THE TEACHING AND LEARNING TOOLKIT

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THE TEACHING AND LEARNING TOOLKIT

WHAT IS THE TOOLKIT?

The Sutton Trust-EEF Teaching and Learning Toolkit is an independent resource which provides guidance for teachers and schools on how to use their resources to improve the attainment of disadvantaged pupils.

The Toolkit is an accessible summary of educational research. It currently covers 21 topics, each summarised in terms of their potential impact on attainment, the strength of the evidence supporting them, their cost, and their applicability.

Just as doctors would not be expected to prescribe treatments without access to medical research, we believe that teachers should be supported with information about what has worked – and, just as important, what has not – in England and around the world. We hope that the *Toolkit* will help schools to identify which approaches are the 'best bets' for increasing the attainment of disadvantaged students and which approaches offer less promising chances of success.

WHY IS RESEARCH USEFUL?

Research can help you identify which ways of spending time and money are likely to lead to the biggest possible increases in pupils' learning. School budgets are finite, and not every way of spending budget will lead to the same increase in pupil attainment; getting maximum "educational bang" for your buck is important, but not straightforward.

In fact, even establishing a clear link between increasing educational expenditure and pupils' learning is harder than you might think. It may seem obvious that more money will lead better or higher quality educational experience, but extensive research shows that there is no clear relationship between increased expenditure and increased outcomes. Given that it is difficult to turn increased spending into improved outcomes, the decisions you make about *how* you spend your money are very important. Educational research can help you make those decisions.

One particular spending decision which research can inform is how to spend the pupil premium. Introduced in 2010 the aim of the pupil premium is to raise achievement among disadvantaged children.[1] It provides additional funding to schools for disadvantaged pupils to ensure they benefit from the same educational opportunities as pupils from wealthier families. In 2012-13 the pupil premium is worth £600 per child, and by 2014-15 this is expected to rise to approximately £1,200 per child. The research summarised in the *Toolkit* suggests that different ways of using the premium are likely to have very different impacts on attainment. If the pupil premium is to succeed in achieving its ambitious goals, the choices that schools make in allocating the money are of vital importance.

HOW SHOULD THE TOOLKIT BE USED?

Like any toolkit, the *Teaching and Learning Toolkit* will be most useful when in the hands of professionals. The aim of the *Toolkit* is to support schools and teachers to make their own informed choices and adopt a more 'evidence based' approach; the research evidence it contains is a supplement to rather than a substitute for professional judgement. There are no guaranteed solutions or quick fixes.

It is important to emphasise that applying findings from educational research in new contexts is never simple. Much depends on your school, its teachers (their levels of knowledge and experience), its pupils (their level of attainment and their social background) and the educational outcomes that you want to improve (knowledge and skills or understanding, attitudes and dispositions).

Crucially, the summaries in the *Toolkit* combine evidence from a range of different research studies into a single average for each area. **This average will not necessarily be the impact of this approach in your school.** Some of the approaches which are less effective on average, might be effective in a new setting or if

[1] For the latest Government information on the Pupil Premium, see: http://www.education.gov.uk/schools/adminandfinance/financialmanagement/schoolsrevenuefunding/a00200697/pupil-premium-2012-13

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 evidence of average impact elsewhere 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.

To take an example we have discussed with many teachers since the *Toolkit* was launched in 2011, the fact that the average impact of teaching assistants (TAs) is not positive. This in no way means that TAs cannot have a positive impact on attainment, but it does imply that schools might want to think carefully about the strategies they use to ensure that they get the best out of their TAs.

As a result of the importance of context, it is crucial to use the *Toolkit* alongside on-going evaluations of the impact of the decisions you make, to ensure that the approaches you use are having the desired effect.

Finally, it should be noted that the evidence summarised in the *Toolkit* takes educational attainment as its primary metric. Most of the measures used are traditional measures of attainment such as curriculum tests and examinations. This focus does **not** suggest that all educational aims and outcomes are captured in the literature that we have pulled together. Though we highlight impacts on other outcomes such as aspiration, attendance or behaviour where this information is available, these outcomes are not systematically recorded, or reflected in the overall summary.

How was the Toolkit put together?

Approaches in the *Toolkit* are summarised in terms of their potential impact on attainment, their cost, their applicability and the strength of evidence supporting the conclusion we have reached. A range of approaches were selected for analysis and inclusion, based on: *i)* approaches commonly mentioned in connection with education policy, *ii)* suggestions from schools, and *iii)* approaches with a strong evidence of effectiveness not covered by either previous criterion.

Potential gain is estimated in terms of additional months progress you might expect pupils to make as a result of an approach being used in school, taking average pupil progress over a year is as a benchmark. The progress that an average pupil in a year group of 100 students makes over a year is equivalent to them moving up from 50th place to 16th place, if all the other students had not made any progress.

For example, if a feedback intervention has an effectiveness impact of nine months, 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 6th best pupil in the control class having made 21 months progress over the year, compared to an average of 12 months in the control class.

These estimations are based on 'effect sizes' reported in British and international comparative data (see table below). Effect sizes are quantitative measures of the impact of different approaches on learning. The *Toolkit* prioritises systematic reviews of research and quantitative syntheses of data such as meta-analyses of experimental studies. To be included in the analysis an approach needed to have some quantifiable evidence base for comparison.

Months' progress	Effect Size from …	... to	Description
0	-0.01	0.01	Very low or no effect
2	0.10	0.18	Low
4	0.27	0.35	Moderate
6	0.45	0.52	High
8	0.62	0.69	High
10	0.79	0.87	Very high
12	0.96	>1.0	Very high

Cost estimations are based on the estimated cost of implementing an approach in a class of thirty pupils. Where the approach does not require an additional resource, estimates are based on the cost of training or professional development which may be required. Approaches marked with £££ or less could be funded from the 2012-13 pupil premium allocation of £600 per eligible pupil.

