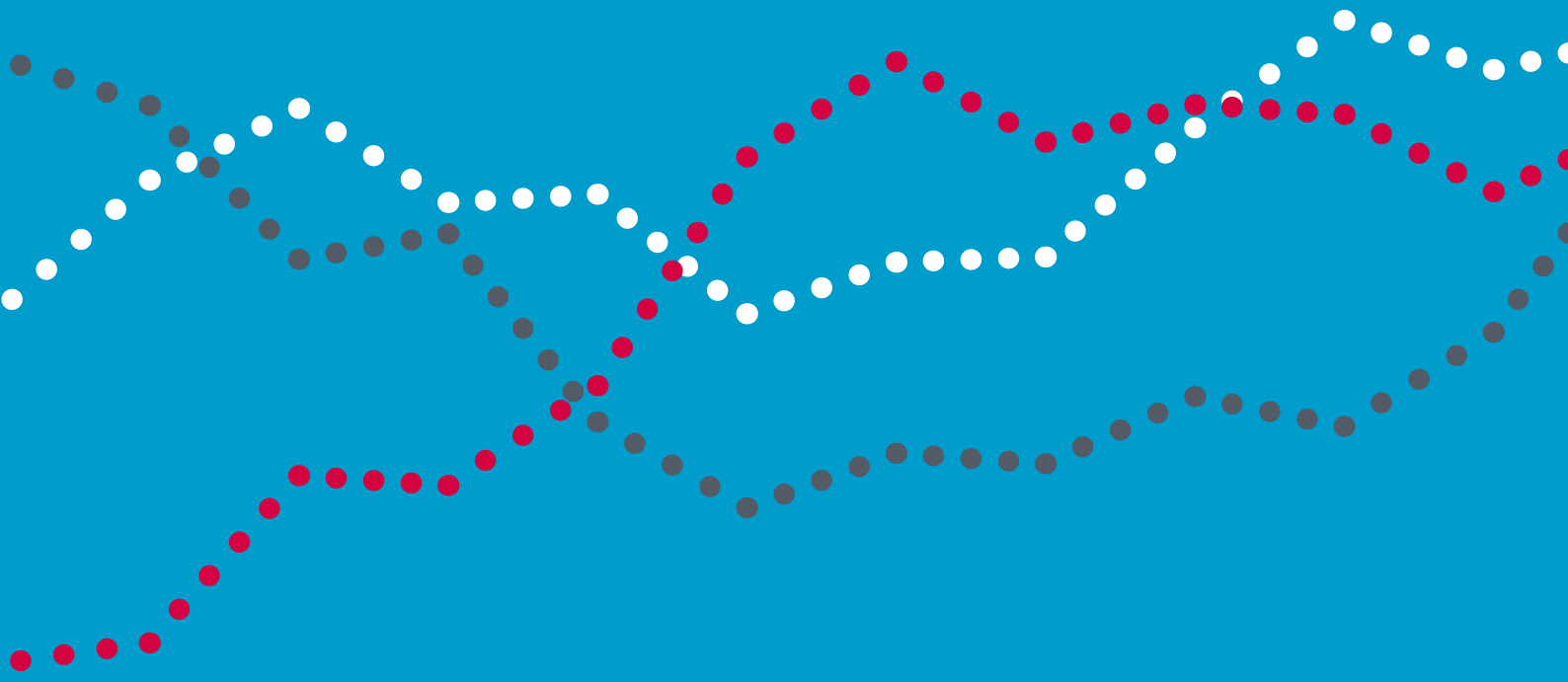
KING'S College LONDON

Ark

Lessons learned:

Putting experience to work



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Ark is an education charity and one of the country's top performing academy networks. We run schools in communities which traditionally have not been well served educationally. We also support global education programmes in Asia and Africa to allow children to get the possible start in life. Our aim is to create outstanding schools that give every pupil the chance to go to university or pursue their career of choice.

King's College London is one of the top 20 universities in the world. It is the fourth oldest university in England with more than 26,000 students from nearly 140 countries, and more than 7,000 employees. Its Department of Education and Professional Studies has a proud history of contributing to public policy debates in the UK and internationally, as well as providing study programmes across multiple sectors that help professionals critically analyse and effectively respond to changes in thinking and policy in their fields. Today the Department is renowned for its teaching and research expertise in science and mathematics education; language, culture and communication; and education policy and professional studies. The Research Excellence Framework 2014 ranked the Department as second in the country for the quality of its research.

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Chapters

"The best thing for being sad," replied Merlin, beginning to puff and blow, "is to learn something. That's the only thing that never fails. You may grow old and trembling in your anatomies, you may lie awake at night listening to the disorder of your veins, you may miss your only love, you may see the world about you devastated by evil lunatics, or know your honour trampled in the sewers of baser minds. There is only one thing for it then — to learn. Learn why the world wags and what wags it. That is the only thing which the mind can never exhaust, never alienate, never be tortured by, never fear or distrust, and never dream of regretting. Learning is the only thing for you. Look what a lot of things there are to learn."

TH White, The Once and Future King

Alan Milburn was the Member of Parliament for Darlington from 1992 until 2010. He served as Chief Secretary to the Treasury, Secretary of State for Health and Chancellor of the Duchy of Lancaster. He stood down as an MP at the 2010 election and became Chair of the Social Mobility and Child Poverty Commission in 2012.

Venessa Willms is the Director of Primary at Ark. She was one of the founding headteachers of King Solomon Academy. Located in the most deprived ward in London, it is one of the best performing schools in the country. She previously worked in Tower Hamlets, where she was an Assistant Headteacher and led a pilot programme to improve key stage 3 science results across the borough.

Paul Bambrick-Santoyo is the Managing Director of Uncommon Schools Newark, which comprises ten North Star Academy schools. During his twelve years at North Star, the schools have seen dramatic gains in student achievement, making them among the highest-achieving urban schools in the United States. Author of 'Driven by Data', 'Leverage Leadership' and 'Great Habits, Great Readers', he has trained over 10,000 school leaders worldwide in instructional leadership. Prior to joining North Star, he worked for six years in a bilingual school in Mexico City.

Jeremy Hodgen is Professor of Mathematics Education at the University of Nottingham. Previously at King's College London, he specialises in assessment, teachers' professional development, standards of attainment over time and international comparisons. He mainly teaches in the areas of quantitative methods, mathematics education and assessment. He is a joint editor of the journal 'Research in Mathematics Education'.

Oliver Quinlan is Programme Manager for Nesta's digital education projects. His background is in education, originally as a teacher developing the use of new technologies in primary schools. He was one of the first wave of 'Google Certified Teachers' outside of the USA. Before joining Nesta he worked as a lecturer in primary education at Plymouth University. His book 'The Thinking Teacher' was published in 2014 and calls for teachers to construct themselves as leaders who encourage young people to question and evaluate society.

Alison Wolf is the Sir Roy Griffiths Professor of Public Sector Management at King's College London. After working in the US as a government policy analyst, she worked at the Institute of Education as a guest professor. She is a member of the International Accounting Education Standards Board and the author of numerous books including 'The XX factor' and 'Does Education Matter? Myths about Education and Economic Growth'. Her review of vocational education commissioned by the Department of Education was published in 2011. In 2014, it was announced that she was to become a Crossbench Life Peer.

Becky Francis is Professor of Education and Social Justice at King's College London. Her research focuses on gender and achievement and educational inequalities. Her policy research and analysis includes her recent influential work on 'Satisfactory' schools in relation to social disadvantage and her direction of the RSA / Pearson Academies Commission. She has written many books, including the recent 'Identities and Practices of High Achieving Pupils'.

About this report

Ark commissioned this report just over a decade after our establishment as a schools operator. The objective was to better understand what had worked and what hadn't both in Ark and the wider education community. The intention was to provoke a debate on the key issues that will face schools over the coming ten years.

Ark developed a partnership with King's College London's Department of Education and Professional Studies, with the project led by Professor Becky Francis and Dr Ada Mau. King's College London colleagues provided valuable research and policy expertise to ensure that the report is premised on sound research evidence and arguments.

We jointly brought together an editorial board:

- Alex Bigham, Deputy Director of Communications, Ark
- Daisy Christodoulou, Research and Development Manager, Ark
- Prof Becky Francis, Professor of Education and Social Justice, King's College London
- Prof Jeremy Hodgen, Professor of Mathematics Education, University of Nottingham
- Robert Hill, Visiting Senior Research Fellow, King's College London
- Dr Ada Mau, Research Associate, King's College London
- Amanda Spielman, Chair of Ofqual and Adviser to Ark
- Prof Chris Winch, Professor of Educational Philosophy and Policy, King's College London

The editorial board commissioned a number of external authors to write chapters on the theme of closing the educational gap and unlocking the potential of children from all backgrounds. The focus of the report is deliberately on improvements to teaching, classroom practice and curricula – rather than structural changes to governance or accountability. In addition, there are contributions from Ark detailing the impact of these policy recommendations our schools. The report was edited by Alex Bigham and Alistair Walker from Ark in consultation with colleagues Daisy Christodoulou, Amanda Spielman and Alistair Walker.

The editors would like to thank the following for their help in devising this project and their input into this report – Lucy Cooper, Rich Davies, Helen Drury, Jan Fleming, Jo Gibbons, Max Haimendorf, Lucy Heller, Matt Jones, James Lovell, Michael Mann, Damian McBeath, Katie Oliver, Natasha Porter and Daniel Upfield.

We would like to thank the editorial board for their help and insight into the project and those of all the contributors – Alan Milburn, Venessa Willms, Paul Bambrick-Santoyo, Jeremy Hodgen, Oliver Quinlan, Alison Wolf and Becky Francis.

Any errors or omissions are the responsibility of Ark and the editors alone.

July 2015

Foreword

Lucy Heller, CEO, Ark

Ark has been involved in education for ten years now. Our mission is to provide an excellent education to children irrespective of their background. We believe that a good education can radically alter the life chances of any child and that, in turn, will provide huge social and economic benefits. Our schools in the UK are places of academic excellence which serve some of the most disadvantaged communities in the country. Internationally, we are opening schools and collaborating with partners to ensure children aren't just able to go to school but also to have a good education once they get there.

There is, however, still much to be done. Educational outcomes remain poor for many children from low-income backgrounds with your postcode still determining how well you progress in life.

Ark is an educational innovator. We fund educational programmes which tackle age-old problems in new and innovative ways. As well as running academies, we also want to spread our expertise beyond our schools, because we know we can transform more children's lives when we work with those who share our vision. It's been ten years since we made the decision to expand our international mission from health and child protection to education. To mark this milestone, we've brought people together to debate some of these most pressing educational issues, drawing on the research evidence to inform these debates.

As well as giving real choice to those pupils in our schools, we want to help contribute to system-wide improvement. Ultimately, we believe that the only way we can meet the many challenges facing us in education is by first examining, openly and frankly, the issues and possible solutions which promise to improve academic achievement for all children.

While building the best educational provision possible is a complex mission, one that requires balancing a whole range of solutions and priorities, we have focused on three major themes:

- How educational disadvantage of all kinds can be effectively tackled.
- How to maximise teacher capacity, giving them the pedagogic tools and time needed to teach effectively.
- How best to allocate resources – including funding – for maximum results.

There are no silver bullets in education and we make no grand claims about academisation. Instead it is more helpful to think of the journey to transform schools as analogous to how Dave Brailsford and his team made British cycling into world beaters. Small changes around behaviour, transitions, teacher practice on their own may not be effective. But taken together, the aggregation of marginal gains can have an impact that is greater than the sum of minor improvements.

We hope this report provides some suggestions of how to secure those gains, but it is not intended to be comprehensive, or a manual on how to turnaround a school.

In the first chapter of our report, Venessa Willms addresses pre-school educational provision, an area at the heart of all three of the themes addressed above. Drawing on the current debate and research over the long-term utility of early years' intervention, Venessa argues that the foundations of poor academic attainment – and, indeed, economic, physical and mental well-being – are laid in the first five years of a child's life. To give teachers and pupils the best chance for a successful education between the ages of five and 18, she argues, we must first ensure that children are school-ready by the time they arrive at primary school.

Uncommon Schools Managing Director Paul Bambrick-Santoyo demonstrates an approach to teaching quality that has already shown great promise in the US and, increasingly, the UK: one-to-one staff coaching. Unlike many other professions, teaching seldom gives the opportunity for contact and feedback from the practitioner's peers, relying instead on termly assessments and professional development days, coupled with interventions from senior leaders only in times of specific need. Paul advocates a different approach: weekly classroom observation, followed by coaching on the basic building blocks of a great lesson to ensure that every teacher has the opportunity to improve. Paul draws on Robert Coe's 'What makes great teaching' to argue that "sustained professional learning is key to embedding approaches such as mastery learning into practice."

Jeremy Hodgen seeks to address one of the perennial issues within modern British education: how to address poor academic achievement in English and maths, the major building blocks of any educational career. Examining the experience of high-performing jurisdictions such as South Korea and Singapore, Jeremy argues that the modern British curriculum suffers from two major pitfalls: emphasising breadth over depth, giving children scant opportunity to master the discipline's basics before moving onto more complex topics; and focusing too heavily on a pupil's ability to produce a correct answer, rather than their capacity to use different or creative approaches to arrive at that answer.

As in so many areas of modern life, new and developing technologies divide educational opinion. For some, educational technologies provide exciting opportunities to engage children in ways that would have been impossible thirty years ago; for others, they're a

distraction from academic achievement and discourage the accumulation of knowledge. Oliver Quinlan argues that both views are correct and that more research is needed into how best to integrate technology to teach a new, tech-savvy generation. He argues that for technology to really improve education, the sector must learn the lessons from education technology's past failures and successes.

Alison Wolf argues for the prioritisation of post-16 education. In her piece, Alison contends that apprenticeships are rarely a good substitute for well-designed further education courses which successfully adapt to business needs. Alison argues that post-16 education has been 'levelled down', rather than up: that the previous funding gap between sixth form and further education colleges was equalised through reducing sixth form funding, rather than increasing FE funding. Alison argues that early years' intervention has been prioritised above post-16 education – and that allocating greater resources into post-16 training is the most effective way to ensure that children succeed when they leave school.

Professor Becky Francis concludes our report by examining the issue of educational attainment and the gap between pupils from middle- and low-income families. Becky argues that the Pupil Premium programme requires higher and better-allocated funding. She also advocates teaching disadvantaged pupils, or those with low academic attainment, a more engaging curriculum not just the basics. Furthermore, she argues, research suggests that pedagogical methods such as one-to-one and small group tuition or high-quality intervention are critical to ensuring success for disadvantaged pupils.

Ark is mindful of the challenges presented by each of these authors and each chapter is accompanied by a short vignette illustrating how our network of schools has tried to address the issues presented. We don't have all the answers and over the coming weeks and months we hope this report will spark a debate that will encourage us all to challenge ourselves to do better – whether we are a student, a teacher or a group of schools. In doing so, we have brought together a number of leading educational practitioners and experts to provide their views on how we might build an educational system which successfully caters for all.

We believe all children can succeed with the right educational opportunities. Unlocking the potential of children is our goal. We know it is shared by many and so we hope that, by bringing together this report, we can progress the ideas that will make a real difference to more children's lives both in the UK and around the world.

Introduction

Alan Milburn

There is a real likelihood that this generation of students – particularly those from poorer backgrounds – will grow up with fewer opportunities to progress than their parents.

In spite of policies such as academies introduced by the last Labour government and the Pupil Premium by the Coalition, our education system remains one of the most divided in the OECD.

At age five, children in the UK from low income backgrounds are 19 months behind their peers when they start primary school. Nearly two thirds of students who come from low income backgrounds still don't get the basic passport of five good GCSEs by the time they are 16.

While standards have risen for all students, the gap between pupils of different incomes remains stubbornly wide. On current predictions, it will take at least 30 years before the attainment gap at GCSE is closed between those on free school meals and their wealthier peers. If we do not do more and act more quickly, we will fail millions of children.

We need a concerted effort from policymakers and teaching professionals to close that gap. London schools – which in the last decade have overtaken all other regions – show what can be done.

Some of those high performing schools are run by academy chains like Ark – demonstrating that a culture of high expectations does not have to be limited to the independent sector or grammar schools. King Solomon Academy is just off the Edgware Road – in the most deprived ward in London. Last summer, 93% of its pupils got five good GCSEs including English and maths, making it one of the top ten comprehensive schools in the country.

