IEE Innovation Evaluation projects

Summary reports
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About IEE Innovation Evaluation Grants

The first four IEE Innovation Evaluation Grants were awarded in February 2017. Funded by the Institute for Effective Education (IEE), these grants supported pilot evaluations of innovations of teaching and learning approaches based on the Research Schools Network’s goal of improving the attainment of pupils by increasing the use of evidence-based practices.

Since then a further 26 projects have been successful in their application for an IEE Innovation Evaluation Grant, bringing the total number to 30. The applications we received included a wide range of interesting, school-led innovations – from after-school film clubs to improve the creative writing of Year 5 pupils, to the use of audio feedback with Year 12 pupils – and we were really impressed with the thought that applicants had put into how these innovations could be evaluated.

The evaluations are small-scale, and test the kinds of innovations that schools are interested in. This is very much a “bottom-up” exercise, allowing schools to get some indicative evidence behind real-world initiatives. Many evaluations are now coming to an end, and we are starting to publish reports on the findings. It is important remember that these are small-scale projects, often carried out in one school, so it is not possible to generalise their findings. In fact, the main benefit of the Innovation Evaluation projects may be in the process, rather than the findings.

You can find out more about the projects and download the final reports from the project pages on the IEE website: www.the-ieee.org.uk/what-we-do/innovation-evaluation-grants.
Using testing to improve the quality of learning in reading

Description of the innovation

‘Go Through’ sessions are lessons where a teacher provides whole-class feedback on a reading test. The teacher initially marks all reading tests. They then deliver a specific lesson in which they model how they would answer the questions, sharing their thought processes with the class. The lesson focuses on questions which many pupils got incorrect and on common misconceptions from the test. Pupils are taught specific reading comprehension skills and techniques. Pupils make changes and corrections to their test paper during ‘Go Through’ sessions and use testing notebooks to record their personal targets and learning points.

Summary of the evaluation

Sixty-four Year 5 pupils in two parallel classes participated in the evaluation. One class was allocated to be the intervention group while the other acted as a control group. The intervention class took three reading tests followed by three ‘Go Through’ sessions each half term for five months. The control class also took three reading tests (one each half term) but did not carry out a structured review of the test.

NFER Year 5 reading tests were administered to all participating pupils as a pre- and post-test. Reading comprehension outcomes were reported.

Summary of findings

On average, pupils in the intervention group made more progress in reading comprehension than pupils in the control group (effect size = +0.37). In particular, the percentage of pupils scoring above age-related expectations (standardised score of 115 and above) increased more in the intervention group than in the control group.

Lead school
Ocker Hill Academy, Birmingham

Main findings

Effect size for pupil progress in reading comprehension = +0.37
Reading Masters
Evaluating the impact of Reading Masters on the reading skills of pupils in Year 4

Description of the innovation
The evaluation investigated the impact of a whole-class reading comprehension programme which ran over a school year in Year 4 classes. Progress was compared with similar Year 4 pupils in control schools.

Reading Masters ran as a five-day per week programme for reading fluency and comprehension. Each day a specific reading skill was taught, modelled and practised in a whole class setting. There were five elements taught in this intervention:

- text and talk fluency
- retrieval
- inference
- structure and grammar
- points of view: prediction and wider context.

Summary of the evaluation
In total, eight schools took part in the project, four implementing the reading programme and four control schools. Seven schools worked with a whole class of 25–30 pupils, while one intervention school worked with two classes of 25–30 pupils. However, only seven schools reported their final results meaning data from five intervention classes and three control classes was included in the analysis.

The Progress in Reading Assessment (PIRA) test was administered to assess all pupils pre- and post-intervention. This test assesses comprehension of text including all the skills taught as part of this intervention. The standardised scores of these tests were analysed.

Summary of findings
The research found that Reading Masters had a positive impact on pupil progress in reading comprehension (effect size = +0.29). Results also showed a statistically significant impact on pupils with English as an additional language, although this analysis was unplanned in the original proposal and so this finding should be interpreted with caution.
Improving reading fluency

Description of the innovation

This evaluation investigated the impact of an eight-week small-group reading fluency intervention (the Herts for Learning Key Stage 2 (HFL KS2) Reading Fluency Project) on reading comprehension and reading accuracy for children in Years 4, 5 and 6 who were working below age-related expectation. The HFL KS2 Reading Fluency Project entails two small-group reading sessions per week, with each session lasting 20 minutes. Session one focuses on teacher-led modelled fluent reading, alongside interspersed echo reading, ending with a performance read. Session two is a traditional guided reading session with time for high-level discussion.

Summary of the evaluation

Pupils in Years 4, 5 and 6 at a large community school in St Albans participated in the evaluation. They were pupils who:

- were working below age-related expectation (ARE) in reading at the end of Year 3, Year 4 or Year 5 (the year prior to their September 2018 year group)
- had a reading age below their chronological age
- struggled to read a text judged to be at ARE.

One class in each year group took part in the innovation while the other class formed the control group. Pupils were matched from both classes based on the criteria described above.

The York Assessment of Reading for Comprehension (YARC) was administered as a pre- and post-test to all participating pupils. Reading accuracy and reading comprehension ages were analysed.

Summary of findings

The research found that the HFL KS2 Reading Fluency Project had a positive impact on developing pupils’ reading accuracy and comprehension, as measured by the YARC. Over the course of the eight week evaluation, the average progress in reading comprehension age for pupils who took part in the intervention was eight months while those in the control group made an average of two months progress (so a +6 months positive difference, effect size = +0.38). Average reading accuracy age progress for intervention group pupils was one year, one month while the control group made five months progress (a +8 months difference; effect size = +0.64).

Because there were only 20 pupils in the intervention group and 20 pupils in the control group, our results show a positive finding from a small-scale study, which suggests that a larger-scale evaluation is merited. Our results mirror the results other schools have had with the HFL KS2 Reading Fluency Project.
Enhancing reading skills in young learners

Description of the innovation

The intention of the evaluation was to investigate whether early reading skills could be further developed with the explicit teaching of sight word recognition and phonological awareness training. The intervention ran over a 10-week period. Pupils received four 20-minute teaching assistant-led sessions a week in groups of six or seven. Each session involved the explicit teaching of common sequences (for example, days of the week), consonant blends, high frequency sight words, rhyme and the segmenting of syllables (the latter two being elements of phonological awareness).

Summary of the evaluation

Following assessment using PM Benchmark (a reading age test which assesses reading accuracy and comprehension) and the PhAB2 (Phonological Assessment Battery), 37 Year 1 pupils were identified as eligible for the planned intervention. The criteria for a pupil to be part of the intervention was if they were reading at a minimum of six months below their chronological age and/or profiled with a phonological awareness deficit. Eligible pupils were randomly allocated to either the intervention group or a waiting-list control group. PM Benchmark and PhAB2 assessments were repeated after the intervention as a post-test.