£	Very low: up to about £2,000 per year per class of 30 pupils, or less than £70 per pupil per year.
££	Low: £2,000-£5,000 per year per class of 30 pupils, or up to about £170 per pupil per year.
£££	Moderate: £5,000 to £18,000 per year per class of 30 pupils, or up to about £600 per pupil per year. This represents the 2012/13 pupil premium allocation.
££££	High: £18,000 up to £30,000 per year per class of 30 pupils, or up to £1,000 per pupil.
£££££	Very high: Over £30,000 per year per class of 30 pupils, or over £1,000 per pupil. By 2014/5, the pupil premium is projected to rise to approximately £1,200 per pupil.

Evidence estimates are based on: the availability of evidence (i.e. the number of systematic reviews or meta-analyses and the quantity of primary studies which they synthesise); the methodological quality of the primary evidence; the magnitude of the impact (in terms of effect size); and the reliability or consistency of this impact across the studies reviewed.

★	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[2] high quality evidence from at least five robust[3] and recent meta-analyses where the majority of the included studies have good ecological validity[4] and where the outcome measures include curriculum measures or standardised tests in school subject areas.

Applicability summarises where the evidence of impact is greatest in terms of impact across primary and secondary schools and subject area. Also included in this analysis is a judgement about the challenge associated with adapting or implementing the approach in schools. For example, evidence of previous implementation in the UK is weighted more strongly as is more recent research, particularly in areas where the context changes, such as ICT.

More detailed information about how the *Toolkit* was put together, including listings of all the studies included estimates is available in the **Technical Appendices** which can be found at www.educationendowmentfoundation.org.uk/toolkit.

[2] 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.
[3] Meta-analysis reported with confidence intervals and heterogeneity. Some checks for bias investigated (e.g. study quality and/or and some moderator exploration).
[4] Studies conducted in schools with more than one teacher or class.

WHO PUT THE TOOLKIT TOGETHER?

The *Toolkit* was originally commissioned by the Sutton Trust and developed as the *'Pupil Premium Toolkit'* in partnership with Durham University. The '*Sutton Trust-EEF Teaching and Learning Toolkit (2012)'* has been developed from this initial analysis.

The Education Endowment Foundation (EEF) is an independent grant-making charity dedicated to raising the attainment of disadvantaged pupils in English primary and secondary schools by building and sharing evidence of what is effective to improve learning. Founded by in 2011 by the Sutton Trust in partnership with Impetus Trust, the EEF was set up with an initial £125m grant from the Department for Education. With investment and fundraising income, the EEF intends to award over £200m to support its aims over the next 15 years.

HOW WILL THE TOOLKIT DEVELOP?

The *Toolkit* is a live resource which will develop as the evidence base in education grows. As findings from EEF-funded projects and other high-quality research become available, these will also be integrated into the *Toolkit* evaluations.

We will be expanding the breadth and depth of the *Toolkit* on a regular basis, and welcome suggestions for topics to be included in future editions. If you have a topic suggestion, or any other comments or questions about the *Toolkit*, please contact the EEF at info@eefoundation.org.uk.

ABILITY GROUPING

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
± 1 MONTH	£	Science Primary Maths Secondary English	★★★

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 is that it will be possible to teach more effectively or more efficiently with a narrower range of attainment in a class.

HOW EFFECTIVE IS IT?

The evidence is consistent that while there may be some benefits for higher attaining pupils in some circumstances, with an average impact of about two additional months progress, these benefits are largely outweighed by the direct and indirect negative effects for mid-range and lower performing learners. In particular the longer term negative effect on the attitudes and engagement of low attaining and disadvantaged pupils is clear. There is some evidence that effective and flexible grouping for particular tasks can be beneficial, or when high-performing teachers are assigned to low attaining groups but, 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 indicate that the overall impact on low attaining learners is negative (i.e. delaying their progress by about two months over the course of a year).

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 issue is that the language of 'ability' can imply that ability is a fixed construct and reduce effort. We know from other research that it is important for pupils to believe that they can improve and succeed if they work hard.

WHAT DO I NEED TO KNOW?

The key issue is ensuring that any ability grouping is beneficial for all learners, particularly low-attaining or disadvantaged pupils. It will be important to monitor the impact on pupils' attitudes and beliefs about themselves as successful (or unsuccessful) learners. Schools should consider how differences in grouping will support more effective teaching, such as small group intensive support for pupils who are falling behind or cross-age peer tutoring where older pupils tutor their younger peers.

- Groups should be based on learners' needs rather than organisational convenience.
- Flexible within-class grouping is preferable to tracking or streaming.
- Where pupils are organised in groups by attainment it is important that these groups are regularly re-organised on the basis of progress made and that success is attributed to effort, not to ability.
- The impact on low achieving pupils' attitudes to learning and self-esteem need to be addressed over the medium and long term to mitigate the likely negative effects.
- If higher ability groups just move at a faster rate through the same curriculum their progress may be restricted once they have 'reached the end'.

WHAT ARE THE COSTS?

Ability grouping is an organisational strategy which has few, if any, financial costs associated with it.

HOW APPLICABLE IS IT?

Evidence suggests that the 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 other subjects, though negative effects are reported for low attaining pupils across the curriculum. The evidence indicates ability grouping particularly affects upper primary and lower secondary education.

FURTHER INFORMATION:

Jo Boaler's work provides a vivid account of secondary pupils' experiences in mathematics: http://www.nottingham.ac.uk/csme/meas/papers/boaler.html.

An older, but thought provoking article by Adam Gamoran from 1992 available at: http://gayleturner.net/Gamoran_Is_Ability_Grouping_Equitable.pdf.

AFTER SCHOOL PROGRAMMES

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 2 MONTHS	££££	Science Primary Maths Secondary English	★★

WHAT IS IT?

Children or young people are involved in planned activities which are supervised by adults at the end of the school day. The goals, objectives and approaches of the programmes may vary greatly. Some 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 indicates that participants in after school programmes score higher on measures of academic achievement. However, the gains are low to moderate on tested attainment of reading or mathematics (with a benefit 2-4 additional months progress) and lack a clear pattern of impact. This suggests that the quality and focus of the programme is important. In the UK there is evidence that such programmes are linked with GCSE improvement by a third of a level in maths and three-quarters of a level in science. There is evidence that there are wider benefits for low-income students in terms of behaviour and relationships with peers.