After more than a decade of structural reform, we have new providers and greater freedom to innovate in our schools system. We now need a similar revolution to overhaul what happens in the classroom.

This report is an important contribution to that agenda. In its recommendations to improve the quality of teaching, particularly in the early years, it is driven by a growing body of research that demonstrates how the attainment gap can be closed.

With important proposals to strengthen the curriculum, raise the quality of early years teaching, make the most of technology, provide rigorous teacher professional development and give a much needed boost to skills provision for older teenagers, it should be required reading for everyone who is interested in education.

Every parent is rightly ambitious for their child. Our education system must be too.

Unlocking potential in the early years: The importance of quality teaching

Venessa Willms

Too often, our education system works on the assumption that socioeconomic and educational inequalities are best fixed within schools. Yet, trying to create – or starting to create – educational equity from primary school onwards misses the most critical stages of a child's development. By the age of three, children from more disadvantaged backgrounds have heard around 30 million fewer words than children from affluent families – or 1,400 words fewer per hour. Children in the UK from low income backgrounds are 19 months behind their peers when they start primary school.[1]

1 Ofsted Annual Report 2011/12
Quoted here: http://www.telegraph.co.uk/education/educationnews/9706275/Ofsted-third-of-five-year-olds-not-ready-for-school.html

This achievement gap in the early years has a profound impact on later life chances. Vocabulary at age five has been found to be the best predictor of whether children who experienced social deprivation in childhood were able to escape poverty in later adult life. A vocabulary gap at five carries significant risk of low academic achievement years later, for example in key stage 1 assessments.[2] The legacy of poor vocabulary doesn't stop there, however adults in their mid-thirties are one and a half times more likely to be poor readers and over twice as likely to be unemployed if they had poor vocabulary at five.

School-based nurseries

All of this demonstrates the importance of high quality learning in the early years. Ark has found that nurseries that are co-located with schools are able to offer some major benefits to children. Being able to share a site, staff and facilities allows nursery children to make frequent visits to the primary school, using resources such as IT and multimedia facilities as well as larger sports and drama spaces that might not otherwise be available at a nursery, in order to prepare them for how to behave in this type of setting. Staff at the nursery are able to work alongside qualified teachers from the primary school to do joint curriculum planning as well as staff training and development helping to make sure there is a focus on learning outcomes and a smooth transition from nursery to primary school. Overall, the strong links between the different settings helps promote a sense of being part of a wider community amongst staff, children and parents.

At the same time, nurseries can benefit from the kind of central systems for tracking attainment and progress through the Early Years that have been implemented in schools. Early Years' practitioners can be clear about where each child in on their learning journey and target additional support where it is most needed. The quality and quantity of data collected in our data tracking systems such as Ark's CCR (Click, Click, Report), allows accurate and rigorous analysis of pupil performance and need, enabling each nursery to intervene effectively and quickly.

Wider research supports the beneficial impact of school based nurseries. It also indicates that poor children are less likely to attend a high quality pre-school. According to the Department for Education, 96% of 2 year olds are in private, voluntary or independent settings.[3] A major study by the Nuffield Foundation published last year found the quality of learning to be lower in private, voluntary and independent nurseries in disadvantaged areas, whereas school-based nurseries were found to offer as good, sometimes better, provision in disadvantaged areas.[4] Such patchy quality will only serve to amplify existing attainment gaps.

Most of the time, the attainment gap has nothing to do with unloving or uncaring parents neglecting to ready their children for school; much more often, it is simply due to the fact that parents don't have the knowledge or resources to give their children the tools they need for early success. Parents of GCSE and sixth form students who themselves have attended university are better equipped to guide their children towards subjects or extracurricular activities that will give them an edge in their UCAS applications. Those same parents are also likely to have a better understanding of how to foster basic

2 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/193505/DFE-RB172a.pdf

3 Department for Education Statistical First Release: Provision for children under five years of age in England: January 2015, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/437598/SFR20-2015_Text.pdf

4 Nuffield Foundation Study reported here: http://www.bbc.co.uk/news/education-27602287

numeracy or literacy, leaving the offspring of parents without the specific know-how at a distinct disadvantage come primary school and beyond.

This discrepancy is even more pronounced for those without a first-hand understanding of British educational provision, with children arriving in the UK who may have had no experience of school or whose parents may have no experience of how to navigate the British school system.

"Ultimately, if we want to narrow the gap we should not be afraid to teach children, in an age-appropriate way, from a very early age."

Of course there are opportunities when parents engage in the school system to support their own literacy and numeracy. A number of Ark schools offer classes to parents in these skills and have even enabled them to take GCSEs in core subjects alongside their own children. These are positive moves, but no substitute for early intervention which is more efficient and effective.

Given the above, we can neither assume that parents can provide broadly equitable pre-school support to their children, ensuring an educational gap doesn't open in early years. Ultimately, educational institutions play a significant part in the solution. To address the issue, we need to look at the two institutional tools we have at our disposal – nurseries and reception classes – to ensure that they provide genuine school readiness.

Teaching Quality

Ultimately, if we want to narrow the gap we should not be afraid to *teach* children, in an age-appropriate way, from a very early age. The evidence shows that access to good quality early years provision has the second largest impact on children's development by the age of five, after the home learning environment. The effects of good early years education and care have been shown to result in 'very high economic returns, offsetting disadvantage and inequality, especially for children from poor families'[5], particularly where teachers and other early year practitioners are well qualified[6]. At the same time, research shows that both practitioners and parents should have a good understanding of how young children's brains develop. Oates et al[7] ask whether those responsible for policy decisions and implementation are sufficiently knowledgeable about young children's brain development. [8] Supporting healthy brain development is also recognised by the World Bank as in need of priority funding for the development of healthy citizens.[9]

5 UNECSO 2006 p 4

6 Siraj-Blatchford et al. 2002, Ackerman 2004, Connor et al. 2005, Nutbrown 2012

7 2012

8 … for children to reach their full potential, supporting the healthy development of their brains is paramount and the powerful effects of early environments, both physical and social, can no longer be ignored. (Oates et al., 2012 p ix)

9 …to develop properly, a child's growing brain needs nurturing long before formal schooling starts at age 6 or 7. Investments in prenatal health and early childhood development programs that include education and health are essential to realize this potential. (World Bank, 2011, p. 4)

The key is to ensure that the early years' curriculum and pedagogy are structured and focussed on learning outcomes. Nurseries will still rightly take a play-based approach in the early years but each activity should be constructed toward teaching and learning. For instance, babies can practise early writing skills using finger paint on their high chair trays and staff can actively encourage children to count and use mathematical language as they play. As children get older, nurseries should provide an additional focus on phonics and early numeracy skills in order to ready children for a smooth transition to reception.

The Nuffield Foundation research found significant difference in levels of qualification between various types of early years' settings. They found that school-based nursery classes were almost always led by graduate-qualified teachers, while less than half of private and voluntary nurseries and pre-schools employ a graduate and only 8% employ more than one. The researchers found that among private and voluntary providers with a graduate on the staff, the "quality gap" between nurseries in disadvantaged and advantaged areas was much smaller than in nurseries without a graduate - for example, 3% as compared with 10% in relation to support for children's language skills.[10]

In their first annual report on early years published in April 2014, Ofsted found that "pre-school children from poorer backgrounds need the support of professionally trained teaching staff to stop them falling behind as soon as they reach school age." As the Chief Inspector Sir Michael Wilshaw put it, "What children facing serious disadvantage need is high-quality, early education from the age of two delivered by skilled practitioners, led by a teacher, in a setting that parents can recognise and access. These already exist. They are called schools."

We need to improve the quality of teaching and the quality of teachers, particularly in our most deprived communities. Likely solutions include the expansion of school-based nurseries or graduate fast-track nursery practitioner schemes, modelled on successful programmes such as Teach First or Frontline. Allowing early years professionals to get Qualified Teacher Status was advocated by former education minister David Laws, alongside an expansion of school-based nurseries in disadvantaged communities.

As well as being a potential growth sector within education, nurseries based in – and run alongside – schools provide a more seamless transition from pre-school to school, as well as offering opportunities for nurseries to take full advantage of the substantial educational resources within primary schools.

At the same time, we need to ensure we are attracting the best and brightest to the early years' profession. Teach First has already had some success in attracting an initial cohort of early years teachers through its programme. The organisation expanded into early years in 2013. So far, they have trained 53 participants in London and the South East and plan to expand to around 200 participants a year by 2018. A comprehensive evaluation of the programme's first year found that participants had an equal or better impact on their pupil progress compared to their more experienced school colleagues or their school's typical achievement.

In partnership with the Institute of Education and Canterbury Christ Church, participants can qualify for an early years PGCE and qualified teacher status, giving

10 Nuffield Foundation Study reported here: http://www.bbc.co.uk/news/education-27602287

greater portability, higher status and better pay than other early years' qualifications – all major factors in attracting the best graduates. Trainees also do a placement of between 10 and 20 days focused on early childhood development in a 0-3 year old setting, to allow a strong understanding of this crucial stage in a child's life.

A lack of competitive pay and a clear route for career progression have traditionally hampered efforts to recruit in the sector. However, graduates are increasingly attracted to this route as participants have a clearer pathway to progress in their career in a school-based nursery.

Structured Learning

A further – and perennial – problem is that of the balance to be struck between structured and non-structured learning. Both are incredibly valuable, but the tendency has traditionally been to lean towards non-structured learning, in no small part because of the belief that pre-school is a last opportunity for 'children to be children' before school.

While valid, that belief is a disservice to children: a recent study compared the early years' foundation stage framework to the more formal schooling implied in the new programmes of study and showed that formal approaches to teaching can have a positive effect in the early years.[11] Likewise, new research about child development shows that even very young pupils are capable of engaging with complex content, if it is taught in the right way. [12]

Furthermore, there is absolutely nothing to say that play need not be educational, so long as the play is structured and set towards learning outcomes. A nursery play dough activity, for example, can be led towards children forming the individual letters of their name. As well as helping develop the fine motor skills, necessary for handwriting, the exercise gives children a creative exercise that also promotes further literacy.

However, a patchwork and sometimes inappropriate balance between structured and non-structured learning is currently applied nationally. The Government's statutory framework for the early years' foundation stage rightly identifies that:

"Play is essential for children's development, building their confidence as they learn to explore, to think about problems and relate to others. Children learn by leading their own play and by taking part in play which is guided by adults. There is an ongoing judgement to be made by practitioners about the balance between activities led by children and activities led or guided by adults."

However, it remains unclear what the result of the 'ongoing judgement' about the balance should be – it is left entirely to the practitioners or the school provider to decide how to interpret that balance. Children at Ark's reception classes are provided with structured, direct learning of phonics, English and maths every day, with opportunities for child initiated learning during the afternoon. The impact of this approach is evident in the significant progress and attainment seen across the network's Early Years classes and is borne out further in the network's performance on the year 1 phonics check. In all cases, Ark outperforms national achievements by some distance, despite serving some of the

11 in the British Educational Research Journal, reviewed in Academies Week http://academiesweek.co.uk/reviews/edition-7/

12 Willingham, Daniel T. "What Is Developmentally Appropriate Practice?" American Educator 32.2 (2008): 34.

country's most deprived communities and having relatively lower levels of achievement on entry to our settings.

There is little firm guidance within the framework on assessment of impact – especially as the Framework is explicitly not a curriculum document. As with the issue of balance between structured- and non-structured learning, measuring and assessing progress through the Early Years phase is not universally codified – ultimately leading to varying degrees of rigour and interpretation. While the introduction of standardised baseline assessments at the start of reception will go a long way to injecting rigour to this phase of education, the policy did not go far enough. Statutory standardised baseline testing at the start of schooling – from nursery – and end of phase standardised testing would mark a significant and transformative improvement.

We need desperately to improve the quality of early years' teaching if we are to have any hope of closing the attainment gap between wealthier and disadvantaged children. There is no single measure that will transform the quality of provision – it is more about the aggregation of marginal gains across curriculum, pedagogy and nursery structure. There is a growing body of research that demonstrates that school-based nurseries with highly qualified staff, working to a curriculum that is focused on learning outcomes, with each child being closely tracked will make sure that every child is ready for school by the time they reach reception.

Ark Alpha

Ark Alpha, a nursery based in Portsmouth, is located in Southsea ward, an area which has twice the national average of children in poverty. The nursery is in a community that faces many of the challenges of coastal areas in providing a high quality education, particularly to white British pupils on free school meals.

At Ark Alpha those pupils are thriving. In March 2014, Ark Alpha Nursery was judged by Ofsted as outstanding in all areas, with inspectors noting "all children are making rapid progress towards the early learning goals in relation to their starting points on entry." It is run as a public-private partnership. While nursery places which start at three months are fee paying, the nursery is located in the same building as a state primary school and the nursery offers free government funded sessions for children from low income backgrounds aged two, three and four.

Co-location

Ark Alpha is on the same site as Ark Ayrton Primary Academy, which serves pupils from nursery through to year 6. The provision is led by an experienced nursery manager who is line-managed by the headteacher of Ark Ayrton, which last year was the most improved primary school in Portsmouth, with the number of pupils reaching expected levels at key stage 2 up by 21 percentage points. Co-location and line management arrangements ensure that Ark Alpha staff, and in turn their pupils, benefit from working alongside qualified teachers from Ayrton in the form of joint curriculum planning as well as staff training and development.

Pupils, too, benefit from their access to the school's resources and from being a part of a wider family of learners and from intentional consistency around key aspects of school life and culture. As children move through the nursery, they begin to see themselves as part of a wider community. Being able to access the wider school environment such as the use of the library at Ark Ayrton; the use of the school's hall for physical development opportunities; and in seeing older siblings in the school it begins to instil a strong sense of identity. Attending a school assembly and beginning to understand the behaviour expected from school age pupils sets young children up for their future learning. The importance of these environmental factors cannot be underestimated. The transition from nursery to primary can be one of the more stressful moments in a child's school career as they move from a home or nursery setting through to a school setting. Co-location reduces this stress.

Co-location and shared training have ensured that there is a strong link between the 'climate for learning strategies' used in the nursery and those used in school. This ensures that the language used within lessons and around the building is similar for all age groups, which in turn has rendered the children's transition from Ark Alpha Nursery to Ark Ayrton primary seamless.

Relationships

Staff at Ark Alpha Nursery understand the importance of attachment and quickly form positive relationships between key workers and children. These relationships are facilitated by effective partnerships with parents. Staff make sure that information is shared openly for the benefit of all children. Parents are actively encouraged to be fully involved in their children's learning as soon as they register at the nursery.

Staff gather a wealth of information from parents about the children's welfare, learning and development, including detailed information about starting points in relation to their learning. All parents have access to their children's records at any time, both online and thorough their learning journals and are able to make written contributions. Parents have regular opportunities to attend parent's evenings and receive written summary reports, including information about next steps.

Karen Hawkyard, parent of Norahbelle, age three, believes the nursery is working. "It really has helped develop her social skills and I've found that her little friends that don't go to nursery, their speech isn't as good as Norahbelle's. She can count and it's really, really brought her on."

Curriculum and assessment

In Sir Michael Wilshaw's speech 'Unsure start' at the first annual report for Early Years in April last year, he spoke of the false dichotomy of setting up play and learning as opposites.[13] The Ark Early Years curriculum and assessment model is an unapologetically "taught" curriculum. The curriculum and subsequent learning opportunities offered at Ark Alpha hold true to what we know is good practice in early years' education. Staff extend children's learning through directed and child initiated activities, both of which are expertly planned and executed. Learning is hands-on, experiential and rooted in a deep understanding of how every activity develops skills and strength for later learning.

For example, physical activities are planned so as to develop fine motor control as a pre-cursor to handwriting. Early literacy is developed through the sharing and reading of books with all children in the nursery, including babies and a

13 Ofsted says that pre-school children from poorer backgrounds need the support of professionally trained staff, https://www.gov.uk/government/news/report-notes-importance-of-teaching-and-learning-in-pre-school

structured programme of teaching nursery rhymes begins in the baby room. Phonics and maths form a key part of what is taught, while also providing significant and deliberate opportunities for children to explore, communicate, play and share.

Ark has developed a central system for tracking attainment and progress through the Early Years, allowing practitioners to be clear about where children are in their learning and where to focus targeted support. This model of data driven nursery provision ensured that in 2014, of pupils that exceeded in all 17 of the Early Learning Goals at Ark Ayrton, over 80% had attended the onsite provision at either Ark Alpha or the school's own nursery the previous year.

