



## **Toolkit of Strategies to Improve Learning**

### **Summary for Schools Spending the Pupil Premium**

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## Toolkit to improve learning

The aim of the Government's new Pupil Premium is to raise achievement among disadvantaged children<sup>1</sup>. It will provide additional funding for disadvantaged pupils to ensure they benefit from the same educational opportunities as pupils from wealthier families. Although the precise mechanism for allocation and evaluation is still being finalised, the amount per pupil has been announced initially as £430 for 2011/12, then perhaps rising to as much as £1750 by 2014/15.

The Pupil Premium has a number of wider aims:

- to increase social mobility;
- to enable more pupils from disadvantaged backgrounds to get to the top Universities;
- to reduce the attainment gap between the highest and lowest achieving pupils nationally.

Simply spending more on children from less affluent backgrounds, however, will not necessarily improve their learning or their aspirations. There is no direct link between spending on schools and outcomes for pupils. Extensive research in this area shows that it is a complex issue, indicating that the way the money is spent is crucial. So if the Pupil Premium is to succeed in achieving its ambitious goals, the choices that schools make in allocating the money will be vital so that the funding can help raise pupils' attainment and aspirations.

The aim of this document is therefore to summarise some of the research evidence on improving learning and attainment to help schools to make more informed choices about how to support their pupils who are eligible for the additional funding. In each area we have identified different approaches to improving learning in schools, and identified the strength of the existing research evidence and then made an estimate of the costs of adopting the approaches. The toolkit also provides guidance on whether the approaches are applicable to primary or secondary school settings, and in which core subjects – English, maths or science.

Applying this knowledge in schools about each approach, to ensure that the impact of any changes benefits pupils' attainment will still be challenging, as there is no simple solution or guaranteed bet. The aim of the toolkit is to encourage schools and teachers to make their own informed choices and adopt a more 'evidence based' approach: they will need to monitor the effect of their chosen approach and evaluate the investment to ensure it is having the desired effect.

We also present a short summary and an outline of what we see as the relative benefit of the different approaches. Two appendices indicate the approximate levels of additional funding a school is likely to receive initially according to its size and the

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<sup>1</sup> For the latest Government guidance on the Pupil Premium, see: <http://www.education.gov.uk/schools/teachingandlearning/assessmentandachievement/premium/a0076063/pupil-premium-what-you-need-to-know>

percentage of pupils receiving free school meals (Appendix 1). £430 is about equivalent to two full days of additional teacher time per pupil per year, or a bit less than a month of a teacher's full and undivided attention over the course of their school career. If the Pupil Premium is increased to about £1750 by 2014/15 this is nearer eight days of teacher time per year or nearer four months total schooling (Appendix 2). The challenge is to use this effectively to support improved educational outcomes for these learners.

Finally, we should point out that it is always challenging to apply the findings of educational research from one context to another. However our aim is to help schools to identify potentially productive strategies and approaches which they will then need to develop and evaluate to suit their own setting and context.

### **Spending for learning: linking resources and learning outcomes**

The challenge to establish a clear link between educational expenditure and pupils' learning is harder than you would think. It may seem obvious that more money offers the possibilities for a better or higher quality educational experience, but the evidence suggests that it is not simply a question of spending more to get better results. This may be because in the UK and other developed countries we broadly spend reasonably efficiently and increased effectiveness comes at much greater cost. Much of the early research in this area failed to find a convincing connection. More recent research suggests that there is a link between spending and outcomes, but that it is a complex picture.

Investing in better learning, or 'spending for learning', is therefore not easy, particularly when the aim is to support disadvantaged learners. Much depends on the context, the school, the teachers (their levels of knowledge and experience), the learners (their level of attainment and their social background) and the educational outcomes that you want to improve (knowledge, skills or dispositions). Improving test scores in arithmetic in the short term, for example, may not raise students' aspirations for what further learning in mathematics may accomplish for them.

Though there is not clear evidence of the link between additional spending and learning, we interpret this to mean that it is difficult to spend additional resource effectively. On average it may be hard to find a link, but there must be some areas which offer a better bet than others, and this is what this toolkit shows.

We are also not suggesting that all educational aims and outcomes are captured in the literature that we have pulled together. Most of the measures are traditional measures of attainment, curriculum tests and examinations or standardised measures. Some studies include assessment of attitudes and beliefs, but even these may have a specific focus in the studies, depending on the research aims. The rationale for inclusion and evaluation is presented in Appendix 3, with full details in the technical report which accompanies the toolkit.

Our solution to the challenge of linking spending with learning is to focus on what the evidence indicates is effective in improving teaching and learning using typical measures, and then working out what additional costs are associated with these approaches, so as to highlight the issues for schools to explore. A number of other, less effective approaches have been included as a comparison or where they are better known to provide a reference point.

The summaries combine evidence from a range of different research studies. In all cases there is a range of effects which have been combined into a single average for each area. We are not claiming that this will necessarily be the impact when schools try them out. Some of the approaches which are less effective on average, might be effective in a new setting or if developed in a new way. Similarly an approach which tends to be more effective, on average, may not work so well in a new context. However we think that this evidence will be useful to schools in making a good 'bet' on what might be valuable, or may strike a note of caution when trying out something which has not worked so well in the past.

The toolkit purposefully compares broad approaches against one another, rather than advocating specific schemes, although we hope in time to develop a number of links to specific resources for teachers to explore further, and make their own choices. Whatever approach is chosen, of course, it will still be necessary for each school to evaluate the actual benefits of any changes in a real context to ensure the investment really does help pupils from low-income families achieve their educational potential.

This summary document represents the first stage of the toolkit. The next stages will involve an evaluation of how a number of schools fare in actually implementing the toolkit, and the development of the toolkit into a more interactive online resource for schools and teachers.

## Toolkit to improve learning: summary overview

<i>Approach</i>	<i>Potential gain</i> <sup>2</sup>	<i>Cost</i>	<i>Applicability</i>	<i>Evidence estimate</i>	<i>Overall cost benefit</i>
<b>Effective feedback</b>	+ 9 months	££	Pri, Sec Maths Eng Sci	☆☆☆	Very high impact for low cost
<b>Meta-cognition and self-regulation strategies.</b>	+ 8 months	££	Pri, Sec, Eng Maths Sci	☆☆☆☆	High impact for low cost
<b>Peer tutoring/ peer-assisted learning</b>	+ 6 months	££	Pri, Sec Maths Eng	☆☆☆☆	High impact for low cost
<b>Early intervention</b>	+ 6 months	£££££	Pri, Maths Eng	☆☆☆☆	High impact for very high cost
<b>One-to-one tutoring</b>	+ 5 months	£££££	Pri, Sec Maths Eng	☆☆☆☆	Moderate impact for very high cost
<b>Homework</b>	+ 5 months	£	Pri, Sec Maths Eng Sci	☆☆☆	Moderate impact for very low cost
<b>ICT</b>	+ 4 months	££££	Pri, Sec All subjects	☆☆☆☆	Moderate impact for high cost

<sup>2</sup> Maximum approximate advantage over the course of a school year that an 'average' student might expect if this strategy was adopted – see Appendix 3.

<b>Assessment for learning</b>	+ 3 months	££	Pri, Sec Maths Eng	☆	Moderate impact for moderate cost
<b>Parental involvement</b>	+ 3 months	£££	Pri, Sec Maths Eng Sci	☆☆☆	Moderate impact for moderate costs
<b>Sports participation</b>	+ 3 month	£££	Pri, Sec Maths Eng Sci	☆☆	Moderate impact for moderate cost.
<b>Summer schools</b>	+ 3 months	£££	Pri, Sec Maths Eng	☆☆	Moderate impact for moderate cost
<b>Reducing class sizes</b>	+ 3 months	£££££	Pri, Sec Maths Eng	☆☆☆	Low impact for very high cost
<b>After school programmes</b>	+ 2 months	££££	Pri, Sec Maths Eng Sci	☆☆	Low impact for moderate cost.
<b>Individualised instruction</b>	+ 2 month	££	Pri, Sec Maths Eng Sci	☆☆☆	Low impact for low cost.
<b>Learning styles</b>	+ 2 month	£	Pri, Sec All subjects	☆☆	Low impact, low or no cost
<b>Arts participation</b>	+ 1 month	££	Pri, Sec Maths Eng Sci	☆☆☆	Very low impact for moderate cost.

