Institution: Lancaster University
Unit of Assessment: 4, Psychology, Psychiatry and Neuroscience
Title of case study: Enhancing children's reading comprehension by changing national and international policy and practice
Period when the underpinning research was undertaken: September 2005 - present
Details of staff conducting the underpinning research from the submitting unit:

Name(s):	**Role(s) (e.g. job title):**	**Period(s) employed by submitting HEI:**
Kate Cain	Professor	09/2005 - present

Period when the claimed impact occurred: August 2013 - present
Is this case study continued from a case study submitted in 2014? N

1. Summary of the impact

Cain's award-winning research has demonstrated the importance of including three discourse-level skills that support successful reading comprehension (inference and integration, knowledge and use of text structure, and comprehension monitoring) in early reading instruction. This work has:

1) improved reading instruction in England by underpinning policy changes that require reading comprehension to be taught; since 2014, these policies impact more than 4 million children in the UK each year and have resulted in revisions to national assessments.

2) informed directly successful school-, classroom- and child-level training programmes in the UK and Americas to improve reading comprehension, reaching 6,000 school leadership teams and more than 14,000 trained users, globally. Separate programmes of eBooks and digital reading support have reached more than 250,000 children worldwide.

3) enriched the awareness and understanding of the skills required for good reading comprehension of more than 20,000 education and healthcare professionals globally.

2. Underpinning research (indicative maximum 500 words)

Approximately 10% of children globally have reading comprehension skills that are significantly behind their word reading ability and those of other same-age children, impacting their educational success and also their future employment options, income, and health outcomes. The World Literacy Foundation estimates the cost of illiteracy to the UK economy at £81 billion per year. Improving literacy skills in the school years is a key step to breaking a family's cycle of poverty and disadvantage.

Cain's research has elucidated the relations between core discourse-level language skills and reading comprehension development and difficulties. Traditionally, early reading instruction focused on recognising and pronouncing written words; the language skills that support reading comprehension were not a focus of instruction.

Cain has published more than 70 papers since her appointment at Lancaster in 2005. This body of work provides a more detailed and precise understanding of the skills that support the development of reading comprehension and why some children have substantial difficulties with reading comprehension, despite developing age-appropriate word reading skills.

Successful reading comprehension involves the construction of a meaning-based mental representation of the situation described by the text. To construct this mental representation, readers draw on lexical-, sentence-, and discourse-level language skills. Notably, Cain's work has identified the importance of three discourse-level language predictors of reading comprehension, namely: inference and integration skills (the ability to make links between sections of text and prior knowledge); knowledge and use of text structure (to establish causal and temporal event sequences and identify main themes); and comprehension monitoring (knowing how to check understanding and rectify problems).

Cain's work has shown that, beyond the general contributions of word reading, vocabulary and grammar, these three discourse-level language skills are unique predictors of reading comprehension (3.1). Her work has provided novel evidence that these skills directly affect the development of reading comprehension during the primary school years and are not simply by-

products of good comprehension. Four strands of evidence demonstrate the specific importance of these discourse-level skills:

1) The skills are weak in 8- to 10-year-olds with reading comprehension difficulties: when compared with peers at the same level of word reading and vocabulary, children with poor reading comprehension (assessed with a standardised assessment) have weaker inference, text structure, and comprehension monitoring skills (3.1, 3.2);

2) Performance on these discourse-level skills predicts long-term reading comprehension outcomes between 4 and 11 years of age, after controlling for initial comprehension ability (3.3, 3.4);

3) Developmental comparisons (7-year-olds through to adults) indicate that these skills explain age-related improvements in general measures of reading comprehension (3.5); and

4) When targeted in training programmes, growth in these skills for 7- to 10-year-olds results in improved reading comprehension on standardised assessments (3.6).

This body of work provides robust evidence that these language skills should be included in the literacy curriculum to support reading comprehension development in general, and that they should be targeted in interventions to develop reading comprehension and remediate specific reading comprehension difficulties. The results of such inclusion are described in the Impacts section below.

3. References to the research (indicative maximum of six references)

The example research papers underpinning the impact are all authored by Cain. The Language and Reading Research Consortium was funded by Institute of Education Sciences and Cain was the Lancaster PI: she co-designed the longitudinal study and curriculum intervention studies; designed the assessment tools for inference and integration skills, knowledge and use of text structure, and comprehension monitoring; and co-wrote the papers. Authorship contributions are evidenced in the author note for these papers. Named authors on papers by the Language and Reading Research Consortium are postdoctoral researchers who conducted data analysis.

