

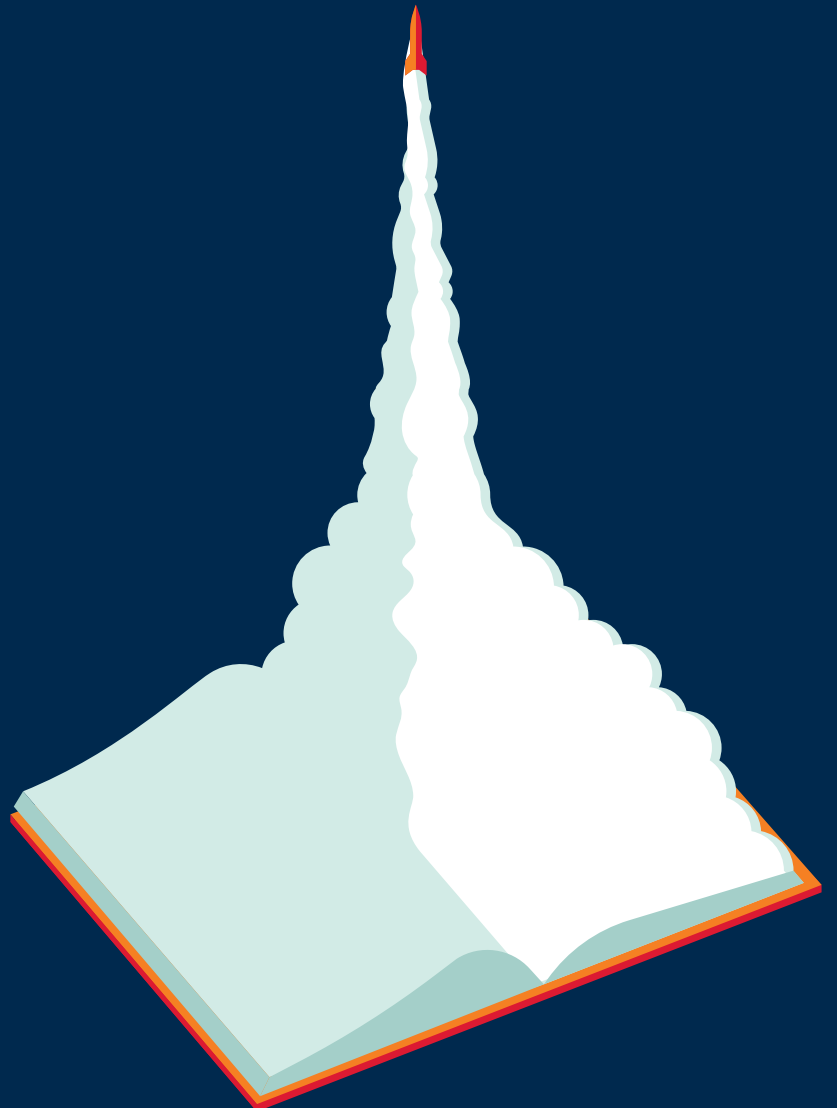


Pearson

Bug Club

Efficacy Research Report

April 3 2018



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The corpus of research for this product includes research conducted by our in-house researchers in partnership with customers, and research conducted by third party researchers. All research included in this report meets the standards we have set out for our own efficacy research. These are informed by and aligned with guidance on educational research quality provided by organisations such as the American Educational Research Association and the What Works Clearinghouse.

Efficacy statements in this report are subject to independent assurance by PricewaterhouseCoopers LLP (PwC). The PwC assurance report is on page 23 and further details can be found in the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Introduction

In 2013, Pearson made a commitment to efficacy: to identify the outcomes that matter most to students and educators, and to have a greater impact on improving them. Our aspiration is to put learners at the heart of the Pearson strategy; our goal, to help more learners, learn more. Part of our commitment was to publish research regarding the impact of the use of our products on outcomes, and to have the outcomes subject to independent audit. We call this efficacy reporting. There is no rulebook for how to do this, no model to follow. We've had to learn fast during this journey, we've sought guidance from others including external expertise, and we are now some, but not yet all of the way there.

The road taken and the milestone reached

In a first for the education sector, we have published audited efficacy reports on some of our most widely used products. Together, these products represent 18 million learners. This Research Report includes independently audited efficacy statements that have been prepared using the [Pearson Efficacy Reporting Framework dated April 3 2018](#) — which we have used consistently for the Pearson products we are reporting on.

We have sought to use the efficacy reporting process to amplify existing non-Pearson peer reviewed research about our products. We've also sought to foster innovation in efficacy research by conducting new research and placing value on a range of research methods — including implementation studies, correlational and causal designs — ensuring data is collected, analysed and presented to agreed standards at the appropriate stages in each product's lifecycle. The research conducted for this report, and the efficacy statements produced as a result, are designed based on international best practices such as those set out by the American Education Research Association and the What Works Clearinghouse. We have synthesised these into a set of standards we hold ourselves accountable for in our research and reporting. These are set out in the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Furthermore, we adhere to the same peer-review processes as other high quality research in the education sector. Our work was independently reviewed and validated by SRI International, a well-known non-profit research center, and shared for discussion at research conferences organised by, among others, the American Education Research Association.

Our body of research contains evidence of statistically significant relationships between the use of our products and learner outcomes like student achievement. We want to be clear, though, that efficacy is not a quality a digital product can possess in and of itself. We recognise that implementation — the way a product is integrated into teaching and learning — also has a significant impact on the outcomes that can be achieved. Our reports do not yet capture the full range of intended product outcomes, nor the variety of different ways of implementing our products. What we do know is that the more we can engage with our customers about best practices that can support the integration of learning technologies into their teaching, the more likely they will be to achieve their desired outcomes.