<b>Performance pay</b>	+ 0 months	£££	Pri, Sec Maths Eng Sci	☆	Very low/no impact for moderate cost
<b>Teaching assistants</b>	+ 0 months	££££	Pri, Sec Maths Eng Sci	☆ ☆	Very low/no impact for high cost
<b>Ability grouping</b>	± 1 month	£	Pri, Sec Maths Eng Sci	☆ ☆ ☆	Very low or negative impact for very low or no cost
<b>Block scheduling and timetabling</b>	± 1 month	£	Pri, Sec Maths Eng Sci	☆ ☆	Very low or negative impact for very low or no cost
<b>School uniforms</b>	± 1 month	£	Pri, Sec Maths Eng Sci	☆	Very low or negative impact for very low or no cost

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## After School Programmes

### *What is it?*

After-school programmes are services offered during term time and at the end of the school day where children or young people are involved in planned activities which are supervised by adults. However, the goals, objectives and approaches of the programmes may vary greatly. Sometimes they will have an academic focus and be taught by teachers from the school the pupils attend, others will have a wider variety of activities supported by adults with a range of skills and qualifications.

### *How effective is it?*

Research findings indicate that participants in after-school programmes score higher on measures of academic achievement. However the gains are modest on tested attainment of reading or mathematics (with an effect size between .13 and .31) but no clear pattern of impact. There is evidence that there are wider benefits for low-income students in terms of behaviour and relationships with peers. For these families, attending a formal after-school programme where children spend more time in academic and enrichment activities reliably but modestly linked with their learning and behaviour, relations with peers and their attitudes to learning.

**Impact summary: + 2 months (effect size 0.16)**

### *How secure is the evidence?*

There are a number of reviews and a comprehensive meta-analysis, mainly using data from the USA, but with broadly similar findings in the UK.

**Strength of the evidence:** ☆ ☆

### *What are the costs?*

Analysis suggests that enthusiasm for after-school programs has outpaced the research base indicating the need for more rigorous evaluations with outcome measures that demonstrate effectiveness.

Most of the cost estimates after-school programmes come from the US, with a wide range from \$8 to \$36 (£5 - £25) per day for each young person involved, with an average at about (£10). The costs of different after-school programmes depend on a number of factors, including decisions about the types of activities provided, the staff-to-young person ratio, and the extent of investment in factors such as fundraising and the future sustainability of the programme. However assuming £10 a day for about half a school year (100 days) comes to about £1000 per pupil.

**Cost summary: ££££**

### *How applicable is it?*

Programmes with greater structure, a strong link to the school-day curriculum, well qualified and well-trained staff, and opportunities for one-to-one tutoring seem particularly promising and more clearly related to academic benefits. Programmes may not be equally effective with all students. At risk children may benefit more as do younger children (5 – 10 year olds). In terms of subjects, positive effects for reading were highest for younger primary pupils and in secondary schools. For mathematics the gains were higher for older primary and secondary pupils. However it is harder to attract and retain pupils as they get older.

*Further information:* There is a 2007 review by the Collaborative for Academic, Social and Emotional Learning (CASEL): <http://www.casel.org/sel/meta.php> .

## Ability grouping

### *What is it?*

Pupils with similar attainment levels are grouped together either for specific lessons on a regular basis (setting or regrouping) or as a class (streaming or tracking), the assumption being that it will be possible to teach more effectively with a narrower range of attainment in a class.

### *How effective is it?*

The evidence is consistent that though there may be some benefits for higher attaining pupils in some circumstances (e.g. gifted and talented programmes), these are largely outweighed by the negative effects on attitudes for middle and lower performing learners (with an average effect size of about 0.12). There is some evidence that effective and flexible grouping for particular tasks can be beneficial, or when effective teachers are assigned to low attaining groups. However, more routine setting arrangements tend to undermine low attainers' confidence and the belief that effort is more important than ability. This is a clear example of what *not* to do if you want low income pupils to benefit as they are more likely to be assigned to lower attaining groups. Some reviews suggests the overall impact on learners is negative (i.e. over time their performance deteriorates – an effect size of -.06).

**Impact summary: ± 1 month (effect size .12 / -.06)**

### *How secure is the evidence?*

The evidence is robust and has accumulated over at least 30 years of research. Although there is some variation depending on methods and research design, the conclusions are relatively consistent. One of the complexities of the issue is the language of 'ability' which implies a fixed construct rather than approaches which suggest learners can improve and which emphasise success through effort.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

Ability grouping is an organisational strategy which has few, if any, financial costs associated with it. Schools should be aware of the detrimental effects on low attaining pupils, of which those receiving free school meals will be likely to form a large proportion. If schools adopt mixed ability grouping they more likely to use inclusive teaching strategies and to promote higher aspirations for their pupils.

**Cost summary: £**

### *How applicable is it?*

The evidence suggests that impact of setting is most detrimental to low attaining pupils in mathematics who do better in mixed attainment groups. The effects appear to be less evident in English and Science, though negative effects are more commonly reported for low attaining pupils across the curriculum. The evidence is available particularly for upper primary and lower secondary education.

### *Further information:*

An older, but thought provoking article by Adam Gamoran from 1992 available at: [http://gayleturner.net/Gamoran\\_Is\\_Ability\\_Grouping\\_Equitable.pdf](http://gayleturner.net/Gamoran_Is_Ability_Grouping_Equitable.pdf) .

## Assessment for learning

### *What is it?*

Assessment for learning (AfL) is based on the idea that students need a clear understanding of what it is that they need to learn and evidence about their current level of performance, so they can close this gap. The concept developed from definitions of formative assessment and feedback and has clear links with other approaches such as mastery learning. A number of classroom strategies have been developed to support the approach such as using the traffic lights metaphor to indicate learners' confidence or personalizing the process with characters (such as Walt, Wilf, Tib and Oli) for younger learners.

### *How effective is it?*

The theoretical evidence for the benefits of feedback on learning is strong. Reviews consistently suggest that the potential benefit in terms of effect size is large (about 0.8). It is less easy to make this work in practice in a classroom setting with a large group of learners. The Kings Medway Oxford Formative Assessment Project (KMOFAP), one of the few quantitative studies of Assessment for Learning, found an average effect of 0.32, or about half a GCSE grade.

**Impact summary: + 3 months (effect size .32)**

### *How secure is the evidence?*

There are a number of robust reviews and meta-analyses of the importance of feedback for learning. There are no meta-analyses of the impact of Assessment for Learning or the wider use of formative assessment in schools. There is some evidence of the importance of supporting teachers' and pupils' understanding of the purposes and processes involved (see also metacognitive approaches).

**Strength of the evidence: ☆**

### *What are the costs?*

The actual costs of implementing Assessment for Learning are low, however the evidence suggests that professional development is needed. In the KMOFAP project studies, the teachers involved had about six days of professional development and were supported in implementing and evaluating the approach. The costs were estimated at about £2000 per teacher.

**Cost summary: ££**

### *How applicable is it?*

There is limited research evidence about its applicability, however it is readily adaptable to all phases and subjects of education.

*Further information:* The national strategies produced support materials for schools in England which are still available at:

<http://nationalstrategies.standards.dcsf.gov.uk/node/97905> and the GTC's Teacher Learning Academy has a research summary with practical advice:

[http://www.gtce.org.uk/tla/rft/af\\_l\\_prac0904/](http://www.gtce.org.uk/tla/rft/af_l_prac0904/) .

## Arts participation

### *What is it?*

Participation in artistic and creative activities, including dance, drama, music, painting, sculpture etc, both in terms of performance and creation. Participation may be organised as regular weekly activities or more intensive programmes such as summer schools or residential courses.

### *How effective is it?*

Overall the impact on academic learning is moderate, though greater effects have been identified for younger learners of primary school age in terms of impact on cognitive tests.

**Impact summary: + 1 months (effect size 0.05)**

### *How secure is the evidence?*

There are a number of systematic reviews and meta-analyses which have consistently found benefits, though these vary according to approach and age group studied so the effects are hard to generalise.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

Costs vary considerably from small local junior drama groups with small annual subscription (about £20), through organised dance groups for young people at about £5/ session to high quality music tuition at about £35/hour. Costs are estimated at £150/ year, though it should be noted that some kinds of participation would be considerably more (e.g. nearer £1500 for individual music tuition).

**Cost summary: ££**

### *How applicable is it?*

There is consistent evidence that participation in artistic and creative activities are beneficial. Effects have been identified from arts participation in terms of impact on English mathematics and science learning in school at both primary and secondary school level. Specific benefits are linked with some particular activities (such as spatial awareness and music for example). There is some evidence that younger learners may benefit more from these approaches.

### *Further information:*

The Department for Culture, Media and Sport (DCMS) set up the Culture and Sport Evidence (CASE) programme was set up by to collect evidence about participation in culture and sport and their recent review is available at: <http://www.culture.gov.uk/images/research/CASE-systematic-review-July10.pdf> .