Collaboration

Collaboration is a significant factor underpinning Ark Alpha's success. Collaboration takes place between Ayrton and Alpha staff on a regular basis. For example, Lisa, a lead practitioner at Ark Alpha, works closely alongside Gemma, the lead nursery teacher and a qualified teacher at Ark Ayrton, ensuring consistency and shared expertise in terms of training, pedagogy and curriculum. Furthermore, the nursery teacher from Ayrton has also supported Alpha's climate for learning work and curriculum development as well as supported extensive continuous professional development (CPD) through modelling and co-planning with the Ark Alpha staff.

Julie, the nursery manager at Ark Alpha, attends frequent training with Ark's central team on developing aspects of CPD with her team such as Instructional Lead training, a tool to improve the quality of teaching through regular observations and feedback. All staff in the Ark network attend training days throughout the year where all 120 early years' staff come together for CPD.

Ark Alpha has provided a blueprint for successful early years' learning. The nursery demonstrates the real benefits of the colocation model, adapting the best elements of primary school curricula, resources and pedagogy in an age appropriate way to give children from all backgrounds the best possible start. It clearly demonstrates that high quality early education can be delivered whatever the context and will provide valuable lessons as Ark and we hope other providers, review their nursery provision in the coming years.

Unlocking potential in our teaching profession: Leaders at the pitch

Paul Bambrick-Santoyo

Rookie maths teacher Allyson Reynolds peers at her laptop, twisting her hair behind her shoulders so she can take notes more easily. As intent as she is on the video she's watching, it's not entirely unfamiliar to her: it's a clip from a lesson she taught earlier this week and the voice emanating from the laptop speakers is her own. Serena Savarirayan, Allyson's principal, is also watching the lesson unfold and also not for the first time. She shot this video herself, when she came to Allyson's class to observe her in action.

"So what were the ideas the kids were giving you when you asked about the difference between a histogram and a bar graph?" Serena asks about halfway through, pausing the video.

"They were focusing on visual differences," Allyson says after a moment of reflection. "Things like, 'Oh, this one has spaces between the bars and the other two don't, so it must be a bar graph.'" She recalls two different students, Amir and Melody, who answered along these lines. Both described how the graphs they were looking at appeared different, but they weren't identifying what actually made them different visual representations of data. No one talked about the different information you get from a histogram versus from a bar graph—except for Nasir.

"When school leaders take the football approach to training teachers, observing them in action and paying close attention to their actions, they revolutionise their impact on instruction and learning."

"Nasir was the only one who got it right," Allyson remembers.

"So how do the kids end up knowing that those other two answers were wrong?" Serena asks her next. "Let's watch for a couple more minutes."

In the next minutes of the video, Allyson confirmed that Nasir had identified the correct answer to the question her students had been looking at. But she simply repeated the same correct reasoning Nasir had already provided, re-stating how one could draw different conclusions from these two different types of graphs.

As Serena and Allyson watch this part of the video, Allyson frowns. "So I never went back to Amir and Melody," she murmurs, as the video comes to a close. She notes that even though she stated that Nasir's answer was correct, she never went back to Amir or Melody to clarify why their responses were incorrect, which might have left them with lingering confusion.

"So if you had to go back to that point where you've gotten those two wrong answers," Serena presses, "what would you want to do next to make sure that you're hitting the objective?"

"I'd probably want to go back to Amir and Melody," Allyson says slowly, thinking out loud, "and make sure they're clear that their answer is wrong. I never explicitly said that, so it's very possible that even while they're writing they still think their original answers were right, or partially right."

"Right," Serena agrees. "So say the difference between histograms and bar graphs, go back to Amir and then to Melody to clear up each misunderstanding, then move on to the next part of the lesson." Allyson nods, writing these three steps down.

Fifteen minutes later, Allyson has practiced going back to students with wrong answers to clarify misunderstanding several times, with Serena providing pointers. As they wrap up their meeting, Allyson makes her way back to her classroom, fully prepared to put her new skill into action.

What Serena and Allyson have just identified together is a clear process Allyson can use to correct misunderstandings, raising the rigor for all her students. That's no small feat: it will drive student learning in Allyson's classroom for the rest of year, no matter what content Allyson is teaching. How was Allyson able to recognise how to do this in such a short time, especially just a few months into her teaching career? Because Serena coached her like a football coach would.

No football coach would ever dream of coaching a team by reading about the results of the game in the sports section. Instead, the manager is constantly on the sidelines, aware of the players' every move and identifying exactly what keeps them from scoring goals as quickly, as neatly, or as often as possible. Then, at the next team practice, the manager can coach each player on the specific techniques that would improve this player's game the most. When it comes to coaching football, teaching piano, or directing actors in a play, we all accept that this approach to training professionals—watching what they're doing out in the field and giving them feedback that speaks to their actions—is the most effective.

This approach is rarer when it comes to coaching teachers. But in fact, learning to be an excellent teacher is no different from becoming a professional footballer. When school leaders take the football approach to training teachers, observing them in action and paying close attention to their actions—such as how they respond when students stumble over challenging questions—they revolutionise their impact on instruction and learning.

That's what Serena has done. Her core practice as an instructional leader is to observe the teachers she works with for about ten minutes every week—a small chunk of time in the short term, but one that quickly adds up to far more time on the pitch than if Serena stuck to the more traditional practice of only observing her teachers once or twice a year for an annual or semi-annual evaluation. And from her spot alongside the pitch, Serena gains the necessary insight to provide weekly feedback that addresses exactly what Allyson needs most in her classroom right away, rather than relying on sweeping, infrequent evaluations.

In short, Serena's real-time presence at the sidelines of Allyson's classroom has transformed her from a judge into a coach. She's given Allyson a strategy that will enable her to dive directly back into her classroom and immediately begin meeting her students' needs more astutely than ever. Together, they're making sure both the children and the adults at Serena's school can win their race to the greatest possible heights of learning and achievement. All this becomes possible when a principal's purpose is not to evaluate teachers, but to develop them.

How did Serena get there? The remainder of this article will focus on two of the most important steps: getting to classrooms in the first place and knowing what to look for once you get there.

Getting to the Game

The biggest roadblock for a leader making the shift to the football approach is time. Leading a school is such a consuming task that when you imagine going to the game, it may feel as if the pitch is surrounded by a ring of fire—a fire made up of the dozens of surprise mini-crises that erupt daily in any school. Most headteachers and principals are eager to devote more time to their teachers. But all too often, they're already giving so much time to everything from building management issues to student discipline challenges that it can seem as if there's simply no more to give.

Moreover, in many schools, the expectation that principals will spend their time fighting fires rather than coaching teachers runs so deep that school leaders who venture into the classrooms often meet with initial resistance. Teachers who have grown accustomed to being observed only once or twice a year—and having that observation function primarily as an evaluation, not as an opportunity for growth or guidance—fear that a principal's sudden presence in their classroom will lead to over-monitoring or unfair judgment. For these teachers, the more time a leader spends in their classroom, the more alarming it may be.

Yet what we see in Serena and Allyson's work together is something very different. Serena's presence in Allyson's classroom has put her in a position not to be unfairly judged, but to resolve her most pressing teaching challenges with the help of an expert guide. Because Serena will be back in Allyson's classroom again next week, she'll share in Allyson's triumph when her addressing of student misunderstanding has improved, as well as being able to see where Allyson needs the most support next. Her presence doesn't exacerbate the problem of focusing on teacher evaluation rather than teacher coaching—it's the key to eliminating it.

But what makes this possible is by no means that Serena has more time on her hands than any other principal. Instead, it's that she's intentionally prioritised her time so that no matter what fires spark up during the school day, observation and feedback still happen. If a principal's role is that of an instructional leader, coaching teachers is one task that simply cannot be put on the back burner. Here, in three steps, is how Serena makes sure it doesn't, setting aside discrete time every week when she'll be out of her office and in the game.

1 **Share and conquer.** What makes it possible for any leader to embrace the role of instructional leader is that he or she need never do it alone. First and foremost, there are a great many challenges of running a school that aren't directly related to instructional leadership, such as building compliance. These are essential to keeping a school afloat, but a principal can earn back untold hours for instructional leadership by delegating as many of them as possible to other members of his or her staff—and if those staff have special expertise at completing the tasks they're assigned, those tasks may even be done better than they were before. Even after this, however, most principals won't be able to provide meaningful coaching to every teacher in a school on his or her own; as a rule of thumb, the greatest number of teachers one leader can coach is either fifteen per week, or thirty every other week. What to do? Divide up your teachers among the other instructional leaders who keep your school running: reading coaches, assistant principals, department heads and so on. In our work with schools across the globe, my colleagues and I have discovered that nearly 95% of schools, large or small, rural or urban, can get to a ratio of 30 teachers or fewer per coach if all leaders are brought on board.

2 **Observe for just ten minutes.** Observing every teacher every week may sound like a daunting task, but it doesn't take a long observation to let you know what will help a teacher the most. Scheduling ten to fifteen minutes to observe each of your teachers is usually sufficient, especially if you plan to observe during a time when you know the teacher will be doing what you anticipate giving him or her feedback around (for example, since Serena was working with Allyson on correcting student misunderstanding, she wouldn't have come to the classroom at a time when Allyson would be delivering a quiz).

3 **Give feedback for just thirty.** By the same token, giving feedback and coaching after you observe a teacher needn't take longer than about half an hour. Schedule these standing appointments before you schedule your ten-minute observations, so you can make sure that every week, you have something valuable to discuss with your teachers when you see them.

When Serena has scheduled ten minutes of observation and half an hour of feedback into her weekly schedule for every teacher, here's how it looks:

Serena's Weekly Observation and Feedback Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM		Meet Teacher 1	Meet Teacher 7		
8:30 AM		Meet Teacher 2	Meet Teacher 8		
9:00 AM	Observe Teacher 1, Teacher 2, Teacher 3	Meet Teacher 3			
9:30 AM					
10:00 AM			Observe Teacher 10, Teacher 11, Teacher 12		Observe Teacher 13, Teacher 14, Teacher 15
10:30 AM					
11:00 AM					
11:30 AM					
12:00 PM	Observe Teacher 4, Teacher 5, Teacher 6				Meet Teacher 12
12:30 PM		Meet Teacher 4			Meet Teacher 13
1:00 PM		Meet Teacher 5			Meet Teacher 14
1:30 PM		Meet Teacher 6	Meet Teacher 9		Meet Teacher 15
2:00 PM		Observe Teacher 7, Teacher 8, Teacher 9	Meet Teacher 10		
2:30 PM			Meet Teacher 11		
3:00 PM					

Note that while observation and feedback does take up a significant chunk of Serena's time every week—about thirteen hours—it also leaves about 60% of her time free. If a crisis only she could manage came up on Tuesday morning, for example, she'd have the ability to reschedule her meetings with those three teachers for another time. A schedule like this isn't all-consuming—but it's the keystone of the football approach. Stick to it and it ensures that you'll be in the right place to guide your teachers at the right time. The task that remains is to focus on the right information when you get there.

Watch the Moves, Not just the Scoreboard

The most powerful feedback you can give a teacher will never be broad commentary, but granular action steps that give him or her something concrete to do differently in the classroom tomorrow. In the example we witnessed earlier, for instance, if Serena had given Allyson an annual evaluation with a multi-page list of feedback, she would never have provided the information Allyson really needed to make her teaching better. Working with Allyson specifically to improve how she addressed individual student misunderstandings made a far greater difference in Allyson's classroom than a general statement like "pay attention to student learning" ever could have. This kind of change adds up to even more dramatic growth over time. Over a period of weeks—not to mention the entire school year—the various action steps Serena will deliver to Allyson will add up to growth in leaps and bounds.

However, they accomplish this because, not despite, the fact that taken alone, they're tiny, granular steps. From action steps that are both specific and economical, we gain four key things that aren't present if the feedback is too broad or unwieldy:

- Immediate— Allyson can implement this action step in her classroom the moment she returns there and it will begin paying off right away
- Practice-worthy— Allyson can practice this action step, perfecting it in isolation and making it a teaching habit she can turn to without hesitation
- Visible—Next time Serena's in Allyson's classroom, it will be easy for her to recognise whether Allyson has implemented this action step—and what action would be most valuable for her to implement next
- Transformational—This action step will cause a ripple effect, improving Allyson's teaching across the board (not just when she's teaching about bar graphs and histograms)

Over the course of a year of teaching, these little action steps also attain one more important quality: sticking power. By practicing something small every day for about a week, a teacher like Allyson is able, one-by-one, to build habits of great teaching. She progresses from needing Serena to point out what she needs to do to doing it automatically, not even pausing before doing what will make student learning soar.

The Impact—A Champions League Team

When a leader gets in the game, the effects ripple outward in countless ways. Each great action step improves every lesson that follows in the classroom of the teacher implementing it. Each improved lesson will get twenty or thirty students several steps closer to mastering the material they need to learn. And when that ripple effect is multiplied by the number of teachers who receive this kind of coaching, the result is a transformed team—one in which teachers like Allyson are able to get their students achieving on an extraordinarily high level, even if they've only been teaching for a short time. Every teacher and every student, gets the chance to make it to the cup final.

This upward spiral of growth is not only an indispensable driver of student achievement, but also the heart of great leadership. Leadership isn't just about doing your own job incredibly well: it's also about creating other leaders who can do the same. By stationing herself at the game, Serena is naturally coaching a new generation of leaders who know what it means to be at the game themselves. She's passing on her expertise to everyone else around her and thankfully for both her teachers and her students, the power of those actions reaches far beyond what she could possibly do alone.

The Ark Coaching Model – How Ark Globe is developing teachers

Located near Elephant and Castle in south London, Ark Globe Academy is rated good with outstanding features by Ofsted and the school's 2014 GCSE results were above the national average. This is despite the school being located in one of the most deprived boroughs in the country and that it was in special measures when it joined the Ark network in 2008.

Among the biggest changes implemented at the school is a coaching programme where every teacher has one lesson per week observed by a senior leader, followed by a session where the teacher is coached in a single skill to be improved upon.

Although controversial when first implemented, Globe's Principal, Matt Jones, credits the programme with driving much of the school's recent academic successes.

Matt first decided to implement a full-scale coaching programme to develop his teachers after visiting Uncommon Schools, the US network of schools managed by Paul Bambrick-Santoyo and seeing their coaching first-hand.

Matt, who was a professional footballer and coach before becoming a teacher in 1993, says: "My time with Paul was the most impactful and insightful piece of training I've had from a very, very long time.

"What I took away from that most of all – and I can't believe I didn't think of this earlier, given my background in sport – is that in every profession where you have to perform your best in front of an audience, it requires performance away from the theatre or the pitch. You spend more time practicing than you do delivering.

"As a footballer, I used to train for five days, just to execute on one day. A musician will practice for six, seven hours a day and perform for two in an evening – why should teaching not have the same focus on practice?"

Currently, all UK teachers are required to have one lesson per term observed, after which they are given a set of areas to improve upon by the next observation. However, without ongoing observation and development, Matt says this set-up is akin "to Arsène Wenger turning up at Arsenal's training session in September, telling them what to improve upon and then not turning up to any matches until January."

"What is needed is an ongoing process, where you're always getting professional feedback on how to improve. When I saw Paul's approach, I realised that we have got enough time in the week to make it happen and, in fact, it's imperative that we made it happen."

On returning to the UK, Matt set about trialling, refining and rolling out a coaching programme – in which each and every teacher would have regular observations and coaching sessions from a dedicated member of the senior leadership team.

The process was not without difficulty and Matt had to persuade staff to view coaching and classroom observation as a chance to develop, rather than simply a way of being scrutinised: "We were going from a culture where previously at Globe you had to give five days' notice for a class observation.

"When I first arrived, they didn't want, expect or like senior leaders going into classrooms without prior notice without a specific purpose, so we had to go from a very guarded, mistrustful professional environment to one where senior leaders would be in your classroom once a week and following up with a 45 minute conversation about how the lesson went.

"A lot of teachers think of teaching as quite a private thing, something where you shut the door and then it's your space, where another teacher in your classroom must mean something's wrong. So we were instantly working in a context where classroom observation had an extremely negative connotation."