Summary of findings

Using Cohen’s d effect size analysis on the results of the PM Benchmark there was a medium effect size of +0.4 for the pupils in the intervention group. On average pupils in the intervention group made 2.3 months more progress than the control group in reading age. The PhAB results were more variable; the intervention group made more progress in rhyme, fluency and digit naming, however the control group made more progress in alliteration, blending, phoneme segmentation, picture reading and non-word reading. It should be noted that the sample size was very small and also the distribution of pupils profiling with a phonological deficit was uneven, with a higher proportion in the intervention group. The evaluation shows evidence of promise that the intervention may improve the reading of Year 1 pupils with low reading age and/or poor phonological awareness.
Evaluating the impact of Mastery English on reading ages in Year 7 and on teacher workload

Description of innovation

Mastery English is a teaching strategy that had shown promise in primary schools. This evaluation investigated whether the principles can be transferred into the secondary phase.

Teachers in the intervention group delivered “Mastery English” lessons to students in Year 7. These lessons had a well-defined, disciplined six-part structure – engage, introduce, consider and practice, going deeper, independent task, reflect – and used high quality texts to teach reading comprehension and grammatical skills. A key part of each lesson was an explicit checkpoint after each lesson part. The same texts (Refugee Boy by Benjamin Zephaniah and Boy in the Striped Pyjamas by John Boyne) were used as the starting point for all other teaching activities during the period concerned. This Mastery English teaching structure was trialed over two periods of 18 lessons. Teachers in the “business as usual” control group followed the school’s normal scheme of learning.

Summary of evaluation

Three schools participated in the evaluation. Each school selected four mixed or middle prior attaining classes; two were allocated to the intervention group and the remaining two formed the control group. The STAR reading assessment was used to calculate a reading age for all participating pupils before the intervention started in autumn 2018. The test was repeated as a post-test in summer 2019. Complete data was collected and analysed for 279 pupils. Intervention group teachers completed questionnaires about their perception of Mastery English and the workload associated with the approach after delivering the innovation.

Summary of findings

Over the course of the evaluation pupils in the intervention group made more progress in reading age than pupils in the control group (effect size +0.29). Most teachers surveyed felt that their workload relating to marking and assessment had decreased, and that they spent the same or slightly less time planning when compared to their typical teaching style. The small sample size, difficulties recruiting schools and gathering complete data for all pupils, and questions around the appropriateness of text choice mean it would be unwise to draw firm conclusions about the effectiveness of the approach. However, the evaluation does suggest the approach has some merit and that further evaluation would be beneficial.
Structured after school support and its impact on reading age

Description of the innovation

The innovation comprised of two reading sessions per week for 25 weeks. One session focused on reading and comprehension of text. The second session focused on developing study skills – in particular pupils’ ability to research and carry out enquiries in a range of curriculum areas (history, geography and science).

Summary of the evaluation

All pupil premium pupils in Year 7 in all four participating schools were tested using Access Reading Test interactive (ARTi) (McCarty & Swift, 2007) to give a baseline score for reading age in September 2018. The ARTi reading test provided a reading age together with a score for literal comprehension, vocabulary, inference and analysis. Pupils who achieved a reading age at or below their chronological reading age, along with pupils who showed weaknesses in at least one of the ARTi skills (literal comprehension, vocabulary, analysis and inference) were invited to take part in the intervention.

After obtaining consent, 27 pupils were allocated to an intervention group and 27 were allocated to a control group. Following the intervention the ARTi test was administered again to see how the evaluation had affected reading age in the two groups.

Summary of findings

Our research found that the after-school structured reading project had a positive impact on reading age, as measured by ARTi. Over the course of the evaluation, the additional mean progress in reading in months was +8.67 when comparing the intervention group with the control group. This produced a small but positive effect size (+0.34).

The data produced through ARTi to measure reading age did show substantial increases and decreases in reading age for individual pupils thus producing a healthy scepticism of the validity of data produced. The data did, however, show that the intervention group made more progress than the control group in overall reading age and all subtests of the ARTi and when coupled with the suggested increase in confidence and self-esteem through student interviews, it could be argued that the intervention shows promise, although a larger scale evaluation of the approach would be beneficial.
Word rich readers

Description of the innovation

The Word rich readers innovation is based directly on the ‘Faster Read’ research by Westbrook, Sutherland, Oakhill and Sullivan (2018). During the academic year 2018–2019, Key Stage 3 pupils (in Year 8) read a new novel during their English lessons for the first two weeks of the spring and summer half terms, in addition to two novels in the first term that formed part of existing schemes of work, ensuring that participants read a total of six novels. Control group pupils read just the two novels in the autumn term. The reading did not incorporate additional study of the texts and pupils were simply encouraged to enjoy and engage with narratives. Novels were carefully chosen for their challenge and contemporary appeal.

Summary of the evaluation

Four mixed prior-attaining classes participated in the evaluation, drawn from eleven Year 8 classes in the school. Participating classes were matched for similar ability using average CAT scores and Key Stage 2 writing levels for comparison. Prior experience of the teachers of those classes was also matched as evenly as possible, and intervention and control groups were randomly assigned.

A total of 90 pupils were involved in the trial and analysis (44 intervention group and 46 control group pupils). Reading scores pre- and post-intervention were collected using Literacy Assessment Online reading tests. Full data was collected for 81 pupils. The results from internal writing exams were also compared. Individual interviews were conducted with participating teachers at the end of the process to explore factors around the delivery of the innovation.

Summary of findings

Reading a greater number of books as a whole class did not, on its own, improve reading outcomes for pupils. The results of the study showed an effect size of -0.49, suggesting that the intervention had a medium negative impact overall. It may be that pupils need to be ‘taught’ the books in order for the additional reading to lead to progress. The experience and reading pedagogy of the individual teachers seemed to be a greater factor in progress.

There were a number of limitations to the study. Given the complexity of reading as a process, it is possible that there may be a delayed effect on the pupils who were ‘word rich’. A twenty-minute multiple choice test involving only single sentences is a blunt tool for the measurement of complex reading and comprehension skills.

Lead school

The Weald School, West Sussex

Main findings

Effect size for pupil progress in reading age = -0.49
Vocabulary Banking
A strategy for boosting vocabulary and reading comprehension at KS3

Description of the innovation

Pupils were provided with A5 booklets called Word Banks in which to collect words that they thought they could reuse in other contexts and subjects across the curriculum. Each banked word secured a point, and pupils were able to secure a bonus point for each word that was successfully reused in another context or subject. Pupils used their word banks in English, history, geography, religious studies, and citizenship. Pupils were asked to underline reused words so that teachers could praise and reinforce the effort.

Summary of the evaluation

The evaluation took place in an urban co-educational Roman Catholic secondary comprehensive for two terms. Participating pupils were in Year 7 and 8 at the start of the innovation and Year 8 and 9 at the end, because the project spanned the summer holiday. Five high prior-attaining sets participated in the evaluation, with three in the intervention and two in the control group.

The Hodder Group Reading test was used as a pre- and post-test to provide a measure of reading comprehension progress. In addition, pupils completed a simple Likert scale survey before and after the innovation to measure attitudinal responses to vocabulary, active reading strategies and word banking.

Summary of findings

On average, the 80 high prior-attaining pupils in the intervention group improved their standardised scores by 7.5 points. In contrast, the 48 control pupils’ scores increased by an average of 2.4 points. The overall effect size was +0.56, +0.76 for boys and +0.40 for girls. The 18 pupils who were deemed ‘High participation’ because they successfully managed to bank and recycle more than 500 words, increased their average score by 13.5 points. The findings suggest that high prior-attaining pupils who successfully develop the self-regulatory impulse to hone in on adjectives and verbs while making evaluative judgements on their transferability make rapid progress in their ability to infer or ‘read between the lines’ of increasingly challenging texts.
No More Marking

Description of the innovation

During intervention lessons, pupils were supported to make multiple comparative judgements of both older pupils’ work and the work of their peers. This was done using No More Marking software in four lessons over two cycles of work.