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 from less rigorous evaluations undertaken in the UK. Analysis suggests that enthusiasm for after school programmes in the USA has outpaced the research base indicating the need for more rigorous evaluations with outcome measures that demonstrate effectiveness on learning.

WHAT DO I NEED TO KNOW?

- Programmes with greater structure, a strong link to the curriculum, well qualified and well-trained staff are more clearly related to academic benefits.
- The academic component should be supported by qualified and experienced teachers.
- Particularly promising after school activities include one-to-one or small group tutoring.
- Enrichment activities (such as sports or arts engagement) may have positive benefits on attitudes, but these alone will not improve academic learning.
- Particular effort may be required to engage and retain older secondary pupils.
- Booster activities to support revision and test or exam practice are likely to improve results.

WHAT ARE THE COSTS?

Most of the cost estimates come from the US, with a wide range from £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 £1,000 per pupil.

HOW APPLICABLE IS IT?

Programmes may not be equally effective with all students. At risk children may benefit more as do younger children (5-10 year olds). Positive effects for reading were highest for younger primary pupils and in secondary schools. Maths gains were higher for older primary and secondary pupils. However it is harder to attract and retain pupils in after school programmes at secondary level compared with primary pupils.

FURTHER INFORMATION:

There is a 2007 review by the Collaborative for Academic, Social and Emotional Learning (CASEL): http://casel.org/publications/a-meta-analysis-of-after-school-programs-that-seek-to-promote-personal-and-social-skills-in-children-and-adolescents/.

MacBeth's report 2001 indicates that significant gains are possible for secondary pupils from study support, including after school provision: http://dera.ioe.ac.uk/4624/1/RR273.pdf, though this design and analysis may over-estimate the actual gains made. This site is funded by the US Department of Education.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

ARTS PARTICIPATION

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 1 MONTH	££	Science Primary Maths Secondary English	★★★

WHAT IS IT?

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

HOW EFFECTIVE IS IT?

Overall the impact on academic learning tends to be low, though greater effects have been identified for younger learners of primary school age in terms of impact on cognitive tests. Wider benefits on attitudes and well-being have also consistently been reported.

HOW SECURE IS THE EVIDENCE?

There are a number of systematic reviews and meta-analyses which have consistently found small benefits for arts participation. However, these vary according to the detail of the approach and the age group targeted so the effects are hard to generalise.

WHAT DO I NEED TO KNOW?

The wide range of effects and outcomes in the research evidence suggests that the aims and focus of a programme of arts participation are of crucial importance. It is therefore difficult to identify features of effective practice with confidence in this area.

- Benefits for learning appear to be more achievable with younger learners.
- This appears particularly true of developing skills in music performance when young children seem to gain in terms of their wider attainment.
- Transfer of learning to the classroom is not automatic and needs further exploration such as by encouraging pupils to apply their learning from arts participation in more formal contexts.
- Arts-based approaches may offer a route to re-engage older learners in school.

WHAT ARE THE COSTS?

Costs vary considerably from junior drama groups with small annual subscriptions (about £20), through organised dance groups for young people at about £5 per session to high quality music tuition at about £35 per hour. Costs are estimated at £150 per year, though it should be noted that some activities would be considerably more expensive (e.g. nearer £1,500 for individual music tuition).

HOW APPLICABLE IS IT?

There is consistent but weak evidence that participation in artistic and creative activities is 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 to collect evidence about participation in culture and sport. Their recent review is available at: http://www.culture.gov.uk/images/research/CASE-systematic-review-July10.pdf.

BLOCK SCHEDULING AND TIMETABLING

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 1 MONTH	£	Science Primary Maths Secondary English	★★

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 4x4 seemed to produce higher overall achievement than traditional schedules, though 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 (two to five months of additional progress); 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.

This evidence is insufficient to support the introduction block scheduling in secondary schools to raise attainment by itself. The evidence 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. Teachers and students often perceive that timetabling changes are beneficial especially when it appears to increase one-to-one interaction. However these perceptions are not clearly linked with improved learning outcomes.

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.

WHAT DO I NEED TO KNOW?

- Timetabling changes alone are not sufficient to improve learning.
- Teachers need to alter the way that they teach and should plan and organise different kinds of learning activities to obtain benefits.
- Timetabling changes need to be matched to curriculum goals and teaching and learning objectives (such as longer lessons for science experiments).
- One promising approach might be to investigate how longer lessons can increase the amount of feedback that students get from the teacher or from each other (see *Feedback*).

WHAT ARE THE COSTS?

The costs of making alterations to the timetable are mainly in terms of organisational effort and time.

HOW APPLICABLE IS IT?

Timetabling mainly affects secondary schools, though the time spent on different areas of the curriculum is also relevant at primary level. 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 YEARS INTERVENTION

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 6 MONTHS	£££££	Primary Maths English	★★★★

WHAT IS IT?

Early years or early childhood interventions are approaches which aim to ensure that young children have educationally based pre-school or nursery experiences which prepare for school and academic success, usually through additional nursery or pre-school provision. Many of the researched programmes and approaches focus on disadvantaged children. Some also offer parental support.

HOW EFFECTIVE IS IT?

Overall the evidence suggests that early years and pre-school intervention is beneficial with above average levels of impact (a typical impact of six additional months progress). There is some international evidence that these programmes need to be for whole day (rather than half-day – though the UK's EPPE study did not find a difference here) and of longer duration (up to a year or more) rather than for shorter periods of time. In most studies, the impact tends to wear off over time, though impact tends to be more durable on attitudes to school than measures of attainment.

HOW SECURE IS THE EVIDENCE?

There are a number of systematic reviews and meta-analyses which have looked at the impact of early childhood 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 and from generalising from exceptionally successful examples. However, overall the evidence supporting early childhood intervention is robust.

WHAT DO I NEED TO KNOW?

- High quality provision is essential with well-qualified and well trained staff.
- Such provision is likely to be characterised by the development of positive relationships between staff and children and by engagement of the children in activities which support pre-reading, the development of early number concepts and non-verbal reasoning.
- Extended attendance (1 year+) and starting early (e.g. 3 years) is more likely to have an impact.
- Disadvantaged children benefit from good quality programmes, especially where these include a mixture of children from different social backgrounds, and a strong educational component.