To sell staff on the idea, Matt showed three videos of coaching in highly-skilled professions to draw analogies with how the practice could help them. The first showed Bayern Munich FC manager Pep Guardiola coaching the team, which had won every competition they had entered in the previous season.

"I showed that because many teachers think, 'I'm already an excellent teacher, why do I need to be coached further?', but showing them an elite team being coached was really instructive.

"The Bayern Munich players would have been within their rights to tell Guardiola that they knew what they doing, but these players hung on his every word as he led them through an incredibly basic defensive session.

"It was the kind of session you might expect to coach 11- or 12-year-olds in – a few simple skills done over and over and refined until it's perfect. The message was that the reason these are elite footballers is because they master the basics, not because they do the impossible."

Globe's approach is to now focus on individual teaching skills to build successful teaching environments – an entire session can focus on something as basic as standing in a way that grabs attention when a student is being disruptive.

Matt says: “One of the teachers I coached was a really quietly-spoken guy and wasn’t someone you would think would do particularly well in an inner city school. We worked on physical presence and technique, spending at least two or three sessions just working on the first few minutes of a session – entering the room and creating a great learning environment.

“He made such rapid progress and got to the point where he was automatically applying what he’d learnt to areas we hadn’t even started coaching yet. Now, just a year after joining the profession, he’s a consistently good-to-outstanding teacher taking up a role leading year 9 English.

“Ultimately, it’s about becoming the best teacher you can be by mastering the basics – and what teacher, what person, doesn’t want to be better at their job?”

Unlocking potential in our curriculum: Mastering subjects

Jeremy Hodgen

Educational reform in England is currently focused on how our educational performance compares to the highest attaining systems internationally: Singapore, Shanghai and others on the Pacific Rim. My own research comparing standards over time shows that mathematical understanding of 14 year olds in England has actually fallen since the 1970s.[14] This is clearly a very serious problem, but how can we solve it? One possibility is a focus on mastery learning – making sure that all students gain a good understanding of the key ideas in each subject. In this chapter, I will consider what mastery learning is, whether it is possible for all students to achieve mastery of English, mathematics and science and what kinds of pedagogies might help students achieve this.

14 Hodgen, J., Brown, M., Küchemann, D., & Coe, R. (2011). Why have educational standards changed so little over time: The case of school mathematics in England. Paper presented at the British Educational Research Association (BERA) Annual Conference, Institute of Education, University of London.

What is mastery learning?

"Teachers in Hong Kong, Singapore and South Korea tend to spend much longer on particular topics than teachers in the UK, whilst their textbooks encourage a greater depth of understanding."

The term 'mastery learning' was first used by educational psychologist Benjamin Bloom in the 1960s to describe a way of addressing the gap in educational achievement. Bloom noticed that typically schools and teachers teach most students in the same way. This style and mode of teaching suited some students more than others and, hence, they learnt more and better. Bloom argued that in order to reduce the variation amongst students, teachers need to increase the variation in their teaching. Adapting teaching approaches to students' learning needs, he argued, would enable almost all students to reach a high level of attainment and would thus reduce the attainment gap. This led Bloom to develop the now familiar notion of formative assessment, which he viewed as central to mastery learning. In order for students to achieve mastery, he proposed, teachers need to give effective and individualised feedback to all students and provide students with opportunities to learn alternative approaches together with additional learning time for those who hadn't grasped the ideas.[15] This should be coupled with enrichment activities intended to deepen the understandings of those students who have mastered the initial ideas.

Mastery programmes such as Ark's Mathematics Mastery are designed so that every child can achieve challenging goals. While they have some similarities to Bloom's model, Ark uses a different approach which shares some key features. Dr Helen Drury, who developed the programme, explains: "The mastery approach follows a cumulative curriculum, with sufficient time for every child to access age-appropriate concepts and skills"[16] They allow pupils to draw links between different concepts and enable them to think mathematically.

Ark's development of this mastery approach has been influenced by comparisons with high-performing countries overseas, particularly those from the Pacific Rim. Typically, these systems place considerable emphasis on all students grasping, or mastering, the key ideas in a topic.[17] They devote time to ensuring proficiency in the fundamental principles of a subject. In order to achieve this, teachers in Hong Kong, Singapore and South Korea tend to spend much longer on particular topics than teachers in the UK, whilst their textbooks encourage a greater depth of understanding by providing more systematic variation in the examples used. In addition, teachers in these systems also tend to value effort over ability. In other words, they believe that the key to successful learning is not whether an individual

15 Bloom, B. S. (1971). Mastery learning. In J. H. Block (Ed.), Mastery learning: Theory and practice (pp. 47-63). New York: Holt, Rinehart & Winston.

16 Drury, H. (2014). Mastering mathematics: Teaching to transform achievement. Oxford: Oxford University Press.

17 Askew, M., Hodgen, J., Hossain, S., & Bretscher, N. (2010). Values and variables: A review of mathematics education in high-performing countries. London: The Nuffield Foundation.

student is naturally 'clever', but rather that success in learning is down to hard work. As a result, it is argued, teachers in the Pacific Rim tend to promote what Carol Dweck refers to as a growth 'mindset' amongst students, whereby students are incentivised to work harder, rather than rely on 'natural ability' to account for their progress.[18]

With the introduction of the 2014 curriculum, use of the term 'mastery' is becoming more widespread. Jane Jones, Ofsted's National Lead for Mathematics, emphasises that, although the new national curriculum for maths does not explicitly use the term 'mastery', there are synergies between the aims of the national curriculum and the principles of the mastery approach.[19]

The National Centre for Excellence in the Teaching of Mathematics, has published a paper defining its understanding of the word 'mastery' when applied to mathematics teaching and mathematics curriculum design.[20] It defines the principles of the mastery approach as follows: "Though there are many differences between the education systems of England and those of east and south-east Asia, we can learn from the 'mastery' approach to teaching commonly followed in these countries.

Certain principles and features characterise this approach:

- Teachers reinforce an expectation that all pupils are capable of achieving high standards in mathematics
- The large majority of pupils progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention
- Teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge
- Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts in tandem
- Teachers use precise questioning in class to test conceptual and procedural knowledge and assess pupils regularly to identify those requiring intervention so that all pupils keep up"[21]

Charlie Stripp, Director of the National Centre for Excellence in the Teaching of Mathematics, advocates that the dominant approach to addressing attainment differences in the UK is misguided.[22] The dominant mode of differentiating the curriculum is to 'accelerate' high-attainers by introducing them to more advanced content whilst simultaneously reducing the demands on low-attainers by focusing on 'basic' content. This increases rather than reduces the attainment gap because low-attainers then find it almost impossible to catch up with the high, or even middle, attainers. Echoing Bloom's ideas, advocates of the mastery approach argue that all students should be taught the same content at the same time and that differentiation is best achieved by varying the level of support offered.

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18 http://mindsetonline.com/

19 Jones, J. (2014, 12th November) Charlie's Angles - guest blog by Jane Jones HMI, Ofsted https://www.ncetm.org.uk/resources/46034

20 https://www.ncetm.org.uk/public/files/19990433/Developing_mastery_in_mathematics_october_2014.pdf

21 NCETM (2014, October) Mastery approaches to mathematics and the new national curriculum https://www.ncetm.org.uk/public/files/19990433/Developing_mastery_in_mathematics_october_2014.pdf

22 Stripp, C. (2014, 3rd October). Mastery in mathematics: What it is and why we should be doing it. Retrieved from http://www.ncetm.org.uk/resources/45776

Is mastery learning effective?

The research evidence suggests that mastery learning may be effective. In the Education Endowment Foundation's toolkit, Steve Higgins and colleagues[23] consider four meta-analyses[24] that review a total of 243 research studies and estimate the impact of a mastery learning approach to be equivalent to around five months additional progress over a year. However, they sound several notes of caution. First, they consider the current strength of evidence to be moderate rather than strong. Second, they suggest that, although the evidence is extensive, much of it is dated and is based on statistical techniques that may over-estimate the impact. Third, there is a wide variation in the effectiveness of interventions focused on mastery learning and, in particular, a significant proportion of studies show no effect at all. This variation is unusual in comparison to other approaches and suggests that the success of mastery approaches may be highly related to context, topic or the students involved. Fourth, mastery approaches appear to benefit lower attainment students more. Whilst this may have the benefit of reducing the attainment gap, some of this effect may be at the expense of high attaining students.

In order to address these difficulties, Higgins recommends that schools and teachers give careful thought to the design and implementation of a mastery-focused programme. They also suggest that mastery learning may work best when combined with approaches that encourage students to take responsibility for each other's learning and that some additional support for low-attainers may be required. Additionally, they suggest that mastery may be particularly effective for challenging or 'hard-to-teach' topics.

One key challenge to the effectiveness of mastery learning is implementation. The principles are deceptively simple, yet complex to put into practice. There is good evidence that effective formative assessment, for example, is hard to implement in classrooms.[25] Indeed, as Dylan Wiliam has recently argued, although feedback is one of the most effective educational approaches, actually in practice, poor feedback often hinders rather than helps learning.[26] This may be because, as Bethan Marshall shows, implementation often focuses on the 'letter' rather than the 'spirit' of an approach and thus miss the point of the approach almost entirely.[27] Hence, Guskey criticises many mastery initiatives as misinterpreting Bloom's principles.[28] Instead of focusing on developing a 'deep' understanding of key concepts, he argues that many initiatives focus narrowly on low-level skills and breaking down subjects into small and fragmentary elements.[29]

23 Higgins, S., Katsipataki, M., Kokotsaki, D., Coleman, R., Major, L. E., & Coe, R. (2013). The Sutton Trust-Education Endowment Foundation Teaching and Learning Toolkit. London: Education Endowment Foundation. http://educationendowmentfoundation.org.uk/toolkit/

24 Meta-analysis is a statistical approach to aggregating the effects of several distinct research studies.

25 Smith, E., & Gorard, S. (2005). 'They don't give us our marks': the role of formative feedback in student progress. Assessment in Education: Principles, Policy and Practice, 12(1), 21-38.

26 Wiliam, D. (2014, 29th November). Is the Feedback You're Giving Students Helping or Hindering? Retrieved from http://www.dylanwiliamcenter.com/is-the-feedback-you-are-giving-students-helping-or-hindering/

27 Marshall, B., & Drummond, M. J. (2006). How teachers engage with Assessment for Learning: lessons from the classroom. Research Papers in Education, 21(2), 133-149.

28 Guskey, T. R. (2007). Closing Achievement Gaps: Revisiting Benjamin S. Bloom's "Learning for Mastery". Journal of Advanced Academics, 19(1), 8-31. doi: 10.4219/jaa-2007-704

29 The term 'mastery' can also be misunderstood as referring to breadth rather than depth of understanding as appears to be the case in the current draft assessment guidelines for primary: https://www.gov.uk/government/consultations/performance-descriptors-key-stages-1-and-2

It is also interesting to note that the average effect size for mastery learning appears to be smaller than the average effect size for feedback, one element the approach[30]. This suggests that it may be important to emphasise effective feedback alongside a mastery approach.

A further issue is that mastery learning has been developed in very different educational contexts to the UK. The bulk of the research evidence has been in just one country: the United States. In the Pacific Rim, mastery is embedded in a very different cultural context to the UK, one in which the emphasis tends to be on the collective rather than the individual. Elsewhere, I have cautioned against simply 'cherry-picking' practices from elsewhere.[31] To be effective, mastery learning needs to be tailored and adapted for the UK context.

Mastery learning in the UK?

Implementation is a challenge, however there are a number of promising initiatives being developed in the UK that address aspects of mastery learning. All, however, combine mastery approaches with other promising approaches including collaborative learning and the use of meta-cognitive strategies.

The first of these, Mathematics Mastery,[32] developed by Ark, is outlined in more detail on page 41. This initiative brings together mastery approaches from Singapore and a range of other good practice from the UK and internationally. Maths Mastery focuses on spending, more time on fewer topics in order to develop a deep understanding of mathematical ideas. Maths Mastery aims to transform achievement in mathematics by facilitating a collaborative partnership of schools, committed to a common vision and shared curriculum, who engage in high quality professional development.

The Let's Think[33] initiative in English, Mathematics and Science is a well-established approach based on Cognitive Acceleration, which was first developed in the 1980s by Michael Shayer and Philip Adey and has a solid body of evidence showing long term delayed effects.[34] Whilst the approach does not identify itself in terms of mastery, it does share some key features with mastery learning. But crucially mastery is combined with a strong evidence-based focus on cognitive development. Let's Think aims to accelerate students' cognitive development by teaching all students to be smart or 'clever'.
To do this, lessons involve low floor, high ceiling tasks that are designed to provide challenge for students of all levels of attainment.

30 The effect of feedback is estimated as equivalent to 8 months additional progress over a year. Higgins, S., Katsipataki, M., Kokotsaki, D., Coleman, R., Major, L. E., & Coe, R. (2013). Op cit.

31 Askew, M., Hodgen, J., Hossain, S., & Bretscher, N. (2010). Op cit.

32 http://www.mathematicsmastery.org

33 http://www.letsthink.org.uk/

34 Shayer, M., & Adey, P. S. (Eds.). (2002). Learning intelligence. Buckingham: Open University Press; Shayer, M., & Adhami, M. (2007). Fostering Cognitive Development Through the Context of Mathematics: Results of the CAME Project. Educational Studies in Mathematics, 64(3), 265-291.

Another intervention in mathematics, the Increasing Competence and Confidence in Algebra and Multiplicative Structures (ICCAMS)[35] project focuses on overcoming the difficulties that teachers encounter in putting formative assessment into practice. The approach is directed at developing a deep understanding of a small number of key 'hard to teach' concepts in algebra, ratio, decimals and fractions. Drawing on evidence about students learning, ICCAMS enables teachers to assess students' understanding, provide specific feedback and provide appropriate and engaging tasks. Like Maths Mastery and Let's Think, ICCAMS has a strong focus on talk and collaborative learning. Results show that ICCAMS more than doubled the rate of learning over a year when compared to a matched control group of students.[36]

Putting mastery learning into practice?

Mastery learning is not a simple solution to all educational problems. Whilst the evidence suggests it to be a promising approach, embedding mastery learning is likely to pose challenges especially at a large scale. Implementing mastery approaches locally within schools or across collaborative groups of schools is certainly worth serious consideration. In order to maximise impact, careful thought should also be given to ensure implementation fits alongside other approaches that complement mastery, particularly feedback and collaborative learning. In addition, successful implementation appears to require significant investment in professional development for teachers. Changing one's pedagogy is no mean task for groups of teachers. As Robert Coe demonstrates in 'What makes great teaching'[37], sustained professional learning is key to embedding approaches such as mastery learning into practice.

35 http://iccams-maths.org/

36 Hodgen, J., Coe, R., Brown, M., & Küchemann, D. E. (2014). Improving students' understanding of algebra and multiplicative reasoning: Did the ICCAMS intervention work? In S. Pope (Ed.), Proceedings of the Eighth British Congress of Mathematics Education (BCME8) (pp. 167-174). University of Nottingham: BSRLM / BCME.

37 Coe, R., Aloisi, C., Higgins, S., & Major, L. E. (2014). What makes great teaching? Review of the underpinning research. London: The Sutton Trust.

The Ark approach – Maths Mastery and beyond

Maths Mastery aims to transform achievement in mathematics by facilitating a collaborative partnership of schools, committed to a common vision and shared curriculum, who engage in high quality professional development. Maths Mastery is not only a curriculum, but also a training programme and a partnership. It was developed by Ark to address educational disadvantage and under-attainment in maths.

Maths Mastery's aim is to transform achievement across pupils' education career – whole school change and consistently exceptional teaching – not a quick fix. However, a recent evaluation by the Education Endowment Foundation showed that in the first year of implementation, Maths Mastery has a positive effect upon year 1 children's maths test scores, equivalent to approximately two months of additional progress, and on year 7 children's scores equivalent to one month's additional progress. Given the low per-pupil cost (£10 per pupil once the whole school has implemented) this could be a cost-effective change for schools to implement, as the EEF evaluation notes.[38] As a cumulative curriculum the hope is that such gains will be repeated in future years.

How does a mastery curriculum work in maths?

Maths Mastery is intended to give every child firm foundations. The curriculum aims to ensure that pupils have a strong foundation in calculation, geometry and key concepts such as fluency, reasoning and problem solving. Ultimately, pupils gain a deeper understanding of mathematical concepts and how they work in the real world. They learn to think independently, instead of learning to answer certain questions in a certain way.