Summary of the evaluation

The study involved a total of 24 classes of Year 7–9 pupils from four urban secondary schools with lower than national average proportion of disadvantaged pupils. Two classes from each year group in each school took part. Assignment to treatment was carried out at a whole class level using Key Stage 2 (KS2) writing scores to minimise the difference in prior attainment between control and intervention cohorts.

The pre-test, immediate post-test and delayed post-test (one month after completing the second cycle of work) were all questions in the style of GCSE English Paper 1 Section B – a descriptive piece of writing based on a visual stimulus.

Summary of findings

The study found that the use of No More Marking by pupils for two cycles of Key Stage 3 (KS3) descriptive writing lessons over a period of one to two months, led to pupil outcomes in descriptive writing that are comparable to the use of conventional teacher marking (delayed testing effect size = -0.06). However, there was variation in effect sizes at the delayed post-test between boys (-0.23), girls (+0.14) and disadvantaged pupils (-0.20). In almost all cases the effect size was more positive for the delayed post-test than the immediate post-test.

The study also found that the use of this intervention reduces teacher perception of their workload (t-test p-value < 0.001) compared to the work involved in conventional marking and feedback. Qualitative pupil responses indicated a greater enjoyment of lessons than normal for the intervention cohort. Pupil responses also indicated that, despite the withdrawal of (often labour-intensive) conventional feedback provided by the teacher, the intervention cohort felt equally able to both describe what a good piece of work looked like, and to produce a better quality piece of work in the future. These results are important because they could have positive implications for teacher retention.
Improving children’s narrative writing through film clubs

Description of the innovation

The intervention took the form of a structured programme of film-enriched literacy, based on the international film education programme le Cinéma cent ans de jeunesse (CCAJ), a programme which sets out a recursive curriculum of watching, making and discussing film. Five CPD sessions were held for teachers delivering the intervention between November 2017 and May 2018, and each intervention group was visited by either the project co-ordinator, or one of two researchers, to follow the implementation of the project.

Summary of the evaluation

The five participating schools set up an after-school group to follow the intervention for seven months, from November to May; these were attended by a total of 38 Year 5 pupils across the five schools. For pragmatic reasons it was not possible to randomly allocate pupils to attend CCAJ so a matched comparison group based on gender, pupil premium status and Key Stage 1 literacy attainment was formed. Thirty-two pupils from four schools completed the project and outcome data was analysed for a total of 23 intervention group and 23 matched comparison group pupils.

Between November and May three written assignments were given to the whole cohort. Potential change in writing attainment was assessed using the Year 5 End of Year Expectations – Writing – the national curriculum attainment measures for writing in Year 5.

Summary of findings

Pupils who attended after-school CCAJ clubs made slightly more progress in writing than comparison group pupils, as assessed by Year 5 national curriculum writing attainment measures. The effect size based on raw post-test scores between the intervention and control groups was +0.06, and the effect size of progress between the two groups was +0.08. The assessor of the written assignments also observed that pupils who participated in CCAJ were more likely than the pupils in the comparison group to successfully manage the pace of their narrative writing, and orientate their writing towards a reader, and our qualitative researchers made a number of observations about the intervention pupils’ skills in story-telling through film – although these could not be compared with the control group, who didn’t follow a film-making programme.

Benefits were also evident in verbal feedback following screenings of the children’s work, from both peers and parents in the wider school community. The project highlighted what was possible in terms of young people’s film production and explicitly valued children’s creative work.
Implementation of Knowledge Organisers in Year 8 English lessons

Description of the innovation

In this evaluation, Knowledge Organisers (KOs) were used as follows:

- Pupils were given a KO at the beginning of the English unit that categorised all the knowledge that pupils would need over the course of that unit.
- Each lesson began with a five-question knowledge recap pertinent to the ensuing lesson.
- Pupils were encouraged to refer to the KO during lesson time to reinforce missing knowledge.
- Weekly 10-question quizzes tested pupils on a specific knowledge category.
- Homework consisted of quiz revision and completion of activities taken from the KO.

Summary of the evaluation

The project took place in a mixed, comprehensive school in Brent, North West London. Among the 1,600 pupils enrolled, there is a large mixture of ethnic backgrounds and one-in-three pupils speak English as a second language or are bilingual.

173 pupils across six Year 8 English classes (age 12–13) participated in the intervention. All classes were mixed prior-attainment. Classes were randomly allocated to be either intervention or control classes. The evaluation was carried out over one unit of work, which was taught over six weeks.

During pre- and post-tests, pupils answered the same question in relation to different texts. Responses to the questions were assessed in relation to the following criteria: read, understand and respond to the text; analyse language, form and structure; and explore the relationship between texts and context.

Summary of findings

As a whole, pupils who took part in the innovation made less progress than those who did not (effect size = -0.17). Having said this, elements of the lesson design were popular with pupils and teachers alike.
Using self-regulated strategy development to improve writing in Year 8

Description of the innovation

Year 8 English teachers trialled the use of Self-Regulated Strategy Development (SRSD) to teach writing. This included discussing pupil attitudes to writing and developing confidence through employing positive self-talk statements. In addition, pupils were taught acronyms to help them approach and plan extended non-fiction writing including a report, a letter, a magazine article and a speech.

Summary of the evaluation

The study involved a total of six classes of Year 8 pupils from one urban secondary school where there was a slightly higher than national average proportion of disadvantaged pupils. A total of 77 pupils from three classes received the intervention while 78 pupils were taught as normal in three classes. All classes were mixed middle and lower prior attainment groupings. Classes were randomly allocated to be either intervention or control classes. The evaluation was carried out over a year with pupils being taught the intervention to produce different non-fiction writing outcomes.

The effect size was measured by comparing pre-test scaled scores generated from No More Marking Proof of Progress test in the autumn term with post-test scaled scores from the summer term.

Summary of findings

The study found that the use of SRSD had a slight negative effect size for pupils in the intervention group (-0.02) and for low prior attainers (-0.09). However, there was a very slight positive effect size for pupils with special educational needs (+0.03) and for pupil premium pupils (+0.01). Ultimately as these effect sizes are so slight, they cannot be seen to have any value in a practical sense therefore the study found that the use of SRSD as a writing intervention has no discernible impact on pupil progress in writing in Year 8.

We did find that the use of this intervention may have a positive impact on pupils' confidence with, and attitude to planning. In open and closed questions, pupils reported a positive response to the use of the planning element to help them develop and elaborate ideas in extended writing.

Year 8 pupils reported some improvement in levels of confidence and enjoyment in writing, however this was found in both the control and intervention groups. The staff who taught the intervention did find it a useful tool to implement and have used it with other year groups within the school, however this is alongside other planning tools to develop extended writing.
A metacognitive approach to the learning and teaching of spelling (MALTS)

Description of innovation
MALTS – the Metacognitive Approach to the Learning and Teaching of Spelling – aims to improve attainment for all learners through the implementation of a thorough and rigorous spelling programme (Support for Spelling, 2009) synthesised with a range of metacognitive strategies to develop children’s spelling consciousness. Class teachers delivered two 45-minute sessions per week over 24 weeks.

