



## Report to the LSE Growth Commission: Education and Skills

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### 1. Introduction

There is much evidence linking education and skills with economic growth. Hanushek and Woessmann (2007) emphasises the role of the quality of this education (rather than quantity alone). Hanushek (2012) states that a one standard deviation difference on test performance (100 points on the PISA assessment) is related to a 2 percentage point difference in annual growth rates of gross domestic product per capita. The gap between the UK and Finland (the top European performer) is about half of a standard deviation in maths in the PISA 2009 assessment.

In this short paper, I will briefly discuss UK performance. Then I will discuss research on the relative role of school and family background in explaining educational attainment. In the next section, I will discuss some evidence on various school-level policies that have tried to improve attainment: resources; teachers; pedagogy; choice and competition; school autonomy and regulation. Then I will discuss the debate on vocational vis-à-vis general education. Finally I will discuss some differences between the apprenticeship system in the UK and other European countries before concluding.

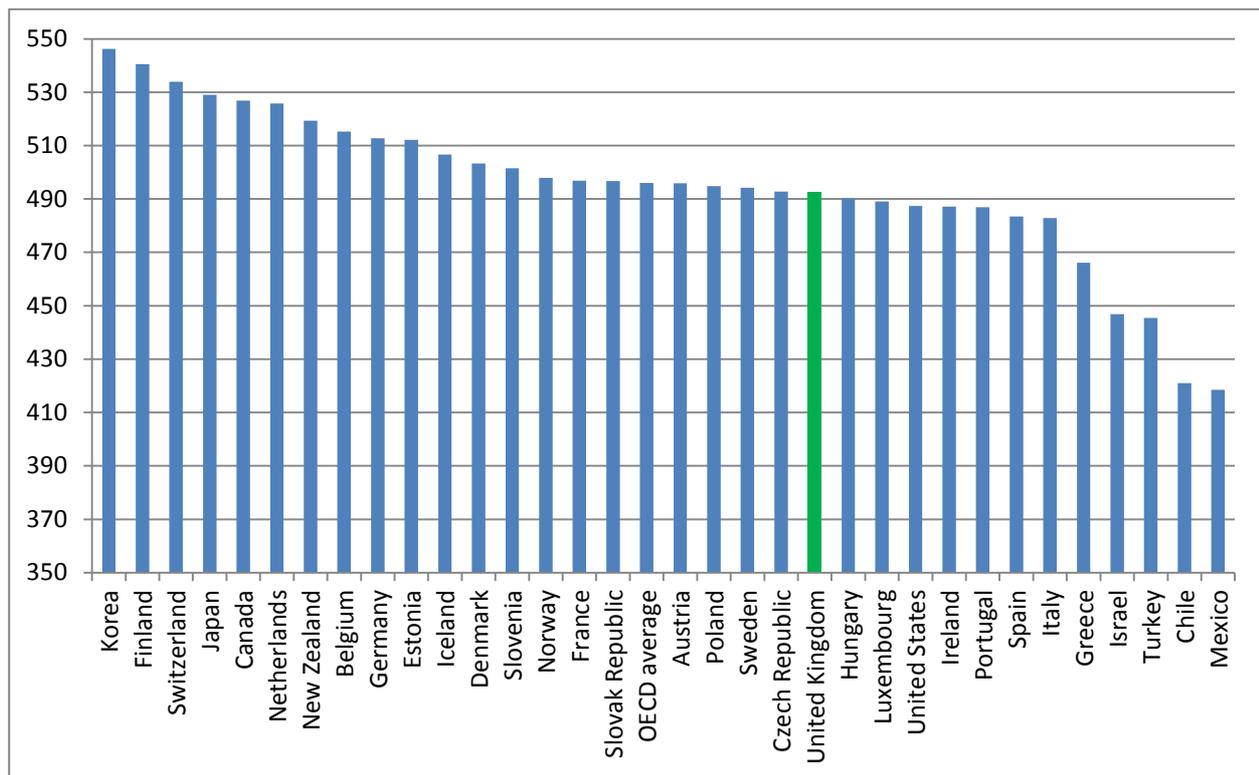
### 2. How is the UK Performing?

There are three international tests of relevance for looking at performance at school: Progress in International Reading Literacy (PIRLS), conducted in 2001 and 2006 for pupils of about 10 years old; the Programme for the International Student Assessment (PISA), conducted in 2000, 2003, 2006 and 2009 for 15 year olds; and Trends in International Mathematics and Science Study (TIMSS), conducted in 1999, 2003 and 2007 for pupils of about age 10 and age 14 (that is, years 5 and 9 in England).

The latest PIRLS study shows that England is significantly above the international average for the reading abilities of 10 year olds. But this is below some major European countries (including Italy and Germany) and there has been a decline in performance since 2001.<sup>1</sup>

With regard to measures of secondary school performance, TIMSS is more curriculum-based and closer to what is measured in national key stage tests. PISA measures the application of knowledge in everyday situations. In TIMSS, England is one of the top performers and there has been an increase in test scores over time. However, PISA has a much higher public profile. Unfortunately, there are problems with the use of PISA for comparing trends over time because of problems with the English entry in both 2000 and 2003.<sup>2</sup> In PISA, the UK does relatively badly, performing just below the OECD average in 2009 (see Figure 1). There has also been a small decline in UK performance in PISA between 2006 and 2009 (and a larger decline if one believes the results in 2000 and 2003, although this is controversial – see Jerrim, 2011).

**Figure 1. PISA scores in Maths. OECD countries, 2009.**



If one looks at an older age group (25-34 year olds) for roughly the same set of OECD countries, it is interesting to see a similar pattern with regard to the relative performance in the UK. This shows