It's designed to make ideas stick. Every year is organised so that pupils progress logically from one idea to the next. Like building a pyramid, the curriculum is designed to ensure children at primary school have the firm foundations in maths so they don't struggle later on or have to repeat topics. That means studying fewer topics in more depth, particularly in the early years.

It focuses on depth before breadth. Students often rush from one mathematical idea to the next. Instead, Maths Mastery pupils spend almost half of year 1 working on place value – the different meaning of the tens digit and the ones digit. In year 7, students spend the whole autumn term focussing on addition, subtraction, multiplication and division – they deepen their understanding of these operations by applying them to very large and very small numbers, to area and perimeter problems and to statistics.

38 https://educationendowmentfoundation.org.uk/projects/mathematics-mastery/

It aims to give pupils a deeper understanding of the subject by using images and objects as well as traditional learning techniques. Objects, pictures and words are everywhere. They are used to help pupils explore maths and understand the role it plays in their lives, as well as interacting with other subjects. To support literacy as well as mathematical thinking, pupils are taught to explain maths in full sentences – not just what the answer is, but how they know it's the right answer.

It teaches both the how and the why. With the pressure to 'get the right answer' in high stakes external exams, teachers often end up focussing heavily on how to carry out a technique. This procedural understanding is important –every child should be confident and competent at calculation – but it is not enough on its own. It also means using a more hands on approach to maths – the use of number blocks, bead strings and dice. This enables pupils to better grasp the fundamental concepts of maths so they have a deep understanding, rather than a shallow memorisation.

Problem-solving is integrated throughout every lesson. Pupils of all standards are required to select, understand and apply the relevant mathematics principle. They represent concepts using 'bar models', objects and pictures, and by making connections between different representations. This gives them the confidence, resilience and ability to tackle any problem rather than repeating routines without grasping the principles.

Implementation

Prior to 2012, the mastery approach was developed and piloted in primary and secondary schools within the Ark network. Schools in both phases saw a significant improvement in pupils' understanding of, enjoyment of, and achievement in mathematics.

Charter Academy in Portsmouth saw results leap from 40% achieving A*-C in GCSE maths to 73% in just one year – from 2011 to 2012. The school was in the top ten schools in the country for value added maths.

As Jeremy Hodgen notes, a mastery curriculum on its own was powerful, but when combined with collaboration and training, its impact was significantly increased. A mastery curriculum alone is not enough to truly transform maths throughout a school. The Mathematics Mastery model therefore combines the 'mastery curriculum' with other good practice. We support teachers to change their practice through integrated CPD, training and in-school support, and by facilitating collaboration between schools.

2014 saw the impact of the Maths Mastery partnership and the hard work of schools recognised publicly. In July, Ark Atwood – a Maths Mastery partner school right from the start – was awarded the TES Numeracy and Maths Award for its work within the Maths Mastery partnership.

Ark Atwood's results are impressive; 46% of pupils achieved a Level 3 at key stage 1, twice the national average. And 92% of pupils achieved a level 2B+. The TES judges were particularly impressed with the consistency of results across all pupils – 34% of those children receive free school meals and they were not left behind in maths attainment.

Daniel Upfield, Headteacher, is very proud of the progress his pupils have made. "When we joined the partnership all the pupils were achieving national average but there was a lot of variation in attainment. We had some very high attaining pupils and some who were really struggling with maths. We're very proud of the improvement and consistency across the whole cohort".

But it's not just the excellent results that show the impact of Ark Atwood's work. Daniel explains "the children now talk about being mathematicians. They say they love maths and they work with confidence and resilience".

The Maths Mastery partnership

Ark is committed to ensuring that the largest possible number of children – particularly those from disadvantaged backgrounds – benefit from Maths Mastery, whether or not they attend an Ark school. As such, the Maths Mastery partnership now extends to 190 schools across the country. The national roll-out drew lessons from the piloting phase in Ark schools, and also from looking to the practices of more successful countries such as those in the Far East. In these more successful countries, teachers work closely together, are well trained, have time to plan and prepare, and work closely with academia and government.

Mathematics Mastery provides and co-develops (with teachers and researchers) a coherent curriculum, and their on-going training, integrated into the planning, teaching and reviewing of every lesson is focused on deepening understanding. Together they intend to build up a bank of evidence and success stories that will demonstrate what pupils in England are really capable of.

This process begins with face-to-face workshops, where the principles of Maths Mastery are imparted to partner teachers. This gives teachers the understanding, skills and frameworks to begin applying Maths Mastery in their classrooms. There is then ongoing coaching and mentoring, as well as school visits, from experienced trainers to support teachers in their development. This is reinforced with access to exclusive online teaching and learning materials, including lesson guides for each week.

Results

Over 34,000 children are now benefitting from the Maths Mastery programme. Headteachers report that the approach enables the lowest-performing children to comfortably reach the expected standard for their age group, as well as helping a greater proportion of pupils to excel. Last year, Maths Mastery partner schools' KS1 results exceeded the national average and 95% of schools reported that the programme improved pupil attainment. This year, a randomised control trial by the Education Endowment Foundation and the Institute of Education found the approach to have positive statistically significant impact on achievement.[39]

39 Jerrim J & Vignoles A (2015) The causal effect of East Asian 'mastery' teaching methods on English children's mathematics skills

Unlocking potential in the classroom: How digital technology can transform learning outcomes

Oliver Quinlan

In the last few decades the use of digital technology has transformed nearly every aspect of life in our society and it continues to do so at a breakneck pace. If digital technology is part of the future it can seem self-evident that schools should lay the groundwork for a technology-literate society and that the use of digital technology by teachers and students should increase. However, in schools in the UK this varies significantly. Many believe that such technology has a potential to transform learning outcomes, but reaching this potential requires clear thinking about the intentions we have when we use digital technology and the outcomes it can enable.

There are innovative teachers across the UK creating exciting learning experiences using digital technology. Students at Devonport High School for Boys in Plymouth have founded their own successful software company after creating an app for their school[40]. Phill Bagge, a teacher in Hampshire, has young children programming games in the Python programming language and sharing them online[41]. Essa Academy in Bolton and Mounts Bay Academy in Cornwall have implemented tablets for every student and reported gains in achievement as a result.[42]

However, outside impressive anecdotes such as these there is little evidence that digital technology has resulted in widespread benefits to educational outcomes. Nesta's 'Decoding Learning'[43] study found that £487 million spent in 2009-10 on technology could not be clearly shown to have caused an improvement in outcomes. Research into interactive whiteboards installed in every school in London showed no evidence of impact in pupil learning.[44]

Digital learning seems to promise so much. With a sense that something is inherently 'the future' comes an assumption that by adopting it at all we will inexorably move towards a progressive future of better outcomes. The difficulty is that without closely defining what those outcomes are, any improvement can end up being determined more by luck than by judgement.

Although it is prevalent, the use of digital technology by young people varies considerably. Research by London Knowledge Lab has shown that young people's use of technology is extensive, but often not sophisticated[45]. Young people have significant free time available to them and many choose to use much of this with technology. They can therefore develop in their use of it to an extent that seems impressive to those of us with much less time for experimentation.

There is a difference between such interest driven experience and using digital technology for the kind of focused learning usually demanded by formal education. Young people surprised me in my recent research when they found it a challenge to use online resources for self-learning. When given specific learning tasks by their teachers many faced technical challenges they were not able or motivated enough to surmount. Some displayed the very reluctance to using technology for learning that 'edtech' enthusiasts often ascribe to teachers.

This suggests that although immersing young people in digital technology can result in learning, unlocking the potential for systematic benefits in education requires a more intentional approach. This is an approach which is clearly focused on the outcomes desired when we use digital technology in schools.

40 Quinlan, 2012

41 Bagge, 2014

42 Chohan, 2012, BBC, 2013

43 Luckin et al., 2012

44 Moss et al, 2007

45 Luckin et al, 2010, Selwyn et al, 2007

I would suggest that in focusing on outcomes it is helpful to conceptualise three areas in which technology can support school learning.

- Computing: Digital Technology as a subject of study in itself
- Subject specific technology: The use of digital technology within particular subject disciplines
- Educational Technology: Digital technology as a tool for learning processes

In the past two years we have seen a significant shift in how digital technology is included in the English curriculum with the introduction of the new subject of Computing[46]. Within this subject the outcomes are clear. Firstly that young people develop knowledge of how technology works and is used. Secondly the acquisition of skills to manipulate it to achieve a variety of purposes. These range from finding and presenting information to instructing computers to perform processes using programming. There is also an expectation that young people learn to face the challenges posed by a connected society and use online technology safely and responsibly, which has some wider implications than learning about the technology itself.

Although this new curriculum is an opportunity for secondary teachers of the subject and those in primary whose remit covers it, there are also many important aspects of digital technology which apply to all teachers.

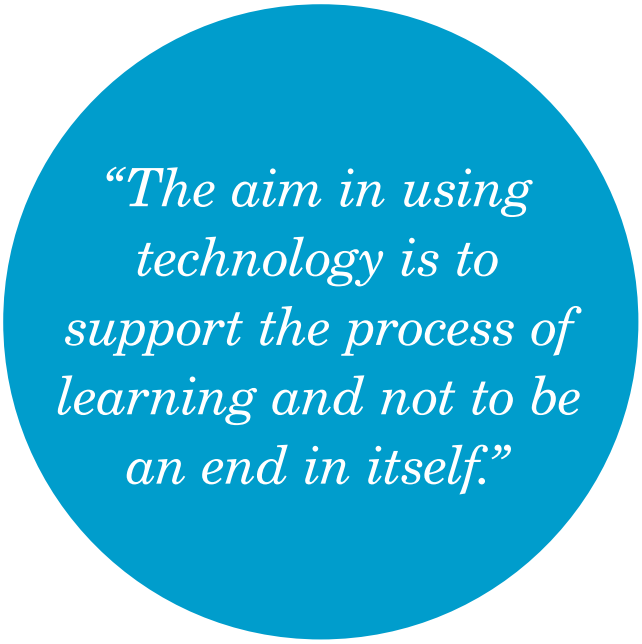
The first of these is how technology is used in curriculum subjects themselves. Computing will equip young people with the skills in its own particular discipline, but all subjects are touched to some extent by the use of digital technology. There are many core and important aspects of science do not directly involve technology and have been taught successfully without it for many years. However, contemporary scientists use digital technology for much of their work. Collecting data about ever smaller and more complex aspects of phenomena, analysing and presenting that data and using the insights gained to model and simulate effects are all part of modern scientific work. In a report on digital skills The Science Council expressed the view that "the need for digital skills in the future will not just be for specialist developers, but also as part of skill set needed by scientists across disciplines".[47]

To focus on a very different subject, contemporary artists and designers use digital technology across their disciplines. This can involve working on touch screens and graphics tablets, or using scanning and digital manipulation to capture, enhance and publish traditional techniques such as drawing. New sub disciplines are appearing and thriving. Nesta's NextGen report found that the video games and visual effects industry in the UK is fast growing and requires many artists with the ability to apply aesthetic skills in a digital environment.[48] There is a long road to expertise in a subject and this is not to suggest that young people are always best placed to be operating at the cutting edge. There are basics to be learnt and understanding to be scaffolded, however in some areas digital technology is significantly changing how subjects are practiced and understood. Contemporary teaching should reflect the contemporary field of the subject.

46 DfE, 2013

47 UKDST, 2014, pp.19-20

48 Livingstone & Hope, 2011



In addition to the subject specific uses of technology, there are also teaching or pedagogic uses of digital technology to enhance or enable learning to take place. Traditionally these have also been conceptualised as 'ICT', but I would like to suggest a more specific way of describing them as 'Educational Technology'. In this case the desired outcomes are those of the particular subject. The aim in using technology is to support the process of learning and not to be an end in itself. Thinking on these lines separates the outcomes of using digital technology for learning and learning skills in the use of technology as a by-product of this. That is not to say the latter could not be intentionally designed in to lessons, but there is clarity of intention that comes with considering them apart in the first instance.

The Royal Society draws a useful distinction between the use of generic digital technology in a learning context and specific technology that has been designed for learning.[49] What is important is that when considering use of technology, teachers focus on learning. For example, using a word processor to write an essay does necessarily enhance the learning process. However, a word processor used as part of a lesson on editing is a useful tool, as it enables this process to be demonstrated and practiced in a more straightforward way than with a handwritten document.
The importance of feedback and assessment for learning has been well illustrated by many from Black & Wiliam to Hattie[50]. Communication tools have the potential to enable this learning focused communication and with it more effective learning. Online collaborative document editors that allow multiple people to access, edit and comment on work can be used for efficient feedback from peers and a teacher. The tool has affordances that enable this process but, fundamentally, it does not cause it – the individuals do. The process of examining another's work and giving useful feedback on whether it achieves particular outcomes is something to be taught and planned in to the process of a lesson. If such technology is intentionally implemented for this type of learning process then the results can be beneficial.

In Nesta's review of the most promising uses of technology in schools[51], they concluded that technologies are often categorised and defined by the type of technology when the most promising uses are defined by a type of learning process. In the previous example software simply makes the communication more efficient than post it notes stuck in books, that is if the practical considerations mentioned above have been met first.

Hattie makes the argument that while we often focus on effectiveness, efficiency of learning is also a desirable goal.[52] Attempting to take well-worn learning processes and make them more efficient using technology is likely to result in such a focus on learning. In that case learning is where the intention starts. Yet there is a point at which a process becomes so efficient that it noticeably changes.

49 The Royal Society, 2012

50 Black & Wiliam, 1998 Hattie, 2009

51 Luckin et al., 2012

52 Hattie, 2011

For example, text editors such as ‘Hemingway’ and ‘Phraseology’ highlight features of writing such as adverbs, adjectives, long sentences and use of the passive voice. For a teacher to mark every instance of such features on a piece of written work so a student can improve it is possible but time consuming, it is much more efficiently achieved using software. Taking this efficiency to the point of marking these features in real time as a student composes their writing changes the experience. A student can notice they are using the passive voice immediately as they do so, rather than waiting for feedback after they have completed a draft. Once experiences are changed to this degree the technology itself is structuring a learning process.

Giving control of a learning process to a structure provided by technology can bring apprehension. Teaching is a human process and this quality is held to be important by teachers, students and parents. However, there is a long tradition of technologies that have been specifically designed for learning. Indeed, one surprising example is the textbook; resources designed with what has been decided to be an optimum process of learning a particular subject. The fact that that optimum can be different in different contexts and also a matter of opinion is demonstrated by the very different use of such resources by different teachers.

With digital technology comes the potential to enhance some of the aspects of textbooks that have historically resulted in criticism. Video and audio can be used to make them more engaging and provide more effective explanations of some concepts. Practice exercises that are automatically marked can reduce the lack of immediate feedback inherent in trudging through a whole page of questions alone as homework.

Using generic technologies in school requires teachers to adapt their practice. They have to think through the outcomes they are aiming for and processes needed to reach these and then discover or invent ways of using technology to enable these to happen. Using technologies, even those as old as textbooks, specifically designed for learning brings to the classroom established learning processes. It also requires teachers to afford it a certain level of trust, as it is not they who are fully in control of these processes.

This has been evident in a trial I have run using video content for instruction. Teachers valued the opportunity to concentrate their energy on coaching students through misconceptions that presenting new content through video brought. Despite this, there was a level of discomfort with handing over the explanation to a video created by someone else. They questioned whether the explanations would be set out in the way they would approach them and whether they would be right for their students. In the trial many teachers were not quite ready to put their professional trust in the learning processes encoded in such resources. If we use technology with learning processes built in we have to be sure they are the processes we want.

If it is efficiency that we are looking for from classroom technology then those technologies with learning processes embedded in them have much potential. The question of whether we can rely on the creators of learning technologies to build in learning processes and free teachers from spending significant time designing them is an area of debate that is likely to continue.

Exploring both generic and specific technologies for learning shows that there is a key factor in how successful they are; teachers' understanding of the technology itself, the subject they are teaching and the pedagogy and learning processes they are deploying to do this. The 'Technological Pedagogical Content Knowledge' model has grown out of such considerations and the way the overlap as being the key to the effective use of learning technology.[53]

Generic technologies perhaps require a greater knowledge of the technology so that it can be mapped to the subject and pedagogy. Specific learning technologies perhaps require a concentration on the pedagogy and subject content so that teacher can be satisfied that what they provide in terms of pedagogy and learning experience is appropriate to the context.