## Block scheduling and timetabling

### *What is it?*

Block scheduling is one approach to school timetabling in secondary schools. It typically means that pupils have fewer classes (4-5) per day, for a longer period of time (70-90 minutes). The three main types of block schedules found in the research are: '4x4': 4 blocks of 80–90 minute classes in one day, students take 4 subjects in one term; 'A/B': classes of 70-90 minutes each for 3/4 different subjects on every alternating day; and 'Hybrid': 5 classes per day, between 55 and 90 minutes in length.

### *How effective is it?*

There is no consistent pattern in the evidence. The most recent systematic review concluded that the 4x4 block seemed to produce higher cross-subject achievement than traditional schedules. However, this may mask differences between subjects. More detailed analysis suggests that in science the A/B block scheduling approach resulted in higher results than traditional schedules (effect sizes between 0.13 to 0.42); in mathematics and English the evidence was unclear with studies showing both better and worse results for any type of block scheduling compared with traditional scheduling (effect sizes between -0.15 to 1.55). There is not therefore sufficient evidence to support the introduction of block scheduling in secondary schools to raise attainment. It is important to be aware that the findings do not indicate that block schedules are likely to produce negative outcomes for pupils across subjects, but the findings on the benefits or positive effects are not strong enough to recommend adoption. It suggests that how teachers use the time they are allocated is more important than the length of lesson or the schedule of lessons. It may also be that when different timetable patterns are introduced, the changes will only be beneficial if teachers alter the way they teach to get the best from the time allocation.

**Impact summary: ± 1 month (effect size -.02 / 0.15)**

### *How secure is the evidence?*

There are a reasonable number of studies and one systematic review which looks at the quantitative evidence of the impact of timetabling and scheduling changes on students' learning.

**Strength of the evidence:** ☆ ☆

### *What are the costs?*

The costs of altering timetabling is mainly in terms of organisational or administrative time to set up the timetable. Additional costs are low.

**Cost summary: £**

### *How applicable is it?*

Timetabling issues tend to affect secondary schools, though the time spent on different areas of the curriculum is of importance in primary education. The research has mainly looked at impact on mathematics, English and science.

### *Further information:*

A review undertaken by the EPPI Centre is available at:

<http://eppi.ioe.ac.uk/cms/Default.aspx?tabid=2476> .

## Early intervention

### *What is it?*

Early intervention approaches are where the aim is to ensure that young children have educationally based pre-school or nursery experience to prepare them effectively for school. Many programmes focus on disadvantaged children. Some also offer parental support.

### *How effective is it?*

Overall the evidence suggests that early intervention is beneficial with above average levels of impact (an average effect size of 0.45). There is some evidence that these programmes need to be whole day (rather than half-day) and of longer duration (up to a year) rather than for shorter periods of time. The impact tends to wear off over time, however, though it tends to have a more durable effect on attitudes to school than measures of attainment.

**Impact summary: + 6 months (effect size .0.45)**

### *How secure is the evidence?*

There are a number of systematic reviews and meta-analyses which have looked at the impact of early intervention. Most of these are from the US however, where children tend to start school at later age. Evaluations of Sure Start in the UK indicate some caution is needed in translating research evidence into practice, particularly at policy level.

**Strength of the evidence:** ☆ ☆ ☆ ☆

### *What are the costs?*

The costs, understandably, are high as adult/child ratios in pre-school provision tend to be higher than school classes and family interventions have similar high costs. Estimates are around £900 per child per year, the Sure Start average was about £1000 in 2006.

**Cost summary: £££££**

### *How applicable is it?*

Applicable to early years education. Most of the studies are in the US however, where children tend to start school later. Evaluation of Sure Start in the UK suggest that the benefits may be harder to achieve at larger scale.

*Further information:* The US Government's 'What Works' Clearinghouse contains details of early childhood intervention programmes with robust evidence of impact: <http://ies.ed.gov/ncee/wwc/reports/Topicarea.aspx?tid=13> .



## Effective Feedback

### *What is it?*

Feedback is information given to the learner and/or the teacher about the learner's performance relative to the learning goals which then redirects or refocuses either the teachers or the learners actions to achieve the goal. It can be about the learning activity or *task* itself, about the *process* of the task or activity, about the student's management of their own learning or their *self-regulation* or about them as individuals (e.g. "*good girl*") Research suggests that feedback is best directed at the task and process level. Research suggests that it should be:

- about *challenging* tasks or goals (rather than easy ones);
- given *sparingly* (i.e. needs to be meaningful);
- more important to give feedback about what is *right* than what is *wrong*;
- important to be as *specific* as you can and, if possible, compare what they are doing right now with what they have done wrong before; and
- it should *encourage* them, and not threaten their self-esteem.

### *How effective is it?*

Feedback studies have tend to have high effects on learning. However some studies also show that feedback can have negative effects so it is important to understand the potential benefits and limitations. This was part of the rationale for the design of Assessment for Learning. Research-based approaches which provide feedback to learners, such as Bloom's 'mastery learning', also tend to have a positive impact on learning when used in schools.

**Impact summary: + 9 months (effect size 0.73)**

### *How secure is the evidence?*

There are a substantial number of reviews and meta-analyses of the effects of feedback. However some are theoretical studies, particularly in psychology exploring both positive and negative effects. Educational studies tend to identify positive benefits where the aim is to improve learning. Estimates of effect sizes from meta-analyses ranging from 0.74 to 1.13 are identified in one recent review. The challenge is making feedback work practically in the classroom.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

The costs of providing more effective feedback are not high. One study even estimates that the impact of rapid feedback on learning is 124 time more cost effective than reducing class sizes! However it probably requires sustained professional development to improve classroom practice.

**Cost summary: ££**

### *How applicable is it?*

Feedback has effects on all types of learning. Evidence in schools has focussed particularly on English, mathematics and to a lesser extent science.

### *Further information:*

There is a good review by Valerie Shute for the Educational Testing Service (ETS) in the USA and a practical summary table of what to do to support learners in the summary: <http://www.ets.org/Media/Research/pdf/RR-07-11.pdf> .

## Homework

### *What is it?*

Homework refers to tasks given to pupils by their teachers to be completed outside of class, with the normal expectation that it will be completed at home. Common homework activities may be reading or preparing for work to be done in class, or practising and completing things already taught or started. It may include extended activities to develop pupils' inquiry skills or work such as revision for tests and exams.

### *How effective is it?*

It is certainly the case that schools whose pupils do homework tend to be successful schools. However it is less clear that the homework is the reason why they are successful. A number of reviews and meta-analyses have looked at homework to explore this issue. There is some evidence that when homework is used as an intervention it is effective in improving students' attainment (an effect size of 0.60). Overall the benefits are likely to be more modest.

**Impact summary: + 5 months (effect size 0.36)**

### *How secure is the evidence?*

Homework has been extensively studied, both by looking at the connection (correlation) between homework and how well schools do, and by studying what happens when homework is introduced.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

There are few costs associated with homework, though there are implications for staff time.

**Cost summary: £**

### *How applicable is it?*

The research strongly suggests that it is more valuable at secondary school level and much less effective for children of primary school age. There is also an optimum level of between 1-2 hours per school day (longer for older pupils), but the effects tail off as the time students spend increases. Pupils also benefit from feedback on homework and effective integration with teaching in lessons.

*Further information:* The Northwest Regional Educational Laboratory in the USA has a useful summary: <http://www.netc.org/focus/strategies/home.php> .

## Individualised instruction

### *What is it?*

Individualised instruction is based on the idea that all learners are different and therefore have different needs, so an individualised or tailored approach to instruction ought to be more effective. Examples of this have been tried over the years in education, particularly in areas like mathematics where pupils have a individual sets of activities which they complete, moving on to the next after successful completion of a task. This has also been tried extensively in computer-based learning and other approaches such as Bloom's 'mastery learning' where, perhaps surprisingly, group approaches are more effective than individual tuition.

### *How effective is it?*

Individualising instruction does not tend to be particularly beneficial. One possible interpretation is that the role of the teacher becomes too managerial in terms of organising and monitoring learning, but not interacting and using formative feedback to refocus effort. Effect sizes tend overall to be low, or even negative.

**Impact summary: + 1 month (effect size 0.10)**

### *How secure is the evidence?*

There have been a number of meta-analyses which have found broadly similar effects. Confirmation comes from other areas such as learning with technology and Bloom's 'mastery learning' where group effects are higher than individual.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

Costs are usually low, unless the approach uses technology (such as tutoring programs or integrated learning systems).