We have commissioned PricewaterhouseCoopers LLP ('PwC') to audit the efficacy statements set out in our Research Reports. This is to demonstrate that the statements accurately reflect the research that has been carried out. PwC's audit report can be found at the end of this document.

The journey ahead

Delivering on our reporting commitment has never been our ultimate goal; what matters most to us is helping more learners, learn more. Our aspiration is to explore what works, for whom, and why; and to encourage discussion about questions such as: What outcomes matter most to students? What should teaching and learning look like? What evidence should we apply to its design? And how should we evaluate impact?

We are excited to continue partnering with educators and others in the field in order to better understand how interactions between educators, students and learning technology can enhance outcomes. We have also been energised to see others in the education sector begin to focus on efficacy and research — though we recognise that their application in education is still nascent. In order to accelerate the emergence of its full potential we are already developing new ways of partnering with educators, researchers and institutions so we can advance this work together. In doing so, we will continue to advocate for the need to apply rigorous evidence to improve the outcomes of teaching and learning, while also seeking to ensure that evidence captures customers' experiences and is relevant and useful to educators in their practice.

Special thanks

We want to thank all the educators, students, research institutions and organisations we have collaborated with to date. We are spurred on by the growing number of opportunities for us to learn from others in the sector who are beginning to tackle the same challenges. If you are interested in partnering with us on future efficacy research, have feedback or suggestions for how we can improve, or want to discuss your approach to using or researching our products, we would love to hear from you at efficacy@pearson.com. If we, as a sector, tackle this together, we will help more learners learn more.



Kate Edwards

Senior Vice President,
Efficacy and Research, Pearson
April 3 2018

Findings in brief

Pearson sought to explore whether the use of Bug Club, an online and in-print reading scheme targeted at ages 4–11, is related to pupils' literacy learning, attitudes to reading and school, and reading activity.

This Research Report presents findings from one research study: a multi-approach evaluation we conducted in collaboration with University College London Institute of Education (UCL-IOE) during 2015 and 2016. The approach included a process evaluation to gather in-depth data on implementation and experiences of Bug Club, and a randomised controlled trial to measure the impact of Bug Club on learners.

The findings appear alongside details of the research study, including a description of the sample studied, method of analysis, results, limitations and generalizability, and notes on possible future research.

The report also summarizes the context surrounding the findings, including the research that informed the design and development of the product, the history of the product in the market, how educators use the product, and its intended outcomes.

The findings are inseparable from their surrounding context and the design of the study that produced them. To learn more about these elements, follow the links to our Technical Reports in the **Research studies** section.

In the context of the UCL-IOE study, conducted at 30 schools for primary school teachers and students using Bug Club to support English (Key Stage 1 and Key Stage 2), Pearson found that:

- After 5.5 months, pupils using Bug Club made significantly greater progress in their reading than children in schools not using Bug Club as measured by the InCAS standardised reading assessment.
- After 12 months, pupils using Bug Club continued to make highly statistically significant gains in their reading when compared to pupils not using Bug Club as measured by the InCAS standardised reading assessment.
- After 18 months, pupils using Bug Club made significantly greater progress in their picture vocabulary than children in schools not using Bug Club.
- After five terms, pupils in the Bug Club programme were 11 months ahead on their expected age equivalent reading score, relative to their chronological age as measured by the InCAS standardised reading assessment.
- After 5.5 and 12 months, Bug Club made a statistically significant impact on the reading gains of children in receipt of pupil premium as measured by the InCAS standardised reading assessment.

The complete statements are set out in full in the box titled "Efficacy statements" on page 19. These statements have been subject to assurance by PwC, whose report can be found at the end of this Research Report.

Product design and development

Product overview

Bug Club is an online and in-print reading scheme targeted at ages 4–11. It is designed to help children learn to read by providing carefully levelled books that "children would choose themselves". The 350+ books follow a defined, phonics progression which is aligned with the National Curriculum for England (2014).

Bug Club is designed to enhance and improve the following outcomes:

- Learner access, in that students can access Bug Club materials in print and online, and at home, as well as at school
- Positive pupil behaviours toward reading, including enjoyment, engagement and independence
- Achievement for all students, regardless of first language, gender or socio-economic factors
- Learner progression, in that students are ready for the next level reading phase

The full list of the outcomes this product is intended to support, accompanied by a brief description, can be found in the appendix of this report.

Foundational research underpinning the design

A core component of Bug Club's pedagogy is built on the seven-year Clackmannanshire study (Johnston & Watson, 2005), which showed that synthetic phonics can be an effective component of reading instruction and 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 to create words. Students sound out each letter in turn and "synthesise" 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 by emphasising sounds in words already known. The Clackmannanshire study assigned 13 Primary 1 classes (approximately 300 total students) to either synthetic phonics or one of two versions of analytic phonics. At the end of 16 weeks, the students in the synthetic phonics group performed above average for their age group in both word reading and spelling, while the two analytic phonics groups did not. After the analytic phonics groups were given synthetic phonics instruction, they too began spelling and reading words at above average levels for their age group. This gain persisted over six more years.

There is clear support for phonics instruction more generally. Two major meta-analyses (statistical syntheses of numerous research studies) concluded that programmes with systematic phonics instruction are more effective than programmes without (National Institute of Child Health and Human Development, 2000; Torgerson, Brooks, & Hall, 2006). According to these meta-analyses, the benefits of one type of phonics instruction over another are not as clear, but all generally appear to outperform reading instruction without phonics instruction. Both meta-analyses recommend 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.

Bug Club works alongside Phonics Bug, which comprises of a set of 135 phonically decodable books. Phonics Bug also has whole class teaching software for the interactive whiteboard, which assists teachers in delivering phonics lessons. Phonics Bug books are also available online and feature similar online quizzes to Bug Club books, but with a 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.