WHAT ARE THE COSTS?

Understandably the costs are high, as adult/child ratios in pre-school provision tend to be higher than in school classes and family interventions have similar high costs. The Sure Start average cost per child was about £1,000 in 2006, so the estimates are in the region of £1,000-£2,000 per child. This can be compared with the average yearly child-care costs for a child under two at about £5,000.

HOW APPLICABLE IS IT?

Most of the studies are from the US however, where children tend to start school later. There is also relatively little evidence of sustained impact over time. Evaluation of Sure Start in the UK suggests that the benefits may be harder to achieve at larger scale, though the Effective Provision of Pre-School Education (EPPE) Project has found important benefits associated with early years provision.

FURTHER INFORMATION:

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

The EPPE Project is the first major study in the UK to focus specifically on the effectiveness of early years education and also reports on longer term outcomes http://eppe.ioe.ac.uk/eppe/eppeintro.htm.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

FEEDBACK

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 9 MONTHS	££	Science Primary Maths Secondary English	★★★

WHAT IS IT?

Feedback is information given to the learner and/or the teacher about the learner's performance relative to learning goals. It should aim to (and be capable of) producing improvement in students' learning. Feedback redirects or refocuses either the teacher's or the learner's actions to achieve a goal, by aligning effort and activity with an outcome. It can be about the learning activity itself, about the process of activity, about the student's management of their learning or self-regulation or (the least effective) about them as individuals.

HOW EFFECTIVE IS IT?

Feedback studies tend to show very high effects on learning (0.74-1.13 in one recent review). However, it also has a very high range of effects and some studies show that feedback can have negative effects and make things worse. It is therefore important to understand the potential benefits and the possible limitations. The research evidence about feedback was part of the rationale for Assessment for Learning (AfL). One evaluation of AfL indicated an impact of half of a GCSE grade per student per subject is achievable, which would be in line with the wider evidence about feedback. Other studies reporting lower impact indicate that it is challenging to make feedback work in the classroom. In general research-based approaches which provide feedback to learners, such as Bloom's 'mastery learning', also tend to have a positive impact.

HOW SECURE IS THE EVIDENCE?

There are a substantial number of reviews and meta-analyses of the effects of feedback. Educational (rather than psychological or theoretical) studies tend to identify positive benefits where the aim is to improve learning outcomes in reading or mathematics or in recall of information.

WHAT DO I NEED TO KNOW?

Providing effective feedback is challenging. Research suggests that it should:

- be specific, accurate and clear (e.g. "*It was good because you…*" rather than just "*correct*").
- compare what a learner is doing right now with what they have done wrong before (e.g. "*I can see you were focused on improving X as it is much better than last time's Y…*").
- encourage and support further effort (getting a balance between support and challenge).
- be given sparingly so that it is meaningful as too much feedback can stop learners working out what they need to do for themselves.
- be about what is *right* more often than about what is wrong (e.g. "*This section is excellent because…*" or "*I thought this was the best way because…*").

Wider research suggests the feedback should be about complex or challenging tasks or goals as this is likely to emphasise the importance of effort and perseverance as well as be more valued by the pupils. Feedback can come from other peers as well as adults (see *Peer Tutoring*).

WHAT ARE THE COSTS?

The costs of providing more effective feedback are not high. However it is likely to require sustained professional development to improve practice, which includes active inquiry and evaluation. Estimates of this (including 7-10 days cover) are in the region of £2,000-£5,000 per teacher per year.

HOW APPLICABLE IS IT?

Feedback has effects on all types of learning across all age groups. Research in schools has focused particularly on English, mathematics and, to a lesser extent, science.

FURTHER INFORMATION:

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

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

HOMEWORK

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 5 MONTHS	£	Science Primary Maths Secondary English	★★★

WHAT IS IT?

Homework refers to tasks given to pupils by their teachers to be completed outside of usual lessons. Common homework activities may be reading or preparing for work to be done in class, or practising and completing tasks or activities already taught or started in lessons. It may include more extended activities to develop inquiry skills or more directed and focused work such as revision for 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 explored this issue. There is some evidence that when homework is used as a short and focused intervention it can be effective in improving students' attainment (some studies showing up to eight months positive impact on attainment). Overall the general benefits are likely to be modest if homework is more routinely set. There is clear evidence that it is helpful at secondary level, but there is much less evidence of benefit at primary level.

HOW SECURE IS THE EVIDENCE?

Homework has been extensively studied. However studies have mainly looked at the correlation between homework and how well schools perform. There is a relatively consistent picture that there is a positive association, but there are a smaller number of studies which have investigated what happens when homework is introduced and compared with classes where homework is not given. These studies tend to show that homework is beneficial, though the evidence is less secure.

WHAT DO I NEED TO KNOW?

Research suggests that homework can be valuable, particularly as a way to improve learning and engagement in lessons in school, and particularly with older learners. However it is also clear that homework is less valuable when it becomes routine or more perfunctory.

- Planned and focused activities are more beneficial than homework which is regular but routine.
- Homework activities should be integrated with activities in lessons.
- The purpose of homework should be made explicit, e.g. to increase a specific area of knowledge, or fluency in a particular area.
- Pupils should receive feedback on homework which is specific, timely and relates to the purpose.
- A variety of tasks with different levels of challenge is likely to be beneficial.
- There is an optimum level of between 1-2 hours per school day (slightly longer for older pupils), but the effects diminish as the time that students spend increases.

WHAT ARE THE COSTS?

There are few costs associated with homework, though there are implications for staff time for preparation and marking. With younger children there may be additional resources required (such as reading books or games for children to take home).

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.

FURTHER INFORMATION:

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

INDIVIDUALISED INSTRUCTION

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 2 MONTHS	££	Science Primary Maths Secondary English	★★★

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, particularly in terms of the tasks and activities that pupils undertake. Examples of individualised education have been tried over the years in education, particularly in areas like mathematics where pupils can have individual sets of activities which they complete.

HOW EFFECTIVE IS IT?