**Cost summary: ££**

### *How applicable is it?*

The evidence is mostly drawn from secondary school studies and predominantly in mathematics, though there is also evidence from other curriculum subjects such as science and history and geography.

### *Further information:*

A summary of some approaches and issues with individualised instruction can be found at: <http://education.stateuniversity.com/pages/2085/Individualized-Instruction.html>.

## Information and communication technologies (ICT)

### *What is it?*

The use of digital technologies to support learning, either through a teaching programme (computer-assisted learning), or where learners use technology in problem-solving or more open ended learning, or where teachers use technology to support learning, such as with an interactive whiteboard or learning platform (virtual learning environment). The range of approaches, equipment and content is varied, making it hard to draw clear conclusions.

### *How effective is it?*

Overall studies consistently find that ICT is associated with better learning, however there is considerable variation in impact. The gains are usually moderate, and it is certainly the case that it is more important to think about the way the technology is used which is important rather than the technology itself. Evidence also suggests that technology should be used to supplement other teaching, rather than replace more traditional approaches. There is some evidence it is more effective with younger learners.

**Impact summary: + 4 months (effect size 0.35)**

### *How secure is the evidence?*

There is extensive research evidence of the impact of different technologies. It is relatively consistent and tends to show moderate benefits for technology use. However, due to the increasing pace of technological change, it is usually about yesterday's technology rather than today's and certainly makes it difficult to know what to buy for tomorrow.

**Strength of the evidence:** ☆ ☆ ☆ ☆

### *What are the costs?*

The costs of investing in new technologies is high, but they are already part of the society we live in and most schools are already equipped with computers and interactive whiteboards. A personal netbook costs about £250 today and an interactive whiteboard set-up for class use about £2,000 - £3,000. Studies suggest that individualising learning with technology (one-to-one laptop provision, or individual use of drill and practice) may not be as helpful as small group learning or collaborative use of technology. The evidence suggests that schools rarely take into account or budget for the additional training and support costs which are likely to make the difference on how well the technology is used.

**Cost summary: £££**

### *How applicable is it?*

There is evidence across age groups and for most areas of the curriculum over the last 40 years or so, suggesting that the impact is relatively robust. In particular there is clear evidence that it is more beneficial for areas like writing than spelling or mathematics.

*Further information:* The US based North Central Regional Educational Laboratory has a review of technology and learning which was updated in 2005:

<http://www.ncrel.org/sdrs/areas/issues/methods/technlgy/te800.htm> .

## Learning styles

### *What is it?*

The idea is based on the notion that, as individuals, we all have different approaches, or styles of learning and that learning will therefore be more effective or more efficient if we are taught in accordingly. It has proved difficult to identify robust learning 'styles' reliably, however. As individuals our preferences change in different situations and over time. There is some evidence that cognitive style and task type may be connected (visualisation in some areas of mathematics is valuable, for example) and it is certainly helpful to have different representations of ideas when developing understanding, but it is unhelpful to assign learners to groups or categories on the basis of a learning style.

### *How effective is it?*

Studies where targeted learning with activities that match an identified learning style have not shown convincingly that there is any benefit, particularly for low attaining pupils. In fact in some studies the controls did better than the learning styles groups. There may be some benefit in learners believing that they can succeed in a task if they can choose the particular approach they use. The effect sizes in independent meta-analyses are low (e.g. 0.14 or negative (-0.03), suggesting that only one or two pupils in a class of 30 might benefit from being taught in this way.

**Impact summary: + 2 month (effect size 0.14)**

### *How secure is the evidence?*

The evidence for the lack of impact (and in some cases detrimental effect) of using learning styles approaches has been demonstrated in a number of studies and meta-analyses. The unreliability of learning styles tests and assessments has also been the subject of a number of reviews. Overall the picture is consistent and robust.

**Strength of the evidence:** ☆ ☆

### *What are the costs?*

The costs are relatively low, though some of the available tests of learning styles require payment.

**Cost summary: £**

### *How applicable is it?*

The lack of impact has been documented at all stages of education. It is particularly important not to label primary age pupils or for them to believe that their lack of success is due to their learning style, rather fostering a belief that they can succeed through effort.

*Further information:* A recent critique, published in *Psychological Science in the Public Interest* entitled "Learning Styles: Concepts and Evidence" by Harold Pashler and colleagues is available at:

[http://psychologicalscience.org/journals/pspi/PSPI\\_9\\_3.pdf](http://psychologicalscience.org/journals/pspi/PSPI_9_3.pdf) .

## Meta-cognitive and self regulation strategies

### *What is it?*

Metacognitive strategies are teaching approaches which make learners' thinking about learning more explicit in the classroom. This is usually through teaching pupils strategies to plan, monitor and evaluate their own learning. It is usually more effective in small groups so learners can support each other and make their thinking explicit through discussion. Self-regulation refers to managing one's own motivation towards learning as well as the more cognitive aspects of thinking and reasoning.

### *How effective is it?*

Meta-cognitive approaches have a consistently high or very high levels of impact with meta-analyses reporting effect sizes between 0.59 and 0.73. These are substantial gains equivalent to moving a class from 50<sup>th</sup> place in a league table of 100 schools to about 25<sup>th</sup>. Encouragingly there is also evidence it is particularly helpful for low achieving pupils.

**Impact summary: + 8 months (effect size .67)**

### *How secure is the evidence?*

There are a number of systematic reviews and meta-analyses of programmes and approaches which promote thinking about thinking which have consistently found similar levels of impact.

**Strength of the evidence:** ☆ ☆ ☆ ☆

### *What are the costs?*

The costs are relatively low, though many studies report the benefits of professional development and/or outside support, or an inquiry approach for teachers where they actively evaluate the use of the strategies as they use them in the classroom.

**Cost summary: ££**

### *How applicable is it?*

The evidence suggests that it tends to be more effective with older pupils, and is beneficial for lower achieving students. Most of the studies have looked at the effects on English (reading and writing) or mathematics, though there is some evidence from other areas of the curriculum such as science, suggesting the benefits are likely to be more widely applicable.

*Further information:* There is an Education Resources Information Center (ERIC) digest in the USA which provides a sound basic overview, if a little dated:

<http://www.ericdigests.org/pre-9218/developing.htm> .

Examples of metacognitive strategies can be found at:

<http://academic.pgcc.edu/~wpeirce/MCCCTR/metacognition.htm> .

## One-to-one tutoring

### *What is it?*

This is where an individual pupil is removed from their class and given intensive remedial tuition, for short, regular sessions (about 30 mins, 3-5 times a week) over a set period of time (6-12 weeks).

### *How effective is it?*

Evidence indicates that in areas like reading and mathematics it can enable learners to catch up with their peers. Meta-analyses suggest an average effect size of about 0.4, indicating that pupils might improve by about 4 or 5 months during the intensive programme.

**Impact summary: + 5 months (effect size 0.40)**

### *How secure is the evidence?*

The evidence is consistent, particularly for younger learners who are behind their peers in primary schools and for subjects like reading and mathematics. Overall there is strong evidence for its benefits. Programmes which used experienced teachers who are given training are more effective than those using volunteers or classroom assistants. Evidence also suggest tutoring should be additional or supplemental to normal instruction, rather than replace it.

**Strength of the evidence:** ☆ ☆ ☆ ☆

### *What are the costs?*

The costs are high as the support is intensive. A single pupil receiving 30 mins, 5 times a day for 12 weeks is about 4 full days of a teacher's time, £800 or so. There is no strong evidence that one-to-one is better than paired tuition or intensive small group teaching and some evidence that pairs make better progress than individual pupils.

**Cost summary: ££££**

### *How applicable is it?*

The evidence is strongest at primary level and for subjects like reading and mathematics. There are fewer studies at secondary level or for other subjects

*Further information:* The Best Evidence Encyclopaedia (BEE) has information on one-to-one tutoring: <http://www.bestevidence.org/reading/strug/summary.htm> .

## Parent involvement

### *What is it?*

Actively involving parents in supporting their children to improve children's learning at school.

### *How effective is it?*

Although parent involvement is consistently associated with pupils' success at school, the evidence about *increasing* involvement to *improve* attainment is much less conclusive. This is particularly the case for poorer families. There is some evidence that supporting parents with their first child will have benefits for siblings. However there is also conflicting evidence which suggests that, at least in terms of early intervention, the involvement of parents does not increase the benefits. This suggests that developing effective parental involvement to improve their children's attainment is challenging and will need effective monitoring and evaluation. The impact of parents' aspirations is clearly also important, though again there is insufficient evidence to show that *changing* parents' aspirations for their children will *raise* their children's aspirations and achievement over the longer term. Two recent meta-analyses of studies in the USA suggest that the effects in primary and secondary schools are about 0.27 and 0.25 respectively.

