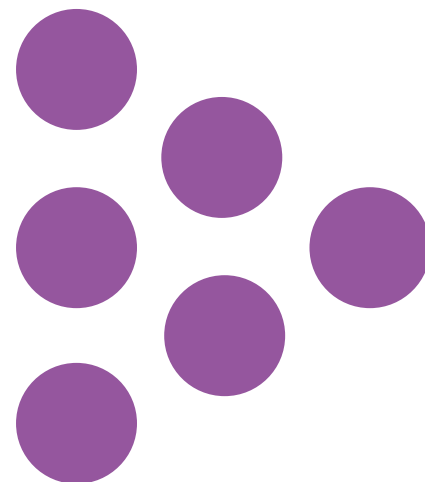

Using the NPD to optimise education RCT design – the Literacy Octopus

NPD User Group meeting

Dr Ben Styles, Head of NFER's Education Trials Unit
19th September 2018



NPD and RCTs

-
- How we use the NPD in education RCTs
 - In-depth example: the Literacy Octopus
 - Other example: Best Practice in Setting
 - The future for NPD use in education RCTs

How we use NPD data in education RCTs

- Baseline testing
- Stratification of randomisation
- Sampling within schools
- Follow-up testing
- Sub-group analysis
- Missing data analysis
- Verification of trial results
- Longitudinal follow-up

The Literacy Octopus

-
- Baseline testing
 - Follow-up testing
 - Sub-group analysis
 - Longitudinal follow-up

What did the trial investigate?

Research objectives

- To explore whether sharing evidence-based resources with teachers in various ways made a difference to teaching and learning
 - To help understand the best ways of communicating/disseminating research evidence to teachers
 - To explore the impact on teachers' research engagement and research use (secondary outcome)
 - Ultimately ... to explore the impact on pupils' learning outcomes in Key Stage 2 literacy (primary outcome)

Who was involved?

A multi-partner trial

- Four providers of evidence-based resources for schools, each with an active and a passive approach
 - Institute for Effective Education (IEE) at the University of York
 - Campaign for Learning / Train Visual delivering Teaching How2s
 - Centre for Evaluation and Monitoring (CEM) at Durham University
 - ResearchEd in partnership with NatCen

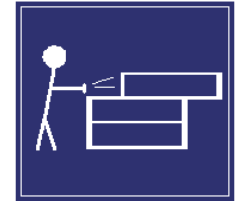


What was involved?

A range of communication/dissemination approaches

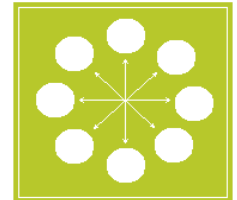
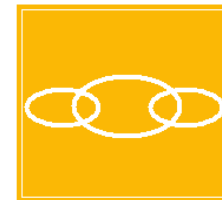
Some were passive ...

- Resources and materials shared by email or post
- Access to an evidence-based website with resources and tools
- Invitations to a conference on research use



Some were more supported or active ...

- Resources **plus** attending an evidence fair or a CPD session
- Access to a website **plus** support
- A conference **plus** pre and post webinar support



All focused on KS2 literacy, with an element of cooperative learning.

How? The trial design

Large-scale active RCT

- 823 primary schools in England
- School-level randomisation
- 10 arms
- Outcomes: attainment in literacy (age 11 2014/15, **2015/16**, 2016/17)
- Secondary outcomes: teacher research-use