Furthermore, Bug Club was created in consultation with reading experts and practitioners, in line with a nationally recognised progression system known as Book Bands, created by the University College London Institute of Education (Baker, Bickler, & Bodman, 2007). Book Banding is a national scheme that grades children's reading books according to the difficulty of the text, and it is aligned to the 2014 UK National Curriculum. This programme includes guided reading, where teachers work with small groups of similar-ability children reading aloud and prompt them to engage in a variety of strategies for word identification and reading comprehension (Iaquinta, 2006). Meta-analysis of research on guided reading practices indicates that such practices have a positive impact on word recognition, fluency, and comprehension (National Institute of Child Health and Human Development, 2000).

Designed to appeal to a generation of 'technology savvy' children with high expectations of engagement and a familiarity with online games and services, Bug Club brings together printed books with an online reading world. Bug Club printed books contain inside cover notes designed to further learning and to aid parents when reading with their children. The online books can be assigned to children by their teacher and feature automatically marked quizzes linked to comprehension skills, which assess a child's understanding of the text. Additional features of the online books include "read to me" functionality (at Key Stage 1, 4–7 years) which models fluent reading.

History and reach of Bug Club

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 (7–11 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. ActiveLearn Primary is built in HTML5, and therefore, is accessible on iPads and other mobile devices.

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

Intended product implementation

Bug Club is intended for use as a main school reading programme in the classroom, for home reading, and for 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. As such, Bug Club materials are designed to be flexible and support multiple implementation models. This flexibility is intended to give teachers the freedom to implement Bug Club in a way that will best engage their pupils and achieve learning outcomes specific to their school syllabus. The Bug Club and Phonics Bug materials are designed to be used as follows¹.

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, six 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 usually 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 and 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 comprehension/phonics questions are delivered to the child 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.

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). The lessons follow a structured progression of phonic sounds to build children's reading fluency. Each lesson examines the sound, reading, spelling, writing and follow-up activities supported by audio, and in some cases video, to demonstrate and deliver the lesson. Each lesson is supported by a suite of games. These can be played by the class on the interactive whiteboard to help embed and formatively assess knowledge of phonic sounds.

¹ Product updates — following feedback from the efficacy study and our customers, we have recently remodelled the Bug Club content at Key Stage 1. We have brought the decodable Phonics Bug titles into Bug Club, and we now package these, and a selection of Bug Club titles, as Bug Club Independent. We package a second tranche of Bug Club titles as Bug Club Guided. The Bug Club Guided titles now come with guided reading cards and photocopiable materials. This is to help teachers understand which texts to use for which purpose.

Product research

Given the alignment of Bug Club with previous research on the efficacy of synthetic phonics and guided reading instruction (see **Product design and development**), we hypothesised that students who learn with Bug Club would show greater reading achievement gains than the control group. Greater reading achievement gains should in turn support readiness to proceed to the next reading phase and might also be accompanied by more positive attitudes toward reading. Additionally, the availability of Bug Club materials both in print and online was hypothesised to be associated with a perception of ease of access among parents of students learning with Bug Club.

Existing research

In 2018 Pearson researchers completed a systematic search and review of research articles published since 2012 that assessed the impact of Bug Club on learner outcomes. Our criteria for the review and inclusion of existing published research on our products were designed based on US Department for Education What Works Clearinghouse guidance. Based on these guidelines, in order for research to be included in this Efficacy Report on Bug Club it needed to meet a number of criteria, including that the study was published in the past five years, examined at least one intended learner outcome category, and reported results in enough detail that the research could be properly evaluated. For more information on this see the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

In our initial screening, we discovered 54 studies. After an initial review we found that one contained information relevant to Bug Club. Following an in-depth review, we discovered that no existing published studies met the necessary criteria to be included in this Efficacy Report. For the initial screening list and a list of the subset of studies that contained information relevant to Bug Club but did not meet our criteria to be included here see the [Pearson Efficacy Reporting Framework dated April 3 2018](#).

Research studies

There is one new study, conducted by Pearson, that forms the basis of the Efficacy Report for Bug Club. The research questions and findings for this study are set out in detail below, including the efficacy statements generated by those studies.

In 2014, Pearson researchers conducted an [exploratory study](#). The aim of this study was to understand the implementation of Bug Club resources in schools, and to inform the research questions and the methodology of the longitudinal randomised controlled trial study, and the process evaluation, which Pearson intended to undertake the following year. This study is not explored in detail in this report as the resulting research questions and methodology are set out in the main study.

Study 1

Study citation

Findings are based on the following reports:

Randomised controlled trial:

Interim Evaluation of the Bug Club Reading Programme I (A1)

Hurry, J., Ahtaridou, E., Carroll, C., Dunn, K., and Grima, G. (2015)

Interim Evaluation of the Bug Club Reading Programme II (A2)

Hurry, J., Carroll, C., Dunn, K., and Grima, G. (2016)

Evaluation of the Bug Club Reading Programme

Hurry, J., Carroll, C., Hooper, A., and Grima, G. (2016)

Process evaluation:

Beginning to be a Bug Club School: Exploring Impact, Usage and Implementation

Bodman, S., Ahtaridou, E., Franklin, G., Dunn, K., Grima, G., and Greene, V. (2015)

Being a Bug Club School; Exploring Sustained Impact, Usage and Implementation

Bodman, S., Franklin, G., Hooper, A., Greene, V., and Grima, G. (2016)

Executive summary – evaluation of Bug Club:

Hurry, J., Bodman, S., Carroll, C., Franklin, G., and Grima, G. (2017)

Bug Club Efficacy Report:

Compiled by Evers, K. (2018)

Research study contributors

Randomised controlled trial:

Department of Psychology and Human Development, UCL Institute of Education:

— Professor Jane Hurry

— Dr. Catherine Carroll

Pearson:

— Associate Professor Grace Grima (2014–2017)

— Dr. Alistair Hooper (2015–2017)

— Elpida Ahtaridou (2014–2015)

— Krystina Dunn (2014–2015)

Process evaluation:

Department of Psychology and Human Development, UCL Institute of Education:

— Professor Sue Bodman

— Dr. Glen Franklin

Pearson:

— Associate Professor Grace Grima (2014–2017)

— Dr. Alistair Hooper (2015–2017)

— Elpida Ahtaridou (2014–2015)

— Krystina Dunn (2014–2015)

— Vanessa Greene (2015)

Research questions

The study focused on answering the questions below, which can be divided into three different topic areas. The first three questions were measured through a randomised controlled trial (RCT) and the last seven through a process evaluation, though sometimes evidence from both parts of the study supported each other.