Individualising instruction does not tend to be particularly beneficial for learners. One possible explanation for this is that the role of the teacher becomes too managerial in terms of organising and monitoring learning, without leaving time for interacting with learners or providing formative feedback to refocus effort. Impact on learning tends overall to be low, or even negative in some studies, appearing to delay progress by one or two months.

HOW SECURE IS THE EVIDENCE?

There have been a number of meta-analyses which have found broadly similar effects, and support the conclusion that individialising learning for whole classes is not beneficial for pupils learning.

This finding is also supported by research from other connected fields, such as computer based learning, and Bloom's 'mastery learning'. In the latter students have instruction broken down into individual steps, receive feedback on their learning, and only move on when they have 'mastered' a particular step. However, as with individualised instruction generally, small group approaches appear to be more effective than individualised approaches.

WHAT DO I NEED TO KNOW?

It is hard to identify exactly why individualised instruction is not more effective. It may be that in a classroom setting learners receive less direct teaching, get less feedback or move at a slower pace when they manage their own learning progress.

- Overall the evidence does not support approaches which individualise instruction at class level.
- Individualised instruction runs the risk of the teacher managing diverse activities and learners, without sufficient time to work directly with learners to teach them.
- Individualised instruction might be a more viable strategy in small group or one-to-one settings, where giving learners direct teaching at the same time is still possible.
- Approaches to individualise learning activities supported by technology may provide learners with effective practice, however it is still important to ensure that learners receive direct instruction from a teacher when learning new content, or when they are not making progress.

WHAT ARE THE COSTS?

The costs of implementing individualised learning are usually low, unless the approach uses technology (such as tutoring programmes or integrated learning systems).

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, history and geography.

WHERE CAN I FIND OUT MORE?

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)

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 4 MONTHS	££££	Primary Secondary All Subjects	★★★★

WHAT IS IT?

The use of digital technologies to support learning, either through a teaching programme, 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. The range of approaches, equipment and content is very varied.

HOW EFFECTIVE IS IT?

Overall studies consistently find that ICT is associated with moderate learning gains, however there is considerable variation in impact. Evidence also suggests that technology should be used to supplement other teaching, rather than replace more traditional approaches. There is some evidence that it is more effective with younger learners.

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.

WHAT DO I NEED TO KNOW?

Technology is popular with students, however it can take additional time to organise and manage. It is important to identify clearly how the introduction of technology will improve learning. It is also more important to think about the way the technology is used (i.e. how does technology facilitate improved learning) rather than assuming that new technology will automatically lead to increased attainment.

- Effective use of technology is driven by learning and teaching goals rather than a specific technology: technology is not an end in itself.
- It should support pupils to work harder, longer or more efficiently to improve their learning.
- Motivation to use technology does not always translate into more effective learning, particularly if the technology is not supported by sound pedagogical principles.
- Teachers need support and time to learn to use new technology effectively. This involves more than just learning how to use the technology and should include support to use it for teaching.

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. 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.

HOW APPLICABLE IS IT?

There is evidence across age groups and for most areas of the curriculum, suggesting that the pattern of impact is relatively consistent. In particular there is clear evidence that it more beneficial for areas like writing than spelling or mathematics practice rather than problem solving.

WHERE CAN I FIND OUT MORE?

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

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 2 MONTHS	£	Primary Secondary All Subjects	★★★

WHAT IS IT?

The idea underpinning learning styles is that we all have different approaches or styles of learning and that learning will therefore be more effective or more efficient if we are taught accordingly.

HOW EFFECTIVE IS IT?

It has proved difficult to identify reliably any consistent learning 'styles' in young people. As learners our preferences change in different situations and over time. There is some evidence that cognitive style and task type may be connected (e.g. visualisation in some areas of mathematics is valuable) 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 supposed learning style.

Studies where targeted learning is adopted in conjunction 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. Impacts recorded are low or negative, suggesting that only one or two pupils in a class of 30 might benefit from this approach. Where gains are found these may come from pupils taking responsibility for learning (see *Meta-cognition*) rather than directly from the use of learning styles approaches.

HOW SECURE IS THE EVIDENCE?

Overall the picture is consistent and reasonably robust. The evidence for the lack of impact (and in some cases detrimental effect) of using learning styles approaches has been shown in a number of studies. The unreliability of learning styles tests have also been the focus of a number of reviews.

WHAT DO I NEED TO KNOW?

Learning styles approaches enjoy periodic enthusiasm in schools. However, it appears to be more promising to focus on other aspects of motivation to engage pupil in learning activities.

- Learners are very unlikely to have a single learning style, so restricting pupils to activities matched to their reported preferences may damage their progress. This is especially true for younger learners in primary schools whose preferences are still very flexible.
- Labelling students as a particular kind of learner is likely to undermine their belief that they can succeed through effort and to provide an excuse for failure.
- Teachers should consider how to present information in different ways so that pupils can make connections between the different ways in which ideas and information can be represented.
- Pupils should be encouraged to take responsibility for identifying how they can succeed in their learning and develop successful strategies and approaches.

WHAT ARE THE COSTS?

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

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 than that they can succeed through effort.

WHERE CAN I FIND OUT MORE?

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.

META-COGNITIVE AND SELF-REGULATION STRATEGIES

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 8 MONTHS	££	Primary Secondary Science Maths English	★★★★

WHAT IS IT?

Meta-cognitive strategies (sometimes known as 'learning to learn' strategies) are teaching approaches which make learners think about learning more explicitly. This is usually through teaching pupils strategies to plan, monitor and evaluate their own learning. Self-regulation refers to managing one's own motivation towards learning as well as the more cognitive aspects of thinking and reasoning. Overall these strategies involve being aware of one's strengths and weaknesses as a learner, being able to set and monitor goals and having strategies to choose from or switch to during learning activities.

HOW EFFECTIVE IS IT?

Meta-cognitive approaches have a consistently high levels of impact with meta-analyses reporting impact of between seven and nine months additional progress. Encouragingly there is also evidence it is particularly helpful for low achieving pupils. It is usually more effective in small groups so learners can support each other and make their thinking explicit through discussion.

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.

WHAT DO I NEED TO KNOW?