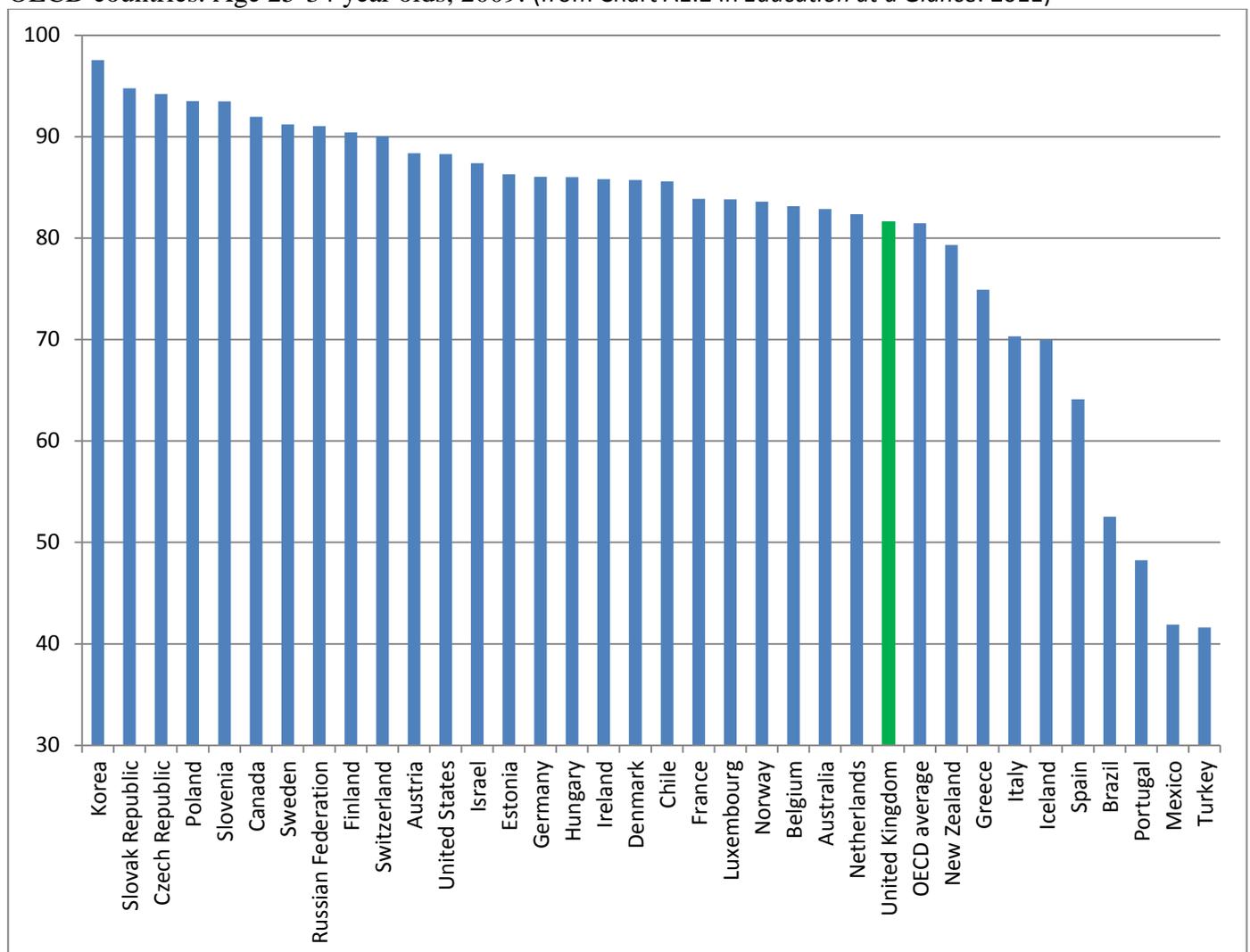
<sup>1</sup> As explained by Twist et al (2006), the change over time is sensitive to the methodology for linking data. Their alternative methodology suggests that the fall over time might be smaller than what appears in the main study.

<sup>2</sup> England did not meet the OECD school response rate for PISA 2000. In 2003, participation rates both at school and pupil level did not meet OECD requirements and England was excluded from international comparisons.

the percentage of this age group with at least an upper secondary education (from 5 GCSE grades A\*-C or equivalent to A-levels). This also shows that the UK lags behind many other countries (though performs similarly to the OECD average). However, when it comes to tertiary education for this age group, the UK performs relatively well.<sup>3</sup>

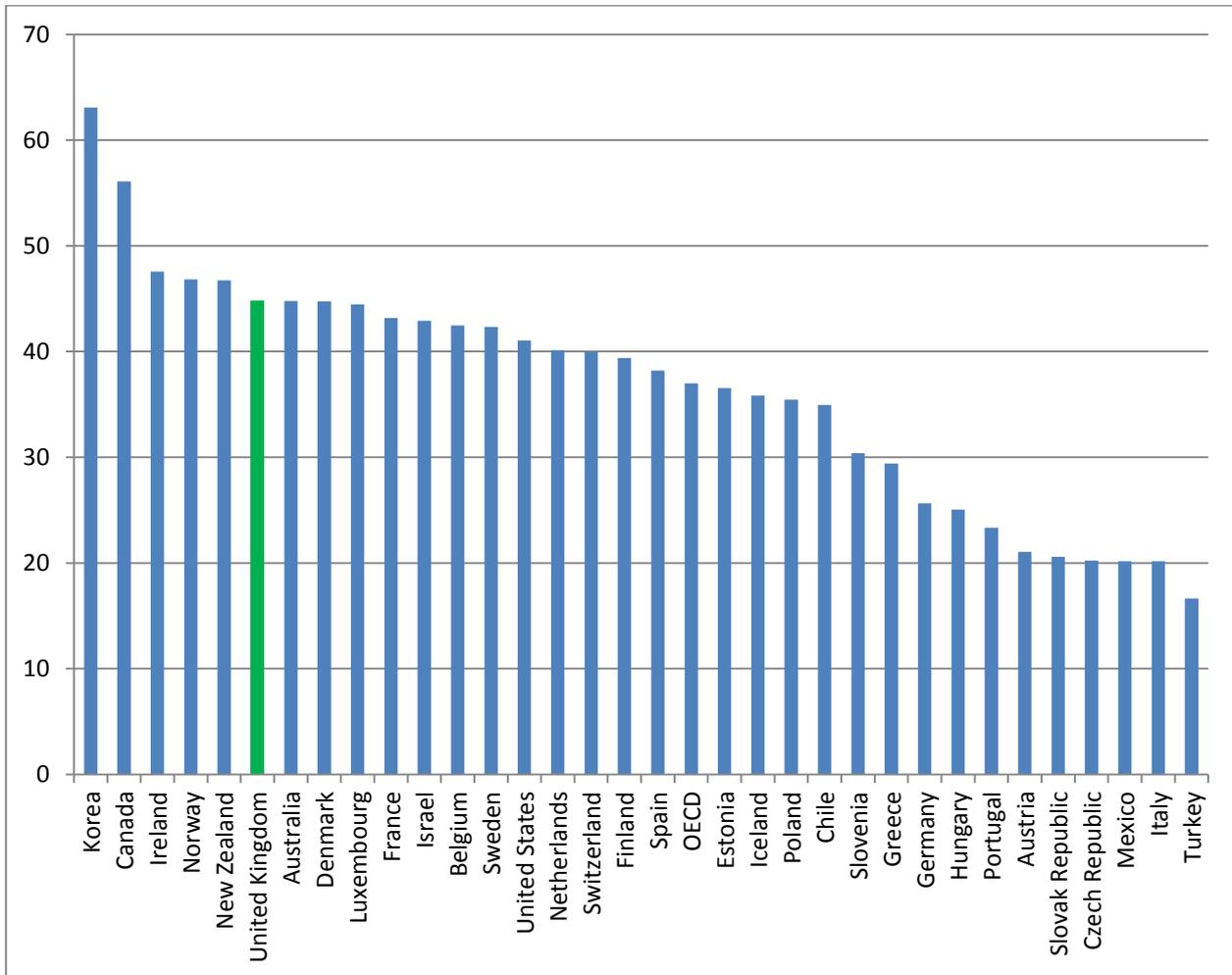
This illustrates that a major problem with ‘educational output’ (relative to other countries) is not so much that the UK fails to produce graduates, but that it fails to produce sufficient numbers of people with good intermediate qualifications. This problem has been well documented (e.g. Hansen and Vignoles, 2005). Although national indicators suggest that performance is improving (i.e. GCSE results), a concern is that at least some of this could be on account of students taking easier subjects and wider issues relating to grade inflation and ‘teaching to the test’.

**Figure 2: Percentage of population that has attained at least upper secondary education OECD countries. Age 25-34 year olds, 2009. (from Chart A1:2 in *Education at a Glance*. 2011)**



<sup>3</sup> This builds on the analysis and commentary in an ‘Anatomy of Economic Inequality in the UK: Report of the National Equality Panel’.