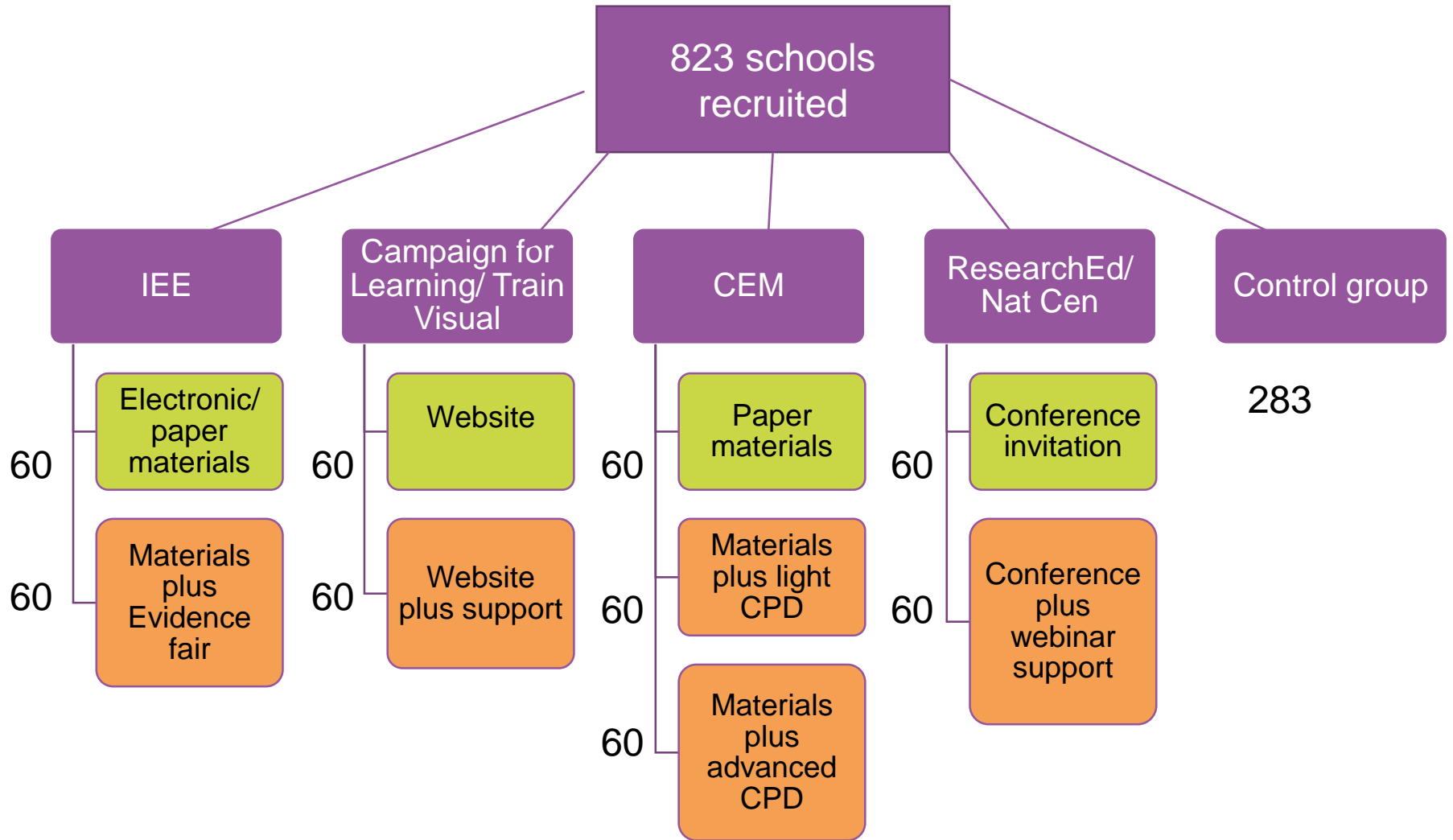
Process evaluation

Cost evaluation

Large-scale passive RCT

- 12,500 primary schools in England
- School-level randomisation
- 5 arms
- Outcomes: attainment in literacy (age 11 **2015/16** and 2016/17)