3.1. **Language and Reading Research Consortium** and Logan, J. (2017). Pressure points in reading comprehension: a quantile multiple regression analysis. *Journal of Educational Psychology, 109,* 451-464. doi: 10.1037/edu0000150 (25 citations*) (prominence percentile: 91.98**)

3.2. **Cain, K**. and Towse, A. S. (2008). To get hold of the wrong end of the stick: Reasons for poor idiom understanding in children with reading comprehension difficulties. *Journal of Speech, Language, and Hearing Research, 51*, 1538-1549. doi: 10.1044/1092-4388(2008/07-0269) (33 citations*) (prominence percentile: 84.85**)

3.3. Oakhill, J. V. and **Cain, K**. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading*, *16,* 91-121. doi: 10.1080/10888438.2010.529219 (271 citations*) (prominence percentile: 91.98**)

3.4. Silva, M., & **Cain, K**. (2015). The relations between lower- and higher-level oral language skills and their role in the prediction of early reading comprehension. *Journal of Educational Psychology, 107,* 321-331. doi: 10.1037/a0037769 (69 citations*) (prominence percentile: 91.98)

3.5. **Cain, K**. and Nash, H. (2011). The influence of connectives on young readers' processing and comprehension of text. *Journal of Educational Psychology, 103*, 429-441. doi: 10.1037/a0022824 (83 citations*) (prominence percentile: 91.98**)

3.6. **Language and Reading Research Consortium**, Jiang, H. and Logan, J. (2019). Improving reading comprehension in the primary grades: Mediated effects of a language focused intervention. *Journal of Speech, Hearing and Language Research, 62,* 2812-2828. doi: 10.1044/2019_JSLHR-L-19-0015 (2 citations*) (prominence percentile: 96.86**)

* Source: Scopus (27/11/2020); ** Prominence (09/07/2020) is an indicator that shows the current momentum of a topic. It is calculated by weighing three metrics for papers clustered in a topic: citation count, Scopus views and average CiteScore.

Grants: The majority of this work was supported by grants from Institute of Education Sciences (US) (3.1, 3.6), ESRC (3.5), and the British Academy (3.2), with Cain as Lancaster PI or PhD supervisor (3.4). Cain was a postdoctoral researcher on the grant held by Oakhill (PI) supporting the data collection for 3.3 (data analysis and write-up conducted while Cain at Lancaster).

4. Details of the impact (indicative maximum 750 words)

Three impacts of Cain's work are described: (1) UK policy changes and resultant change in teacher practice and national assessments; (2) the development of successful interventions to improve reading comprehension; and (3) enriched understanding of the skills required for good reading comprehension for professionals, globally.

1) UK policy changes that influenced teacher practice and national assessments and improved reading instruction.
Cain was approached by the Department for Education during the last REF period to consult on the Programme of Study for English for the new National Curriculum, which was subsequently launched in September 2014.

Cain's research underpinned changes made from the previous National Curriculum, which was in place from 2000, resulting in the inclusion of the three core discourse-level language skills (**inference and integration skills**, **knowledge and use of text structure** and **comprehension monitoring** (5.1)). Cain's contribution during the consultation was to identify specific details and additional skills that were missing from the draft and to further specify what counts as progression in reading development from Year 1 to Year 6 (5.2, 5.3). *"Your contributions to the meetings at the DfE and your detailed, research-led commentary on the various drafts of the curriculum helped to improve substantially the sections on comprehension; these improvements are evident in the published framework."* (5.3, Contracted Drafter for National Curriculum).

The impact includes *a change to reading instruction that impacts more than 4 million children each year in all local authority maintained schools in England* (68% of English primary schools (5.1), who were required by law to teach this programme of study from September 2014 (5.1)). Specifically, UK educational policy and the resultant practice now incorporate a greater emphasis on the teaching of reading comprehension and the three core skills that Cain's work has shown to support reading comprehension (5.1). To date, approximately 6.7 million unique children from 5 to 12 years have benefitted from an enriched opportunity to develop successful reading comprehension skills.