Randomised controlled trial — after 5.5, 12 and 18 months

1. Do pupils following Bug Club make more progress in literacy compared to pupils in a control group?
2. Do pupil and school level factors influence the impact of Bug Club on literacy progress? (Free School Meals, pupil premium, English as an additional language, gender and level of implementation)
3. Do pupils following Bug Club show more positive attitudes to reading and school and engage in more reading activity compared to pupils in a control group?

Process evaluation — after 5.5 months

4. What is the wider impact of Bug Club on pupils, teachers and parents?
5. What impact do implementation models of Bug Club have on outcomes?

Process evaluation — after 18 months

6. Do motivation and engagement continue, at child, teacher and school levels?
 7. What does implementation look like in classrooms where reading gains are high?
 8. Were there changes in usage? If so, why did teachers make those changes?
 9. What are the characteristics of the highest and lowest attaining pupils?
 10. What can we infer about the impact of usage on attainment?
-

Related intended outcomes

- Pupil access is enabled
 - Contributes to positive pupil behaviours to reading
 - The majority of children achieve the appropriate reading standard according to age and aptitude
 - Readiness for the next reading phase
-

Study design

Randomised controlled trial

To measure the impact of Bug Club on learners, the results of Bug Club students and non-Bug Club students were compared after 5.5, 12 and 18 months of Bug Club use. The schools were randomly allocated to either using Bug Club (the intervention group) or not using Bug Club (the control group). Bug Club schools were given Bug Club resources from the beginning of the study and used them throughout. Non-Bug Club schools were given Bug Club resources after 12 months and used them for the last six months of the study and beyond.

Process evaluation

In order to get more in-depth data on implementation and experience of Bug Club, at 5.5 months, there were classroom observations and interviews with pupils, teachers and parents from 10 case study schools. These schools were chosen to give a variety of characteristics in the sample.

At 18 months, researchers returned to six schools, chosen because of their high reading gains. To try to better understand how pupils in these schools had made such progress, researchers interviewed teachers and pupils, and had focus groups with parents.

An analysis of Online Reading World usage was also conducted.

Metrics studied	<p><i>Randomised controlled trial</i></p> <p>The impact was measured through the computerised InCAS assessment programme — an externally validated test that students did at the start of the study and then again at 5.5, 12 and 18 months — and a self-report pupil survey. The data was analysed using descriptive and inferential statistics.</p> <p>The InCAS data provides a standardised assessment score for Reading. The Reading score is a composite score calculated based on the pupil's scores from the Word Recognition, Word Decoding and Comprehension tests. The InCAS assessments also measured pupils' ability in spelling and picture vocabulary.</p>
Description of sample	<p>A total of 30 schools (15 Bug Club schools and 15 control schools) participated in the research, which included approximately 1,500 pupils and 115 teachers. The control schools did not use Bug Club for the first 12 months, so the two groups could be compared. For the last six months, all schools had the Bug Club resources, so there were 'experienced' and 'new' Bug Club schools. The schools were chosen with a variety of characteristics in mind, which included:</p> <ul style="list-style-type: none"> — Percentage of students achieving Level 2 at Key Stage 1; — Percentage of students receiving Free School Meals (FSM) and studying English as an additional language (EAL) — Ofsted rating — Class size — Geographical location <p>The external InCAS assessments that were used also determined that students in Bug Club and non-Bug Club schools were of similar ability in reading, developed ability and attitudes to reading.</p> <p><i>Table 1 (below) provides an overview of the data collected and participants who took part in the study.</i></p>

Table 1: Overview of the data collected and participants who took part in the study

RCT	Process evaluation	Data collected	Participants
Baseline Jan 2015		Measures of child attitude and attainment	1,884 children (1147 intervention, 737 control)
		Teacher attitude questionnaire	115 teachers (74 intervention, 41 control), across 36 schools
A1 July 2015	Phase 1 Jan – July 2015	Teacher attitude questionnaire	164 children
		Implementation survey in all classes	113 teachers
	Data collected in July 2015	Interviews with children, parents and teachers	41 parents, across 10 intervention schools
		Measures of child attitude and attainment	1,695 children (980 intervention, 715 control)
		Teacher attitude questionnaire	115 teachers (74 intervention, 41 control) across 36 schools
		Implementation survey in all classes	41 control) across 36 schools

RCT	Process evaluation	Data collected	Participants
A2 July 2015	Phase 2 July 2015 – Jan 2016	Measures of child attitude and attainment	2,450 children (1,735 intervention, 715 'historic' control)
		Teacher attitude questionnaire Implementation survey in all classes	117 teachers (all implementing Bug Club) across 36 schools
A3 July 2016	Phase 3 Jan 2016 – July 2016	Interviews with children, parents and teachers from six case schools	83 children (54 Y2 and 29 Y1) 115 teachers; 28 parents, across 10 intervention schools
		Data collected in July 2016	
		Measures of child attitude and attainment Teacher attitude questionnaire Implementation survey in all classes	1,695 children (980 intervention, 715 control) 115 teachers (74 intervention, 41 control) across 36 schools
	Phase 4 Oct – Dec 2016	Telephone interviews with teachers in both 'new' and 'experienced' Bug Club schools Key Stage 1 scaled scores collected at pupil level	21 teachers across the remaining 'experienced' and 'new' Bug Club schools (excluding case study schools and teachers of classes of the highest reading gains) 12 schools from both experienced and new Bug Club schools