**Impact summary: + 3 months (effect size 0.25)**

### *How secure is the evidence?*

Although there is a long history of research into parent involvement programmes, there is surprisingly little robust evidence of the impact of programmes which have tried to increase involvement to improve children's learning. The association between parent involvement and their children's success at school is well established, but rigorous evaluation of approaches to improve children's learning and achievement through parental involvement is more sparse.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

The costs of the different parent involvement approaches vary enormously, from running parent workshops and improving communications, which need little additional resource, to intensive family support programmes with specially trained staff.

**Cost summary: ££**

### *How applicable is it?*

The evidence is predominantly at primary school level and in the early years of schooling, though there are studies which have looked at secondary schools. Impact studies tend to focus on reading and mathematics attainment.

*Further information:* A summary of one of the more recent studies into parental involvement by William Jeynes at the Harvard Family Research Project is available at: <http://www.hfrp.org/publications-resources/browse-our-publications/parental-involvement-and-student-achievement-a-meta-analysis> (viewed 30/3/11).

The GTC also have a summary of a review on the Teacher Learning Academy site: <http://www.gtce.org.uk/tla/rft/parent0206/> .



## Peer tutoring/ peer-assisted learning strategies

### *What is it?*

These are a range of approaches in which learners work in pairs or small groups to provide each other with explicit teaching support. In Cross-Age Tutoring an older learner usually takes the tutoring role and is paired with a younger tutee or tutees. Peer-Assisted Learning Strategies (PALS) is a structured approach for mathematics and reading requiring set periods of time for implementation of about 25-35 minutes 2 or 3 times a week. In the collaborative learning strategy 'Reciprocal Peer Tutoring' learners alternate between the role of tutor and tutee. The common characteristic is that the learners take on responsibility for aspects of teaching and for evaluating the success of the learner.

### *How effective is it?*

The evidence of impact is relatively high (typically an effect size of 0.5 or above, equating to about a GCSE grade). The benefits are apparent for both tutor and tutee (particularly in cross-age tutoring), though the approach should be used to supplement or enhance normal teaching, rather than to replace it.

**Impact summary: 6 months gain (an effect size of 0.5)**

### *How secure is the evidence?*

The evidence is consistent and positive especially for mathematics and reading and at both primary and secondary school levels.

**Strength of the evidence:** ☆ ☆ ☆ ☆

### *What are the costs?*

There are few costs directly associated with the approach, though it does need some time to organise and set up, particularly in the early stages. Cross-age tutoring in particular needs some co-ordination as it involves at least two classes from different year groups working together. Training to support staff is usually recommended.

**Cost summary: ££**

### *How applicable is it?*

Consistent positive effects have been found in different countries, across different age groups (from young children to adults) and in different areas of the curriculum.

### *Further information:*

A summary article is available at: <http://www.readingrockets.org/article/22029> . This site is funded by the US Department of Education's Office of Special Education Programs.

## Performance pay

### *What is it?*

We know that teachers are the most important part of the education system in terms of improving students' learning. Performance pay or performance-related pay is where there is an attempt to link a teacher's wages or bonus payments directly to their performance in the classroom. In the USA it is sometimes referred to as 'merit pay', and, due to federal government incentives through the Teacher Incentive Fund (TIF), there has been an increase in these approaches to link teachers' remuneration to student attainment by state governments. In India there is evidence of the benefit of performance pay in the private school sector but not the state sector. One key issue is how performance is measured and how closely this is linked to outcomes for learners. In the UK it was one component in the performance threshold assessment introduced in 2000, but very loosely connected and at the discretion of the head teacher.

### *How effective is it?*

Estimates based on cross-national comparisons suggest that the effect size should be about 0.25. One study in the UK estimates the benefit is about half a GCSE grade, which is about the same level of effect. However when looking at more rigorous evaluations within countries such as the USA, the actual impact has been closer to zero.

**Impact summary: + 0 months (effect size 0)**

### *How secure is the evidence?*

The evidence is not conclusive. Although there has been extensive research, most of this is either from correlational studies linking national levels of pay with general national attainment or from naturally occurring experiments where it is hard to control for other variables which may influence the impact of pay increases.

**Strength of the evidence: ☆**

### *What are the costs?*

Increases are usually of the order of £2000 per teacher or about the equivalent of £70 per pupil across a class of 30 students.

**Cost summary: ££**

### *How applicable is it?*

It is hard to draw clear conclusions from the different types of evidence. There is some evidence from the UK suggesting that the impact may be greater on low achieving pupils and possibly worth as much as half a GCSE grade. However, as the evaluation of a number of merit pay schemes in the USA have been unable to find a clear link with student learning outcomes, it would not seem like a good investment without further study. Whilst teacher quality is an important aspect of education, it may be more effective to recruit and retain effective teachers, rather than look for improvement based on financial reward.

### *Further information:*

An Australian report from 2007 sets out the issues and evidence succinctly:

[http://www.dest.gov.au/sectors/school\\_education/publications\\_resources/profiles/research\\_on\\_performance\\_pay\\_for\\_teachers.htm](http://www.dest.gov.au/sectors/school_education/publications_resources/profiles/research_on_performance_pay_for_teachers.htm) .

## Reducing class sizes

### *What is it?*

Intuitively, it is appealing to reduce the number of pupils in a class to improve the quality of teaching and increase the level of personalisation or the amount of individual feedback a learner receives. As the size of a class or teaching group gets smaller, the range of approaches a teacher can employ increases.

### *How effective is it?*

Overall the benefits are not particularly large or clear, until class size is reduced to under 20 or even below 15. There is little advantage in reducing classes from, say, 30 to 25. The issue is whether the teacher changes their teaching approach when working with a smaller class and whether, as a result, the pupils change their learning behaviours. Having 15 pupils in a class and teaching them in exactly the same way as a class of 30 will not make much difference. However there is evidence that, when it is successful, the benefits can be identified in behaviour and attitudes as well as on attainment, and that they persist for a number of years (from early primary school through to Key Stage 3). Evidence from both the USA and from the UK does not support the use of teaching assistants as an alternative. It appears to be important that a class teacher has responsibility for the learning of a class. Optimistically a school might expect a few months additional gain a year for pupils in smaller classes (an effect size of about 0.21). There is some evidence to support the additional benefit of professional development when class sizes are reduced to enable teachers to capitalise on the potential benefits by developing their teaching skills and approaches.

**Impact summary: + 2 months (effect size 0.20)**

### *How secure is the evidence?*

There are a number of issues in interpreting the evidence about class size as many countries or schools already teach lower attaining pupils in smaller groups. Overall there is a relatively consistent picture where smaller classes are associated with higher attainment (when other factors are controlled for) and when class sizes have been deliberately reduced in more experimental evaluations.

**Strength of the evidence:** ☆ ☆ ☆

### *What are the costs?*

The costs associated with reducing class sizes to a level where a significant benefit is likely are very high. The evidence suggests that typical classes would need to be halved to 15 pupils or even fewer. A class of 30 pupils with 50% of them receiving free school meals would only be allocated an extra £6,450 under the Pupil Premium in 2011/12; this would not be sufficient to appoint an additional teacher.

**Cost summary: £££££**

### *How applicable is it?*

The strongest evidence comes from research into primary schools in the USA with younger children where the benefits appear to be sustained for 3 – 4 years.

### *Further information:*

A good recent summary and analysis of the research evidence is available at:  
[http://www.brookings.edu/papers/2011/0511\\_class\\_size\\_whitehurst\\_chingos.aspx](http://www.brookings.edu/papers/2011/0511_class_size_whitehurst_chingos.aspx).

## School Uniforms

### *What is it?*

Schools identify clothing considered appropriate for pupils to wear in school, usually including style and colour. There is a general belief in the UK that such an approach supports the development of a whole school ethos and therefore is supportive of discipline and motivation. It should be noted that in other cultures the opposite view prevails, and school uniforms are associated with regulation and the loss of individuality.

### *How effective is it?*

There is no robust evidence that introducing a school uniform will improve academic performance, behaviour or attendance. There are studies which have information about these outcomes linked to the introduction of a school uniform policy, but this was usually one factor amongst other improvement measures such as changes in behaviour policy or other teaching and learning developments.