The potential impact of approaches which encourage learners to plan, monitor and evaluate their learning is very high. However it can be difficult to achieve these gains as this involves pupils in taking greater responsibility for their learning and in developing their understanding of what is involved in being successful. There is no simple strategy or trick for this. It is possible to support pupils' work too much, so that they do not learn to monitor and manage their own learning but come to rely on the prompts and support from the teacher. A useful metaphor is scaffolding in terms of *removing* the support and dismantling the scaffolding to check that learners are taking responsibility to manage their own learning.

- Teach pupils explicit strategies to plan, to monitor and to evaluate their learning, and give them opportunities to use them with support and then independently.
- When using approaches for planning, ask pupils to identify the different ways that they could plan (general strategies) and about best approach for a particular task (specific technique).
- Monitoring involves identifying the key steps they need to be aware of as they go through a task to keep it on track. (*Where might this go wrong? What will be the difficult parts?*)
- Evaluating can be part of the process of checking so that it feeds into the current task as it nears completion (*Can you make it better? Are you sure this is right?*). It can also feed forward into future tasks (*What have you learned that will* change *what you do next time?*).

WHAT ARE THE COSTS?

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 strategies as they use them.

HOW APPLICABLE IS IT?

The evidence suggests that teaching meta-cognitive strategies tends to be particularly effective with older and lower achieving students. Most studies have looked at impact on English or mathematics, though there is some evidence from other areas such as science, suggesting benefits are likely to be widely applicable.

WHERE CAN I FIND OUT MORE?

There is an Education Resources Information Center (ERIC) digest in the USA which provides a sound, if a little dated, overview: http://www.ericdigests.org/pre-9218/developing.htm. Examples of metacognitive strategies can be found at: http://academic.pgcc.edu/~wpeirce/MCCCTR/metacognition.htm.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

ONE-TO-ONE TUITION

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 5 MONTHS	£££££	Primary Secondary Maths English	★★★★

WHAT IS IT?

This is where an individual pupil is removed from their class and given intensive tuition for short, regular sessions (about 30 minutes, 3-5 times a week) over a set period of time (6-12 weeks). It may also be undertaken outside of normal lessons.

HOW EFFECTIVE IS IT?

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

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 (nearly double the effect). Evidence also suggests tutoring should be additional or supplemental to normal instruction, rather than as a replacement. 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.

WHAT DO I NEED TO KNOW?

One-to-one tuition is very effective in helping learners catch up, but can be relatively expensive.

- Consider other groupings for intensive support such as one-to-two or even one-to-three.
- Monitor progress to ensure the tutoring is beneficial.
- Short periods (5-10 weeks) of intensive sessions (up to an hour three or four times a week) tend to have greater impact.
- A qualified teacher is likely to achieve greater progress than support staff or volunteers.
- Pupils and regular class teachers may need support at the end of the tutoring to ensure the impact is sustained once they return to normal classes.
- This is likely to include support explicitly linked to what happens in class.

WHAT ARE THE COSTS?

The costs are high as the support is intensive. A single pupil receiving 30 minutes tuition, 5 times a week for 12 weeks requires about four full days of a teacher's time, which will cost in the region of £800. Costs could be reduced by using groups of one-to-two or one-to-three.

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.

WHERE CAN I FIND OUT MORE?

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

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

PARENTAL INVOLVEMENT

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 3 MONTHS	£££	Primary Science Maths Secondary English	★★★

WHAT IS IT?

Actively involving parents in supporting their children's learning at school. This includes programmes focused on parents and their skills (such as improving literacy or IT skills), general approaches to encourage parents to support their children read or do mathematics and more intensive programmes which for families in crisis.

HOW EFFECTIVE IS IT?

Although parental involvement is consistently associated with pupils' success at school, the evidence about *how* to increase involvement to improve attainment is much less conclusive. This is particularly the case for disadvantaged 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 years intervention for example, that 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 also important, though again there is insufficient evidence to show that changing parents' aspirations will raise their children's aspirations and achievement over the longer term. Two recent meta-analyses from the USA suggest that increasing parental involvement in primary and secondary schools has on average 2-3 months positive impact.

HOW SECURE IS THE EVIDENCE?

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

WHAT DO I NEED TO KNOW?

Focused approaches which support parents in working with their children to improve their learning are beneficial. The challenge is in engaging and sustaining such involvement.

- Involvement is often easier to achieve with parents of very young children.
- Parents of older children may appreciate short sessions at flexible times to involve them.
- Schools can be daunting places for parents so it is important to establish a welcoming environment.
- Parents may be anxious about their own educational achievements it is important to encourage them to focus on their children's effort and improvement, rather than worry about ability ("*You did really well and learned to do X better, because you really practiced/ worked hard at/ concentrated on Y…")*.

WHAT ARE THE COSTS?

The costs different approaches vary enormously, from running parent workshops and improving communications, which are cheap, to intensive family support programmes with specially trained staff.

HOW APPLICABLE IS IT?

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

WHERE CAN I FIND OUT MORE?

A recent summary 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.

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

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

PEER TUTORING

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 6 MONTHS	££	Primary Secondary Maths English	★★★★

WHAT IS IT?

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 takes the tutoring role and is paired with a younger tutee or tutees. Peer-Assisted Learning is a structured approach for mathematics and reading with session of 25-35 minutes two or three times a week. In Reciprocal Peer Tutoring, learners alternate between the role of tutor and tutee. The common characteristic is that learners take on responsibility for aspects of teaching and for evaluating their success.

HOW EFFECTIVE IS IT?

The evidence of impact is relatively high (typically 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. There is some evidence that children from disadvantaged backgrounds and low attaining pupils make the biggest gains.

HOW SECURE IS THE EVIDENCE?

Consistent positive effects have been found in different countries, across all age groups and across the curriculum. Cross-age tutoring appears to offer slightly greater benefit for tutor and tutee.

WHAT DO I NEED TO KNOW?

There are several different approaches to peer-tutoring which make different demands on the teacher(s) organising the pairs and on the tutors and tutees.