Summary of evaluation
The sample for the randomised control trial consisted of Year 3 and 4 pupils from two Lewisham primary schools. Half of these children were assigned to the intervention group, the other half to a control group. Both groups used Support for Spelling as the basis of their teaching, but teachers in the intervention group were sent adapted versions on a weekly basis, which incorporated a metacognitive structure and metacognitive strategies for teaching and learning the content. The intervention was delivered to whole classes by the class teacher.

A baseline assessment was conducted and, using mean age-related scores, similar Year 3 and Year 4 classes were matched. Once similar classes had been paired, one class from each pair was assigned to the intervention and the other to the control group, using a random number generator. The Helen Arkell HAST-2 standardised test was used for the baseline assessment and the post-test, which provided a ‘spelling age’ for each child.

Summary of findings
Based on the data from the pre- and post-test, the innovation showed a positive effect size of +0.08, showing a small positive impact. In Year 3, the effect size was +0.25, whereas in Year 4 it was -0.07. The overall effect size for disadvantaged children (those receiving the pupil premium grant) was +0.11. For children identified as having a special educational need or disability, the effect size was +0.05.

These findings suggest that this spelling programme may need to begin earlier in children’s time at school, ensuring there are no gaps in the rigorous teaching of spelling. In both schools, Year 3 were taught a robust phonics programme through Early Years and Key Stage 1, then went straight into the MALTS programme; whereas Year 4 had one year without any spelling programme before beginning the MALTS programme in Year 4.

Lead school
Rathfern Primary School, London

Main findings
Effect size for pupil progress in spelling age = +0.08
Developing word knowledge

Description of innovation

A bespoke word knowledge intervention was taught to pupils in Years 3 and 5. This intervention focused on five aspects of word knowledge: breadth of vocabulary, depth of vocabulary, fluency, word memorisation and recall automaticity. Two word knowledge lessons were taught each week, one introducing the weeks’ spellings and the other focusing on semantics and morphology. These lessons were reinforced by short word level activities throughout the week and a spelling test at the end of the week. The intervention lasted for one academic year.

Summary of evaluation

Two schools participated in the evaluation. One Year 3 class and one Year 5 class from each school formed the intervention class while the parallel class from each school formed the control class. All participating pupils took NFER standardised reading and spelling tests at the beginning and end of the academic year. The Grey Oral Reading Test (GORT-5) was also administered to eight pupils, with a range of NFER spelling test scores, in each class at the beginning and end of the academic year.

Summary of findings

Results were variable across measures, year groups and schools. The NFER spelling outcomes showed positive impacts on progress in Year 3 but only minor impact in Year 5. The NFER reading comprehension outcomes differed according to school rather than group. Outcomes from the GORT-5 show variability in the impact (ie, both negative and positive) of the intervention: children in the intervention groups made substantial progress in relation to reading accuracy and fluency subtests of the GORT-5, but the control group pupils made more progress in reading rate in all year groups, and in reading fluency and comprehension in Year 5.

These results are somewhat perplexing and not expected in light of the results from the pilot study and the research evidence on which the innovation was based. The intervention was high intensity (an extra two word knowledge sessions per week, plus word knowledge activities and homework) and meant that the intervention group pupils received potentially an extra two hours of word knowledge instruction/practice per week than control group pupils, yet there was no clear benefit compared to the relatively light touch ‘business-as-usual’ control group outcomes.

The small sample size combined with variable outcomes between classes and schools, limits the conclusions that can be drawn from the current study. The evaluation does highlight a number of possible avenues for further study.

www.the-ieee.org.uk/what-we-do/innovation-evaluation-grants/developing-word-knowledge
Improving times tables fluency

In 2020, children in Year 4 will be required to take a multiplication tables check (MTC). There is much debate about the need for this test and its format but also about the most effective way to teach and practice times tables, as efficient recall without the need to use precious working memory capacity in calculating tables facts is helpful in making larger multiplication and division calculations and problems easier to solve.

In 2017, Underwood West Academy carried out research which concluded that the teaching of times tables may be made more effective by using a conceptual approach, which concentrates on examining the connections and patterns in the tables facts, rather than "business as usual". We theorised that there might be an optimum balance of procedural and conceptual approaches to practising times tables.

Description of the innovation

Pupils had four 15-minute times tables lessons each week. Teachers were provided with conceptual and procedural activities for these lessons: conceptual activities were games that focused on the connections and patterns in tables facts, while procedural activities were games in which pupils practised multiplication facts.

Summary of the evaluation

Thirty-four Year 4 classes (876 children) took part in the evaluation. Classes were allocated to one of five conditions, with each condition using a different balance of conceptual and procedural activities during times tables lessons. The intervention lasted for 12 weeks. Before the intervention started, all participating pupils carried out a simple times tables test comprising of 25 spoken multiplication questions. The same test was repeated as a post-test.

Summary of findings

The results of the trial showed that no one balance of practise activities was more effective than another. We conclude that times tables may be best taught by using a balanced approach – teaching both the concepts behind them and practising them in a range of ways with low-stakes testing.
Let’s Think Early Years

Description of the innovation

The Let’s Think Maths approach to mathematics teaching was introduced into four Reception classrooms, providing a professional development programme across the 2018–19 academic year. Teachers also received two coaching visits in their own schools and received a Let’s Think teacher pack with activity plans and resources. The four teachers taught Let’s Think activities to up to 13 pupils within each of their classes on a weekly basis over the course of approximately nine months. Pupils experienced a series of guided, small group activities, alongside their usual maths curriculum, using problem solving, social construction and metacognition.

Summary of the evaluation

Four Reception classes in four inner-city London primary schools across Southwark were involved in the intervention, in which between 10 and 13 pupils in each class acted as the intervention cohort, while the other pupils in their class acted as within-class controls. A further four Southwark primary schools acted as school-level controls.

Pre-testing of all pupils was carried out using the Piagetian Spatial Relations Test, which was repeated with all pupils at the end of the year. Early Years Foundation Stage scores were also compared for control and intervention groups within intervention classes. Intervention and control group teachers completed questionnaires about their views and expectations of Reception pupils’ mathematics capacity.

Summary of findings

Intervention pupils made more progress on the Piagetian Reasoning Test: Spatial Awareness than within-class controls, but intervention classes made less progress than control classes. The reasons for these unexpected findings are unclear, but hypotheses include lack of comparability across control and intervention classes and the intervention taking place over one academic year rather than two, as is more typical in Let’s Think evaluations.

Questionnaire data suggested that intervention teachers’ understanding of children’s mathematical capacity increased over the year. Intervention teachers reported feeling more confident teaching maths; using more challenging activities; allowing the children more time to think, talk, listen and reflect on their learning; and having a greater focus on engagement and participation in children’s learning at the end of the intervention.

Limitations of the study include the low reliability of early years teacher assessment data. There were also some issues with the teacher questionnaire which may have led to incorrect scoring.