Aside from such debates, what is likely to take place in classrooms is the development of a mixed approach to using digital technology. On some occasions teachers will choose to use the potential of generic technology to support the lessons they have in mind. On others they will use technology designed for learning to support the processes they intend.

What is most important is the intention, underpinned by clear thinking on the types of outcomes and processes taking place. Digital technology can deployed to be learned about in itself, because it has become a part of the modern subject, or as a tool for learning. In any case, there is great importance in the clarity of intention behind its use and how to relate to learning outcomes.

Perhaps the potential of technology can be unlocked by shifting the focus away from its own potential and instead towards unlocking the potential of students themselves and the outcomes they can achieve.

53 Mishra & Koehler, 2006

The Ark technology model – Making the most of teacher time and skills

Few primary schools have embraced the educational potential of technology as completely as Ark Conway Primary Academy and its sister schools, Ark Bentworth Primary Academy and Ark Swift Primary Academy. Ark Conway, which last year had the best key stage 1 results in England, shares a common approach with Ark Bentworth and Ark Swift, as well as an Executive Headteacher, Damian McBeath, and an innovative approach to technology, known as 'Blendspace'.

An online platform with a vast array of dedicated resources and activities, each honing in on a particular skill or set of skills, Blendspace is accessed by pupils during lessons on tablets or computers, blending traditional learning with a pupil-centric approach. Fundamentally, the approach allows teachers to direct pupils towards the lessons they will most benefit from or the area where improvement is the most critical. A pupil who has yet to master capital letters and proper nouns, for example, may not necessarily benefit from a lesson on apostrophes in the same way, to the same extent and at the same as their peers. Instead of teaching solely to the middle of the class, trying to address the subject most needed by the greatest number of pupils, Blendspace means that teachers at the three schools can have each pupil simultaneously working on the skill that they need.

Each classroom has a paired 'virtual classroom', which is accessible online. The use, content and approach of each of the digital classrooms differ from class to class depending upon the activity or topic being taught. Pupils might be set home learning tasks to complete; take part in class based online questionnaires; independently work through online lessons or use the class technology to find things out.

Damian McBeath says: "One of the things we were adamant about was that the technology wasn't just nice and shiny – it had to be educational and have real educational outcomes at its heart.

"There is the obvious argument for edtech – that the rapidly changing nature of technology and its growing importance in the workplace means children need to understand how to use technology effectively – but we wanted one of our over-arching aims to be using technology in a way that supported and augmented traditional education. We did this by focusing on one area where we thought we could make the biggest difference – personalising lessons to individual pupils' needs."

The schools' approach has evolved over time, with adaptations made as lessons are learned from the approach. Damian says: "One thing we learned early on was that we had to make sure we hosted the online content ourselves. We had started off using a commercial open source platform and uploaded hundreds of hours of our own content and lessons. What we came to realise, however, was that we ran the risk of the platform closing down and us losing the entire resource, so we are in the process of making Blendspace part of our own online domain."

Blendspace will remain open source and will be accessible by other schools and pupils, lending the resources to a wider audience. In addition to the use of Blendspace, Ark Conway, Bentworth and Swift have also built in lessons to ensure that their pupils learn vital tech skills ahead of secondary school and, ultimately, a career. From year 1, pupils at all three schools learn coding, as well as word processing and email, to give them a direct insight into the applications of technology and foster 'digital citizenship'.

Unlocking potential of students post-16

Alison Wolf

Over the last seven years of economic crisis and austerity, youth unemployment has - rightly – been a major political and media concern. Hard times always hit the young worst; and the less academically qualified they are, the harder they find it to get a job. For those who move easily from GCSE to A levels, the path on to university is well mapped and more or less universally followed. What more can and should we do to unlock the potential and talents of their peers?

At present the most visible concrete idea, for which there is strong cross-party consensus, is apprenticeships. It is quite true that a good apprenticeship can provide a truly excellent broad training and the start to a successful adult life. But when politicians vie with each other to promise ever greater apprenticeship numbers, listeners' hearts should sink.

Targets are always a dangerous policy tool, prone to generating unintended and pernicious consequences. As ministers should by now know, but are universally reluctant to admit, many recent government-supported apprenticeships have been of very poor

quality.[54] Producing large numbers of good ones will require gradual build-up over many years. If governments are going to bind themselves to targets, this will push quality down, not up: and they will nonetheless fail, even on their own quantitative terms.

For the foreseeable future - and I mean many decades – most 16-19 year olds will be in full-time education. So we need to look at how to improve and strengthen post-16 provision. This chapter focuses on non-A level provision: and in order to understand what can and should be done, some recent history is needed.

The gap between rhetoric and reality is glaring in the field of post-16 education. For decades, politicians of all parties have lined up to proclaim their belief in 'parity of esteem' for academic and non-academic routes among 16 to 19 year olds. We endlessly discuss 'skills gaps' and the need for the education system to provide employers with what the economy needs – a narrow vision, but at least one which seemed to promise jobs for young school leavers and an awareness of labour market data.

In practice, however, education policy has militated against any such synergy in four deeply harmful ways. First, throughout the 1980s, 1990s and early 2000s, we had constant incomprehensible change for non-A level pupils, thus ensuring that most of what they studied was in fact totally unrecognised by the labour market and therefore treated as effectively valueless. In addition, we had a funding system which encouraged schools and colleges to channel pupils into inappropriate programmes: and while informed middle-class parents provided a bulwark on the academic side, this was far less true for the vocational. Thirdly, compounding this, government after government maintained English exceptionalism and resisted the extension of good universal and general education into the 16-19 age group, even though this was not just the international pattern, but something the labour market (i.e. employers) clearly rewarded. And last but far from least, we have starved this group of resources. We are highly unusual among OECD (and indeed emerging and developing) countries by consistently and progressively favouring pre-16 spending over expenditure on 16-19 year olds.[55]

Some of this is now, belatedly, changing. But it is important to understand why recent changes are important and are central to creating opportunities for everyone post-16. And it is also important to understand what more needs to be done.

The costs of reform

Ministers (especially junior ministers) want to be noticed. The media can be relied on to produce a steady flow of bad news stories. And education is everyone's favourite scapegoat for the West's economic woes. So it is not surprising that education ministers are happy, and able, to seize the chance to reform, and change, and reform again.

However, while education professionals are moderately able to keep up with the nature and justification for new initiatives, they also have a very strong motive to do so. This is not true for the rest of the society and certainly not for most employers. They are busy trying to keep up with changes to the tax code, changes to the regulations that affect their business and changes to their trading environment – all of which have a direct and immediate bearing on their ability stay in business and pay their employees. They also

54 Richard 2012; Panorama 2012; Dolphin and Lanning eds

55 Wolf, 2002; Keep et al 2006; Wolf 2011; OECD 2013

have no way of knowing what the actual quality is of new programmes, or new qualifications and rely on their own memories and the experiences of their own families and close friends.

"Whatever else post-16 education needs in the next decade it is emphatically not another major attempt to create brand-new qualifications."

This makes the labour market very conservative and slow to change in what it values and recognises – and it is entirely rational for it to be so. Universities are slightly faster to recognise changes but only slightly: senior admissions officers may be well briefed on this year's changes, but academics do not read the TES, do not follow school news carefully and only know about detailed changes if they affect their own children.

As a result, all across the world, employers rely on a very few very long established 'general' signals of academic performance, supplemented, in specific trades, by whatever they did themselves when they were apprentices or trainees. They will know about the high-prestige academic secondary leaving certificates (A levels, Abitur, Maturita); they will know about long-established general leaving certificates, like the US high school diploma. They will know about core lower-level certificates, like English and maths GCSE. They will know about specific vocational certificates if they are long-established. And that is it. Anything else is by nature both unknown and unknowable and therefore heavily discounted or ignored.[56]

Parents, and especially middle-class parents, sense this, and respond very negatively to attempts at wholesale, root-and-branch reform of elite certification. If you look across the developed world, it is very striking how gradual and tentative reforms of elite certifications turn out to be. Active reform is, instead, concentrated on the lower-prestige, vocational and quasi-vocational routes. This can be very risky and when reform becomes serial and frenetic, it can be very harmful indeed: because it means that employers turn off, as English employers indeed have. They stop trying to keep up, discount the non-familiar certificates being offered by young school-leavers: and the latter thus become of little worth, in absolute terms or relative to academic ones. That has demonstrably happened in England in recent years. Whatever else post-16 education needs in the next decade it is emphatically not another major attempt to create brand-new qualifications to follow the sorry road taken by CPVEs, NVQs, GNVQs, Diplomas and a host of other forgotten and ambitious initiatives.

56 Jenkins and Wolf 2006; Pryor and Schaffer 1999

A misconceived funding system

Some time back in the 1990s, governments looked at low completion rates for many further education colleges and convinced themselves that the answer was payment-by-results. By 2010 (when I was asked to carry out a review of vocational education for the Coalition), this had morphed into a unique funding system for all post-16, non-university education in England. Instead of receiving a grant of so much a year for a student, as happens for all younger groups and for university students, payment was by qualification. A high proportion of the payment depended on success, so it was impossible to stay solvent as an institution unless almost everyone passed pretty much everything.

The effect on quality can be imagined and has been well documented. It also led to a pattern of what one college principal I know has called 'fat students and thin students', where size serves as a metaphor for likely ability. Fat ones were a good bet to pass lots of qualifications and were duly entered for as many as possible – albeit only those they could be sure of passing. Thin students were risky, so you didn't put them in for very much and what you did was, as far as possible, under your control (i.e. free of external assessment or much in the way of quality checks). Of course, within these constraints, many schools and colleges did the very best they could by their students. But the system was bizarre, unique and pernicious in the incentives it created.

It has now gone for 16-19 year olds, hopefully never to return. Pupils in this age group receive a per-capita grant, like other school pupils, and are expected, starting in the 2013-14 academic year, to have a coherent individual study programme. It is a sign of how little we care about or notice non-academic education post-16 that, outside the school and college sector itself; almost no-one has noticed any of this. It should, quite quickly, lead to a major improvement in provision for this group. But the old system has left a harmful legacy, to which I return below.

In and out of step

All across the developed world, for many decades now, we have seen a pattern of prolonged full-time education, with few students leaving before the very end of secondary education. This is as true of the UK as it is of other parts of the developed world, though we came to it later than most. There has also been a near-universal pattern with respect to the content of secondary education with a continued emphasis on general education (alongside more specialised academic and vocational subjects) as part of every student's programme. It was 'near universal' because the UK allowed and indeed encouraged the abandonment of general education, and especially maths and English, post-16. (The pattern was less marked in Scotland but still present.)

It is totally extraordinary that we preserved our exceptionalism for so long; and did so in the face of strong evidence about the importance of both maths and English language skills for the labour market as well as for progression into higher education. This is now finally changing. My own report recommended the compulsory inclusion of maths and/or English in the study programmes of students who had not yet got A*-C in their GCSEs. The Labour Party has declared that it's in favour of maths for all post-16 and the Conservatives have also prioritised GCSE retakes in maths. But more action is still needed.

Starved of funds

Last but not least comes money. It is a sign of our real priorities, as opposed to political rhetoric, that for many years, post-16 students in further education colleges were funded at a lower rate than those in school sixth forms. When the rates were equalised, it was by reducing payments for school sixth forms – a levelling down rather than an expensive levelling up.

This has left us in the anomalous position of being one of the only OECD countries (possibly the only one) to fund 16-19 education at a consistently lower rate than 11-16 education. And when the government was recently looking for savings to pay for (among other things) free school meals for all infant school pupils, irrespective of family income, it was to post-16 that they looked.

Many of our most vulnerable and lower-achieving pupils spend three years post-16 in colleges or schools: at age 19, when their academic peers are proceeding to the first year of a university degree, they are finally finishing much lower-level qualifications which are nonetheless critical to their progress and future success. The ability of many young people to function as productive and integrated members of society is closely tied to this additional period in upper secondary education. And their funding was slashed, so that far less money is available for them than for 16 and 17 year olds.

The relative neglect of post-16 funding – especially but by no means only the less academically able – is, in my view, related to the huge hopes pined on pre-school education. In recent decades, expanding pre-school provision has been seen as the nearest thing to a magic bullet in terms of equalising life-chances and raising overall attainment levels. Good pre-school provision is indeed effective in developing young children's skills and ensuring that they start formal schooling at an appropriate level in terms of both cognitive and social skills. And stellar pre-school programmes can indeed have a huge impact on participants' lives for years to come, as the famous 'Perry Pre-school' programme in the USA has demonstrated.[57] But providing something really good, let alone stellar, across a whole nation is enormously hard and not something that any country has come anywhere near achieving.[58]

Overall, our huge expenditures on pre-schooling have had some effect on children's early attainment, a marginal and small impact on levels of female (maternal) employment and no effect at all on class-related inequalities in academic success[59]. This does not mean we should abandon them, but what has also happened is that we have extrapolated far too ambitiously from the very best examples and concluded – implicitly or explicitly – that pre-school is 'the' answer and that spending more money later in young people's lives is less efficient, less effective, less sensible. The evidence does not justify this. It is surely time to attend just as much to post-16 opportunities and to offering pupils really good programmes at this level and a genuine second chance.

57 Schweinhart et al 2005

58 OPRE 2010

59 Brewer et al 2014

Last but not least

One thing that we know from countless studies is that work experience is enormously valuable in helping young people to make good choices, in motivating them and in enabling them to get a job. Indeed, throughout life, the best predictor of being in employment next year is being employed now: get a job to get a job.[60]

This is one reason good apprenticeships are so successful. But as already noted, there is no realistic prospect of moving from about 5 % to 50% of the age group in good apprenticeships, probably ever and certainly in the next decade. Meanwhile, the Saturday job is vanishing and there are fewer and fewer fulltime jobs for teenagers.

In this context, schools and colleges have to take an active and major role in building work experience into their programmes, especially for those not going on to higher education. And these need to be proper work placements, with real employers: not a simulacrum on school premises.

60 Wolf 2011

Ark's post-16 Professional Pathways – Enabling more of our students to access university or their career of choice

In September 2015 three new pathways will launch in Ark's south London sixth forms to provide an aspirational alternative to academic A level courses. Walworth Academy, Ark Globe Academy and Evelyn Grace Academy will respectively offer Professional Pathways in Finance & Investment, Enterprise & Project Management and Information Technology. Up to six additional Professional Pathways are planned across the Ark network for September 2016.

At its core, each Professional Pathway contains a qualification that is equivalent to 3 A levels, worth up to 420 UCAS points and enables young people to go on to good universities to study related courses. However, by including entry level professional qualifications, employer-led curriculum projects and frequent opportunities for students to interact meaningfully with a range of large employers, the Pathways will also serve as excellent preparation for aspirational school leaver programmes, degree apprenticeships and higher (Level 4) apprenticeships.

Ark has consulted a range of partner firms and universities to assure the quality, breadth and depth of the new curriculum: each Pathway will contain common elements while being tailored to the needs of individual schools and employer partners:

1. **Core level 3 qualification** – Cambridge Technical Extended Diploma in Business or IT. This qualification is worth up to 420 UCAS points and will allow students who gain good grades to access a range of related courses at leading universities. Our minimum targets for students on the pathway will equate to 360 UCAS points, allowing them to progress to degree programmes at virtually all UK universities.
2. **Entry-level professional qualification** – we have taken advice from employers about the best entry level qualifications to give students a real edge in the job market, while also enhancing their UCAS applications by displaying greater depth and application of knowledge.
3. **Work readiness programme** – includes experience of work, with a minimum of 200 hours corporate work experience with our employer partners for every student; employability skills workshops, delivered in schools by a range of corporate partners and business leaders from across industrial sectors and focused on developing and enhancing core skills such as CV writing and applications, written communication for business, presentation skills, effective team working, leadership and problem-solving; and employer-led projects (created in collaboration with exam board OCR) supporting the delivery of the core curriculum and providing a meaningful link between the classroom and the workplace.

Our highest performing secondary schools continue to prove that progression either to a good university or an aspirational career of choice is a realistic ambition for every Ark student and our school sixth forms will play a fundamental role in ensuring that this is the case. While we will aim to retain the vast majority of our students on A level or equivalent Level 3 pathways (such as the Professional Pathways) within our schools, we also recognise that we are unlikely to be able to cater for every individual due to the necessary limitations of school-based post-16 provision. It is therefore imperative that we build sustainable relationships (both at local and network level) with forward-thinking and high quality providers of further education, provide exemplary advice and guidance and also continue to work with employers to create pathways for our students into dynamic sectors of the UK economy.