Sample size

- The study adopted a two stage randomisation process. In the first stage, 42 schools were placed in alphabetical order with their pairs and allocated the letter A or B.
- Following the drop out of six control schools and the consequent loss of their paired Bug Club school, the final sample comprised 15 Bug Club schools and 15 control schools.
- The sample of 1,510 pupils (year 1 = 719/year 2 = 791) was drawn from 30 schools (15 Bug Club and 15 control) across England and Northern Ireland.
- The second sample of 1,425 pupils in January 2016 included the year 1 pupils who were followed into year 2 and re-assessed in January 2016 (n = 643) along with a new cohort of n=782 pupils (year 1 n = 664; year 2 n = 118).
- Bug Club and control groups were well matched on demographics at baselines (January 2015 and January 2016), with no significant differences in gender, age, year group, pupil level EAL or school level FSM. In the January 2015 cohort there was a significant difference for pupil level pupil premium (PP), which is additional funding for publicly funded schools in England to raise the attainment of disadvantaged pupils of all abilities and to close the gaps between them and their peers.
- Bug Club and control groups were well matched at baselines (January 2015 and January 2016) on reading, developed ability and attitudes to reading and school, with no significant differences between the two groups.

Analysis

Randomised controlled trial data analysis:

Data was analysed using descriptive and inferential statistics in the statistical package SPSS. Significance was measured at $<.05$ which indicates a confidence level in a finding of 95% or above. The statistical tests (Chi-square, Mann-Whitney test, independent samples t-test, linear regression and multiple regression) were chosen based on the type of data being analysed and the purpose of analysis.

Justification for statistical tests:

The Chi-square is a statistical test commonly used to compare differences between two different samples. In the context of this study, it allows us to eliminate whether any findings might have been influenced by any bias in the sample. A Mann-Whitney test is a test that looks for differences between two independent samples and is used when the initial data gathered does not follow a normal distribution pattern. In this study, for example, some schools had very small numbers of pupils with EAL and others very high numbers. As with the Chi-square it allows us to eliminate whether any findings might have been influenced by any bias in the sample. In this study, the independent samples t-test compares the means between two unrelated groups on the same continuous, dependent variable, which in this context were the reading and developed ability standardised scores. It is regarded as a 'stronger' statistical test than Chi-square or the Mann-Whitney but should only be used with interval variables (such as a test with a score from 1 to 10) unlike categorical variables such as gender and year group.

Multiple linear regression models were used for multivariate analysis: to measure how far a single independent variable, such as gender, might predict the value of a dependent variable such as Reading at A1, controlling for the same measure at baseline, and; where two or more independent variables were used to predict the value of a dependent variable.

Process evaluation:

Observations and semi structured interview data with children, teachers and parents were analysed inductively to produce key themes. Thematic analysis was used on the data.

Results

Randomised controlled trial — achievement and progression

Bug Club pupils made 30 months' progress in 18 months:

After 5.5 and 12 months, Bug Club pupils made significantly more progress in reading compared to pupils not using Bug Club. The increased progress of Bug Club users was not observed from 12 to 18 months, where instead progress continued as expected.

After five terms of using Bug Club, pupils in the Bug Club programme were 11 months ahead of their expected age equivalent reading score. The Bug Club pupils started off being one month behind, so made 12 months' progress. This is a total of 30 months' progress in 18 months.

Table 2 (below) shows how many more months of progress Bug Club pupils made compared to non-Bug Club pupils. Where progress made by pupils using Bug Club was similar to progress made by pupils not using Bug Club (but another resource), this is noted as 'similar'.

Table 2: Progress made by pupils using Bug Club, measured at intervals over four time periods

Bug Club pupils' average advantage gains. v control pupils			
	0-5.5 months	0-12 months	12-18 months
Reading standardised score	1.65 standardised points	1.74 standardised points	Similar
Reading standardised score subtests			
Word recognition	1 month	Similar	Similar
Word decoding	3 months	6 months	Similar
Comprehension	2 months	Similar	Similar
Other subtests			
Spelling	3 months	Similar	Similar
Picture vocabulary	1.5 months	3 months	2 months

*Only statistically significant scores are presented in this table at a p value <0.05

Results

There was no difference in gender, age or language:

The Bug Club programme had the same effect on boys and girls; pupils in year 1 and year 2; and pupils with English as an additional language throughout the study.

There was no difference when using Bug Club more frequently:

At 5.5 months, 68 teachers in Bug Club schools were compared by the level of Bug Club resource use, as reported by the teachers themselves, and it was found that higher usage was not associated with higher pupils' reading gains.

Socially disadvantaged pupils made the most progress:

Bug Club had a greater impact (compared to non-Bug Club children) on pupils' reading and spelling gains in schools with a higher take up of Free School Meals (FSM) than in Bug Club schools with a lower take up. Following the same pattern as the average literary progress, students at FSM schools made most progress after 5.5 and 12 months. This increased progress among disadvantaged pupils was even clearer when looking at individual pupils on pupil premium (PP). The enhanced impact of Bug Club on pupils from disadvantaged backgrounds was also supported when looking at the characteristics of the highest and lowest attaining pupils during the process evaluation. More of the children in the high gains groups were in schools that served more disadvantaged pupils. Schools with less apparent needs were less well represented among the highest reading gains. The pupils with the lowest gains were both pupils with EAL and pupils in receipt of PP, as this appeared to create a double deficit. They had less than half the chance of being in the top 20% than pupils with EAL or PP alone.