Lead school
Charles Dickens Primary, London

Main findings
Mean progress in spatial reasoning made by intervention group pupils = +0.58.
Mean progress in spatial reasoning made by within class control pupils = +0.54.
Mean progress in spatial reasoning made by control group pupils = +0.71.
**Science learning journals**

*Description of the innovation*

The innovation was the use of learning journals during Year 6 science lessons throughout the academic year 2018-19. These were used by the classroom teacher and specialist science teachers to plan lessons and address misconceptions. Separate professional development sessions delivered by a specialist science teacher were also offered to primary teachers focusing on specific Key Stage 2 (KS2) science curriculum areas and beyond.

*Summary of the evaluation*

Eight feeder primary schools to Heathfield Community College were involved in the evaluation. All pupils in Year 6 from participating schools took part in the evaluation (where schools had Year 5 and Year 6 in the same class, only Year 6 data was used).

Four schools were control schools and four schools were intervention schools. The size of Year 6 cohorts for the feeder primaries varies. In order to ensure similar-sized intervention and control groups, the eight primaries were paired up; one small school to one large school. These four pairs of schools were randomly allocated to either the intervention group or control group (two pairs in each group).

Pupils sat two science tests at the beginning of term 1. These tests comprised papers A and B from the 2012 KS2 science SATs. This formed a baseline assessment for comparison. Pupils sat the same tests at the end of term 6 and scores were compared to term 1 and between the two groups of schools.

*Summary of findings*

The intervention group made more progress on the test between term 1 and term 6 than the control group (effect size +0.72). The data suggests that the intervention had little impact on pupil premium (PP) pupils (effect size +0.09) and a small impact on the pupils with special educational needs and disabilities (SEND, effect size +0.26) although both groups had relatively small numbers (PP 11&9; SEND 5&8). Due to absence, less data was provided in term 6 than in term 1 and so several pupils were not included in the data analysis. This meant in the whole sample 57 pupils were included in the intervention group and 73 in the control group.
Teaching A-level pupils “skills for learning”

Description of the innovation

This innovation aimed to teach pupils with relatively low prior attainment (GCSE APS 40-46) the non-subject-specific ‘skills for learning’ required to be successful at A-level. Participating pupils took part in a launch day which included a motivational speaker from outside the school. They were then taught non-subject-specific ‘skills for learning’ required to be successful at A-level, in nine after-school twilight sessions delivered by lead teachers. The pupils also attended fortnightly mentoring sessions with a high-attaining Year 13 pupil.

Summary of the evaluation

Ashby School is an age 14-18 school with approximately 1,700 pupils. There are approximately 600 pupils in the sixth form. Two cohorts of Year 12 pupils were selected to participate in the innovation. All selected pupils had a GCSE prior-attainment score of APS 40–46. They were paired in terms of GCSE attainment (APS score) and choice of A-level subjects, and then split randomly to ensure that the cohorts were balanced and therefore comparable. Cohort 1 (n=19) received the innovation in the autumn term and cohort 2 (n= 17) received the same innovation in the spring term. Progress was assessed for each pupil at various internal data collection points and then analysed to produce an ALPS score.

Summary of findings

The results do appear to show a slight improvement in ALPS grade at the spring assessment for the cohort receiving the innovation (cohort 1), suggesting that the innovation may have been successful in improving progress. However, with the relatively small sample size, this small improvement is not statistically significant, preventing us from drawing any firm conclusions.

Similarly, the fact that cohort 2 had a lower ALPS score than cohort 1 at the spring assessment, but following their intervention, at the summer assessment point, had an ALPS score above cohort 1 is encouraging. This suggests that the innovation may have been effective and also that the innovation may be more effective when delivered during the second term of an A-level course. However, these differences are not statistically significant precluding the drawing of firm conclusions.

Overall, the results are mildly encouraging suggesting that the innovation may have had a positive impact on pupils’ progress. However, the improvements are not as large as was hoped, and too small to be statistically significant and allow firm conclusions to be drawn from this relatively small sample size.
The Meta-package

Description of the innovation

The Meta-package includes two distinct elements – a series of lessons on neuroscience and a language-for-learning approach that was incorporated into tutor group lessons. The innovation was designed to have a long-lasting effect resulting in improved progress in English Baccalaureate (Ebacc) subjects.

The Meta-package began with a series of seven lessons on neuroscience spaced fortnightly, and running between October and December. In January, the language-for-learning element began, which was present in all lessons where intervention pupils were taught as a tutor group (approximately 50% of their timetable).

Summary of the evaluation

The project was run in a rural secondary academy with 261 Year 7 pupils in nine mixed gender and prior-attainment classes (five intervention and four control classes). The three outcome measures used in the evaluation were:

- summative assessment across the seven subjects where language for learning was used
- the Metacognitive Awareness Inventory (MAI)
- a mindset measurement tool.

Summary of findings

Intervention group pupils made more progress than control group pupils in history, geography and science, all of which have written examinations, with an average effect size of +0.37. However, across the four subjects of music, drama, art, and philosophy and religion (PR), all with either portfolio, project or performance-based assessments, the effect size was -0.05. Across all seven subjects the average effect size was +0.16.

The MAI effect size across all cognition areas was 0.00. The mindset measure showed an effect size of +0.11.

The positive effect sizes seen in history, geography and science are promising, but the negative effect sizes in art, drama, music and PR are not. The progress within history, geography and science was made six months after the neuroscience lessons and is a positive achievement if valid. There is some evidence that the language-for-learning aspect is important to make progress. The study conclusions are limited in what can be generalised due to the variable effect size across academic subjects. The study was with just one age group in one school in a rural setting with low percentage of EAL and PP pupils compared to the national average. Further study is required and several improvements are suggested.

Lead school

St John’s International Academy, Wiltshire

Main findings

Across all seven subjects the average effect size = +0.16
The MAI effect size = 0.00
The mindset measure effect size = +0.11

www.the-ieee.org.uk/what-we-do/innovation-evaluation-grants/the-meta-package
Building resilience in learners

Description of the innovation

The intervention, called ‘My Big Life’, was a six-week series of classes based on cognitive behaviour therapy principles. Each session lasted for one hour per week and was delivered as a life-skills lesson to a class of 25. The sessions aimed to develop pupils’ emotional wellbeing and provide them with strategies to cope with difficult emotions and situations. Pupils were given a small My Big Life card that summarised the techniques they had learnt.

The application of these skills was supported by completion of a daily reflection journal, supported by a trained member of staff, where pupils recorded any situations they faced, what strategies they employed and how they felt about the outcome. Over the period of the intervention pupils gained an increasing toolkit of strategies that they were able to employ.

Summary of the evaluation

This research has been a collaboration of six rural secondary schools in Devon and Dorset. All schools delivered the My Big Life course to one group of Year 7 or Year 8 pupils selected based on their identified low attendance, achievement, attitude to learning and poor behaviour. A total of 268 pupils were involved in the trial and analysis (136 intervention pupils, 132 control pupils). We collected the following data pre- and post-intervention from existing school reporting systems: attendance, behaviour concerns, progress, attitude to learning and homework. We also asked all pupils to complete a self-evaluation of wellbeing using the Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS).

Summary of findings

Pupils’ self-reported wellbeing (measured using WEMWBS) showed a positive effect size, with mean WEMWBS score increasing in the intervention group compared with little change in the control group (effect size = +0.28).