Unlocking the potential of all pupils: High achievement irrespective of background

Becky Francis

Explanations for the underachievement of disadvantaged students

Socio-economic background continues to be the strongest predictor of educational achievement in the UK. Other factors such as ethnicity, gender and even birth date within an academic year all contribute (and interact), but social background is the strongest individual indicator. There are large gaps for attainment between those in poverty (as indicated by entitlement to free school meals) and those not;[61] and a strong

61 See DfE, 2014

relationship between parental wealth and educational attainment.[62] Of course, it is often pointed out that education is only one area wherein social inequalities are reflected and that education institutions cannot compensate for society. Jerrim and Macmillan (2014) establish that the UK is among a small group of OECD countries where parental education continues to have a direct influence upon offspring earnings, even after taking into account the qualifications the offspring have obtained. Their cross-national evidence also suggests that financial resources play a central role in the intergenerational transmission of advantage. This undermines social mobility and belies popular notions of meritocracy.

The two key elements contributing to educational inequality are material capital and social capital.[63] Material capital (financial resources) enables payment for additional and/or high quality education (e.g. educational resources/experiences, access to housing in the catchment of a high attaining school; payment for private schooling or tuition, etc.), as well as the provision of home environment and facilities conducive to learning. Social capital refers to the networks, understandings and experiences that can support social progress. In relation to education, for middle class parents this often includes experience of higher education; understanding of the education system and the confidence to negotiate it; and connections to others with expertise, information and support offers (e.g. professional work experience placements, internships etc.). The possession or absence of these two kinds of capital mean that children start in very different places in relation to their ability to realise their potential educational outcomes; and that often inequalities are reproduced (or even exacerbated) as children progress through the education system.

There are many aspects that perpetuate inequality within the schooling system, but the key factors can be listed as follows:

- Disadvantaged pupils are often concentrated in poorer quality schools
- Disadvantaged pupils are under-represented in high-attaining schools (including grammar schools and high achieving private and non-selective state schools)
- Disadvantaged pupils are concentrated in lower streams and sets, which tend to be subject to poorer pedagogy[64]
- Disadvantaged pupils may be disengaged from schooling
- Disadvantaged pupils are less likely to pursue subjects that enable progression routes to high status careers

Of course, some schools are successfully bucking the trend and producing good results for disadvantaged young people.[65] Identifying, celebrating and learning from these schools are incredibly important and needs to be done more systematically.

62 See e.g. Clifton & Cook, 2012; Lupton et al, 2009.

63 A further potential explanation raised in present debates is genetic hereditability. However, gradients in educational attainment according to social background vary across countries. As Jerrim (2012) points out, if, as seems reasonable to assume, heredity transmission works the same across countries, it suggests that that other important factors (e.g. material capital and social capital) are at play.

64 See e.g. Dunne et al. 2007. Disadvantaged pupils are likely to be placed in low sets and streams because they arrive with lower achievement. However, research has shown that teacher perception may play a part in such allocation. Research also shows that low sets tend to suffer from low expectations and poor quality pedagogy (Ireson & Hallam, 2001).

65 See, for example, the Pupil Premium Award-winning schools and other outstanding cases; including the account from Haimendorf (2014), and Hutchings, Francis & De Vries' (2014) identification of five academy chains (including Ark) that are succeeding in raising the attainment of disadvantaged pupils against a range of measures.

What can be done to address this inequality?

The fact that educational inequality can be explained by differentials in material and social capital suggests that expecting schools alone to remedy these inequalities will be fruitless. A range of independent analyses shows how social mobility is lower in more unequal countries.[66] Hence social policies need to tackle social inequality, to ensure that a) children have more equal starting points and b) there is less incentive for more affluent families to invest in social reproduction. Although much more could be done in this regard across a range of fronts, one of the ways that successive Governments have tried to address inequality and provide a measure of financial redistribution is via school funding. The Pupil Premium specifically allocates a sum of money to schools for each child on the school roll 'Ever FSM'.[67] This is envisaged to fund additional/high quality provision for those most in need and to incentivise schools to welcome these pupils. In addition, redistributive practices work against the forces of social immobility, which as we have seen is a necessary element in achieving greater social mobility and social justice.[68]

However, there have been three key challenges to the Pupil Premium policy:

1. The amount of dedicated funding is insufficient to achieve the desired improvement for disadvantaged pupils (Sibieta, 2009)[69];
2. this money may not reach the pupils concerned, or not be spent effectively (Sutton Trust, 2012; 2014) and
3. the money is insufficient to incentivise the best schools to take additional FSM pupils, given the high-stakes nature of league tables and other performance indicators.

"Bodies such as the proposed College of Teaching should supply schools with evidence on effective uses of the Pupil Premium funding and tighten accountability."

These challenges are real and will be discussed further below. Nevertheless, none of them question the principle of the Pupil Premium, which appears incontestable in promoting social justice and equality of opportunity. Rather, the challenges concern quantity and quality. Ofsted now have a remit to focus on schools' use of pupil premium funding,

66 As indicated by earnings mobility. See e.g. Blanden (2013), Corak (2013), Jerrim & Macmillan (2014), Wilkinson & Pickett (2010).

67 I.e. having accessed free school meals at any time within the last 6 years

68 The many positive and helpful interventions driven by well-intentioned policy work are insufficient to do more than protect the poor against further inequality without more radical support and/or action against the forces of immobility (Francis, 2013).

69 The Pupil Premium has doubled over 3 years, from 1.25bn in 2011-12 to 2.5bn in 2014-15, but even so the sums involved are far smaller than originally recommended by the Sutton Trust (2010) and Liberal Democrat manifesto, and in comparison with similar international initiatives such as the Harlem Children's Zone project. Sibieta (2009) estimated that the cost for getting the attainment of poor children up to the national average would require the pupil premium to be set at over £25,000 per pupil.

providing a measure of accountability concerning its spending; although this does not address the question of funding being at a sufficient level - given the accountability framework - to incentive schools to actively seek to recruit pupils on FSM.

Beyond financial redistribution, several of the education-specific aspects identified above as further impeding disadvantaged pupils suggest structural policy approaches necessary to ensure better equity of access to high quality provision. For example: to ensure that all families have equal information and potential to access high quality and/or high achieving schools; to ensure that schools cannot 'select out' or 'select in' certain pupils; to ensure that all schools provide high quality teaching and learning (removing the need for competition to access better schools). Such policies would also support social mixing, which is shown to be beneficial for all pupils (and especially disadvantaged pupils) (OECD, 2010).

Many education policies and initiatives have tried in various ways to address these aims. The extent or otherwise of their success have been widely debated. What is not debated is that the various challenges have not yet been resolved and that there is further work to be done. However, while much has been written on structural policies, less has been written on what goes on inside schools in relation to addressing disadvantage. This is crucial: as Connelly et al (2014) confirm, there is extensive evidence to suggest that school type has little impact on pupil outcomes: it is the quality of offer within schools (and the diversity therein) that counts.

Engaging working class pupils

Of the various explanations for unequal outcomes specific to the education system, several relate to the content and quality of educational provision. An especially important point is that disadvantaged pupils may be disengaged from schooling. And - arguably related to some extent - disadvantaged pupils are less likely to pursue subjects that enable progression routes to well-remunerated or high status careers.

These two points have been in tension in recent policy debates. The Coalition Government, under the passionate direction of Michael Gove, has driven forward a knowledge intensive curriculum, in which part of the agenda has been to ensure that all pupils access 'powerful knowledge' and that the high-status curriculum subjects that facilitate access to elite universities are not the exclusive preserve of middle-class pupils. 'Progressive' educationalists have often protested that this focus on 'traditional knowledge' will further disengage working class pupils and thus exacerbate existing gaps. The debates precipitated have tended to evoke an unhelpful binary, with 'standards', knowledge and attainment positioned on one side and inclusion, skills and engagement on the other.

It is beyond doubt that the market in vocational 'equivalent' qualifications – driven at least to some extent by schools' desire to boost league table results – let pupils down,[70] disproportionately affecting pupils from disadvantaged backgrounds. Nevertheless, this does not negate the point that engagement is a necessary precursor to learning.[71] Traditionalists scoff at the 'progressive' preoccupation with 'relevance'; but there is substantial evidence that working class pupils especially need to see the relevance of the

70 Given that, as Wolf (2011) identified, they frequently reflected impoverished curricula that wasted curriculum time potentially better spent on other subjects, and were not recognised by employers and/or HEIs.

71 Perry & Francis, 2010

curriculum to facilitate engagement.[72] This does not preclude their being taught content for which they cannot see relevance, or subjects which they dislike; but it demands that this is balanced with learning that excites and engages them, in order to maintain motivation.

A further challenge and tension lies in the need to focus on 'the basics' for disadvantaged children, while also providing the educational enrichment which middle class pupils are shown to access. Lupton & Hempel-Jorgensen (2012) have shown that, often due to the multiple additional demands of teaching disadvantaged cohorts, these pupils tend to be offered a curriculum focused on inculcating 'the basics' and using punitive discipline to do so. In contrast, cohorts in schools with middle-class intakes were more likely to experience pedagogy encouraging a sense of individual agency and an 'enriched' curriculum. Clearly it is imperative that schools seek to address the point that many children from disadvantaged backgrounds begin school with lower literacy and numeracy skills than their middle-class counter-parts and to ensure that these children have in place the skills they need in order to access a wider curriculum. Yet this needs to be balanced with a recognition that all young people are entitled to the 'sense of wonder'[73] that engages them in learning – and indeed, this engagement may be especially central in facilitating achievement and progression for working class young people. Balancing these two demands may be challenging, but appears central to the success of schools that are attaining high results for all pupils.[74] It may be that the Progress 8 measure, with its incentivisation for EBacc subjects but flexibility for inclusion of (some) arts and vocational qualifications, may help facilitate a balanced offer of entitlement and engagement.

Schooling for equality?

So what, then, does appropriate pedagogy and curriculum content look like? The Pupil Premium funding provides additional capital to schools for each child 'Ever FSM', but if the achievement of these pupils is to be raised, it is imperative that this money is spent productively. Recent research by the Sutton Trust (2014) indicates that 1 in 4 teachers are doubtful as to whether this is the case. Despite Pupil Premium spending now being part of the Ofsted accountability framework, questions remain as to who knows 'what works' (including the inspectorate). I have been privileged to sit on the judging panel for the TES/DfE Pupil Premium Awards (2013 and 2014) and have seen an amazing diversity of practice represented in applications – much of it impressive, but some weak or even plain perplexing. Perhaps this is unsurprising, given that evidence on successfully raising the attainment of disadvantaged pupils remains relatively scant. This is a gap that the Education Endowment Foundation is seeking to address. There is a substantial literature on schooling and social justice, which addresses questions of democracy, engagement and inclusion. This also includes discussion of education for social justice, for example including critical pedagogies and schooling designed to empower students; challenging the educational status quo. However, there is far less work examining pedagogies and interventions that raise the attainment of disadvantaged students within existing mainstream schooling. The Education Endowment Foundation's Toolkit digest of existing research evidence and its funding of intervention trials, comprises an innovative development in this regard.

72 Lupton & Hempel-Jorgensen, 2012

73 Munns et al, 2007

74 See, for example, Headteacher of Ark's King Solomon Academy, Max Haimendorf's (2014) account of how they achieved such high GCSE results for all pupils.

Such research and dissemination is urgently needed. Nevertheless, a clearer view is emerging of what is required to both engage and secure attainment for disadvantaged pupils: and this incorporates both 'the basics' and enrichment. In terms of ensuring an environment to support attainment, a raft of research illustrates the need for strong leadership and systems, excellent teaching, high expectations, a culture of monitoring achievement and reflection and pedagogic approaches that encourage engagement and meta-cognition. There is a growing body of evidence on successful strategies to secure the literacy and numeracy skills necessary to access a wider curriculum, including one-to-one and small group tuition,[75] and/or particular high quality interventions.[76] Work on the importance of high teacher expectations and non-deterministic 'mindset' is also well established and underpins various successful pedagogic programmes, such as the Productive Pedagogies[77] approach. This holistic framework is based on four key principles: intellectual quality, supportive classroom environment, recognition of difference and connectedness. The framework offers a teacher reflection tool and emphases high expectations for all, as well as attunedness to local social contexts and a valuing of the different knowledge young people (including those from disadvantaged backgrounds) bring to school. This latter touches on a further point shown to be beneficial: engaging parents. This has traditionally been easier for primary schools than secondaries; yet research shows the benefits of parental engagement and again, valuing and working to include parents from all backgrounds in partnership, rather than information being simply one-way.

There is a growing body of evidence on the causes of underachievement for disadvantaged pupils and effective practice to address this. Policymakers should maintain and extend Pupil Premium funding to those on free school meals. Bodies such as the proposed College of Teaching should supply schools with evidence on effective uses of the Pupil Premium funding and tighten accountability. The new College of Teaching should support the spread of good practice and CPD, including knowledge of approaches proving successful in particular schools, Local Authorities and academy chains. While schools cannot be solely responsible for closing the gap, Governments need to apply broader social policies to reduce the social inequality that currently sets children on divergent starting points. Finally, we need to find ways to incentivise good teachers to teach in schools in areas of disadvantage.

Schools need to use proven, research-evidenced approaches to ensure that all young people are properly equipped with the requisite skills in literacy and numeracy, necessary to successfully access a wider curriculum. Equal access to a rich and diverse curriculum is necessary, including a curriculum and qualifications offer that keeps all students' future open options open for as long as possible. Young people and their parents need a clear understanding of the consequences of their curriculum choices for their future progression routes. Finally, schools must develop a high expectations culture that demands extension and good outcomes for all young people, regardless of background.

We need a paradigm shift that values the knowledge of working class young people and their parents as a resource, rather than as in deficit and works to actively engage parents in their children's progress and in the life of the school.

Becky would like to record her thanks to John Jerrim for his helpful input to this piece.

75 See: http://educationendowmentfoundation.org.uk/toolkit

76 See e.g. the 'Success for All' literacy intervention, for which there is evidence of significant positive effect.

77 See https://musghillss.eq.edu.au/Supportandresources/Formsanddocuments/Documents/prodped.pdf for a Classroom Reflection Manual on Productive Pedagogies

The Ark model of closing the gap – How King Solomon Academy fostered a high aspirations culture in the poorest ward in London

King Solomon Academy (KSA) is located in Church Street Ward which straddles the Edgware Road and is rated '1' in the IDACI rankings (an index of deprivation) making it the lowest income area of the capital. Three-quarters of pupils are eligible for the pupil premium and two-thirds speak English as an additional language – both well above the national average.

But last summer, 93 per cent of those pupils got five good GCSEs including English and maths, the highest ever results by this measure for a school with such levels of deprivation. 75 per cent passed the EBacc, a basket of academic subjects that the best employers and universities demand. As Toby Young pointed out, "to give you an idea of what an achievement this is, the percentage of pupils achieving the EBacc benchmark at Rugby last year was 64 per cent."[78]

According to a survey by the Telegraph, it put the school in the top ten comprehensive schools in the whole country.[79] In its first year of operation, KSA's primary school has achieved similar success, with 97% of pupils passing the phonics screening check and 87% achieving expected levels at age 11.

The secondary school is led by Max Haimendorf, who at 29 when he took on the role, was one of the youngest ever secondary headteachers in the country. Haimendorf, who is an Oxford science graduate, says he did not underestimate the fact that there was a mountain ahead of him when he started, just like his pupils. He loved the idea of the job, he says, because it seemed so different from the "usual conveyor-belt that takes Oxbridge graduates into the City".

As Max puts it, "the belief in every child's potential to succeed in academic university study defines our culture and approach, and has attracted a group of leaders and teachers, who believe anything is possible and are willing to do whatever it takes to provide a life of opportunity for all their pupils." This clear mission and the ability to have rapid career progression have been critical to attracting high quality teachers and leaders throughout Ark.

78 See http://blogs.telegraph.co.uk/news/tobyyoung/100283606/the-school-that-proves-michael-gove-is-right/

79 See http://www.telegraph.co.uk/education/leaguetables/11050344/GCSE-results-2014-state-school-results.html

The curriculum at KSA has ensured that pupils have a strong grounding in English and maths, so they can succeed academically and access a much broader curriculum. The school believes that without developing 'mastery' of maths and English, it is very hard to succeed in a sixth form and beyond.