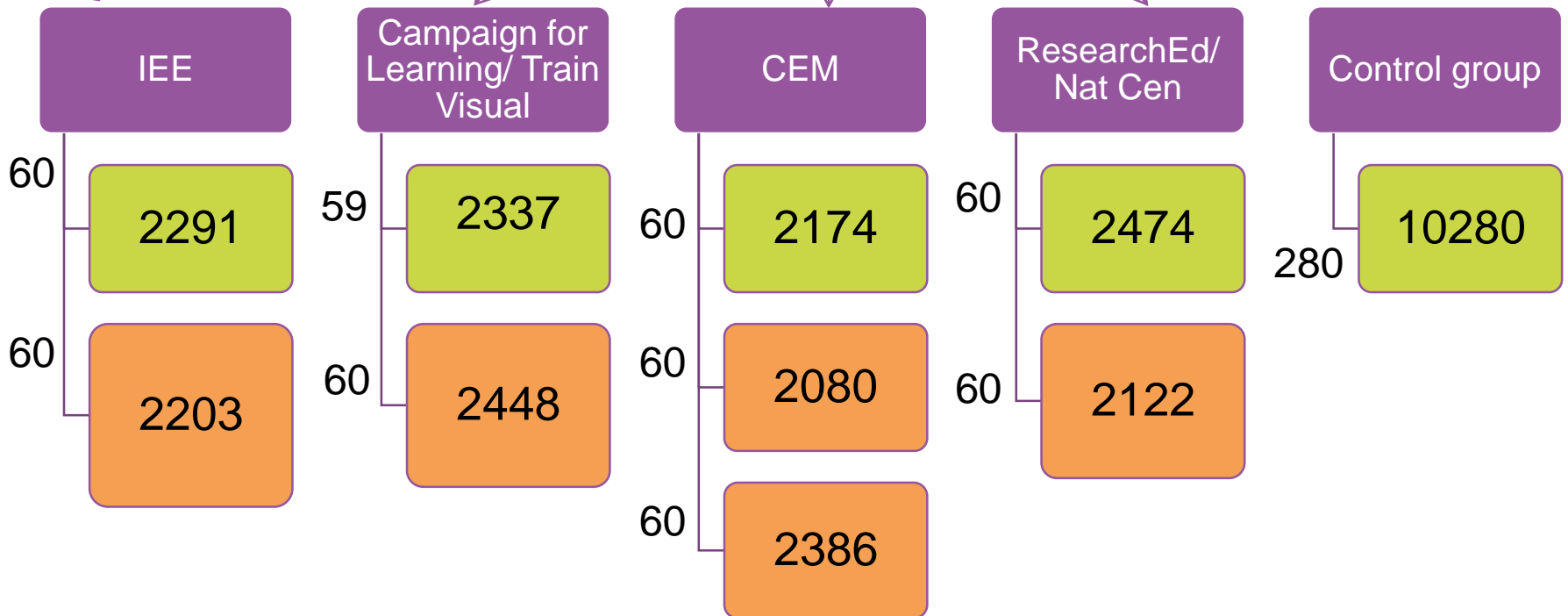
Active trial recruited



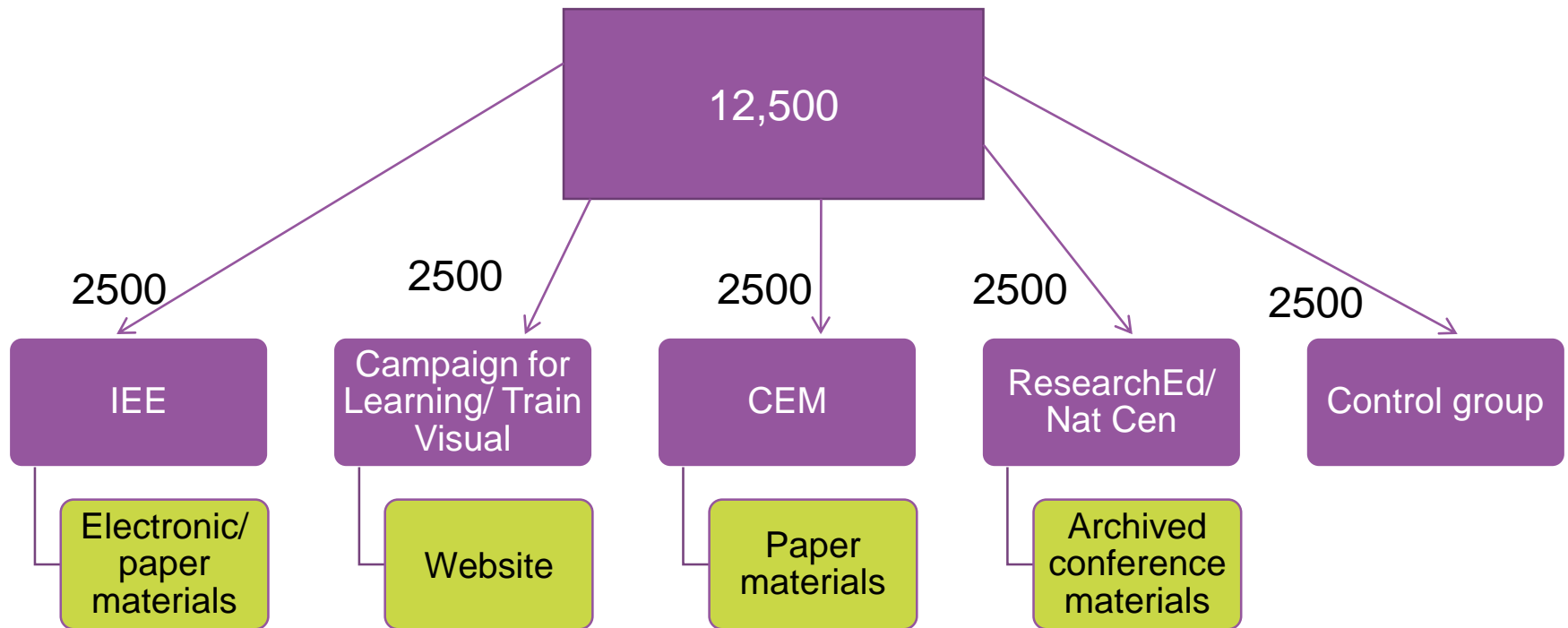
Active trial analysed

Matched to NPD: 819 schools
32,613 Y6 pupils

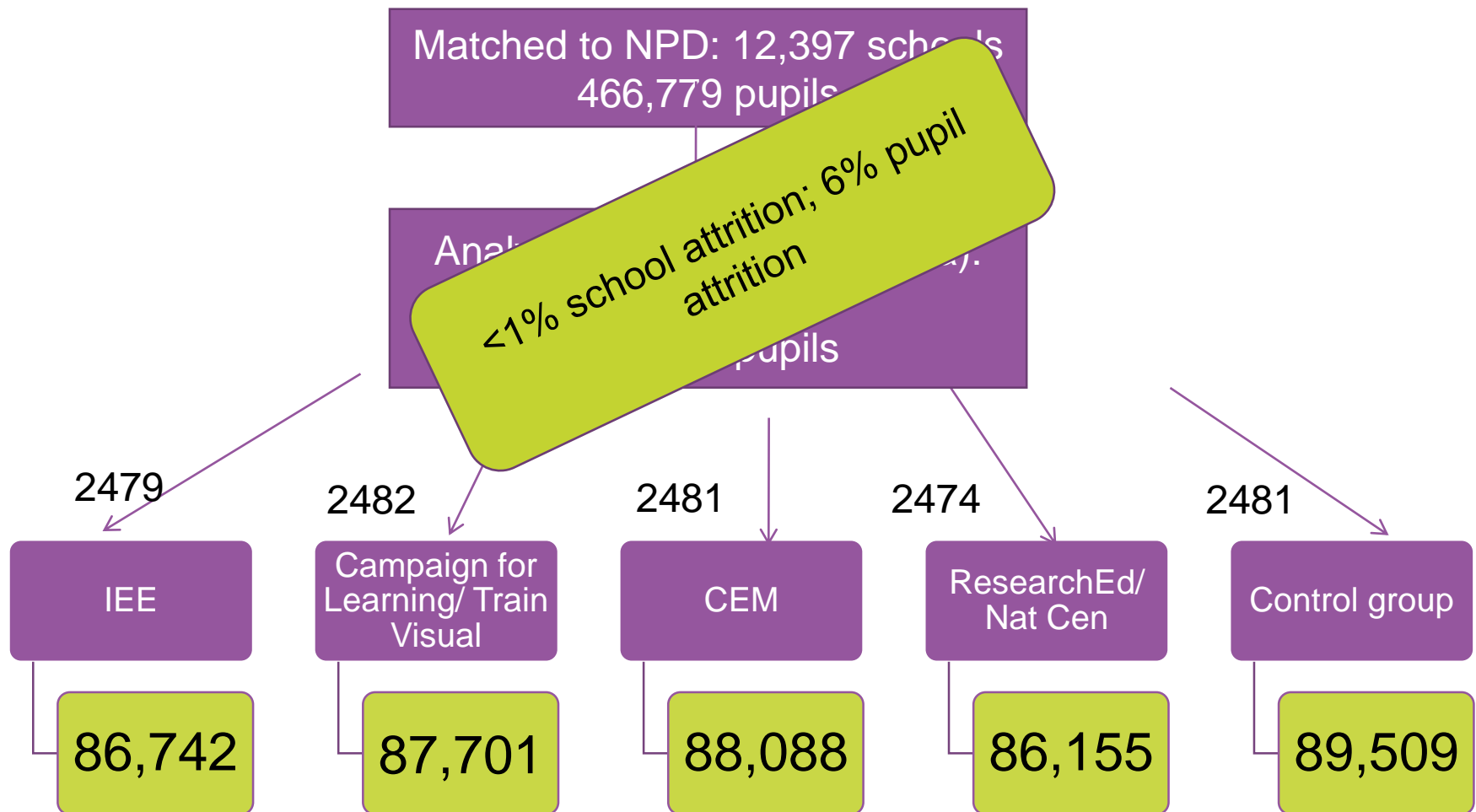
Analysed (with 16 pupils):
0.5% school attrition; 6% pupil attrition



Passive trial recruited



Passive trial analysed



Primary outcome model

Multilevel regression model (pre-specified in SAP)

- Intention-to-treat
- Key Stage 2 literacy as outcome
- Level 1 pupil; level 2 school
- Key Stage 1 literacy as level 1 covariate