**Figure 3: Percentage of population with tertiary education**  
 OECD countries. Age 25-34 year olds, 2009. (from Table A1:3a in *Education at a Glance*. 2011)



It is not at all clear why the UK has a greater level of educational inequality than other countries. However, inequality is manifest in other areas too – as well demonstrated by the National Equality Panel.<sup>4</sup> One aspect of inequality is the relationship between family background and educational attainment. Scheutz et al. (2005) relate family background to student test scores across countries using TIMSS. Although the gradient is present in most countries, the estimated effect is higher in England than in any other country for this particular survey. Since educational inequality is linked to other sources of inequality (with persistence over generations), it is not easy to point to underlying causes. However, the fact that it is manifest even before children start school (as shown in the next section) suggests that the educational system cannot take sole responsibility

<sup>4</sup> <http://eprints.lse.ac.uk/28344/1/CASereport60.pdf>

## Schools or parents?

Several studies investigate how much of the variation in educational attainment can be attributed to schools versus families and peers. They all suggest that families are much more important (Teddlie and Reynolds, 2000; Todd and Wolpin, 2007; Kramarz, Machin, Ouazad, 2009). Furthermore, even before pupils start school, there is a large gap in cognitive ability between children from high and low socio-economic backgrounds. Feinstein (2003) finds significant gaps between children from a high and low socio-economic background in an index of development, which is derived from tests of ability (at 22 months) in cube stacking, language use, drawing and personal development. Furthermore, he finds that the test-score gap tends to widen as children age; and through the levels of the education system.<sup>5</sup> Another way to illustrate pre-school gaps is to look at vocabulary skills by gender and ethnic group at the time of school entry. Table 1 (taken from Dustmann et al, 2010) shows the vocabulary skills of five year olds in the Millennium Cohort Study (MCS)<sup>6</sup>. The test scores have been standardised to have a mean of 50 and a standard deviation of 10. It is evident that sizeable gaps in vocabulary skills exist even at the time of school entry.

**Table 1:**  
**Age 5 Differences in Vocabulary Tests by Gender and Ethnicity, Millennium Cohort Study**

Ethnic Group	Boys	Girls
White British	55.9	56.5
Black, Caribbean	48.4*	51.0*
Black, Other	44.2*	47.2*
Bangladeshi	40.4*	41.7*
Pakistani	40.6*	40.7*
Indian	49.8*	50.3*
Chinese	41.2*	55.2
Number of Children	4,587	4,452

Notes: Based on Table 3 of Dustmann, Machin and Schonberg (2010). The vocabulary test is standardised to have mean 50 and a standard deviation of 10. A \* denotes statistically significant differences relative to White British boys or girls respectively.

This illustrates that human capital acquisition is not something that begins only at school and that inequality is evident even at an early stage. Breaking the link between family background and

<sup>5</sup> The extent to which inequalities actually widen with age is controversial (Jerrim and Vignoles, 2011). However, educational inequalities are certainly present at all stages of the lifecycle (Machin and McNally, 2011).

<sup>6</sup> The MCS is a longitudinal survey of around 19,000 children born in the UK over a twelve month period from 2000 to 2001. The first survey took place when the children were around nine months old. Follow-up interviews have, at the time of writing, taken place when children were aged three, five and seven.

educational attainment (and improving educational attainment generally) seems to require policies directed at families before the start of formal schooling. This might involve close attention to the quality of early childcare and pre-school settings. However, if part of the issue is poverty and worklessness, then the policy solutions may also lie in other areas of social policy.

Despite the fact that family background appears to be more important than the school as a determinant of educational attainment, there are some recent papers showing that particular schools in the US have had an enormous impact on a student's educational attainment (Dobbie and Fryer, 2009; Abdulkadiroglu et al. 2011). But the context of these studies is not necessarily generalizable. These schools (for example, charter schools in Boston; the Harlem Children's Zone in New York) are attended by disadvantaged children and they receive a range of services not typically provided by schools (e.g. a much longer school day and year; after school tutoring). It would seem that in these examples, teachers partly substitute for the role of parents.

It is difficult to fully separate the influence of families and schools. Many people look for somewhere to live partly based on the quality of local schools. Apart from convenience, an additional incentive to locate near a 'good' school is that it greatly improves the chances that a child will gain entry to a popular school. This is because most schools in England use distance from the school as a criterion for selecting students when the school is oversubscribed. It is unsurprising that academic research finds that a 'school quality' premium is incorporated into property prices. In England, this is about 3 per cent of the average value of a home. The opportunity to buy a home near a popular school is only available to those who are both willing and able to pay. One way to help break the link between family background and educational attainment would be to change admissions criteria such that it is less linked to distance from the school. This might be done through admitting students (or at least a proportion of students) by lottery or introducing banding (i.e. forcing students to admit a proportion of students in each ability range). However, it appears to be politically difficult to impose these requirements on schools.<sup>7</sup> A longer term solution is to simply make the choice of school a lower stakes decision by improving the quality of schools at the lower end of the distribution. The next section discusses evidence on potential school-level policies.

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<sup>7</sup> There was much publicity surrounding Brighton's Local Authority's decision to introduce lotteries for schools in that area. However, it is transpired that the lotteries only apply to people living within particular catchment areas, thus largely retaining the link between residential location and the school attended.

### 3. Evidence On School-Level Policies<sup>8</sup>

#### Resources

One of the long disputed questions in the academic literature is whether additional school expenditure has an effect on raising pupil attainment. The relevant question is not about spending *per se* (which of course is necessary) but whether additional spending can be cost effective at the typical levels found in developed countries. Internationally, there are many studies about school expenditure but there are different views about how to best interpret results. Hanushek (2008), for example, argues that accumulated research suggests no clear, systematic relationship between resources and student outcomes. However, others place more weight on studies with a particularly strong methodological design that show positive effects (e.g. the class size studies of Angrist and Lavy, 1999; Krueger, 1999; Krueger and Whitmore, 2001).

The difficult empirical issue in this area is that additional school resources are often disproportionately allocated to disadvantaged students. Unless this is fully dealt with in the methodological design, the relationship between resources and attainment is easily obscured. The positive association between school resources and educational disadvantage is counter-balanced against the negative association between educational disadvantage and educational attainment. The net result can easily be an observed association between school resources and educational attainment that is too low and does not reflect the true causal relationship.<sup>9</sup> It is very difficult to prove that this particular problem has been overcome, particularly where it is not possible to implement randomised controlled experiments. Yet as the third biggest category of government expenditure (in the UK)<sup>10</sup>, it is important to get a sense of whether an increase or a reduction of spending is likely to affect student outcomes – which are so important for the future of the economy as well as for the individual's future prosperity.

There have been several recent studies looking at this issue for England using a census of all pupils (the National Pupil Database) and expenditure data for all schools. The English National Curriculum is divided into four 'key stages', at the end of which students are evaluated by their teachers (at age 7 and 14) or they undertake national tests that are externally set and marked by the school (at age 11 and 16). Two studies that evaluate the relationship between expenditure and

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<sup>8</sup> The sections on school expenditure, the institutional environment, school autonomy and pedagogy draw heavily on Machin and McNally (2011).

<sup>9</sup> Holmlund et al. (2010) illustrate that this is an important concern in an English context.

<sup>10</sup> This refers to education spending as a whole, although most education spending is at school-level.

attainment in secondary school are by Levčič et al. (2005) and Jenkins et al. (2006). They look at outcomes at age 14 (end of Key Stage 3) and age 16 (end of Key Stage 4) respectively. Both studies find a small positive effect of resources on pupil attainment. A difficulty is that they use political control as an instrument for school expenditure. This involves making the assumption that political control of a Local Authority only influences pupil-level outcomes through school expenditure. This might not be the case since Holmlund et al. (2008) show that changes in political control are correlated with changes in the demographic characteristics of Local Authorities, even when the sample is restricted to Local Authorities where the election outcome is ‘close’ and there is a small difference in the share of seats of the two largest parties.