Over the last five years pupils in year 7 have spent up to 12 hours each week studying English and literacy, on top of another five hours of reading in and out of school. Such a sharp focus on English and maths enables KSA's children to be successful readers, writers and mathematicians and the first GCSE results are one way of illustrating this: 95 per cent of year 11 pupils achieved Bs and above in English Literature and 75 per cent achieved B and above in Maths. The prioritisation of English and Maths mastery in the early years of secondary school also provides the foundation for academic success in all subjects, with 95 per cent of the year group studying Spanish or French, 75 per cent studying triple science and 93 per cent studying at least one of history and geography for GCSE. As the school opened the doors to its sixth form in September 2014, pupils continue to study rigorous academic subjects at A-level to enable them to achieve at the very best universities.

In addition to high quality teaching, the school has instilled a culture of high aspiration from day one. Teachers' have graduation photos and university memorabilia on display in their classroom and every class is named after the university that its class teacher attended. Each year group is referred to by the year in which pupils are due to graduate from sixth form and be able to attend university. Each year, pupils who work hard are rewarded with a week-long residential at one of the country's top universities. The pupils who sat their GCSEs this summer had already visited Warwick, Bath, Bristol, Oxford, Cambridge and a number of London universities before they started year 11. The school's motto – prominently displayed across the entrance to the building – is 'climbing the mountain to university'.

School has to be engaging and enriching for pupils to enjoy and thrive: as part of the curriculum, KSA provides every pupil with a string instrument and teaches them to play to orchestra standard; pupils from year 7 onwards perform unabridged Shakespeare plays. These activities provide pupils with extended character development opportunities through working with perseverance, discipline and teamwork to achieve great things. Residential trips give pupils the experience of living on a farm for a week, visiting Paris, seeing the battlefields in Belgium or going camping, experiences that in many schools' are the privilege of those whose parents can afford them.

Pupils also benefit from a longer school day, running from 7.55am to 4pm, which allows additional time for English and mathematics, as well as daily music and PE. There are then extension activities from 4pm to 6pm including homework clubs and after school activities.

The school believe that this extra learning time is crucial in enabling pupils to achieve their goals. As a small school, they are able to change the timings and content of the school day as pupils' needs change over time.

The other distinctive element of King Solomon Academy is the use of the all-through model from 3 to 18. This allows for a shared philosophy and ethos which ensures there is a consistency around expectations and teachers can develop stronger relationships with students and get to know every child as an individual over time. The all-through model also reduces the difficult transitions that can happen between primary and secondary school and allows older pupils to act as mentors for younger children.

Venessa Willms, the director of primary for Ark Schools and the founding primary head of King Solomon Academy, before handing over to the current primary head Jonathan Molver, believes that the all-through model offers enormous benefits for both students and teachers. The transition between primary and secondary schools can often lead to inconsistency and disruption to learning. Having staff all the way through in one school is a huge advantage. The children are not moving between different settings with different expectations. Ark has four new all-through schools that it has established to date. All have been rated as outstanding by Ofsted.

There is an urgency to addressing the attainment gap when it comes to school, especially when so many children start school behind their more affluent peers. Although parents want to do the right thing, they face severe challenges and many of our pupils have not had the richness of home experiences that other children have had. Many start school well behind where children are expected to be at that age. That gap needs to be closed fast.

The all-through model of King Solomon Academy allows the school to plan for a child's education from nursery all the way through to university entry. By providing consistency and excellence year after year through fifteen years of schooling, KSA aims to provide a transformational and rigorous education which enables all of its pupils, irrespective of background to gain access to a life of opportunity which has, for too long, been the reserve of the privileged few.

References

Ackerman D (2004) *States' Efforts in Improving the Qualifications of Early Care and Education* Teachers Educational Policy vol. 18 no. 2 p311-337 doi: 10.1177/0895904803262145

Allen G (2011) *Early Intervention: The Next Steps: An Independent Report on the Early Years Foundation Stage to Her Majesty's Government* London: DfE
Athey C (2007) *Extending Thought in Young Children, a parent-teacher partnership (2/e)* London: Sage

Australian Government Department of Education, Employment and Workplace Relations for the Council of Australian Governments (2009) *Belonging, Being and Becoming The Early Years Learning Framework for Australia*

Babbage C (1864) *Passages from the Life of a Philosopher* Longman and Co. p67

Bagge P (2014) *Junior Computer Science*

BBC (2013) *Tablet school: pupils do better at Mounts Bay Academy*, News: Cornwall, 19th June 2013.

Bjork R A (1988) *Retrieval practice and the maintenance of knowledge.*

Black P and Wiliam D (1998) I*nside the Black Box: Raising standards through classroom assessment.* London: King's College

Blanden J (2013) *Cross-national rankings of intergenerational mobility: A comparison of approaches from economics and sociology.* Journal of Economic Surveys 27(1): p38–73

Brewer M, Cattan C and Crawford C (2014) *The impact of free early education for 3 year olds in England* IFS

Chohan A (2012) *[Case study] iPads and apps at Essa Academy*, Innovate my school, 25th July 2012.

Clifton J and Cook W (2012) *A Long Division: Closing the attainment gap in England's secondary schools*, London: IPPR

Connelly R, Sullivan A and Jerrim J (2014) *Primary and Secondary education and Poverty Review*, London: Institute of Education

Connor C M, Son, Hindman A and Morrison FJ (2005) *Teacher qualifications, classroom practices, family characteristics, and preschool experience: Complex effects on first graders' vocabulary and early reading outcomes* Journal of School Psychology Volume 43, Issue 4, p343–375

Corak M (2013) *Income Inequality, Equality of Opportunity, and Intergenerational Mobility.* Journal of Economic Perspectives, 27(3): p79-102

Department for Education (2012) *Statutory Framework for the Early Years Foundation Stage: Setting the standards for learning, development and care for children from birth to five* London: DfE

Department for Education (2013) *Statutory guidance* DfE (2014) *GCSE and equivalent results in England, 2012 to 2013* (revised) London: Department for Education

Department for Education (2015) *GCSE and equivalent attainment by pupil characteristics: 2014*, London: Department for Education

Department for Education (2015) *Statistical First Release: Provision for children under five years of age in England: January 2015,* London: Department for Education

Dolphin T and Lanning T (2011) *Rethinking Apprenticeships* IPPR

Dunne M, Hunphreys J, Sebba J, Dyson A, Gallanmaugh F and Muijs D (2007) *Effective teaching and learning for pupils in low attaining groups.* London: DCSF

Ericsson K, Anders R T, Krampe and Tesch-Römer C *The role of deliberate practice in the acquisition of expert performance.* Psychological review 100.3 (1993): p363

Field F (2010) *The Foundation Years: Preventing Poor Children Becoming Poor Adults: The Report of the Independent Review on Poverty and Life Chances* London: HMSO

Fjortoft I (2001) *The natural environment as a playground for children: the impact of outdoor play activities in pre-primary school children*, Early Childhood Education Journal, 29(2), p111–117

Frances B (2013) *Promoting social mobility: What the government can and should be doing* Leicester: Association of School and College Leaders

Francis B and Wong B (2013) *What is preventing social mobility? A review of the evidence* Leicester: Association of School and College Leaders

Gray C (2012) *Developing an appropriate curriculum and pedagogy for young children: rhetoric and reality* International Journal of Early Years Education Volume 20, Issue 1, 2012 p1 -3

Haimendorf M (2014) *How we achieved dramatically good GCSE results in the poorest ward in London*, TES Connect

Hattie J (2009). *Visible Learning: A synthesis of over 800 meta-analyses related to achievement* Oxon: Routledge

Hattie J (2011) *Visible Learning for Teachers: Maximising impact on learning.* London: Routledge

Hawley T (2000) *Starting Smart* Washington: Ounce of Prevention Fund and ZERO TO THREE.

Higgins S, Beauchamp G, and Miller D, *Reviewing the literature on interactive whiteboards* Learning, Media and technology 32.3 (2007) p213-225

Hutchings M, Francis B and De Vries R, (2014) *Chain Effects? Which academy chains have done most to advance low income students?* London: The Sutton Trust

Ireson, J and Hallam S (2001) *Ability Grouping in Education*, London: Paul Chapman Publishing

Jackson, L. (2012) *Securing Standards, Sustaining Success: Report on Early Intervention*

Jenkins A and Wolf A (2006) *Test use in selection: professionalisation, regulation and change* Human Relations Management Journal 16.2

Jerrim J & Macmillan L (2014) *Income inequality, intergenerational mobility and the Great Gatsby Curve: is education the key?*

Jerrim J (2012) *The socio-economic gradient in teenagers' literacy skills: how does England compare to other countries?* Fiscal Studies, 33 (2) p159 – 184

Jerrim J, Vignoles A, Lingam R, and Friend A (2014) *The socio-economic gradient in children's reading skills and the role of genetics*, British Educational Research Journal

Johnston K, and Hayes, D (2007) *Supporting student success at school through teacher professional learning: the pedagogy of disrupting the default modes of schooling* International Journal of Inclusive Education 11(3) p371-381

Keep E, Mayhew K and Payne J (2006) *From skills revolution to productivity miracle—not as easy as it sounds?* Oxford Review of Economic Policy, 22(4), p539-559

Kirschner P A, Sweller, J, and Clark, R E, (2006) *Why minimal guidance during instruction does not work: an analysis of the failure of constructivist, discovery, problem-based, experiential, and inquiry-based teaching* Educational Psychologist 2006; 41 p75–86

Schweinhart L J, Montie J, Zongping Xiang W, Barnett S, Belfield C R, and Nores M, (2005) *Lifetime Effects: The High/Scope* Perry Preschool Study Through Age 40 High/Scope Press

Lindley J and Machin S (2012) *The Quest for More and More Education: Implications for Social Mobility* Fiscal Studies, 33(2), p265–286

Livingstone I and Hope A (2011) Next Gen: Transforming the UK into the world's leading talent hub for the video games and visual effects industries.

Luckin R, Bligh B, Manches A, Ainsworth S, Crook C and Noss R (2012) *Decoding Learning: The proof, promise and potential of digital education*

Luckin R, Logan K, Oliver M, Mee A and Clark W (2010) *Web 2.0 technologies for learning at key stages 3 and 4*

Lupton R and Hempel-Jorgensen (2012) *The importance of teaching: pedagogical constraints and possibilities in working class schools* Journal of Education Policy, 27(5) p601-620

Lupton R, Heath N and Salter E (2009) *Education: New Labour's top priority*, in Hills J, Sefton T and Stewart K (eds) *Towards a more equal society? Poverty, inequality and policy since 1997.* Bristol: Policy Press

Malaguzzi L (1996) *The right to environment.* In Filippini T and Vecchi V (1996) *The Hundred Languages of Children: the exhibit Reggio Emilia* Reggio Children

Mathers, S and Smees R (2014) *Quality and Inequality: Do three- and four-year-olds in deprived areas experience lower quality early years provision?* Oxford: Nuffield Foundation

Mishra P, Koehler M (2006) *Technological Pedagogical Content Knowledge: A Framework for Teacher Knowledge* Teachers College Record 108 (6) p1017-1054

Moss G, Jewitt C, Levacic R, Armstrong V, Cardini A, and Castle F (2007) *The interactive whiteboards, pedagogy and pupil performance evaluation: an evaluation of the Schools Whiteboard Expansion (SWE) project:* London Challenge (Vol. RR816). London: Department for Education and Skills

Munns G, Sawyer W and Cole B *(2007) Exemplary Teachers of Students in Poverty,* London: Routledge

National curriculum in England (2013) *Computing programmes of study.* London: DfE

New Zealand Ministry of Education (1996) *Te Whãriki: He Whãriki Mãtauranga mõ ngã Mokopuna o Aotearoa/Early Childhood Curriculum*. Wellington: Learning Media

Nutbrown, C (2012) *Foundations for Quality: The Independent Review of Early Education and Childcare Qualifications. Final Report* London: Department for Education

Nutbrown C (2011) *Threads of Thinking: Schemas and young children learning* (4th edition) London: Sage

Nutbrown C, Hannon P, and Morgan A (2005) *Early literacy work with families: policy, practice and research* London: Sage

Oates J, Karmiloff-Smith A and Johnson M H (2012) *Developing Brains: Early Childhood in Focus 7* Milton Keynes: Open University Press

OECD (2010) PISA 2009 *Results: What Makes a School Successful?* Resources, Policies and Practices (Volume IV)

OECD Indicators (2013) Education at a Glance 2013 Paris: OECD OPRE (Office of Planning, Research and Evaluation) (2010) *Early head Start Children in Grade 5*

Panorama (May 2012) *The Great Apprenticeship Scandal* BBC

Perry E and Francis B (2010) *The social class gap for educational achievement: a review of the literature.* London: RSA Projects

Petrie P, Boddy J, Cameron C, Heptinstall E, McQuail S, Simon A et al. (2008). *Pedagogy - A holistic, personal approach to work with children and young people, across services.* London: Thomas, Coram Research Unit, Institute of Education, University of London

Pryor F L and Schaffer D L (1999) *Who's Not Working and Why* Cambridge University press

Quinlan O (2012) *Empowered mobile learning: iDHSB* Oliver Quinlan's blog: 21st June 2012

Reynolds A J, Temple J A, Robertson D L and Mann E A (2001) *Long-term effects of an early childhood intervention on educational achievement and juvenile arrest- A 15-year follow-up of low-income children in public schools.* Journal of American Medical Association, 285(18), p2339-2346.

Richard D (2012) *The Richard Review: the future of apprenticeships* Department of Business, Innovation and Skills/Department for Education

Schweinhart L J, Montie J, Xiang W, Barnett S, Belfield C R and Nores (2005) *Lifetime Effects: The High/Scope Perry Preschool Study Through Age 40* (pp. 194–215), by Ypsilanti MI, High/Scope Press

Selwyn N, Cranmer S and Potter J (2007) *Learner voice and technology: 7 to 11*

Sibieta L (2009) *A disadvantaged pupil premium* Observations: Reflections on current events.

Siraj-Blatchford I, Sylva K, Muttock S, Gilden R and Bell D (2002) *Researching Effective Pedagogy in the Early Years* Research Report RR356

Soler J and Miller L (2003) *The Struggle for Early Childhood Curricula: A comparison of the English Foundation Stage Curriculum, Te Wha¨riki and Reggio Emilia International* Journal of Early Years Education Volume 11, Issue 1, 57-68 DOI:10.1080/096697603200006609

Sutton Trust (2012) *Pupil premium money will have limited impact on poorer pupils, teacher survey suggests*

Sutton Trust (2014) *Nearly 1 in 4 teachers think pupil premium funds may not be targeted at poorest students* Sutton Trust Poll

The Economist, (2013) *Catching on at last*

The Royal Society (2012) *Shut down or restart? The way forward for computing in UK schools*

The Telegraph (2008) *Learning by heart is 'pointless for Google generation'*

UK Digital Skills Taskforce (UKDST) (2014) *Digital Skills for Tomorrow's World: The independent report of the UK Digital Skills Taskforce* Beta Edition July 2014

UNESCO (2005) *Education for All: Literacy for Life Global Monitoring Report 2006.* Paris: UNESCO

UNESCO (2006) *Strong Foundations: Early childhood care and education* 2007 Paris: UNESCO

UNICEF (2005) *Convention on the Rights of the Child: From abstract rights to realities*

Wilkinson K and Pickett R (2010) *The Spirit Level* London: Penguin.

Willingham D T (2009) *Why Don't Students Like School?* San Francisco: Jossey-Bass, p54

Wolf, A (2002) *Does Education Matter? Myths about education and economic growth* London: Penguin

Wolf A (2011) *Review of Vocational Education – the Wolf Report* London: DfE

Wood E (2004) *A new paradigm war? The impact of national curriculum policies on early childhood teachers' thinking and classroom practice* Teaching and Teacher Education, (20), p361–374

Wood E (2013) *Play, Learning and the Early Childhood Curriculum (3/e).* London: Sage.

World Bank (2011) *Learning for All: Investing in people's knowledge and skills to promote development, World Bank Group Education Strategy 2020* Washington DC: The International Bank for Reconstruction and Development/The World Bank