The data also suggests a link between wellbeing and attendance. Pupils with low pre-test wellbeing scores (≤ 40 on the WEMWBS) showed a significant increase in attendance, with a 3% increase in average attendance for the intervention group compared to 0% change in the control group (between groups effect size = +0.35).

Based on analysis of the whole cohort we found some neutral and some positive effect sizes for behaviour, homework, attitude to learning and progress, although there were concerns about the validity of these measures.

Lead school
Sidmouth College, Devon

Main findings

Effect size for pupils’ self-reported wellbeing = +0.28
Effect size for attendance = +0.06

www.the-see.org.uk/what-we-do/innovation-evaluation-grants/building-resilience-in-learners
Desk cycle study

Description of the innovation

All children in the intervention groups were given access to a desk cycle during maths lessons. A desk cycle is a small, portable pedal unit which fits under a desk allowing a person to pedal whilst doing work. The units work on a magnetic resistance so are quiet. The children were able to decide for themselves how they used the cycles (i.e., constant pedalling, or pedalling for only part of a lesson). The intervention lasted 15 weeks, starting at the end of January 2018 and continuing until May half-term. The main objective of the evaluation was to investigate whether teacher reports of children’s hyperactivity changed in any way as a result of using the desk cycle. Of additional interest was whether there were any changes in the fitness levels of the children, or their attainment in maths.

Summary of the evaluation

Four schools in Stoke-on-Trent participated in the evaluation. The 2015 Index of Multiple Deprivation ranks Stoke-on-Trent as the thirteenth most deprived Local Authority in England, and all four schools are located in areas of high social deprivation.

The study involved 99 children from Year 6 and Year 5 classes. The children in each class with the highest hyperactivity scores were selected to be in the sample and classes were chosen at random to be intervention group or control group classes.

The measurements used were the hyperactivity scale of the Strength and Difficulties Questionnaire (SDQ), waist-to-height ratio, the time to complete the daily mile, and scores for the 2017 Year 6 SATs arithmetic paper or the Year 5 Maths Hub arithmetic paper, depending on the age of the child.

Summary of findings

Overall, the study showed positive effect sizes for waist-to-height ratio (+0.15), time to complete the daily mile (+0.11) and SDQ hyperactivity scale (+0.93). Pupils in the intervention group had a median reduction of two points on the 10-point teacher-reported hyperactivity scale in contrast to a median reduction in score of 0 for the control group pupils. However there were negative effect sizes for maths progress in both Year 6 (-0.52) and Year 5 (-0.16).

Limitations of the study include the small sample size of 99 children, difficulty reliably determining how far the children had cycled, and lack of prior research in this area (meaning a literature review proved to be very difficult). The 15-week trial period was also quite short so a longer study is required to produce more reliable data.
Retrieval practice in primary science lessons

Description of the innovation

Key Stage 2 science sampling tests reveal a significant decline in attainment since national tests were abolished in 2009/10, with only 23% achieving an estimated expected standard in the 2016 samples compared to 88% achieving a level 4 in 2009 (Key Stage 2 science sampling 2016 Methodology note and outcomes July 2017, Standards & Testing Agency). The gap between pupil premium and non-pupil premium pupils is also significant. We wanted to test the effects of retrieval practice in primary science lessons, in the form of multiple-choice quizzing (MCQ), to examine how well pupils retain the content they have been taught.

Intervention pupils were assigned to answer multiple-choice questions using the quizzing app, Socrative, at the beginning of science lessons. Each 10-minute quiz tested pupils’ knowledge and application of information learnt from the previous lesson(s). Control groups were asked to reread materials from previous lessons for 10 minutes. Socrative quiz questions, test questions and reading materials were aligned to the National Curriculum objectives for each unit of work studied.

Summary of the evaluation

For the evaluation, 188 pupils were selected from Year 2–5 classes in two urban schools: Old Hill Primary and St James’ CofE Primary. Both schools are based in Sandwell and are comparable, with half the pupils eligible for pupil premium. Classes were randomly assigned to either intervention or control group. Pupils undertook a unit pre-test for baseline percentage measures and two further delayed tests once the unit of work was completed: after one week and 12 weeks respectively. Additionally, pupils and teachers completed a simple survey before and after the innovation, to measure attitudinal responses to science lessons, subject knowledge and tests.

Summary of findings

Intervention pupils attained an overall effect size of +0.26 for the one-week delayed test. More interesting, was the 12-week delayed intervention effect size of +0.58. The results suggest that pupils who practise multiple choice quizzing not only perform better in a one-week delayed test than their peers, but perform considerably better after 12 weeks, thus demonstrating a greater retention of learning when retrieval practice is employed in lessons. Results for pupil premium pupils are particularly of interest, revealing no loss of learning in Years 2 and 5 and only a 5% percentage loss in Year 3.
Low stakes quizzing

Description of the innovation

Intervention group pupils receive the weekly, 10 minute low stakes quizzing intervention which consisted of 10 closed questions.

Summary of the evaluation

Heathfield Community College is a rural, comprehensive secondary school in the south of England. The Year 8 pupils taking part in the study were taught in eight mixed prior-attaining classes throughout the academic year in geography and history by subject specialists. Four classes (approximately 50% of the cohort) were randomly selected to receive the low stakes quizzing intervention. The remaining four classes were the control classes who took part in retrieval practice on an ad hoc basis throughout the evaluation period. All pupils sat a baseline assessment in each subject at the start of the evaluation and their mean scores were compared with the mean scores in the end of year assessments in each subject.

Summary of findings

The intervention in geography showed a positive impact with an effect size of +0.3 for all pupils. It had a greater effect on girls (+0.4) and on pupils who were not in receipt of pupil premium (+0.5). The greatest effect was on pupils with special educational needs and disabilities (SEND +0.8) but it has to be considered that the sample size was small (n=9), especially compared with the whole cohort (n=218). Our key conclusion is that low-stakes retrieval practice in the form of short answer recall tests does boost meaningful learning in geography.

In contrast, the intervention in history showed little impact with an effect size of +0.1 for all pupils. It had a slightly greater impact for boys (+0.2) in comparison to girls (+0.1). Similar to geography, the greatest effect was on pupils with SEND (+0.2), but the sample size was also small (n=12) in comparison to the whole cohort (n=215). Consequently, the conclusion drawn here is that low stakes retrieval practice in the form of short recall tests in history does not lead to a notable increase in meaningful learning in history nor helps pupils in applying knowledge to write about the subject.

One limitation of the study is that the conclusions are predicated on the final assessment truly being a test of meaningful learning and this could be contested. Although the overall sample sizes for the intervention group and the control group were fairly large compared to other practitioner research studies some of the subgroups were much smaller; such as the numbers of SEND and pupil premium. There were also differences in the numbers of pupils who eventually sat the history and geography assessments due to pupil absence.
**DoNow+**

**Description of the innovation**

This innovation tested whether pupils’ retention of content knowledge in their long-term memory could be improved, and thus improve their performance in academic activities such as analytical writing. Teachers used ten highly structured recall questions and one carefully planned elaborative question at the start of every lesson with their Year 8 history or English class, in two different schools. The innovation was due to be conducted over two terms but due to delays around the baseline assessment, the study was shortened to three half terms.