**Impact summary:  $\pm 1$  months (0.03 Eng/ -.06 Ma)**

### *How secure is the evidence?*

One of the problems in interpreting the evidence is that schools in challenging circumstances often choose a school uniform policy as part of a broader range of improvement measures. There are no systematic reviews of well-controlled interventions of a school uniform policy. The evidence rests mainly on correlational studies which look at the relationship between schools with uniforms compared with those without or the performance of schools before and after the introduction of uniforms and the school's subsequent trajectory of improvement. The most rigorous reviews and analyses have so far been unable to establish a causal link, but speculate that adoption of a uniform policy may provide a symbolic and public commitment to school improvement.

**Strength of the evidence:** ☆

### *What are the costs?*

The costs associated with introducing a school uniform are low and mainly depend on parents buying the clothes instead of others the child would wear.

**Cost summary: £**

### *How applicable is it?*

There are cultural issues about how a school uniform is perceived which play an important role in determining the acceptability and success (in terms of compliance). There is some evidence that in areas of very high poverty free school uniforms improve attendance, however this seems likely not to be applicable in other settings.

### *Further information:*

A good summary of the debate and evidence can be found in an article on the Education World site at:

[http://www.educationworld.com/a\\_admin/admin/admin130.shtml](http://www.educationworld.com/a_admin/admin/admin130.shtml) .

## Sports participation

### *What is it?*

Physically engaging in sports as a participant. This might be through organised after school activities or as an organised programme by a local sporting club or association. Sometimes the sporting activity is used as a means to encourage young people to engage in additional learning activities, such as football training at a local football club combined with study skills, or ICT or literacy or mathematics lessons.

### *How effective is it?*

The overall impact on academic achievement tends to be low (an effect size around .02), though there is recent evidence from the UK that sports and learning participation can have a more dramatic effect on, for example, mathematics learning as assessed by standardised tests (an effect size of 0.8) when combined with a structured numeracy programme.

**Impact summary: + 3 months (effect size 0.19)**

### *How secure is the evidence?*

There have been a number of reviews linking the benefits of participation in sport with academic benefits, including a recent systematic review for the Department for Culture, Media and Sport (DCMS). There is considerable variation in impact, including some studies which show negative effects.

**Strength of the evidence:** ☆ ☆

### *What are the costs?*

Cost estimates are hard to identify in terms of costs of participation in specific activities (such as a football coaching club, linked with after school study), but are estimated here at up to about £200/pa excluding clothing and equipment. These costs vary according to equipment and venue, sports like rowing and ice hockey tend to have an annual fee (about £50, plus monthly subscription (£30/month)).

**Cost summary: £££**

### *How applicable is it?*

The variability in effects suggest that it the quality of the programme and the emphasis on or connection with academic learning that may make more difference than the specific type of approach or activities involved.

### *Further information:*

The Department for Culture, Media and Sport (DCMS) set up the Culture and Sport Evidence (CASE) programme was set up by to collect evidence about participation in culture and sport and their recent review is available at:

<http://www.culture.gov.uk/images/research/CASE-systematic-review-July10.pdf> .

## Summer schools

### *What is it?*

Summer schools are when students attend lessons or classes during their summer holidays, often as catch-up or enrichment lessons. Some summer 'schools' do not have an academic focus and concentrate on sports or other non-academic activities. These approaches are not usually evaluated for, or associated with, learning gains. Others may be targeted at either low or high performing students for under-achieving or gifted and talented students.

### *How effective is it?*

The effects are reasonably consistent (with an average effect size of about 0.26), though usually more beneficial for higher attaining pupils and less effective for low-SES pupils. Programmes are usually more effective in mathematics, when they are specifically tailored to students needs, and when parents are involved. Other variables seem to make less difference, such as whether the teacher is one of the student's usual teachers.

**Impact summary: + 3 months (effect size 0.26)**

### *How secure is the evidence?*

There are a number of meta-analyses, finding broadly similar effects, though mostly based on studies in the USA. As mentioned above, a crucial factor is whether the summer school has an academic focus.

**Strength of the evidence:** ☆ ☆

### *What are the costs?*

The costs involved are employing teachers for the duration of the summer school, with associated venue and resource costs (books, photocopying etc). Residential courses are in the region of £300 per week per student.

**Cost summary: £££**

### *How applicable is it?*

The impacts vary according to the focus of the summer school, but benefits have been identified in a range of subjects, particularly for secondary school pupils.

### *Further information:*

There is a good summary of the research evidence and helpful advice on running effective summer schools from Child Trends, a non-profit, non-partisan research centre in the US which studies children at all stages of development:

[http://www.childtrends.org/Files/Child\\_Trends-2009\\_09\\_01\\_FS\\_WWSummerLearning.pdf](http://www.childtrends.org/Files/Child_Trends-2009_09_01_FS_WWSummerLearning.pdf) .

## Teaching Assistants

### *What is it?*

A teaching assistant or classroom assistant (or sometimes called an educational assistant or paraprofessional) is someone who supports a teacher in the classroom. Their duties can differ dramatically from school to school, though the main tasks tend to be working with small groups of children who need extra support in an area, such as literacy or numeracy. They are also often responsible for hearing children read, and helping teachers' preparation by photocopying, or sorting out equipment.

### *How effective is it?*

Most studies have consistently found very small or no effects on attainment, though pupils' perceptions and attitudes may be more positively affected. There are also positive effects in terms of teacher morale and reduced stress of working with a teaching assistant. One clear implication from this is that if teaching assistants are used with the intention of improving the learning of pupils, they should not undertake the tasks they are routinely assigned. There is some evidence that there is greater impact when teaching assistants are given a particular pedagogical role or responsibility in specific curriculum interventions where the effect appears to be greater, particularly with training and support. Even here, however, comparisons with qualified teachers suggest they are consistently less effective (achieving about half the gains compared with qualified teachers).

**Impact summary:  $\pm 0$  months (effect size 0.0)**

### *How secure is the evidence?*

There are a number of systematic reviews of the impact of support staff in schools, though no meta-analyses specifically looking at the impact of teaching assistants on learning. However, there have been a number of reviews internationally which have consistently found broadly similar effects. The most recent study in the UK suggests low attaining pupils do less well with a teaching assistant.

**Strength of the evidence: ☆ ☆**

### *What are the costs?*

The average teaching assistant salary is about £16,000 pa or about half of an average teaching salary (including headteachers and deputies).

**Cost summary: ££££**

### *How applicable is it?*

Evidence suggests that impact is similar across literacy and mathematics and at both primary and secondary level.

*Further information:* A report on the role and impact of teaching assistants in the UK was commissioned by the Department for Education and Skills and undertaken by a team from the Institute of Education at London University:

<http://www.education.gov.uk/publications/eOrderingDownload/RR605.pdf> .

## Appendix 1: Estimates for additional income per school 2011/12

(based on an allocation of £430 for pupils receiving free school meals)

No on roll	%fsm								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
50	£2,150	£4,300	£6,450	£8,600	£10,750	£12,900	£15,050	£17,200	£19,350
100	£4,300	£8,600	£12,900	£17,200	£21,500	£25,800	£30,100	£34,400	£38,700
150	£6,450	£12,900	£19,350	£25,800	£32,250	£38,700	£45,150	£51,600	£58,050
200	£8,600	£17,200	£25,800	£34,400	£43,000	£51,600	£60,200	£68,800	£77,400
250	£10,750	£21,500	£32,250	£43,000	£53,750	£64,500	£75,250	£86,000	£96,750
300	£12,900	£25,800	£38,700	£51,600	£64,500	£77,400	£90,300	£103,200	£116,100
350	£15,050	£30,100	£45,150	£60,200	£75,250	£90,300	£105,350	£120,400	£135,450
400	£17,200	£34,400	£51,600	£68,800	£86,000	£103,200	£120,400	£137,600	£154,800
450	£19,350	£38,700	£58,050	£77,400	£96,750	£116,100	£135,450	£154,800	£174,150
500	£21,500	£43,000	£64,500	£86,000	£107,500	£129,000	£150,500	£172,000	£193,500
550	£23,650	£47,300	£70,950	£94,600	£118,250	£141,900	£165,550	£189,200	£212,850
600	£25,800	£51,600	£77,400	£103,200	£129,000	£154,800	£180,600	£206,400	£232,200
650	£27,950	£55,900	£83,850	£111,800	£139,750	£167,700	£195,650	£223,600	£251,550
700	£30,100	£60,200	£90,300	£120,400	£150,500	£180,600	£210,700	£240,800	£270,900
750	£32,250	£64,500	£96,750	£129,000	£161,250	£193,500	£225,750	£258,000	£290,250
800	£34,400	£68,800	£103,200	£137,600	£172,000	£206,400	£240,800	£275,200	£309,600
850	£36,550	£73,100	£109,650	£146,200	£182,750	£219,300	£255,850	£292,400	£328,950
900	£38,700	£77,400	£116,100	£154,800	£193,500	£232,200	£270,900	£309,600	£348,300
950	£40,850	£81,700	£122,550	£163,400	£204,250	£245,100	£285,950	£326,800	£367,650
1000	£43,000	£86,000	£129,000	£172,000	£215,000	£258,000	£301,000	£344,000	£387,000
1100	£47,300	£94,600	£141,900	£189,200	£236,500	£283,800	£331,100	£378,400	£425,700
1200	£51,600	£103,200	£154,800	£206,400	£258,000	£309,600	£361,200	£412,800	£464,400
1300	£55,900	£111,800	£167,700	£223,600	£279,500	£335,400	£391,300	£447,200	£503,100
1400	£60,200	£120,400	£180,600	£240,800	£301,000	£361,200	£421,400	£481,600	£541,800
1500	£64,500	£129,000	£193,500	£258,000	£322,500	£387,000	£451,500	£516,000	£580,500
1600	£68,800	£137,600	£206,400	£275,200	£344,000	£412,800	£481,600	£550,400	£619,200
1700	£73,100	£146,200	£219,300	£292,400	£365,500	£438,600	£511,700	£584,800	£657,900
1800	£77,400	£154,800	£232,200	£309,600	£387,000	£464,400	£541,800	£619,200	£696,600
1900	£81,700	£163,400	£245,100	£326,800	£408,500	£490,200	£571,900	£653,600	£735,300
2000	£86,000	£172,000	£258,000	£344,000	£430,000	£516,000	£602,000	£688,000	£774,000