In addition, the revised National Curriculum (2014) led to changes in the Standard Assessment Tests (SATs) papers taken by every child in England (excluding academy and free schools) at the end of Key Stages 1 & 2. SATs now include the assessment of the key areas identified by Cain's research: assessing the ability to "*make inferences from the text",* using text structure to *"explain how narrative content is related and contributes to meaning as a whole",* and comprehension monitoring by making *"comparisons within the text"* (5.1). The percentage of children reaching the expected level of performance or above at the end of Key Stage 2 rose from 66% in 2016 to 73% in 2019 (5.1). Finally, the OFSTED inspection framework (2019) now considers the role of inference and monitoring in the teaching of comprehension and acknowledges Cain's work (5.1).

2) Influencing the development of successful school-, classroom- and child-level interventions and curriculum supplements to enhance reading comprehension.
Cain has directly supported the development of national and international interventions and curriculum supplements designed to improve reading comprehension skills in school children.

At the school level, nationally, Cain served as series editor on the UK-based *Oxford Owl School Improvement Pathway for Teaching Comprehension* (Oxford University Press, OUP). Cain co-wrote the research overview for teachers, drawing on her own work that identified the core components of successful reading comprehension, took part in videos to explain the research base, and helped to develop the template materials and texts. Since the launch in 2015

this has provided more than [text removed for publication] UK school leadership teams with the structure, research and resources to develop and monitor a whole-school improvement plan targeting reading comprehension across all year groups (5.4).

At the classroom level, nationally, Cain's work informed directly the ***Inference Training Programme*** (published by Leicester City Council, November 2013 and developed by literacy advisor Whatmuff) (5.5) and OUP's ***Project X Comprehension Express*** (5.5). Inference Training has been accessed by over 2,000 UK schools with demonstrated efficacy: more than 12 months' improvement on standardised tests of reading comprehension after 12 weeks of intervention (5.5, 5.6). Internationally, the significance of Cain's work was noted by educational psychologists at the Universidad Nacional de San Martín, Buenos Aires, Argentina; they drew heavily on Cain's research to justify inclusion of the three discourse-level skills in two Spanish-language classroom-based reading comprehension programmes that they developed and designed. This is evidenced in the theoretical manuals that accompany the programmes (5.7). ***LEE Comprensivamente,*** designed for 8-year-olds, has around 7,300 trained users (educational psychologists and teachers) in Argentina and other Spanish-speaking countries (e.g., Uruguay) since 2014. ***Para Leerte Mejor (PLM) Programme*** (published 2016), targeted at 6- to 8-year-olds, has around 6,500 trained users to date (5.7). Nearly 26,000 copies of the materials for children have been purchased, to date (5.7). In Argentina, these classroom-based programmes have led to significant improvements in the target skills and, critically, scores on a standardised measure of reading comprehension compared with non-intervention schools, regardless of socio-economic status (5.7). Cain's work is highly cited in a report about the Teachers [sic] College globally reaching Reading and Writing curriculum; the report judged to be one of the 10 most influential reports in education in 2020 influenced the curriculum author's intention to change the focus of the programme (5.8). Finally, Cain's work influenced directly ***The Reading Comprehension Blueprint*** (Hennessy, 2020), a theoretical and practical manual for literacy instructors, and related comprehension professional development course for educators, which has now reached more than 3,000 literacy specialists (5.9).

At the child level, Cain's research has informed directly the development of two digital literacy supplements. Cain worked with OUP to develop ***Oxford Reading Buddy***, a programme of eBooks with a virtual tutor to support deeper comprehension, and quizzes to provide feedback to teachers. According to OUP's Reading Buddy website, it *"has been devised to represent the best research in the area of comprehension whilst also reflecting statutory assessment criteria and ease of use for teachers and students"* (5.4). Launched in summer 2019, Oxford Reading Buddy has changed the literacy experience of children in over [text removed for publication] schools globally (5.4). Cain's research has been used to support the inclusion of specific comprehension skills, and the design of the activities to teach those skills, in another digital reading supplement developed by the US-based company ***Amplify*** (5.10). Amplify Reading has been adopted by nearly 2,000 elementary schools, reaching approximately 250,000 children in the US from kindergarten through to Grade 5. Usage of the programme for just a single semester resulted in significant improvements on a standardised reading assessment, with students showing average gains of 100 compared with 57.6 points for students in the national database group (who did not receive the Amplify supplement) (5.10).