Government initiatives have provided a better framework to examine causal effects in this context. Machin et al. (2004, 2010) evaluate a flagship policy of the Labour government in the early 2000s – the Excellence in Cities (EiC) programme for English secondary schools. In this programme, schools in disadvantaged, mainly urban, areas of England were given extra resources to try to improve standards. Initially most of the funding was directed at core strands (Learning Support Units; Learning Mentors; a Gifted and Talented Programme). Over time, schools were allowed greater flexibility in how to use the funding. The methodological approach is based on ‘differences-in-differences’, where schools in the ‘treatment group’ were compared to schools in appropriately defined comparison group before and after the policy came into effect. Similarly to the study by Levčič et al. (2005), they find evidence for small average effects of additional resources for maths but not for English.

The studies looking at resource effects for primary schools (Gibbons et al, 2011; Holmlund et al. 2010) find that effects are substantially higher for economically disadvantaged students. For secondary schools, both Machin et al. (2010) and Levčič et al. (2005) find that resource effects are higher for disadvantaged students (although this is not found by Jenkins et al, 2006). These findings are encouraging for policy because they suggest that mechanisms have been in place to ensure that disadvantaged students benefit disproportionately from increasing school resources. This helps to reduce the attainment gap between socio-economic groups from what it might otherwise be. On the other hand, it is interesting that both Machin et al. (2010) and Levčič et al. (2005) find that high ability students from disadvantaged backgrounds are most likely to benefit from these policies. Machin et al. (2010) highlight a particular group of concern – low ability students from disadvantaged backgrounds. These are ‘hard to reach’ students who may require more resource-intensive programmes. Another important question is what to make of an effect that appears to be small (at least on average). Levčič et al. (2005) find that spending £100 more per

pupil would raise maths attainment by 0.04 of a level whereas Machin et al. (2011) find that spending £120 more per pupil raises maths attainment only by 0.01 of a level (after about 3 years of the policy).<sup>11</sup> Bradley and Taylor (2010) look at whether the same policy (Excellence in Cities) and the ‘Specialist Schools’ policy had an effect on student outcomes at age 16.<sup>12</sup> They also report evidence of only modest effects.

To conduct an accurate Cost-Benefit Analysis, we need information both on costs and how estimated educational benefits translate into a range of later outcomes – for example, further education, probability of employment, wages, crime. Generally, it is not difficult to estimate the costs of a policy. However, it is often difficult to estimate future benefits. In the absence good information, Machin et al. (2010) ask how much the average benefits in terms of exam achievement would have to translate into higher wages for the policy to break-even. In line with the literature, they assume an average rate of return to a year of schooling to be about 8 per cent. Using the Family Resources Survey data for England and Wales, they obtain a wage profile (an average of weekly earnings by age, for all individuals). If pupils were to obtain the equivalent benefit of a whole year of education at age 14 and then started work at age 16, the lifetime benefit of this extra year is estimated to be about £20,000.<sup>13</sup> According to the National Curriculum a one level improvement corresponds to about 2 years of schooling. If this is true, the benefit of EiC is about 0.02 of a year of schooling (i.e.  $0.01 \times 2$ ) – which comes to about £400 over the lifetime (i.e.  $0.02 \times £20,000$ ). This is very similar to the cost of EiC policy (£120 x 3). This very simple analysis suggests that EiC policy breaks even if improvement in Key Stage 3 results corresponds to years of schooling in the way suggested by the National Curriculum. Even if this is way off the mark, benefits of improved attendance at school and higher achievement at age 14 may lead to economic benefits in the short and long term that we do not observe – for example, increased probability of staying on at school beyond compulsory school-leaving, higher probability of employment, lower probability of turning to crime.

There have been two recent papers about the effects of school expenditure in primary schools (Holmlund et al. 2010; Gibbons et al. 2011). Holmlund et al. (2010) use the National Pupil

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<sup>11</sup> In the Key Stage attainment tests, progress is measured in ‘levels’. At each Key Stage, the National Curriculum defines the level at which students are expected to achieve. In the Key Stage 3 test (i.e. the test used in Levčić et al. (2005) and Machin et al. (2011)), most children achieve within the range of levels 3-8.

<sup>12</sup> Specialist schools are state-maintained secondary schools with a designated subject specialism. They need to apply for specialist status and, if successful, receive significant additional funding.

<sup>13</sup> The estimated benefit is calculated based on the weekly earnings of all individuals in the Family Resources Survey (2002/03) between the age of 16 and 64. The Net Present Value of an extra year of schooling at age 14 is then calculated using a discount rate of 3.5% - the recommended discount rate in the UK HM Treasury Green Book (<http://greenbook.treasury.gov.uk>).

Database between 2002 and 2007 – a period of time in which there was a large increase in school expenditure in England. They find evidence of a consistently positive effect of expenditure across subjects. The magnitude is a little bigger than that found for secondary schools but still modest. Gibbons et al. (2011) uses a very different strategy than that used for other papers and the study applies to schools in urban areas that are close to Local Authority boundaries. The percentage of poor children in these schools is much higher than the national average (28% are eligible to receive free school meals, compared to 16% nationally). The strategy uses the fact that closely neighbouring schools with similar pupil intakes can receive markedly different levels of core funding if they are in different education authorities. This is because of an anomaly in the funding formula which provides an ‘area cost adjustment’ to compensate for differences in labour costs between areas whereas in reality teachers are drawn from the same labour market and are paid according to national pay scales. The study shows that schools on either side of Local Authority boundaries receive different levels of funding and that this is associated with a sizeable differential in pupil achievement at the end of primary school. For example, for an extra £1,000 of spending, the effect is equivalent to moving 19% of students currently achieving the expected level (or grade) in Maths (level 4) to the top grade (level 5) and 31% of students currently achieving level 3 to level 4 (the expected grade at this age, according to the National Curriculum). Bearing in mind that a one level improvement in the National Curriculum has been interpreted as equivalent to two years of schooling (discussed above) and that each extra year of schooling has an estimated benefit over the lifetime of £20,000, the cost of additional school resources can be easily justified in a cost-benefit framework.

Taken together, the papers suggest that there is important heterogeneity in the effects of pupil expenditure with stronger effects in poorer areas (which is good for reducing the attainment gap between socio-economic groups). They suggest that school resources can, in an appropriate setting, matter a lot and that government cuts in this area are of real concern.<sup>14</sup>

The Gibbons et al. (2011) study also looks at how expenditure patterns relate to additional income. Additional income only shifts expenditure patterns to a small extent. However the shift is away from teacher costs (the largest item) and towards categories like learning and ICT resources, professional services and supplies. A possible reason for this is that small expenditure differentials cannot easily be used to employ additional teachers because of the cost of this. Also, the lack of flexibility in teacher pay is a reason why extra expenditure can’t easily be used as incentive

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<sup>14</sup> In education, nominal spending is staying constant (apart from the ‘pupil premium’). However, simple calculations suggest that even schools benefiting from the ‘pupil premium’ will experience a real decrease in funding because of high inflation.

payments for attracting and retaining high quality teachers. Rigidity in the institutional environment is often perceived as something that holds schools back from being as productive as they might be. In the next section we discuss reforms to the institutional environment and evidence on their effectiveness.

### **The institutional environment**

In England, there has been a concerted effort to increase parental choice, competition between schools and accountability of schools for the performance of students. If the ‘market’ works well, parents should be able to make an informed choice about what school to send their child and schools should have an incentive to improve performance because their funding is linked strongly to pupil numbers. The idea is that choice and competition would drive up educational standards.