Table 3 (below) shows how many more months of progress Bug Club pupils on pupil premium or in schools with high Free School Meals uptake made, compared to non-Bug Club pupils on PP or in high FSM schools. Where progress made by pupils using Bug Club was similar to progress made by pupils not using Bug Club (but another resource), this is noted as 'similar'.

Table 3: Progress made by pupils using Bug Club, measured at intervals over four time periods

Bug Club pupils average advantage gains vs. control pupils						
Months	Reading standardised subtests			Reading standardised score	Other subtests	
	Word Recognition	Word decoding	Comprehension		Spelling	Picture vocabulary
0-5.5						
FSM	4 months	10 months	5 months	4.64	4 months	Similar
PP	5 months	15 months	10 months	4.26	8 months	8 months
0-12						
FSM	Similar	10 months	Similar	3.53	Similar	7 months
PP	Similar	12 months	8 months	5.62	Similar	Similar
12-18						
FSM	Similar	Similar	Similar	Similar	Similar	Similar
PP	Similar	Similar	Similar	Similar	Similar	Similar

*Only statistically significant scores are presented in this table at a p value <0.05.

Result*Process evaluation — motivation and engagement**Bug Club pupils were more positive about reading and school after 18 months:*

While there was no evidence of positive changes in attitudes towards reading and school in the first 12 months of the study, Bug Club pupils' attitudes were significantly more positive at 18 months than those of non-Bug Club pupils. Interviews with children, parents and teachers showed that attitudes among children using Bug Club remained positive in the main. After 18 months, there were fewer year 2 children that reported disliking reading, going from 11% in the first six months to 5.35% at 18 months, so more pupils enjoyed reading at the end of the study. Overall, a larger proportion of year 1 children (compared to year 2 children) reported enjoying reading.

Bug Club was felt to be inclusive to all pupils:

All teachers interviewed noted how the Bug Club materials supported the range of needs in their classrooms. Teachers reported that Bug Club was appealing to a wide variety of pupils, regardless of gender, ability or age. While teachers would adapt materials, particularly for the lowest and highest ability ranges, there was agreement across those interviewed that the range of materials meant that all children could access Bug Club at the appropriate level. Interviews with pupils at both 6 and 18 months of the study also indicated that Bug Club appeals to a range of learners.

100% of pupils enjoyed print copy guided reading books:

Print copy guided reading books were the most consistently popular aspects of Bug Club. Enjoyment and motivation for these did not diminish over the 18 months. Bug Club guided reading books received 100% positive evaluations from both year 1 and year 2 children. These self-reports were supported by teacher and parent perceptions. Similar to earlier on in the study, students reported humour, quality of illustration, relevant, interesting and enjoyable stories, and recognisable characters from TV and film as enjoyable. For the vast majority of year 1 and year 2, Bug Club readers continued to support persistence with reading since the books were found by the children to be enjoyable, entertaining and age appropriate. Usage of print copy guided reading books did not diminish over the 18 months.

Bug Club was often considered less engaging as children got older:

Children's comments about the platform being more suitable for younger children and its lack of responsiveness and limitations in the number of games available suggest that as children mature, many became less motivated by Online Reading World (ORW). Just 7.4% of year 2 children responded that they felt the avatars made them more inclined to read on ORW. Teachers perceived the design and rewards to be less motivational for year 2 children, whereas quizzes retained high popularity throughout year 1 and year 2. For some pupils, the decline in the use of ORW was not necessarily seen as a negative. It instead indicated positive progression, as children developed as readers and moved toward the end of Key Stage 2. However, for some, it does seem to be a result of limited motivation owing to dissatisfaction with some technical aspects of the programme, or limited technical competence.

Results

Parents were impressed with the quality and easy access of Bug Club:

After six months, parents reported that they found that ORW was easily integrated with their existing home reading practices. They were impressed with the quality of the books and reported that they felt more confident to support reading at home, with quizzes and comprehension questions supporting their understanding of how to interact with print and comprehension. All parents said they received support for their child's reading development by the provision of materials to read at home. Parents thus reported that it was easy for children to access the ORW, with 90% of parents reporting that their children accessed it at home during the first six months. This declined toward the end of 18 months, most likely because of a combination of factors, including: lack of support from the school, technical issues, and perceptions of a decrease in motivation for ORW on the part of both teachers and children.

Pupils, parents and teachers need to be involved to keep up motivation and Bug Club use of all three parties:

Interviews in the six case study schools found that the proportion of children, parents and teachers reporting home use of ORW had declined by almost 30% from 6 to 18 months of usage. This was in contrast with the reported increase in reading online at home seen during the first six months of the study. Despite the fall in opportunities to use ORW at home, pupils still reported that they enjoyed using it at 18 months, continuing the trend of reported enjoyment and confidence of the first six months. None of the 21 teachers felt that there had been a negative impact on the children's attainment, in either the InCAS reading test or assessments more generally, owing to their decreased use of the resources. After 18 months, parents were less motivated to enable access to ORW, influenced by lower motivation from the children and by less teacher engagement. Children's comments demonstrated that both personal motivation, and home and school factors had influenced this decline. The case that appeared to be the most influential was the decrease in attention to ORW afforded by teachers and parents. A decrease in the numbers of parents accessing ORW at home was primarily triggered by a perception of a decrease in child motivation. When interviewed, parents perceived that the frequency and level of support offered by the school did not meet their needs, and thus influenced the decrease in use. Teachers, however, perceived that they had tried to engage parents but that interest and motivation had not been sustained.