- Planning the organisation of tutoring to address the logistical challenges and then training the tutors is a key step. At least a day's professional development for staff is recommended.
- Activities should be sufficiently challenging for the tutee that they can benefit from the tutor's support but not too difficult that they cannot succeed with support.
- One way of matching pupils across classes is to match the highest attaining pupil in the older class with the highest attaining child in the younger class through to the lowest attaining pupil in the older class being matched with the lowest attaining pupil in the younger class (making adjustments if necessary). This enables the teacher to focus support on lower attaining pairs.
- A study of cross-age peer tutoring showed that the lowest attaining pairs actually made most progress, and a two-year gap seems to support both tutee and tutor learning.
- Reviewing challenges and successes with tutors will improve their skills and learning.
- Relatively short but intensive periods of tutoring over 4-10 weeks are likely to be more effective than for a longer period with more routine sessions.

WHAT ARE THE COSTS?

Direct costs are minimal, though organisation effort is required, and training for staff is recommended.

HOW APPLICABLE IS IT?

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

WHERE CAN I FIND OUT MORE?

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.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

PERFORMANCE PAY

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
0 MONTHS	**£££**	Primary Secondary Maths Science English	★

WHAT IS IT?

We know that teachers are the most important part of the education system in terms of improving students' learning. Performance pay is where there is a direct link between a teacher's wages or bonus and the performance of their class. A distinction can be drawn awards where performance leads to a higher salary and payment by results where teachers get a bonus for higher test scores. In the USA it is sometimes referred to as 'merit pay', and, due to federal government incentives through the Teacher Incentive Fund (TIF), has been increasingly used by state governments. One key issue is how performance is measured and how closely this is linked to outcomes for learners. In the UK performance measurement 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 performance pay could lead to positive impacts of around three months, and one UK study estimates the benefit as about half a GCSE grade, which is a similar effect. However when more rigorous evaluations are looked at, such as those with experimental trials or with well-controlled groups, within countries such as the USA, the actual impact has been closer to zero. In India, there is evidence of the benefit of performance pay in the private sector but not the state sector, but it is not clear how this evidence applies in the UK.

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 pay levels 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, such as teaching to the test or other forms of "gaming".

WHAT DO I NEED TO KNOW?

Payment by results has been tried on a number of occasions, however the evidence of impact on student learning does not support the approach. The UK evidence offers a cautious endorsement of approaches which seek to reward teachers in order to benefit disadvantaged students by recognising teachers' professional skills and expertise. However, approaches which simply assume that incentives will make teachers work harder do not appear to be well supported.

- It is clearly important to recruit the most effective teachers possible, and any additional resource may be better targeted at identifying and appointing the best teachers for a school.
- Spending on professional development linked to evaluation of better learning by pupils, may also offer an alternative to performance pay.
- Performance pay may lead to a narrower focus on test performance and restrict other aspects of learning.

WHAT ARE THE COSTS?

Increases are usually of the order of £2,000 per teacher or £70 per pupil across a class of 30.

HOW APPLICABLE IS IT?

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.

WHERE CAN I FIND OUT MORE?

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.

PHONICS

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 4 MONTHS	£	Primary English	★★★★

WHAT IS IT?

Phonics is an approach to teaching reading and some aspects of writing by developing learners' phonemic awareness. This involves the skills of hearing, identifying and using phonemes or sound patterns in English. The aim is to teach learners the relationship between these sounds and the written spelling patterns or graphemes which represent them. Phonics emphasises the skills of decoding new words by sounding them out and combining or 'blending' the sound-spelling patterns.

HOW EFFECTIVE IS IT?

Phonics approaches have been consistently found to be effective in supporting younger readers to master the basics of reading. The approach tends to be more effective than other approaches to early reading (such as whole language or alphabetic approaches), though it should be emphasised that effective phonics techniques are usually embedded in a rich literacy environment for early readers and only one part of a successful literacy teaching. For older readers (above Year 5) who are struggling, phonics approaches may be less successful, and other approaches such as comprehension focused methods may be more effective. In particular, using age appropriate material is likely to be more successful.

HOW SECURE IS THE EVIDENCE?

There have been a number of studies, reviews and meta-analyses which have consistently found that the systematic teaching of phonics is beneficial. There is some evidence that particular approaches such synthetic phonics may be more beneficial than analytic approaches, however the evidence here is less secure and it is probably more important to match the teaching to children's particular needs and systematically teach the sound patterns they are not yet confident with.

WHAT DO I NEED TO KNOW?

The evidence suggests that phonics can be an important component in supporting the development of early reading skills, particularly for children from disadvantaged backgrounds. However, it is not a panacea and it is also important that children are successful in making progress in all aspects of reading including vocabulary development and comprehension.

- Teaching of phonics should be explicit and systematic to support children in making connections between the sound patterns they hear in words and the way that these words are written.
- The teaching of phonics should be matched to children's current level of skill terms of their phonemic awareness and their knowledge of letter sounds and patterns (graphemes).
- Phonics teaching should be included as part of a wider literacy programme.
- Phonics improves the accuracy of children's reading, but not necessarily their comprehension.
- As a child's reading skills progress and they become successful with a phonics-based approach, the emphasis should move on to develop children's understanding of what they can read.
- Systematic phonics is unlikely to improve spelling, which should be taught separately and explicitly.

WHAT ARE THE COSTS?

There are some costs, as specific resources are needed for teaching phonics. It is also important that teachers have professional development in effective assessment as well as in the use of particular phonic techniques and materials and as the evidence suggests that the effectiveness of phonics is related to the pupils' stage of reading development. Qualified teachers also tend to get better results (up to twice the effectiveness), suggesting that their expertise is a key component of successful teaching of early reading.

HOW APPLICABLE IS IT?

The research suggests that phonics is beneficial for younger learners as they begin to read (4-7 year olds). It is less likely to be helpful for older less successful learners.

WHERE CAN I FIND OUT MORE?

OFSTED produced a report about how successful schools integrated phonics teaching: http://www.ofsted.gov.uk/resources/reading-six-how-best-schools-do-it.

The Department for Education have a phonics website with links to information and resources: http://www.education.gov.uk/schools/teachingandlearning/pedagogy/phonics.

REDUCING CLASS SIZES

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 3 MONTHS	£££££	Primary Maths Secondary English	★★★

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, such as group work or more independent activities.