The mechanisms to improve parental choice include the provision of better information about what actually goes on in schools. Publicly available information comes in two main forms: school performance (or ‘league’) tables and inspection reports from the statutory agency responsible for monitoring schools’ performance (OfSTED). Both forms of information are available online. ‘League tables’ were introduced in 1992 for secondary schools and 1996 for primary schools in England. They consist of measures of performance in tests at age 11 (for primary school) and age 16 (for secondary school). Since 2002/03, ‘value added’ measures were also introduced which looks at the average gain in test scores (rather than their level) and more recently (from 2006), the context is also adjusted for (i.e. taking account of a student’s ethnicity, eligibility for free school meals etc).

While these measures can be helpful to parents, they may also be misleading. This can arise for statistical reasons – for example, value added measures can be quite unstable over time and the fluctuation is often not informative about actual changes in school quality (Leckie and Goldstein, 2011). Another negative potential negative consequence of measuring school quality is that it might encourage behaviour designed to look good on the actual measures while not really improving school quality (or actually neglecting aspects of school quality that are not measured). For example, teachers might concentrate attention on students who are close to the performance threshold and ignore students further away from it. They might teach only what is on the test and ignore broader aspects of education. They might encourage students to take ‘easy courses’ rather than courses that would stretch them. These sorts of behaviours have been documented both in the US and England (see Muriel and Smith 2011). However, Hussain (2012) shows that when schools do badly on an inspection, they do genuinely improve over the following year. This appears to be driven by greater

effort rather than perverse behaviour such as concentrating only on students near the performance threshold.

Even when the information provided is useful, parents might have limited ability to act on it. While parents can apply to any state school (since the 1980s), schools are permitted to discriminate if there is over-subscription and according to an enforced Code of Practice. The most important over-subscription criterion is usually proximity to the school. As discussed above, there is evidence from England and other countries that parents act on available information when they are purchasing a home (for England, see Burgess et al. 2009; Gibbons and Machin 2003; Gibbons et al. 2009; Rosenthal, 2003). Of course, the link between choice and parental income means that many parents are unable to exercise meaningful choice because of their lower income (i.e. they cannot afford to live very close to a popular school). Furthermore, West and Pennell (1999) show that higher socio-economic groups have better information and understanding of school performance. Thus, 'school choice' (although good in itself) is a blunt instrument for addressing attainment gaps by family background.

Parental choice and incentives for schools to perform well should give rise to competition between schools. In the international literature, there have been many attempts to investigate whether increased competition gives rise to improved educational attainment. However, the international evidence is 'voluminous and mixed' (Gibbons et al. 2008) and there are few papers in England. Bradley et al. (2001) look at this at school-level (for secondary schools) and find that schools with the best examination performance have grown more quickly. They argue that increased competition between schools led to improved exam performance. The first pupil-level analysis on this subject relates to primary schools in the South East of England (Gibbons et al. 2008). The authors find no relationship between the extent of school choice in an area and pupil performance. The study also suggests that there is no causal relationship between measures of school competition and pupils' educational attainment. The only case where choice and competition might be beneficial is in the case of faith schools. This might be because many faith schools are voluntary aided and have great autonomy than other state schools (e.g. there is less representation from the Local Authority on the board of governors; they control their own admissions, although they must adhere to the Code of Practice). Therefore it might be the case that competition would play a more important role in school performance if schools were more autonomous.

One way to improve choice and competition is allow schools a lot more freedom on such matters as pay and conditions of staff and what actually goes on in schools. We discuss this in the next Section.

### **School autonomy**

Several countries have enabled a certain proportion of state funded schools to operate with greater autonomy than the norm within the state system. The structure and rules differ between (and sometimes within) countries but they also have much in common – for example, ‘charter schools’ in the US; ‘free schools’ in Sweden and ‘academies’ in England. The rationale is that by giving schools more freedom, they might be better able to respond to local circumstances and become more innovative.

In England, ‘academies’ are run by their sponsors and board of governors. They have responsibility for employing all staff, agreeing pay and conditions, freedom over most of the curriculum (except for core subjects) and all aspects of school organisation. The programme commenced in 2000 and was originally designed to replace failing schools in disadvantaged areas. It is now much more widely available to schools in a range of circumstances. Schools with a more advantaged intake have become more typical of the newcomers. An evaluation has been done of schools that became academies up to 2008/09 (Machin and Veroit, 2011). They compare average educational outcomes in schools that became academies and similar schools, before and after the conversion took place. There are three main findings. Firstly, schools that became academies started to attract higher ability students. Secondly, there was an improvement in performance at GCSE exams – even after accounting for the change in student composition. Thirdly, neighbouring schools started to perform better as well. This might either be because they were exposed to more competition (and thus forced to improve their performance) or it might reflect the sharing of academy school facilities (and expertise) with the wider community.

However, one does need to be careful about extrapolating these early results, which apply to about 200 schools in disadvantaged areas. The programme is now being rolled out to a lot more schools, in particular schools with a more advantaged intake (Machin and Veroit, 2010). It is also as well to remember the longer-term risks posed by such a programme. In the English context, these risks are the following: (1) Too many ‘independent’ state schools might undermine the ability of Local Authorities to provide centrally provided services (e.g. for students with special needs) to schools in their region; (2) When a school becomes an academy, regulation moves from the Local Authority to

a centralised authority (a national Schools Commissioner). However, will a commissioner who is further away from the community be able to react quickly and effectively to more localised problems? (3) No market – public or private – is composed of only successful institutions. Furthermore, one cannot predict with certainty what management or institutions will be successful. In the private sector, firms open and close all the time. However, in the public sector, there is no natural mechanism to facilitate this essential aspect of markets. The worry with academies is that it might prove hard to close down or remove the management of unsuccessful schools in a timely manner. It is interesting to note the contrast with ‘charter schools’ in the US. Here the ‘charter’ is reviewed periodically (typically every 3 to 5 years) and can be revoked if guidelines on curriculum and management are not followed or if the standards are not met.<sup>15</sup> In the UK, it appears that ‘autonomy’ is not something that can easily be taken away from an Academy.

With regard to school autonomy as an issue, there is a distinction between arguing for its merits in a general way and in particular contexts. The important discussion for policy is probably not so much whether autonomy is a good idea in general, but in what spheres should schools be more autonomous, in what contexts (e.g. ‘good’ schools or all schools?) and what are appropriate mechanisms to deal with failing schools. Hanushek et al. (2011) provide a good discussion on where ‘autonomy’ may and may not be desirable. Firstly, some decisions are more appropriately made at the school level where local knowledge is needed – operational decisions like hiring and budget allocations. Where standardization is important (e.g. course offerings and requirements), this may require a higher-level of decision making. Secondly, the impact of autonomy may vary with other elements of the system - for example, whether there is a good system of centralized accountability. A danger with local autonomy (in the absence of accountability) is that it opens up the possibility for more opportunistic behaviour on the part of local school personnel. While the UK does have a good system of accountability and Academies are subject to inspections by Ofsted (like other schools), I think there is a potential weakening of accountability structures. For example, a large number of convertors are currently rated (by Ofsted) as ‘outstanding schools’ - which will no longer be subject to routine inspections under separate changes made to the education inspection regime.<sup>16</sup> Also, as discussed above, Academies are not overseen by elected local authorities but answer to a Schools Commissioner (just one for England!)