- Randomisation stratifier as level 2 covariate
- (Intervention group as nine level 2 dummies)
- Likelihood ratio test between two models

SAP and reports available: <https://educationendowmentfoundation.org.uk/projects-and-evaluation/projects/the-literacy-octopus-communicating-and-engaging-with-research/>

Active trial results (2015/16)

Group	Effect size (95% Dunnett's CI)	Est. months' progress	Per pupil per year cost	No. of pupils*	P value**
IEE Passive Arm 1 vs control	-0.02 (-0.14, 0.10)	0	£0.31	2,291	0.98
IEE Active Arm 2 vs control	-0.04 (-0.15, 0.08)	0	£0.73	2,203	
How2s Passive Arm 3 vs control	0.00 (-0.12, 0.11)	0	£3.90	2,337	
How2s Active Arm 4 vs control	-0.03 (-0.14, 0.09)	0	£4.11	2,448	
CEM Passive Arm 5 vs control	0.00 (-0.12, 0.11)	0	£0.09	2,174	
CEM Active Light Arm 6 vs control	0.03 (-0.09, 0.14)	0	£0.39	2,080	
CEM Active Arm 7 vs control	0.03 (-0.09, 0.14)	0	£10.77	2,386	
ResearchEd Passive Arm 8 vs control	0.00 (-0.11, 0.12)	0	£0.26	2,474	
ResearchEd Active Arm 9 vs control	0.01 (-0.11, 0.13)	0	£0.26	2,122	

*Note, the model included results from 10,280 control group pupils.