In conclusion, the RCT showed that at 5.5 and 12 months, pupils who followed the Bug Club programme had made significantly more progress in reading compared to pupils who were not using Bug Club. At both these points in time, Bug Club had a greater impact on reading gains for pupils in receipt of pupil premium. These gains were not found in relation to other pupil characteristics such as gender, age and English as an additional language. From 12 to 18 months, pupils made expected gains in reading, but gains were not widened. This resulted in pupils being 11 months ahead of their expected age reading score after 18 months. As pupils started an average of one month behind their age equivalents, pupils made 12 months more progress, so using Bug Club made 30 months' progress in 18 months. Finally, pupils had a significantly more positive attitude towards reading and school after 18 months.

Results

The findings of both the RCT and the process evaluation combined clearly demonstrate that Bug Club is not teacher proof. Usage alone cannot ensure expected or above expected progress for the children using it. Other implementation factors to consider include:

- The importance of the professional development for teachers and schools beginning to implement a new programme
- The need for teachers to have the pedagogic understanding to adapt the Bug Club resources to meet the needs of their own class
- The need to ensure that teachers have the technology skills to deliver online materials effectively
- The need for consistent and iterative attention to home-school initiatives
- The support needed for parents to sustain motivation for home reading
- The need for age-appropriate design of materials to encourage continued motivation for positive reading habits

Teachers' professional knowledge and expertise are suggested as the variable with the most impact on reading gains. Much of the literature regarding teacher professional learning would support this interpretation. Frequency and consistency of usage were not linked to high reading gains; high adaptability and consistent, frequent use of evidence based instructional strategies were. Use of non-Bug Club resources was reportedly more frequent in the higher than average reading gains classes that were part of this study. It was the additional quality of the teaching, not the presence of Bug Club alone, that derived higher than average reading gains. Teachers, however, did feel that Bug Club provided suitable tools for them to teach effectively. The findings of this study would suggest that support from Pearson should be focused on professional learning in these key areas, rather than product training, to encourage continued motivation for, and use of, Bug Club.

Efficacy statements

In the context of this study conducted at 30 schools for primary school teachers and students using Bug Club to support English (Key Stage 1 and Key Stage 2), Pearson is able to make the following causal statements about the efficacy of Bug Club:

- After 5.5 months, pupils using Bug Club made significantly greater progress in their reading than children in schools not using Bug Club as measured by the InCAS standardised reading assessment.
- After 12 months, pupils using Bug Club continued to make highly statistically significant gains in their reading when compared to pupils not using Bug Club as measured by the InCAS standardised reading assessment.
- After 18 months, pupils using Bug Club made significantly greater progress in their picture vocabulary than children in schools not using Bug Club.
- After five terms, pupils in the Bug Club programme were 11 months ahead on their expected age equivalent reading score, relative to their chronological age as measured by the InCAS standardised reading assessment.
- After 5.5 and 12 months, Bug Club made a statistically significant impact on the reading gains of children in receipt of pupil premium³ as measured by the InCAS standardised reading assessment.

³ The pupil premium is additional funding for publicly funded schools in England to raise the attainment of disadvantaged pupils of all abilities and to close the gaps between them and their peers.

Limitations and generalisability*Limitations*

1. For the RCT, schools were assigned randomly to control or intervention groups but high EAL rates in certain schools resulted in four schools switching conditions, as explained in section 3.1.1; appendix 1 in the Technical Report. RCTs typically require that only randomisation can determine assignment to treatment but due to the nature of the UK school environment, and the priority of a well matched pair, this was not possible.
2. The RCT witnessed a relatively high attrition rate throughout the study, which is not uncommon in RCTs. The high rates of differential student attrition could arguably add bias towards the intervention groups but the estimates of impact in place allow for this differential attrition.
3. Multi-level modelling was not used in this study, which means the standard errors may be smaller than they should be, thus affecting the Type I error rate.
4. The InCAS assessments included a measure of attitudes, which involved a rating of how much pupils liked/disliked various aspects of their education. The results should be treated with some caution due to the nature of year 1 and 2 pupils' self-assessment. However, the InCAS tests are standardised and pre-tested to ensure as much reliability with the findings as possible.

Generalisability

- For the process evaluations, the small sample size for the interviews impacts the generalisability of the findings to the whole study sample and the wider population. However, the purpose of the process evaluation was to provide rich qualitative data to complement the RCT quantitative data.
- It was observed that the accelerated progress evident from baseline to A1 (5.5 months) and baseline to A2 (12 months), plateaued from A2 (12 months) to A3 (18 months). As the purpose of the qualitative strand of the evaluation was not to undertake a fidelity study, we cannot make robust judgements about whether teachers implemented the programme in a different way in the second year of the study. When teachers were explicitly asked why they had reduced Bug Club use, responses were focused on making decisions about what was appropriate for "their children", and the need to balance Bug Club with the fact that schools had their own assessment systems.
- It is only possible to know about motivation in the six case study schools with highest reading gains. There was evidence that fewer Bug Club materials (in terms of range) were used by these six experienced Bug Club schools. Even the highest achieving teachers reported dropping some of these materials. Use of non-Bug Club resources was also reported more frequently in the higher than average reading gains classes that were part of this study. It is not possible to know to what extent these additional resources, combined with or separate from Bug Club, resulted in higher than average reading gains.
- There was a significant difference between the Bug Club and control groups in attitudes to schools and reading, with Bug Club children showing more positive attitudes. However, the effect sizes were small. A further study would be required to investigate this in more depth, and to ascertain whether such a finding would be repeated.

Future research

Future research could explore whether there is a significant difference between the Bug Club and control groups in attitudes to school and reading. Bug Club pupils did show more positive attitudes. However, the effect sizes were small and a further study would be required to investigate this in more detail.

It was observed that the accelerated progress evident from baseline to A1 (5.5 months) and baseline to A2 (12 months), plateaued from A2 (12 months) to A3 (18 months). The changing landscape in schools during the first and second year of the study, which related to mandatory external assessments, needs to be acknowledged and could be investigated further.