3) National and international engagement that has enriched professionals' awareness and understanding of the skills required for good reading comprehension.
The UK National Curriculum focuses on what skills should be taught, but not why or how. Cain's engagement work has directly addressed this gap. Cain co-authored a book entitled *'**Understanding and Teaching Reading Comprehension'*** targeted at increasing teachers' understanding and awareness of the importance of reading comprehension and how to apply this knowledge in the classroom (Oakhill, Cain, and Elbro, 2015). The book summarises Cain's research, and that of others, and includes practical exercises to demonstrate the comprehension challenges faced by developing readers and poor comprehenders, and recommendations for how to apply this knowledge in the classroom to foster core comprehension skills. The book has sold more than 6,000 copies in the UK to date (5.11). It has been published in Danish (4,000+ sales), and licenced for Arabic, Chinese, Korean, Portuguese, and Italian, each with language-specific changes. The book has been widely praised by teachers and other education professionals. A professor at the State University of New York at Cortland wrote, *"These three*

authors have been leaders in the field of reading comprehension research for decades. This volume provides the fruits of those efforts in an easy-to-read fashion. It should be read by all those who teach our children to read" (5.11).

Effective remediation of poor comprehension requires that education and healthcare professionals are aware of its incidence and potential causes to enable early identification and targeted remediation. Cain has addressed this through extensive national and international engagement with teachers, teacher educators, and speech and language therapists including keynotes at practitioner conferences, bespoke workshops, and live webinars directly reaching at least 20,000 professionals, including members of the Royal College of Speech and Language Therapists, the British Dyslexia Association, and the International Dyslexia Association, and her work on the research advisory panel of AIM academy in the U.S., a school for children with language-based learning difficulties (5.9). The impacts of Cain's engagement about her research are evident from recommendations in resources and good practice for schools and language therapy within and beyond the UK (5.9; 5.11).

The impacts of Cain's research were recognised in the 2016 Samuel Torrey Orton Award, the highest honour awarded by the International Dyslexia Association, that recognises a person who has *"made a vital contribution to our scientific understanding of dyslexia"* through work that has *"significantly enhanced and advanced our capacity to successfully intervene and assist people with dyslexia"* and *"expanded national and international awareness of dyslexia"* (5.9). Cain was also recognised as runner-up (joint with Oakhill) for the 2014 ESRC Outstanding Impact in Society Award, an annual award *"to recognise and reward ESRC-supported researchers who've created or enabled outstanding impact from social science research."* (5.12).

5. Sources to corroborate the impact

5.1 Policy documents published by Department for Education and Testing and Standards Agency containing: a) student numbers - *Schools, pupils and their characteristics*: b) reference to the three discourse-level skills the National Curriculum in England - *Statutory guidance; English programmes of study: key stages 1 and 2*, c) guidance for SATs test developers with reference to the inclusion of these skills in assessment development from 2016; and d) Ofsted inspection framework research base noting Cain's work.

5.2 Letter and verification of Cain's consultation and input into the research base for National Curriculum, from Dept of Education.

5.3 Verification of use of Cain's research base from National Curriculum contracted drafter. (16/11/2020)

5.4 Verification of use of Cain's research base and user numbers for OUP Reading Buddy and Oxford OWLS School Improvement Pathway from OUP Head of Digital Product. (13/11/2020)

5.5 Verification of research base and user numbers of Inference Training and Comprehension Express from author. (12/11/2020)

5.6 PDF of Brooks (2016) What works for children and young people with literacy difficulties, (5th Ed) publication with efficacy data for Whatmuff Inference Training.

5.7 Verification of research base, users and efficacy of LEE Comprensivamente and Para Leerte Mejor (PLM) Programme from co-author of both programmes. (12/11/2020)

5.8 Edutopia's summary of 10 most influential papers in education 2020: https://www.edutopia.org/article/10-most-significant-education-studies-2020

5.9 Verification of research base and user numbers of The Reading Comprehension Blueprint, and enhanced awareness achieved through engagement, from author and former President of the International Dyslexia Association. (09/11/2020)

5.10 Verification of research base, user numbers and efficacy of digital reading supplement Amplify Reading from Director of Learning Science, Amplify. (05/11/2020)

5.11 Summary of book reviews, resources lists and guidance for teachers and language therapists.

5.12 ESRC Impact award: https://esrc.ukri.org/research/celebrating-impact-prize/previous-years-winners/impact-prize-winners-2016/