**The p-value results from a single likelihood ratio test (LRT) across all trial arms.

Sub-group results (2015/16)

Group	Effect size (95% Dunnett's CI)	Est. months' progress	No. of pupils*
IEE Passive Arm 1 everFSM vs control everFSM	-0.03 (-0.19, 0.12)	0	526
IEE Active Arm 2 everFSM vs everFSM control	-0.05 (-0.19, 0.10)	-1	747
How2s Passive Arm 3 everFSM vs everFSM control	-0.07 (-0.22, 0.08)	-1	553
How2s Active Arm 4 everFSM vs everFSM control	-0.01 (-0.15, 0.14)	0	764
CEM Passive Arm 5 everFSM vs everFSM control	-0.02 (-0.17, 0.14)	0	574
CEM Active Light Arm 6 everFSM vs everFSM control	0.05 (-0.11, 0.20)	1	588
CEM Active Arm 7 everFSM vs everFSM control	0.04 (-0.11, 0.19)	0	668
ResearchEd Passive Arm 8 everFSM vs everFSM control	0.04 (-0.11, 0.18)	0	794
ResearchEd Active Arm 9 everFSM vs everFSM control	0.02 (-0.13, 0.18)	0	537

*Note, the model included results from 3,094 control group pupils.

Passive trial results (2015/16)

Group	Effect size (95% Dunnett's CI)	Estimated months' progress	No. of pupils*	P value**
CEM Passive Arm 1 vs control	0.01 (-0.01, 0.03)	0	88,088	0.48
IEE Passive Arm 2 vs control	0.01 (-0.01, 0.03)	0	86,742	
ResearchEd Passive Arm 3 vs control	0.01 (-0.01, 0.03)	0	86,155	
How2s Passive Arm 4 vs control	0.01 (-0.01, 0.03)	0	87,701	

*Note, the model included results from 89,509 control group pupils.

**The p-value results from a single likelihood ratio test (LRT) across all trial arms.

Long-term follow-up

Same schools; different cohort

- Year 6 in 2017

More generally

- Future statutory tests (e.g. GCSE) providing not waitlist design

Other uses

-
- Stratification of randomisation
 - Sampling within schools

 - Missing data analysis
 - Verification of trial results

Missing data analysis

‘Best Practice in Setting’ trial – maths outcome

- 37% school-level and 34% pupil-level attrition
- Missingness mechanism explored (logistic model of observed versus missing with NPD covariates everFSM, KS2 maths point score)
- Multilevel multiple imputation (using NPD variables in the imputation model)
- Sensitivity analysis
- Future GCSE results can be analysed

<https://educationendowmentfoundation.org.uk/projects-and-evaluation/projects/best-practice-in-grouping-students>

The future for NPD use in education RCTs

- Psychometric information on Key Stage tests recently published: <https://www.gov.uk/government/publications/national-curriculum-test-handbook-2016-and-2017>
- Raw scores would be better than scaled scores at Key Stage 2
- Test paper raw scores would be much better than AREs at Key Stage 1
- New access arrangements: publish pre-written analysis code in addition to SAP (for replicability)
- New access arrangements: generic extracts e.g. EEF archive database of trials data matched to NPD (for long-term follow-up and methodological work)

Acknowledgements

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- Literacy Octopus project team: Pippa Lord, Adam Rabiasz, Palak Roy, Jennie Harland, Kathrine Fowler
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 - Department for Education



Evidence for excellence in education

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