**Summary of the evaluation**

Two mixed prior-attaining classes from each school took part in the evaluation in each subject, with one being allocated as the intervention group and one as the control group. In total, 99 pupils participated in the English element of the evaluation (52 in the intervention group and 47 in the control group) and 92 pupils participated in history (48 in the intervention group and 44 in the control group).

Pupils sat a baseline test, per school and per subject, which measured their performance in responding to an analytical question. They did the same at the end of the innovation. Comparative Judgement was used to establish their scaled score in each test in order to determine whether those in the intervention group outperformed those in the control group.

**Summary of findings**

The research suggested that DoNow+ had a positive impact on pupil performance in history (effect size = +0.23) but in English the effects were negative (effect size = -0.35). The process evaluation suggested that even in English, there were positive side-effects of the innovation, particularly in terms of classroom management.

**Lead school**

Greenshaw High School, Surrey

**Main findings**

Effect size for pupil progress in history = +0.23

Effect size for pupil progress in English = -0.35

www.the-ieee.org.uk/what-we-do/innovation-evaluation-grants/donow
Audio feedback
Evaluating the impact of feedback using an audio tool compared to written feedback

Description of the innovation
Teachers of Year 12 A-level mathematics and sociology trialled recording digital audio feedback and sharing this with pupils (for example via school email) instead of providing more traditional written feedback. Pupils accessed the feedback through mobile devices, and where this wasn’t possible, through home computers.

Summary of the evaluation
The study involved a total of 19 classes of Year 12 pupils from seven urban secondary schools where there was a lower than national average proportion of disadvantaged pupils. Assignment to treatment was carried out at a whole class level using GCSE Attainment 8 scores to minimise the difference in prior attainment between control and treated cohorts.

During the trial, pupils in treated groups received recorded audio feedback on three pieces of their work, while control groups received conventional written feedback.

The effect size was measured by comparing GCSE grades with post-test scores.

Summary of findings
The study found that the use of verbal feedback (using an audio tool), delivered over a discrete topic, was more effective than written feedback in improving test outcomes in sociology and mathematics A-level (effect sizes = +0.15 for sociology and +0.18 for mathematics). Effect sizes were similar for boys and girls, but were negative (-0.64) for disadvantaged sociology pupils (although the number of these pupils was small).

We also found that the use of this intervention may have a positive impact on workload for teachers of A-level sociology, but that it had a statistically significant negative impact on the workload of mathematics A-level teachers compared to the work involved in providing conventional written feedback.

Mathematics pupils reported finding conventional written feedback more useful than the use of an audio tool (at a statistically significant level), whereas sociology pupils found the opposite (again at a statistically significant level).
Learning by Questions innovation evaluation grants

These IEE innovation evaluation grants, funded by Learning by Questions, support schools to test a new innovation in classroom practice.

Innovations are either based on existing evidence or, where evidence is lacking, they test a new approach to address a challenge within school.

All the innovations are:

- developed and evaluated within a school setting
- related to core curriculum subjects (maths, science and English) in Key Stages 1–3 (ages 5–14)
- able to use the Learning by Questions (LbQ) system as part of the innovation and/or evaluation.

You can find out more about the projects and download the final reports from the project pages on the IEE website: https://the-iee.org.uk/learning-by-questions.
CoachBright Primary
Evaluating the effects of a maths coaching programme on Year 6 pupil premium pupils

Description of the innovation
This project enabled six schools to each identify two groups of up to four underachieving disadvantaged Year 6 pupils (up to eight pupils in total in each school) with high to middle prior-attainment to receive the CoachBright programme before their SATs tests in May 2019.

Summary of the evaluation
Forty-seven Year 6 pupils from six primary schools across London were involved in the intervention. A further 48 Year 6 pupils from six other, comparable, primary schools acted as controls. According to 2018–19 data, both intervention and control schools had relatively high levels of disadvantage in their pupil population. Both intervention and control pupils completed the epiSTEMe Maths Attitude Questionnaire pre- and post-intervention. They also sat the 2018 Maths SATs Paper 2 reasoning test pre-intervention so that scores could be compared to the scores they obtained on their 2019 Maths SATs Paper 2 reasoning test post-intervention. Year 6 teachers of intervention pupils also provided attainment predictions and outcomes data and wrote short assessments of their eight pupils’ learning, confidence and motivation in maths pre-, during and post-intervention.

Summary of findings
This very short intervention (six hours per pupil) had a small but positive impact (effect size = +0.06) on mathematics attainment as measured by pre- and post-test data. Teacher assessment data appears to support these findings, since 68% of pupils met ambitious targets set by their teachers, with 6% exceeding their target, and 62% of pupils exceeding teacher’s predictions of their likely attainment without the intervention. However, control group teachers were not asked to provide teacher assessments, target data or descriptions of pupil progress so it is not possible to know how similar pupils who did not receive the intervention progressed against these targets.

Teachers’ qualitative feedback also supported the positive effect of the project, with 64% of pupils being seen to make positive progress. Although the intervention had no measurable impact on pupil attitudes towards mathematics, as measured by the pupil attitudes questionnaire, teachers’ qualitative feedback did identify perceived improvements to resilience and confidence.

Lead school
Charles Dickens Primary, London

Year levels
Year 6

Main findings
The evaluation found a small but positive impact (effect size = +0.06) on mathematics attainment as measured by pre- and post-test data.
Using low-stakes quizzing and interleaving to promote learning and retention of information in primary mathematics

Description of the innovation
This innovation project investigated the impact of using low-stakes quizzes and spaced practice and/or interleaving on mathematics attainment in Year 5 pupils in a large three-form entry primary school.

Summary of the evaluation
Sixty-nine Year 5 pupils in three parallel mixed-ability classes participated in the evaluation. All pupils attended a large primary school based in Sandwell. The percentage of pupils eligible for pupil premium at the school is 39%, which is well above the national average.

The three classes were randomly assigned with a coin toss to each of the conditions described below:

Control class – business-as-usual. Paper-based quizzes were presented after a topic was taught in lessons in a blocked fashion corresponding to the topic which had been taught in class.

Intervention class 1 – LbQ quizzes with spaced practice. For the purposes of this project we define spaced practice as children only revisiting the material on one occasion after the initial teaching but with a delay of two weeks after it was taught. Post-topic quizzes were therefore presented to children in lessons with a delay of two weeks between classroom teaching and quizzing.

Intervention class 2 – LbQ with spaced practice and interleaving. As for intervention class 1, there was a delay of at least two weeks between classroom learning and testing, but in addition maths topics were tested in an interleaved fashion rather than blocked practice. In intervention class 2, teachers interleaved practice of different types of mathematical content so that newer tasks were mixed together with revision of earlier lessons and maths topics. This meant that key topics were presented multiple times to pupils before the final post-test in this group.

Summary of findings
The results suggest that there is promising evidence that interleaving had a positive effect on mathematics progress compared to both the control and spacing groups (Effect size for intervention class 2 (spacing + interleaving) vs intervention class 1 (just spacing) = +0.80; Effect size for intervention class 2 (spacing + interleaving) vs control class = +0.78). The control group performed slightly better than the intervention class 1 (just spacing) but there was a small effect size for this comparison (-0.08).
Sandwich lessons
Linking of GCSE exam questions to enquiry based questioning and learning in lessons to increase attainment and progress of pupils in Year 9

Wigmore High School will evaluate whether using a Learning by Question strategy over two terms improves the progress of middle-attaining Year 9 pupils in maths and chemistry in comparison with their lower- and higher-attaining peers who do not experience the use of Learning by Question resources.