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<sup>15</sup> <http://nces.ed.gov/fastfacts/display.asp?id=30>

<sup>16</sup> <http://www.bbc.co.uk/news/education-13274090>

## Teachers

One area where there appears to much consensus is on the importance of teacher quality. ‘Teacher quality’ is not reflected in teacher qualifications, which have very little explanatory power with regard to educational outcomes. In various papers by Eric Hanushek and co-authors, teacher quality is estimated by observing how student value added is related to being taught by a particular teacher. It is identified because the same teachers and students can be observed in different settings. The effect sizes are found to be large. For example, Hanushek and Rivkin (2010) find that having a teachers at the 25<sup>th</sup> percentile as compared to the 75<sup>th</sup> percentile of the quality distribution would mean a difference in learning gains in maths of around 0.2 standard deviations in a single year. Slater et al. (2009) conduct a similar analysis for a sample of students in England. They find that being taught by a high quality (75<sup>th</sup> percentile) rather than low quality (25<sup>th</sup> percentile) teacher adds 0.425 of a GCSE point per subject to a given student, or 25% of the standard deviation of GCSE points. A review of the literature by Richard Murphy (Sutton Trust, 2011) discusses the evidence on teacher effectiveness and policy in detail. His key findings on teacher impacts are as follows:

- The difference between a very effective teacher<sup>17</sup> and a poorly performing teacher<sup>18</sup> is large. For example during one year with a very effective maths teacher, pupils gain 40% more in their learning than they would with a poorly performing maths teacher<sup>19</sup>.
- The effects of high-quality teaching are especially significant for pupils from disadvantaged backgrounds: over a school year, these pupils gain 1.5 years’ worth of learning with very effective teachers, compared to 0.5 years with poorly performing teachers. In other words, for poor pupils the difference between a good teacher and a bad teacher is a whole year’s learning.
- Bringing the lowest-performing<sup>20</sup> 10% of teachers in the UK up to the average would greatly boost attainment and lead to a sharp improvement in the UK’s international ranking. All other things equal, in 5 years the UK’s rank amongst OECD countries would improve from 21<sup>st</sup> in Reading to as high as 7<sup>th</sup>, and from 22<sup>nd</sup> in Maths to as high as 12<sup>th</sup>; over 13 years (the period it takes for a child to pass through the UK schools system) the UK would improve its position to as high as 1<sup>st</sup> in Reading, and as high as 3<sup>rd</sup> in Maths.
- It is very difficult to predict how good a teacher will be without observing them in a classroom; paper qualifications and personal characteristics tell us very little. Gender, race,

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<sup>17</sup> A ‘very effective teacher’ is a teacher in the 84<sup>th</sup> percentile according to value added scores, which are a measure of the impact a teacher has on pupils’ progress. The 84<sup>th</sup> percentile is one standard deviation above the mean. Around one in every six teachers would be at or above this level.

<sup>18</sup> A ‘poorly performing teacher’ is a teacher in the 16<sup>th</sup> percentile according to value added scores. The 16<sup>th</sup> percentile is one standard deviation below the mean. Around one in every six teachers would be at or below this level.

<sup>19</sup> Aaronson, Barrow, and Sander, 2007, Rivkin et al. (2005) and Rockoff (2004)

<sup>20</sup> Performance is referred to in terms of value added scores

teaching experience, undergraduate university attended, advanced degrees, teacher certification and tenure explain less than 8% of teacher quality<sup>21</sup>.

A recent study by Chetty et al. (2011) suggests that teacher quality has long-term effects on student outcomes. They link teachers' impacts on students' test scores (value-added) in primary school to students' later outcomes such as earnings and college attendance. They find that a one standard deviation improvement in teacher value added in a single grade raises earnings by about 1% at age 28. They estimate that replacing a teacher whose value added in the bottom 5% with an average teacher would raise the present value of students' lifetime income by more than \$250,000 for the average classroom in their sample.

While there is consensus that good quality teaching matters, the policy response is more controversial. While value added measures are useful for showing the importance of teacher quality, they are not very reliable for assessing individual teachers. They have been shown to be unstable<sup>22</sup> and contain potential biases<sup>23</sup>. With regard to possible policy options, I draw on Richard Murphy's review of evidence. The following is taken directly from his report to the Sutton Trust on policy options<sup>24</sup>:

- Major reforms are needed to the performance and pay system for teachers, with assessment based on three core factors: improvement in results in the classroom, reviews by headteachers, and external appraisals. Other factors such as previous qualifications, previous experience, or years spent teaching should be given far less importance.
- A new fast-track graduate entry route into teaching should be piloted in disadvantaged schools with aspiring teachers assessed in a classroom - either in newly created summer schools for children at the most disadvantaged schools, or in the new cadre of teaching schools. Fast track teachers would receive extra pay incentives - perhaps £5k more than current starting salaries - after completing a year at school to gain Qualified Teaching Status and provided they continue to teach in a disadvantaged school.
- Teachers should be able to opt out of the standard promotion and pay system, and instead choose a more radical version which rewards high performers with extra pay and opportunities for faster career progression, but penalises under-performance. As well as improving the performance of these teachers, this would make the profession a more attractive option for talented graduates.

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<sup>21</sup> Aaronson et al., 2007; 'teacher quality' refers to value added scores

<sup>22</sup> Koedel and Betts, 2007; find that 30% of teachers in the top quintile fall into the bottom quintile in the next year, whilst 31% who were in the bottom quintile move into the top 2 quintiles. Similar movements are found by Aaronson, Barrow, and Sander, 2007 and Ballou 2009.

<sup>23</sup> Value added measures of individual teacher performance can be biased by school factors, non-random assignment to teachers and the scaling of tests.

<sup>24</sup> Murphy notes that some of these recommendations chime with proposals in the Government White Paper, [The Importance of Teaching](#). He is currently working on policy proposals in relation to how teachers can be helped through better evaluation, feedback and professional development. For further information: [r.j.murphy@lse.ac.uk](mailto:r.j.murphy@lse.ac.uk)

- School heads should be required to submit an annual report to Governors detailing the performance of their staff under this new performance and pay system, including their plans for professional development of teachers. Governors and inspectors need to ask how well heads have used their powers to reward excellence and address under-performance at the school – and this would play a key part in assessing the head’s own performance and pay.

## **Pedagogy**

One approach to reforming teaching is to help reward good practice and make it easier to lay off very poor teachers. However another approach is to help teachers become better at what they do. There appears to be a shortage of hard evidence on the efficacy of different training methods. However, there is some evidence that pedagogical approaches do matter as a school improvement strategy.

In England, top-down policies to influence the teaching of literacy and numeracy in primary schools were first introduced in the late 1990s to some Local Education Authorities (LEAs) in England. For the most part, these were a handful of inner city LEAs – 12 LEAs with respect to the ‘literacy hour’ and 13 LEAs with respect to the ‘numeracy hour’. There was very little geographic overlap regarding where these policies were implemented. The background to these initiatives was concerns about poor standards of literacy and numeracy in English schools. Subsequently both these policies were rolled out nationally as the ‘National Literacy Strategy’ and ‘National Numeracy Strategy’ respectively (in 1998 and 1999 respectively).

The core of these initiatives was a daily ‘literacy hour’ and ‘numeracy hour’ to be taught in primary schools. They aimed to improve the quality of teaching through more focused instruction and effective classroom management. Both the ‘literacy hour’ and ‘numeracy hour’ were supported by a framework for teaching, which sets out termly objectives for the 5-11 age range and provides a practical structure of time and class management. With regard to the ‘literacy hour’ a range of texts were specified and teaching objects set out at three levels (text, sentence and word) to match the text types studied. The daily literacy hour was divided between 10-15 minutes of whole class reading or writing; 10-15 minutes whole-class session on word work (phonics, spelling and vocabulary) and sentence work (grammar and punctuation); 25-30 minutes of directed group activities (on aspects of writing or reading) and a plenary session at the end for pupils to revisit the objectives of the lesson, reflect on what they have learnt and consider what they need to do next. The framework document for the ‘numeracy hour’ also contained a booklet of exemplar lessons and training on strategies to teach mental calculation. The hour itself consisted of a three-part template

for daily mathematics lessons, starting with 10-15 minutes of oral/mental arithmetic practice, then direct interactive teaching of whole classes and groups, and finally 10 minutes of plenary review.

