.7 points average gain compared to -.0.1 points by control children; at A2 9.4 points average gain compared to 4 points by control children). This was an effect size (Cohen's d) of .43 at A1 and of .34 at A.2, both moderate sized effects.

The impact of BC on reading was similar for boys and girls and EAL measured at A1 and A2.

Pupil performance in attitudes to reading and school and changes in reading activity: There was no evidence of positive changes in attitudes towards reading and school as a result of BC, based on the InCAS measure at A1 or A2.

1) Do pupils following the BC Reading Programme make more progress in literacy compared to children in a control group?

Yes, BC continues to have a positive impact on pupils' reading performance. Pupils in schools using the BC programme and resources have made significantly greater progress in their reading than children in schools not yet using BC at A1 and A2. The difference between the two groups of children continues to be statistically significant, giving greater confidence that this is a robust finding. Pupils in the BC schools made almost two more points (1.65/1.74) progress on the standardised reading measure (Cohen's d = .11) than pupils in other schools at both time points.

Whilst these findings are very positive, it does show a trend of BC having less of a statistically significant impact over time. Analysis of the teacher diaries suggests implementation started to vary between classes and that overall, implementation fidelity was lower at A2 than at A1, which could help to explain the differences in results from A1. This reinforces the notion that the resource is not teacher proof.

2) Do pupil factors (year group, gender, PP and EAL) influence the impact of the BC Reading Programme on literacy progress (i.e., is BC more effective for some pupils than others)?

The answer to this question varies to include:

- **Year group:** By and large year group did not influence the impact of BC, as the significantly greater progress of BC pupils was observed in both Year 1 and Year 2 pupils when compared with control pupils. At A1 there were three exceptions: i) only Year 1 BC pupils made significantly greater gains on Picture Vocabulary than control pupils; ii) only Year 2 BC pupils made significantly greater gains on Word Reading than control pupils; iii) only Year 1 BC pupils made significantly greater gains on Reading Comprehension than control pupils.
- **Gender:** No, the impact of BC was similar for boys and girls.
- **PP: Yes,** BC currently appears to be more effective with pupils who receive PP.
- **EAL: No,** the impact was similar for pupils with and without EAL.

3) Do pupils following the BC Reading Programme show more positive attitudes to reading and school and engage in more reading activity compared to children in a control group?

There was no evidence of positive changes in attitudes towards reading and school as a result of BC, based on the InCAS measure at A1 or A2.

Conclusion

The analysis from the second phase of data collection in July 2015 indicated some early promising findings particularly with respect to standardized reading, vocabulary and pupils in receipt of PP. The repeated findings for these assessments from the third phase of analysis demonstrates that we can have more confidence that the Bug Club programme results in greater gains in reading and vocabulary than for pupils in a control group. It also shows that the impact of BC in these assessments can be sustained over one year.

As to whether longer exposure to BC can be associated with greater gains in literacy over time, the only substantial evidence available for this at present were the scores for the word decoding subtest and vocabulary where BC pupils, compared to the control group, doubled their rate of progress since A1. There was also a very slight increase in the standardised reading gains from 1.65 to 1.74 for BC pupils compared to the control group. The final analysis from data collected in July 2016, after five terms as opposed to three, will allow for a more robust analysis of the effect of length of exposure on pupil progress.

Despite these positive findings it should also be noted that at A1 there were significant findings in all of the reading subtests but in just one subtest (word decoding) at A2. At A2 outcomes in spelling were also no longer significant. Interestingly, one of the main components of the programme that was implemented the least was Spelling and Grammar Bug, which could help to explain the decrease in this area after the initial growth at A1.

Furthermore, it could be that the phonics and vocabulary elements of the BC programme are particularly strong and that the other reading subtests require longer to see similar gains. Findings from the final phase of the study will help to elucidate answers to these questions.

Finally, the consistent findings over A1 and A2 that BC had no effect on attitudes to reading and school remain of interest despite a lack of association at this stage. In particular, it shows that attitudes to reading are influenced by factors other than the reading programme (including materials and pedagogy) used in school.

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