Challenge
Pupils’ ability to answer exam questions successfully can limit their success in summative assessments. Pupils present a range of difficulties when attempting questions; however, many pupils display the following struggles:

- The problem of retaining a large number of facts for the new GCSE curriculum.
- A difficulty in understanding how this knowledge links to examination questions.

Innovation
Pupils in the intervention class will experience our Learning by Question intervention.

Each lesson will include a recall element, an application task and, when appropriate, misconceptions will be addressed using the Learning by Question tools.

The tasks will be selected from the Learning by Question resources and pupils will have access to tablets in order to complete them, and receive feedback. The teacher may use the interactive whiteboard to dissect and talk the questions through with the pupils when appropriate. In addition, exam questions will be a key resource.

It is expected that the resources used will, on the whole and aside from the initial lessons, not be pre-planned and will be based on the teacher’s own assessment for learning to meet the needs of their class best.

Class 2 will be exposed to the innovation every lesson for their chemistry and maths lessons.

The two control classes (class 1 and class 3) will not experience the use of Learning by Question tablets and resources.
Improving pupil outcomes in science while reducing teacher workload

This innovation will investigate the effect of Learning by Questions on Progress Test in science scores for Year 7 pupils.

Challenge

Workload is an issue that affects all teachers. Most teachers believe the effective use of ICT in the classroom can reduce workload and benefit the progress of pupils. However, evidence is lacking into specific approaches that demonstrate this. Learning by Questions (LbQ) is a classroom application that uses scaffolded questions and immediate feedback to develop pupil mastery of curriculum content. Real time assessment data from LbQ allows teachers to offer immediate intervention towards individuals or groups of pupils, without the need to mark pupil work.

Innovation

LbQ will be integrated into the curriculum of the intervention group. LbQ science question sets have been mapped to the Sacred Heart Year 7 schemes of work. All teaching groups will receive a summary lesson at the end of each topic.

The control groups will receive a standard hour-long end of topic summary lesson and starter activities. The intervention group will receive an hour-long summary lesson that uses LbQ and LbQ ‘Working Scientifically’ question sets will be completed as starter activities across the year.

Note: A maximum of three question sets will be used in a summary lesson. Every additional three sets will receive an additional revision session e.g. Year 7 topic B3 will require three LbQ summary lessons. The control group will receive extra non-LbQ summary lessons where necessary to ensure both groups receive the same summary time.

The project coordinator will create a log for intervention group teachers to ensure that each question set is completed at the appropriate time.

All pupils involved in the trial will take the GL Assessment Progress Test in science at pre- and post-testing to provide standard age and stanine scores in biology, chemistry, physics and working scientifically. The tests are paper based and will be marked by GL Assessment. We would expect the results of the post-test to show that pupils in the intervention group will make greater levels of progress.

Control and intervention teachers will take an online survey at the start and end of the trial to evaluate the impact of LbQ on teacher workload.

The evaluation will run for one whole academic year.
Multiple choice questioning and whole class feedback

Emmanuel College will investigate what impact using Learning By Questions followed by whole class feedback delivered for 30 minutes each week for 18 weeks has on the attainment of Year 7 pupils in science knowledge when compared with business as usual.

Challenge

One of the main challenges that the school faces is improving the outcomes of pupil premium (PP) or ever free school meals (FSM) pupils. As pupils who are PP or FSM are more likely to have medium- to low-attainment in primary school, the intervention will measure the impact, if any, on these pupils.

The main focus of the innovation is to assess the impact of whole class feedback on the quality of feedback, staff workload and the attainment of all pupils including those that are PP or FSM.

Innovation

Lessons in science notionally have the structure: instruction – practice – feedback.

School data suggests that instruction is carried out well, but lessons are weaker on practice and feedback. To address this, intervention classes will receive one lesson a week where “practice” is achieved using Learning By Questions question sets completed by pupils in class, and feedback is delivered by the class teacher, depending on the pupils’ performance on the question sets. This might involve, for example, re-teaching a misunderstood area of content to some, or all, of the class. This approach should deliver more immediate, and therefore more effective, feedback to pupils, leading to better understanding and retention of knowledge.

Control classes will continue with business as usual.

Year 7 science classes will use the Learning by Questions resource for 30 minutes and staff will use whole class (or individual or small group) feedback to ‘bridge the gaps’ using the assessment data for the remainder of the lesson (between 15–20 minutes). Control classes will continue with business as usual.
Retrieval practice in science

This project will test whether Learning by Questions (LbQ) is a more effective method of retrieval practice in science than more traditional SMART (Smart Minds Active Recall Time) Connect activities in Year 9 low prior-attaining pupils and Year 10 mid prior-attaining pupils.

Challenge

Teaching with a focus on developing memory is a core teaching and learning (T&L) priority for Ashington Academy. Ashington Academy has low attainment and progress in science at Key Stage 4 (P8 -0.76 in 2018). Disadvantaged pupils perform significantly less well than their non-disadvantaged peers (P8 -1.34 compared with -0.6 for non-disadvantaged). Low prior-attaining pupils perform notably less well than the rest of the cohort (P8 -1.03). Staff identify pupils’ lack of resilience and poor retention of core knowledge as a significant barrier to progress, particularly faced with new, more demanding GCSEs. Previous preferred teaching and learning approaches in school have been more focused on skill development than knowledge development.

Innovation

We will use LbQ for memory retrieval at the beginning of lessons, substituting for current traditional retrieval activities used. Currently, the retrieval method used in school is effective, but only when used consistently and systematically. The instant feedback feature of LbQ will allow us to examine whether more structured, consistent feedback allows for greater retention and retrieval.
Supporting maths for biologists

Notre Dame High School will investigate what effect Learning by Questions, used for two terms at the practise stage of their ‘maths skills for biologists’ programme will have on Year 11 pupils’ attainment in their Year 11 mock exams.

Challenge

Achievement in science at Notre Dame High School is generally high, and vulnerable pupils make good progress at our school. But pupils find it hard to apply mathematical skills that they have learned elsewhere to biology contexts.

This issue causes further problems later, as many of our pupils go on to study biology at A-level, and are hampered by their maths skills. This is particularly true for the weaker, and more vulnerable pupils, who find it very difficult to catch up at Key Stage 5 when the demands have increased significantly across the board.

We would like to support all pupils taking biology at GCSE to improve their maths skills, and we have designed and implemented a structured programme to help do this.

Innovation

The innovation will take place with Year 11 biology pupils currently undertaking their GCSEs. Pupils in both intervention and control classes will carry out the following:

- A specific maths skill assigned to each Key Stage 4 biology topic
- Pre-testing of maths skills in biology context.
- Teaching materials for these skills, which are used across the biology department.
- Worked examples and practice questions, designed centrally, and used by all biology teachers.
- Post-testing of maths skills in biology context.

For intervention classes, LBQ will be used throughout the unit to practise specific maths skills. LbQ will be used at least once a fortnight (once every three lessons).

For control classes, paper-based activities will be used to practise specific maths skills.

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