Neither the literacy nor numeracy hour represented an increase in the overall time allotted to teaching these subjects. But both represented a dramatic change in how these subjects were taught. This is explained in detail by Machin and McNally (2008) with respect to the literacy hour. Since the National Strategies were preceded by de facto pilot projects (although they were not seen to be such at the time), there has been opportunity to evaluate their effectiveness via a difference-in-differences strategy. That is, one can compare educational attainment at the end of primary school in 'treatment schools' to schools in an appropriately defined comparison group, before and after the 'pilot' project was introduced. Machin and McNally (2008) evaluate the 'literacy hour' using this methodology. The results point to a significant impact of the literacy hour with their being a 2-3 percentage point improvement in the reading and English skills of primary school children affected by the introduction of the policy. Perhaps of most significance is that effects are generated at an extremely low cost per pupil. The main costs were local centres and literacy consultants in each Local Authority, with some funding to schools for teacher training and resources. Machin and McNally (2008) estimate costs of only about £25 per pupil whereas (discounted) labour market benefits for the improvement in reading are estimated at between £69 and £179 per year of working in the labour market.

Although the National Literacy and Numeracy Strategies are likely to be responsible for a considerable proportion of the improvement in educational performance of primary schools in the 2000s, there is a hard core of students for whom generic pedagogical approaches are not sufficient. About one-fifth of students still do not attain the government targets of 'level 4 or above' by the end of primary school (in the National Curriculum, 'level 4' is the expected level of knowledge and skills at this age). Another more recent initiative to try to address this was the 'Every Child a Reader' programme introduced to schools in some Local Authorities in the mid-late 2000s. The core of this initiative is Reading Recovery, which provides children in the greatest difficulty with daily one-to-one tuition for up to 20 weeks. The programme has been evaluated by a consortium of research institutions (Tanner et al. 2010). The economic evaluation (by researchers at IFS) is also based on a difference-in-differences methodology (as described above). They find that schools introducing the policy had significantly better educational attainment for children at age 7 in reading and writing (i.e. the end of Key Stage 1). The overall effect is similar to the 'literacy hour' in that it increases the proportion of students achieving the expected standard by about 2 percentage points. However, it is considerably more expensive. The programme costs £3,000 per child in the

first year and £2,600 per child thereafter. The future benefits depend on how long the effects endure for. The authors estimate that for the policy to break-even, it would have to increase the probability of obtaining better formal qualifications at age 18 by at least 4 percentage points.

Slavin et al. (2011) review a wide range of evidence on programs to help struggling readers (using international evidence). This includes one-to-one programmes like Reading Recovery but also one-to-one teaching programmes by para-professionals/volunteers; small group tutorials; classroom instructional approaches; and instructional technology. The review is very positive about the effectiveness of programmes like Reading Recovery. The authors conclude that there should be a strong focus on improving classroom instruction and then providing one-to-one tutoring to students who continue to experience difficulties. Given the likely costs involved (as documented by the IFS researchers for England) compared to the costs of more classroom instructional methods (like the literacy and numeracy hours), it would seem that the optimal programme would only implement one-to-one tuition in a context where classroom instructional methods had already been improved as much as possible. However, these more expensive programmes (if well targeted) might be especially helpful for ‘hard to reach’ students who are not helped sufficiently by more generic programmes. If they are successful, they might reduce problems much further down the line such as drop-out at age 16/17 (which is a bigger problem in England than in many other European countries).

There are also programs to help students who have difficulty with Maths. For example, The Every Child Count’s (ECC) programme was developed because of a recommendation by the Williams Review in 2008<sup>25</sup>, which explored poor mathematical performance of the lowest achieving children. A key programme within this, ‘Numbers Count’ (NC), provides intensive one-to-one interventions for those children identified as lowest achievers. This consists of daily 30 minute one-to-one sessions with specially trained Numbers Count teachers. The short-term effectiveness of this programme (after 12 weeks) was very well evaluated using a Randomised Control Trial (Togerson et al., 2011). The estimated effect on the Maths test after this time was 0.33 standard deviations. However, because the control group received the programme after 12 weeks, it is not possible to gauge the longer term impact using such a reliable method. The cost is high if delivered one-to-one (£1,353 per child). Although it would be much lower for 2-1 or 3-1, the evaluation does not provide strong evidence on the relative effectiveness of teaching in larger groups (due to problems of sample size).

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<sup>25</sup> <https://www.education.gov.uk/publications/eOrderingDownload/Williams%20Mathematics.pdf>

These evaluations illustrate that pedagogical methods can be very effective (though sometimes at a high cost). Another issue is to what extent they really need to be prescribed by government agencies. Arguments for intervention at a central or local level are economies of scale in the provision of relevant infrastructure (e.g. training programmes) that are difficult to organize by practitioners at a school level, who are mainly occupied with day-to-day activities in their own school. However, too much prescription (especially from a high-level of government) can mean that schools do not have the flexibility to adapt programmes in a suitable way for their own circumstances and takes away the professional autonomy sought after in other areas of educational policy. A more highly skilled and trained teaching workforce might remove the need for prescribed methods of classroom instruction. However, even in this case, it is important to discover how teaching can be made more effective, especially for hard-to-teach pupils.

#### **4. General or Vocational Education?**

Countries differ greatly in the extent to which vocational education is part of the school curriculum. The US is at one end of the spectrum, where vocational education is not a separate track within secondary schools. Northern European countries such as Germany and Austria are at the other end of the spectrum where there are two separate tracks at secondary level (and additionally, students are selected into these tracks fairly early). The argument in favour of early vocational education is that it may be very beneficial for the economy and for the students themselves if specific skills are taught to a high level at an early stage. In particular, it may help motivate students who are not interested in pursuing academic study and facilitate their transition to the labour market. On the other hand, if there is structural change in the economy, vocational skills may become less useful and such workers may not be equipped to transfer skills and knowledge to other areas.

Krueger and Kumar (2004) link educational content to economic performance at a continental level, contrasting the growth patterns and history of the US with that of Europe. They focus on the 1980s and 1990s, when US growth became stronger relative to European countries (and Japan) in contrast to the previous decades. They argue that the US offered a general curriculum at secondary level, which was much better suited to a period of rapid technological change, and the need to adopt new technologies, than the vocational specialization characterizing European education. However, the study does not do justice to heterogeneity within Europe (Wolf and McNally, 2011).

There have been studies making use of quasi-experimental evidence to test whether workers fare better with general or vocational education. For example Malamud and Pop-Eleches (2010) make use of a major educational reform in Romania in 1973, where cohorts born after 1959 received much less vocational education (on average) than those born earlier. They found that those educated after the change were significantly less likely to become craftsmen or manual workers than those born before; but they found no significant impact on the probability of unemployment or on earnings. In this case, the large cross-sectional difference in labour market outcomes between vocational and general education graduates appears to be driven mainly by selection. However, there are studies that have the opposite implication. For example, Lamo et al. (2009) consider the experience of Poland and Estonia during the period of EU enlargement. They argue that the experience of these two countries shows that specialized education reduces workers' mobility and their ability to cope with economic changes. They find that holding a vocational degree is associated with much longer unemployment duration spells and higher likelihood of leaving activity for older workers.