## Appendix 2: Estimates for additional income per school 2014/15

(based on an allocation of £1750 for pupils receiving free school meals)

No on roll	%fsm								
	10%	20%	30%	40%	50%	60%	70%	80%	90%
50	£8,750	£17,500	£26,250	£35,000	£43,750	£52,500	£61,250	£70,000	£78,750
100	£17,500	£35,000	£52,500	£70,000	£87,500	£105,000	£122,500	£140,000	£157,500
150	£26,250	£52,500	£78,750	£105,000	£131,250	£157,500	£183,750	£210,000	£236,250
200	£35,000	£70,000	£105,000	£140,000	£175,000	£210,000	£245,000	£280,000	£315,000
250	£43,750	£87,500	£131,250	£175,000	£218,750	£262,500	£306,250	£350,000	£393,750
300	£52,500	£105,000	£157,500	£210,000	£262,500	£315,000	£367,500	£420,000	£472,500
350	£61,250	£122,500	£183,750	£245,000	£306,250	£367,500	£428,750	£490,000	£551,250
400	£70,000	£140,000	£210,000	£280,000	£350,000	£420,000	£490,000	£560,000	£630,000
450	£78,750	£157,500	£236,250	£315,000	£393,750	£472,500	£551,250	£630,000	£708,750
500	£87,500	£175,000	£262,500	£350,000	£437,500	£525,000	£612,500	£700,000	£787,500
550	£96,250	£192,500	£288,750	£385,000	£481,250	£577,500	£673,750	£770,000	£866,250
600	£105,000	£210,000	£315,000	£420,000	£525,000	£630,000	£735,000	£840,000	£945,000
650	£113,750	£227,500	£341,250	£455,000	£568,750	£682,500	£796,250	£910,000	£1,023,750
700	£122,500	£245,000	£367,500	£490,000	£612,500	£735,000	£857,500	£980,000	£1,102,500
750	£131,250	£262,500	£393,750	£525,000	£656,250	£787,500	£918,750	£1,050,000	£1,181,250
800	£140,000	£280,000	£420,000	£560,000	£700,000	£840,000	£980,000	£1,120,000	£1,260,000
850	£148,750	£297,500	£446,250	£595,000	£743,750	£892,500	£1,041,250	£1,190,000	£1,338,750
900	£157,500	£315,000	£472,500	£630,000	£787,500	£945,000	£1,102,500	£1,260,000	£1,417,500
950	£166,250	£332,500	£498,750	£665,000	£831,250	£997,500	£1,163,750	£1,330,000	£1,496,250
1000	£175,000	£350,000	£525,000	£700,000	£875,000	£1,050,000	£1,225,000	£1,400,000	£1,575,000
1100	£192,500	£385,000	£577,500	£770,000	£962,500	£1,155,000	£1,347,500	£1,540,000	£1,732,500
1200	£210,000	£420,000	£630,000	£840,000	£1,050,000	£1,260,000	£1,470,000	£1,680,000	£1,890,000
1300	£227,500	£455,000	£682,500	£910,000	£1,137,500	£1,365,000	£1,592,500	£1,820,000	£2,047,500
1400	£245,000	£490,000	£735,000	£980,000	£1,225,000	£1,470,000	£1,715,000	£1,960,000	£2,205,000
1500	£262,500	£525,000	£787,500	£1,050,000	£1,312,500	£1,575,000	£1,837,500	£2,100,000	£2,362,500
1600	£280,000	£560,000	£840,000	£1,120,000	£1,400,000	£1,680,000	£1,960,000	£2,240,000	£2,520,000
1700	£297,500	£595,000	£892,500	£1,190,000	£1,487,500	£1,785,000	£2,082,500	£2,380,000	£2,677,500
1800	£315,000	£630,000	£945,000	£1,260,000	£1,575,000	£1,890,000	£2,205,000	£2,520,000	£2,835,000
1900	£332,500	£665,000	£997,500	£1,330,000	£1,662,500	£1,995,000	£2,327,500	£2,660,000	£2,992,500
2000	£350,000	£700,000	£1,050,000	£1,400,000	£1,750,000	£2,100,000	£2,450,000	£2,800,000	£3,150,000

## Appendix 3: Criteria for inclusion and evaluation

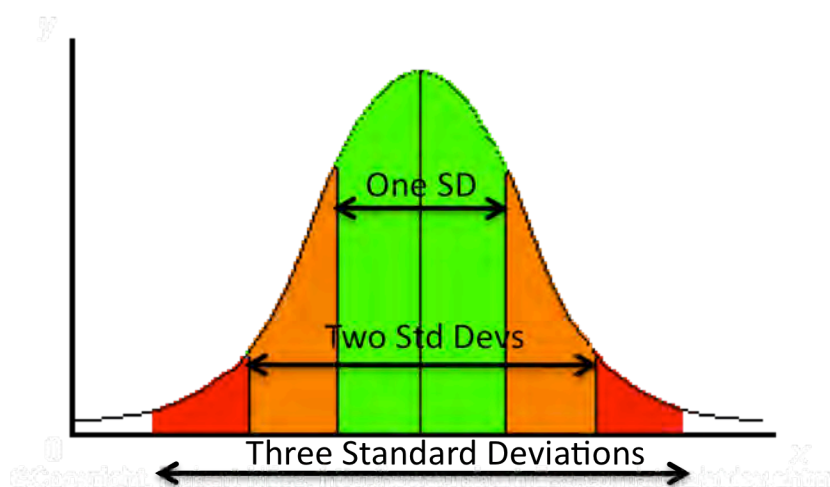
### **Approach**

A range of approaches were selected for analysis and inclusion in the toolkit, based on those commonly mentioned in connection with the policy (such as reducing class sizes or one-to-one tutoring), suggestions identified by schools in informal discussions about how they might spend the Pupil Premium and a number of research-based approaches with a strong evidence of effectiveness (such as feedback and meta-cognitive approaches).