Read about this research in more detail in our [Technical Report](#)

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Appendix 1: full list of intended outcomes

We have evidence about how Bug Club relates to these intended outcomes. Find it under [Product research](#).

Outcomes related to learner access and experience

Intended outcome 1

Pupil 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 while 39% of children and young people read daily using electronic devices, only 28% read printed texts daily.

Intended outcome 2

Contributes to positive pupil behaviours to reading.

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.

Outcomes related to learner access and experience

Intended outcome 3

The majority of children 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 follow a phonic progression in Key Stage 1, and guided reading questions and online activities are 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 Stage2) and also the next stage of their schooling.



Independent limited assurance report to the directors of Pearson plc

The directors of Pearson plc (“Pearson”) engaged us to provide limited assurance over the efficacy statements clearly identified by the box titled ‘Efficacy statements’, including reference to the study design type, in the Pearson Bug Club Efficacy Research Report dated April 3 2018 (“Research Report”).

Our conclusion

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the efficacy statements set out in the Pearson Bug Club Research Report have not been prepared and reported, in all material respects, in accordance with the Pearson Efficacy Reporting Framework dated April 3 2018.

This conclusion is to be read in the context of what we say in the remainder of our report.

Efficacy statements

The scope of our work was limited to assurance over the efficacy statements clearly identified by the box titled ‘Efficacy statements’, including reference to the study design type, in the Bug Club Research Report. Our assurance does not extend to other information presented in the Research Report.

Professional standards applied and level of assurance

We performed a limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) *Assurance Engagements other than Audits and Reviews of Historical Financial Information*, issued by the International Auditing and Assurance Standards board. A limited assurance engagement is substantially less in scope than a reasonable assurance engagement in relation to both the risk assessment procedures, including an understanding of internal controls, and the procedures performed in response to the assessed risks.

Our independence and quality control

We applied the Institute of Chartered Accountants in England and Wales (ICAEW) Code of Ethics, which includes independence and other requirements founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

We apply International Standard on Quality Control (UK) 1 and accordingly maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Our work was carried out by an independent and multi-disciplinary team including educators, statisticians, and experts in reporting and assurance.

Reporting and measurement methodologies

The efficacy statements need to be read and understood together with the Pearson Efficacy Reporting Framework dated April 3 2018 (the “Framework”), available on Pearson’s website at <https://www.pearson.com/efficacy-reporting-framework>. The absence of a fully comprehensive set of generally accepted rules for identifying learner outcomes and defining, assessing and reporting the efficacy of educational products allows for different, but acceptable, ways of measuring product efficacy and reporting findings as efficacy statements. This could affect

comparability between Pearson’s efficacy reporting and that of other organisations.

Work done

We are required to plan and perform our work in order to consider the risk of material misstatement of the efficacy statements. A material misstatement would be an efficacy statement that does not reflect the study design and quality of underlying research or the omission of key information from a relevant study.

In doing so, we:

- made enquiries of relevant Pearson management;
- evaluated the design of the Framework including key structures, systems, processes and controls for managing, generating and reporting the efficacy statements;
- tested all 19 controls across the 8 stages of the Framework;
- confirmed that all management reviews were performed by at least two members of Pearson’s Efficacy & Research team;
- performed substantive testing on a sample basis of the data that underpins the research studies and the resulting efficacy statements, and the controls over the completeness and accuracy of that data (supported by Pearson Internal Audit in those instances where student data was subject to confidentiality restrictions);
- assessed the quality and conclusions of the underlying research studies;
- inspected the statistical analysis to assess whether the efficacy statements are valid, supportable and consistent with the underlying research studies;
- independently re-performed screening of relevant external public research studies and compared to that done by Pearson;
- assessed the efficacy statements and underlying Technical Report(s) for consistency with the Framework; and
- reviewed the product’s efficacy web page, Research Report, and Technical Report(s) for alignment of research studies and efficacy statements.

Pearson responsibilities

The directors of Pearson are responsible for:

- designing, implementing and maintaining internal controls over information relevant to the preparation of efficacy statements that are free from material misstatement, whether due to fraud or error;
- establishing an objective framework for preparing and reporting efficacy statements;
- preparing and reporting efficacy statements in accordance with the Framework; and
- the overall content of the Framework and the Research Report.

Our responsibilities

We are responsible for:

- planning and performing the engagement to obtain limited assurance about whether the efficacy statements are free from material misstatement, whether due to fraud or error;
- forming an independent conclusion, based on the procedures we have performed and the evidence we have obtained; and
- reporting our conclusion to the directors of Pearson.

Inherent limitations

Efficacy research, and the resulting efficacy statements, reflect the implementation and use of a product in a particular context. It would not be appropriate to assume a product would always generate similar outcomes in other contexts and/or in the future.

Intended users and purpose

This report, including our conclusions, has been prepared solely for the board of directors of Pearson in accordance with the agreement between us, to assist the directors in reporting Pearson Bug Club efficacy statements, in accordance with the agreement between us dated 9 August 2017. We permit this report to be disclosed onlineⁱ at <https://www.pearson.com/corporate/efficacy-and-research/efficacy-reports> in respect of the Bug Club Research Report to assist the directors in responding to their governance responsibilities by obtaining an independent assurance report in connection with the efficacy statements. To the fullest extent permitted by law, we do not accept or assume responsibility to anyone other than the board of directors and Pearson for our work or this report except where terms are expressly agreed between us in writing.

PricewaterhouseCoopers LLP

PricewaterhouseCoopers LLP
Chartered Accountants
London
3 April 2018

ⁱ The maintenance and integrity of Pearson's website is the responsibility of the directors; the work carried out by us does not involve consideration of these matters and, accordingly, we accept no responsibility for any changes that may have occurred to the reported efficacy statements or the Framework when presented on Pearson's website.



Pearson