Hanushek et al. (2011) looks at these issues for individuals in a panel of 18 countries using data from the International Adult Literacy Survey. Their main hypothesis is that the relative labour-market advantage of vocational education (compared to general education) decreases with age. To investigate this, they compare the age-employment patterns of workers of the two education types within each country (1994-1998), under the assumption that selection into the different education types has not varied across age-cohort (which they try to account for in various ways). They find that while individuals with a general education are initially 7 percentage points less likely to be employed than those with a vocational gap, the gap in employment rates narrows by 2 percentage points every 10 years. This implies that by age 50, on average, individuals completing a general education are more likely to be employed than individuals with completing a vocational education. There is heterogeneity between countries, and the pattern is most pronounced for 'apprenticeship countries' (Denmark, Germany and Switzerland). In all these countries, individuals completing a general education are more likely to receive careers-related education and to receive more hours of it as they come older (but the estimate is only statistically significant in Germany). The results for earnings look similar to employment in the pooled sample of countries with a significant vocational sector (but generally, the analysis for earnings suffers from problems of small sample size). The authors conclude that the advantages of vocational training in smoothing entry into the labour market have to be set against the disadvantages later in life. However, the impact of vocational education varies considerably with the specific institutional structure of schooling and work-based

training. Some calculations based on employment and earnings over the lifetime suggests that the balance of lifetime earnings favors vocational education in Switzerland and general education in Denmark and Germany. They suggest that a possible explanation is faster growth in the latter two countries – where the flexibility of general education has a greater payoff.

If these results are correct, then one policy conclusion might be that it is important that students entering a vocational track have sufficient general education and also that workers in vocational occupations have more opportunities for updating skills through their working life. The results would also caution against any move to stratify young people into general and vocational routes too early in life.

## **5. Apprenticeships in the UK and Other Countries**

Of course, the policy issue in countries is not only general versus vocational education but also what type of vocational education to develop. Apprenticeships is one of the well-thought of models of vocational education. As discussed by Wolter and Ryan (2011), the potential benefits of apprenticeship (compared to full-time schooling) are: (a) the cognitive and motivational effects of integrating theory and practice in skill learning; (b) a closer correspondence between the content of skills and the requirements of actual production systems; and (c) increased youth employment rates and better school-to-work transitions in general. Current evidence on these issues appears to be fairly mixed. A difficulty with making general claims has partly to do with variability between countries in what is meant by an apprenticeship (and what the alternatives are). Indeed this varies across sectors and occupations within countries.

Hilary Steedman has written extensively about the contrast between apprenticeships in England and in Northern European countries.<sup>26</sup> She suggests that there are fundamental problems with the system in England. In particular, both the quality and quantity of off-the-job training are much lower. Also, most apprentices are over 25 years of age (in contrast with other countries) and current government policy is making no effort to change this. Some contrasts between apprenticeship models in England and other European countries are shown in Table 2.

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<sup>26</sup> <http://eprints.lse.ac.uk/41764/1/pa013.pdf>

**Table 2: Comparing apprenticeship models in England and other European countries**

<b>Apprenticeship – England 2011</b>	<b>Apprenticeship – Austria, Germany, Switzerland 2011</b>
Employed status	Trainee status
Wage (high relative to other countries)	Trainee allowance
Short duration (average one year)	Long duration (average three years)
Most at lower skill level (Level 2)	Most at higher skill level (Level 3)
Outside providers train	Employers train on-the-job
Only 60% of apprentices are under 25	Apprentices are normally under 25
Minimum 100 hours off-the-job training	Minimum 900 hours off-the-job training
4-8% of employers train apprentices	25-30% of employers train apprentices

From Steedman (2011)

Steedman (2011) suggests the policy should have the following aims:

- maximise incentives for employer participation and management of training;
- ensure that young people are not ‘crowded out’ by adults;
- and create conditions that encourage high value-added training.

She suggests the following policy levers that could be deployed to implement these aims:

- extending current pilots of simplified direct funding to medium-sized employers;
- introducing a sector levy to contribute to the cost of sector skills bodies and thereby increase employer commitment;
- switching funding for adult (over-25) apprentices to under-25s to release resources for Level 3;
- re-introducing the entitlement to an apprenticeship place for 16-19 year olds – but at Level 3, with 5 GCSE Grades A\*-C or equivalent as a prerequisite;
- and funding employers of 16-19 apprentices for providing the transferable (education) elements of the apprenticeship programme – recommendation 14 of the Wolf Report (DfE, 2011).

It is not only apprenticeships that need to be overhauled. Other aspects of the vocational system have long been criticised – particularly with regard to having too many qualifications with little or

no value in the labour market. The latest review has recently been conducted by Wolf (2011). This includes a whole range of proposals which the government has given a positive response to.<sup>27</sup>

## 6. Conclusion

Different international surveys and national data give conflicting evidence about the relative performance of the UK and changes over time. However, recent surveys of PIRLS and particularly PISA suggests that the UK is not doing as well as might be expected compared to international competitors and performance has deteriorated in recent years. A particular long-standing problem are too many school leavers with inadequate skills and qualifications. As in many other areas, socio-economic inequality in educational outcomes is particularly high in the UK.

The fact that strong inequalities in cognitive ability are evident even before children start school (by gender, ethnicity and family background) suggests that these problems do not all originate within the educational system. In fact, family background is much more important in determining educational outcomes than schools. Policy solutions aimed at improving educational outcomes might also be appropriate in other areas of social policy aimed at families (housing, jobs, poverty) as well as pre-school and in the educational system itself.

There are some radical solutions to disadvantage that have been shown to have good results in particular contexts (charter – KIPP - schools in Boston; the Harlem Children’s Zone in New York). They appear to work partly because the school substitutes for the parental role in some respects. More generally, high quality teachers are very important for improving student outcomes – and especially the outcomes of disadvantaged students. Policy solutions aimed at recruiting and retaining high quality teachers appear to be crucial for improving the educational system. However, it would be unrealistic to expect radical change in the stock of teachers for some years. It is important that we find out to what extent on-the-job training and particular pedagogical approaches are effective for improving how teachers do their job. There is some good (but limited) evidence about pedagogy. However, this is clearly an area that would benefit from more research. With regard to pedagogy, a higher priority should be given to robust evaluation that it capable of discerning whether approaches have a medium to long-term impact.

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<sup>27</sup> <http://www.education.gov.uk/a0074953/review-of-vocational-education-the-wolf-report>

Other school policies such as general school expenditure, increasing accountability, choice and competition, and school autonomy all have a role. Policies in these areas appear to interact with each other in important ways. For example, although increasing school expenditure has been shown to have had a positive impact, it could probably be more effective if head teachers were able to spend it on rewarding good performance (by teachers or departments) rather than have to adhere to very rigid systems of remuneration. Competition between schools might be a mechanism for improving performance, but only if head teachers are able to respond effectively. This may require more autonomy in how they make decisions. But if this autonomy is inappropriate (e.g setting their own exams) or without proper monitoring, this can have perverse consequences. To date, the debate within England has been about whether or not autonomy is a good thing. However, the way in which school autonomy has been implemented should be more carefully scrutinized – particularly in how schools are being monitored and how to deal with failing management.

Finally, the failures within the vocational system of education in England are well known and documented. The mediocre apprenticeship system is just one prominent example. In order to see improvements in staying on rates (and the quality of education after that time), it is essential to improve the vocational options on offer.

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