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. There is evidence that, when done successfully, benefits of reducing classes sizes to below 20 can be identified in the behaviour and attitudes of pupils as well as on attainment, and that these benefits persist for a number of years (from early primary school through to Key Stage 3), however above this number benefits are likely to be harder to achieve. There is some evidence that reducing class sizes can be more effective when supported with professional development to learn and develop teaching skills and approaches.

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 slightly higher attainment (when other factors are controlled for) and when class sizes have been deliberately reduced in experimental evaluations.

WHAT DO I NEED TO KNOW?

- Smaller classes will not make a difference to learning unless the teacher or pupils do something differently in the smaller class. It is likely that the increased choices the teacher has for grouping and organising learners combined with an increase in the quality or quantity of feedback pupils receive accounts for any gains.
- Deploying staff (including teaching assistants) so that teachers can work more intensively with smaller groups may be worth exploring.
- Reducing class sizes for younger children may provide longer term benefits.

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 be allocated an extra £9,000 under the pupil premium in 2012/13; this would not be sufficient to appoint an additional teacher.

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. There is some evidence that pupils in disadvantaged areas in the UK benefit from smaller classes.

WHERE CAN I FIND OUT MORE?

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.

SCHOOL UNIFORMS

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
± 1 MONTH	£	Primary Science Maths Secondary English	★

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.

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.

WHAT DO I NEED TO KNOW?

- When combined with the development of a school ethos and the improvement of behaviour and discipline, the introduction or enforcement of a school uniform can be successfully included as part of this process.
- Wearing a uniform is not, on its own, going to improve learning.
- The commitment of staff to uphold and enforce a behaviour policy is crucial to its success.
- Improved behaviour, on its own, does not necessarily lead to better learning, though it may be an important precondition.

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.

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.

WHERE CAN I FIND OUT MORE?

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.

SPORTS PARTICIPATION

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 3 MONTHS	£££	Science Primary Maths Secondary English	★★

WHAT IS IT?

Engaging in sports as a means to increase educational engagement and attainment. This might be through organised after school activities or as an organised programme by a local sporting club or association. Sometimes 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 of sports participation on academic achievement tends to be low (less than one additional month progress), 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 when combined with a structured numeracy programme (with one study showing an impact of up to ten months additional progress).

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, however, considerable variation in impact, including some studies which show negative effects.

WHAT DO I NEED TO KNOW?

- Being involved in extra-curricular sporting activities may increase attendance and retention.
- Participation in sports does not straightforwardly transfer to academic learning.
- Planned extra-curricular activities which include short regular structured teaching in literacy and mathematics (either tutoring or group teaching) as part of a sports programme, such as an after school club or summer school) are much more likely to offer academic benefits.

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 per year excluding clothing and equipment. These costs vary according to equipment and venue.

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.

WHERE CAN I FIND OUT MORE?

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

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
+ 3 MONTHS	£££	Primary Science Maths Secondary English	★★

WHAT IS IT?

Summer schools are lessons or classes during the summer holidays, often run as catch-up or enrichment lessons. Some summer 'schools' do not have an academic focus and concentrate on sports or other non-academic activities. 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 impact of about three months progress), though usually higher 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. Summer schools which do not have a clear academic component are not usually evaluated for, or associated with, learning gains. Other variables seem to make less difference, such as whether the teacher is one of the student's usual teachers.

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, a crucial factor is whether the summer school has an academic focus.

WHAT DO I NEED TO KNOW?

- Summer school provision which aims to improve learning needs to have an academic component.
- Qualified and experienced teachers are more likely to support improvement in literacy or mathematics (or other subjects) than less well qualified staff.
- Intensive tutoring (one-to-one or small group) can be productively included in summer school provision.
- Summer schools can also provide support for the highly able and transition to university.

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.

HOW APPLICABLE IS IT?

Impacts vary according to the focus of the summer school, with more academic benefits linked to those with teaching or tutoring. Benefits have been identified in a range of subjects, particularly for secondary school pupils but are not consistent across all programmes. This indicates that it is important to have a clear focus on learning.

WHERE CAN I FIND OUT MORE?

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.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.

TEACHING ASSISTANTS

AVERAGE IMPACT:	AVERAGE COST:	APPLICABILITY:	EVIDENCE STRENGTH:
0 MONTHS	££££	Primary Science Maths Secondary English	★★

WHAT IS IT?

A teaching assistant (TA) 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 of the curriculum such as literacy or numeracy. They are also often responsible for hearing children read, and helping teachers' with administrative tasks.

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 TA. One clear implication of this is that if TAs are used with the intention of improving learning, they should not undertake the tasks they are routinely assigned. Comparisons with qualified teachers suggest they are consistently less effective in terms of raising attainment (achieving about half the gains), however there is some evidence of greater impact when TAs are given a particular pedagogical role or responsibility for delivering specific interventions. Here the effect appears to be greater, particularly with training and support.

HOW SECURE IS THE EVIDENCE?

There are a number of systematic reviews of the impact of support staff in schools, though there are no meta-analyses of specifically looking at the impact of TAs 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 TA supporting them.

WHAT DO I NEED TO KNOW?

Teaching assistants undoubtedly contribute to the effective management and organisation of a school. On average, however, they do not seem to add to the learning of the children and the classes that they support. This means that, on balance, about half do and about half don't. We do not know the best way for them to be used in schools to support learning. Likely best bests are:

- Identify activities where TAs can support learning, rather than simply manage tasks.
- Provide support and training for TAs so that they understand how to be effective, e.g. by allowing time for teachers and teaching assistants to talk before and after lessons.
- Ensure that teachers do not reduce their support or input to the pupils supported by TAs.
- Evaluate the impact of different aspects of TAs' work.
- Ensure that TAs are focused on learning as opposed to ensuring that pupils finish their work.

WHAT ARE THE COSTS?

The average TA salary is about £16,000 per annum or about half of an average teaching salary.

HOW APPLICABLE IS IT?

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

WHERE CAN I FIND OUT MORE?

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.

The Education Endowment Foundation is funding projects in this area. The evaluations of these projects will feed into future editions of the *Toolkit*. For more information about our projects, please visit: www.educationendowmentfoundation.org.uk/projects.