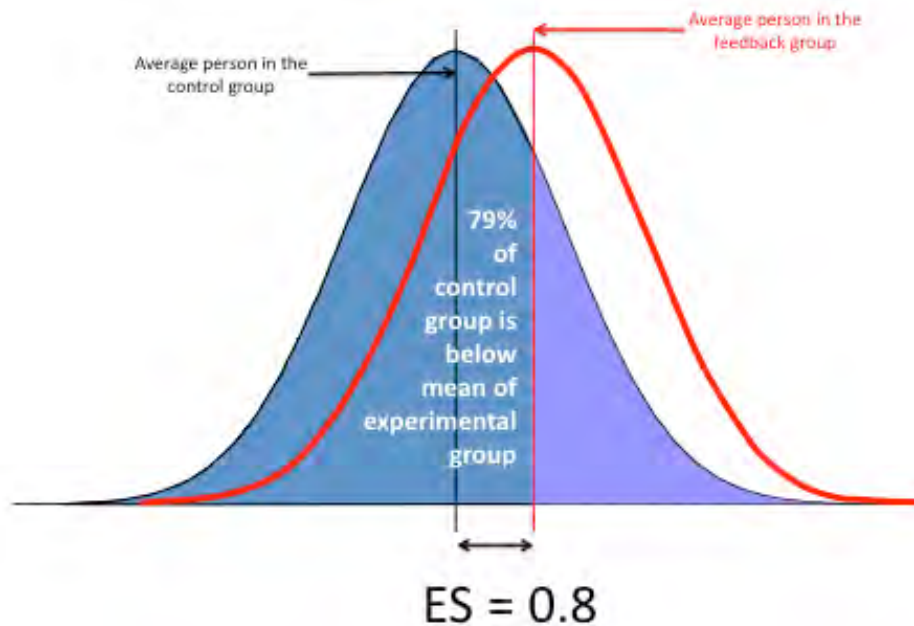
### **Potential gain**

The comparative data is based (where available) on systematic reviews of research and in particular quantitative syntheses of data, such as meta-analyses of experimental studies. These are reviews which have specifically set out to evaluate the impact quantitatively of different approaches on learning using test or examination scores. These therefore offer the best idea of the relative benefit of the different approaches across similar populations of learners. Other types of reviews were included to provide information about applicability and about cost. To be included in the analysis an approach needed to have some quantifiable evidence base for comparison.

*Effectiveness* – estimated as additional progress in terms of months of schooling you might expect pupils to benefit from as a result of a particular approach being used in school. Average pupil progress over a year is used as a benchmark. This is modelled using national test data from upper Key Stage 2 and Key Stage 3. The progress that an average pupil in a year group of 100 students is equivalent to them moving up from 50<sup>th</sup> place to 16<sup>th</sup> place, if all the other students had not made any progress. For national tests this is approximately one standard deviation or one year of progress. From this measure we can estimate the additional progress you might get by adopting different approaches which have been researched using test results by using this common measure or 'effect size' to estimate the additional progress which might be achieved.



*Effect size* – the extent of the difference between an intervention group and a control group in standardised form. Statistically it is the difference between two groups relative to the distribution of the scores, or the difference between them in standard deviation units. This produces a measure where a comparison can be made across a range of different approaches (based on average relative impact on the students tested). It can also be ‘translated’ into a measure of improvement, so one GCSE grade improvement is about an effect size of between 0.5 and 0.7, depending on subject.



If a feedback intervention has an effect size of 0.8, it means that, for two classes of pupils which were equivalent before an intervention, afterwards the class receiving the feedback intervention would be outperforming the control class. The average pupil in a class of 25 pupils in the feedback group would now be equivalent to the 6<sup>th</sup> best pupil in the control group. An effect size of 1.6 would be the equivalent of moving the average pupil in an intervention class of 25 pupils to the top of the control class.

Where there were several meta-analyses available for analysis a judgement was made about their comparability, and an indicative value selected as representative. This was related to how realistic the research was or the ‘ecological validity’, how recent the studies were, and how appropriate outcome measures. So meta-analyses of studies undertaken in schools where students were taught by teachers and where the assessment was made with standardised or national tests undertaken in the last 10 years were given higher weight. Effect size measures are included in the summaries of each approach to provide a more precise figure for comparison. Further details are provided in the technical report in the section on effect sizes.

We do not know to what extent the effects might be additive (i.e. could you get extra benefit by combining different approaches) as there is little evidence in the research literature about this. What information there is suggests it is more likely that there will be a maximum effect from the most beneficial approach and that this is more likely to be reduced if combined with a less effective approach. So a meta-cognitive approach with ICT is more likely will be somewhere between the average metacognitive approach and average ICT approach.

Effect sizes have been estimated in terms of months of progress. These are broad estimates based on national test progress of an effect size of 1.0 over a school year and should not be thought of as guarantees. In the research the analysis is based on there is often considerable variation in impact between different studies and on different pupils in those studies. What is of interest is that there is some consistency in the extent of the effect in different areas of research between the different approaches. So, for example, studies which have looked at approaches improving the quality of feedback in classrooms, for example, tend to have much greater impact on tested learning outcomes than those which have looked at another approach such as matching learning styles. The toolkit is an attempt to look at these patterns and to identify some areas which are likely to be more productive for schools to investigate and to evaluate for themselves.

<b>Months progress</b>	<b>Effect Size from ...</b>	<b>... to</b>	<b>Description</b>
0	-0.07	0.01	Very low or no
1	0.02	0.09	Low
2	0.10	0.18	Low
3	0.19	0.26	Moderate
4	0.27	0.35	Moderate
5	0.36	0.44	Moderate
6	0.45	0.52	High
7	0.53	0.61	High
8	0.62	0.69	High
9	0.70	0.78	Very high
10	0.79	0.87	Very high
11	0.88	0.95	Very high
12	0.96	>1.0	Very high

### **Cost**

Approximate costings have been made where possible based on the £430 allocation for 2011/2. Rough equivalents are given to help understand what the Pupil Premium might support. For example at least 60 pupils receiving the pupil premium are needed to employ an additional teacher (assuming Main Pay Scale 3 (£25,168) or Outer London MPS1 (£25,117) in 2010-11. If the Pupil Premium increases to £1750 by 2014/5, this will be reduced to about 15 pupils. The scale used in the costing assumptions is as follows:

£	Very low: up to about £2000 per year per class of 30 pupils, or less than £70 per pupil per year. This is about equivalent to 7 boxes (35 reams) of photocopying paper.
££	Low: £2000 - £5000 per year per class of 30 pupils, or up to about £170 per pupil per year. This would pay for significant CPD for a teacher with in class support and/or replacement teaching. It would also be equivalent to about 3 weeks after school provision per pupil (at about £10/head/day).
£££	Moderate: over £5k to £15k per year per class of 30 pupils, or up to about £500 per pupil per year. This represents the upper limit for the 2011/12 allocation.
££££	High: over £15k up to £30k per year per class of 30 pupils, or up to £1000 per pupil. This would not currently be achievable with the 2011/12 allocation but would represent about 60% of the allocation by 2014.
£££££	Very high: over £30k per year per class of 30 pupils. By 2014/5, a class of 30 pupils where 70% of them are eligible for free school meals would increase a school's budget by about £36,750 per year.

### **Applicability**

This is a summary of where the evidence is drawn from or where the evidence of impact is greatest in terms of impact across primary and secondary schools. Also included is an indication of what the evidence indicates in terms of curriculum subjects. The majority of experimental studies tend to look at impact on test scores in English or literacy, mathematics and science. These include a range of kinds of tests and assessments such as those designed for the research project, teacher designed tests, existing school tests and exams (usually in specific curriculum subjects), and standardised tests. Where a range of measures were available priority was given to existing school measures and standardised tests. Also included in this analysis is a judgement about the challenge associated with adapting or implementing the approach in schools and evidence from the UK is weighted more strongly as is more recent research, particularly in areas where the context changes, such as ICT..

### **Evidence estimate**

This is based on the availability of the evidence (the number of systematic reviews or meta-analyses and the quantity of primary studies which they synthesise) as well as the quality of the primary evidence (from a methodological point of view) combined with the extent of the impact (effect size) and the reliability or consistency of this impact across.

- ☆ Quantitative evidence of impact from single studies, but with effect size data reported or calculable. No systematic reviews with quantitative data or meta-analyses located.
- ☆ ☆ At least one meta-analysis or systematic review with quantitative evidence of impact on attainment or cognitive or curriculum outcome measures.
- ☆ ☆ ☆ Two or more rigorous meta-analyses of experimental studies of school age students with cognitive or curriculum outcome measures.
- ☆ ☆ ☆ ☆ Three or more meta-analyses from well controlled experiments mainly undertaken in schools using pupil attainment data with some exploration of causes of any identified heterogeneity.
- ☆ ☆ ☆ ☆ ☆ Consistent<sup>3</sup> high quality evidence from at least five robust<sup>4</sup> and recent<sup>5</sup> meta-analyses where the majority of the included studies have good ecological validity<sup>6</sup> and where the outcome measures include curriculum measures or standardised tests in school subject areas.

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<sup>3</sup> Pooled effect sizes are reasonably similar or, where different, similar patterns of effects are found for comparable moderator variables associated with the approach, producing a consistent and coherent picture.

<sup>4</sup> Meta-analysis reported with confidence intervals and heterogeneity. Some checks for bias investigated (e.g. study quality and/or and some moderator exploration).

<sup>5</sup> Within the last 10 years.

<sup>6</sup> Studies conducted in schools with more than one teacher or class.