By Martin Kaliszewski, Astrid Fieldsend and Tony McAleavy

England's approach to school performance data – lessons learned

Education Development Trust

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Welcome to Education Development Trust

At Education Development Trust, we have been improving education around the world for 50 years. We design and implement improvement programmes for school systems, and provide consultancy services deploying specialists internationally. Our work is informed by our continually refreshed body of research which focuses on the bright spots in education, from education authorities as diverse as those in Vietnam, Kenya, England, New York and Dubai.

Bringing about real change that alters the aspects of a national system that, for many reasons, aren't working so well at the time, requires knowledge and ability to design and implement changes to any of the levers that can impede great educational outcomes. So the ability to affect policy, practices, pedagogy, behaviour, funding, attitudes and more is a prerequisite for a company that can truly claim to transform lives through improving education.

As highly informed agents of change operating in low- to high-income countries with their varying internal contexts, we not only design but also show and enable, so when working with us, everyone involved, from policymakers to school leaders and teachers, is able to apply their new knowledge to drive sustainable system reform.

Our expert knowledge, programme design and implementation expertise is also deployed in delivering Ofsted-rated outstanding careers services in England, and in owning and managing a family of independent schools.

We are a not-for-profit and we are driven by our values of integrity, accountability, excellence and collaboration.

About the authors

Martin Kalizewski is an education consultancy professional with over 17 years' experience of leading and managing the use of school performance data in government local authorities, England as a whole and several international contexts. He has been a significant contributor to the English national data system, known as RAISEonline, which is used by schools and Ofsted inspectors. This web-based, pupil-level data driven analysis system was the first of its kind in the world. Known in the UK as RAISEonline, it provides detailed reporting to enable approximately 20,000 schools to evaluate their performance in support of their self-evaluation and to provide inspectors with the data necessary to inform school inspection.

Martin trained as a teacher for both primary and secondary sectors, and he has taught in a range of secondary schools in England. Initially a mathematics teacher, he quickly moved into senior school leadership roles before becoming a School Adviser for East Sussex local authority, where he supported school improvement across all phases of education and all types of schools. He was responsible for monitoring schools' performance and setting targets for improvement. In 2006, Martin was seconded to the UK government's Department for Education to take on this role in a national context through his work developing the RAISEonline system.

Martin has also worked closely with the Fischer Family Trust (now known as FFT) to help them develop the UK's national system for school self-evaluation reporting.

As a Principal Education Consultant at Education Development Trust, Martin travelled to Brunei to advise and train the Ministry of Education on data systems. He also travelled to Rwanda to provide analysis of the current data architecture of the Rwandan Ministry of Education and Rwanda Education Board; developing solutions for an analytics platform; developing solutions for mini-assessments in Rwandan primary schools; and developing programme monitoring solutions aligned to the data architecture vision. Martin also completed an initial scoping exercise for the sampling methodology for the monitoring and evaluation component.

Astrid Fieldsend has spent most of her professional life teaching in challenging secondary schools in London in a variety of roles up to Senior Leadership level. While teaching, she worked on education projects for a range of organisations including Google and the Varkey Foundation, as well as undertaking an MA in Education Leadership at UCL Institute of Education, developing experience across the sector. Astrid's interest in England's use of data stems from her time spent in school, particularly while in roles focused on raising achievement.

Astrid joined Education Development Trust in February 2017. Since joining, she has combined business development and project management within the Research and Consultancy team, as well as carrying out technical assignments in the UK and overseas.

Tony McAleavy is Education Development Trust's Research and Development Director, with corporate oversight of the educational impact of all Education Development Trust's activities and the Education Development Trust public domain research programme. Tony has worked extensively on school reform in many countries, particularly in the Middle East. He has an MA in Modern History from St John's College, University of Oxford.

Foreword

Every year the World Bank produces the World Development Report[1] (WDR) analysing some of the key challenges facing humanity. The WDR for 2018 focuses exclusively on the challenges that the world faces in the field of education, and highlighted the urgent need for good data about student learning outcomes within any improving government school system. The authors of the WDR 2018 remind us of the challenge we face as a global community in our attempts to ensure that all students have access to a high-quality school education as measured by good learning outcomes. They recommend three inter-connected and complementary strategies needed to drive better outcomes:

- **Assess learning—to make it a serious goal.** Measure and track learning better; use the results to guide action.
- **Act on evidence—to make schools work for all learners.** Use evidence to guide innovation and practice.
- **Align actors—to make the whole system work for learning.** Tackle the technical and political barriers to learning at scale.

The WDR 2018 talked about the need for measurement that shines a light on learning. Educational data is the fuel for the engine of school improvement. By itself data changes nothing but, properly used, data can stimulate beneficial change at every level: from the dialogue between a teacher and an individual student to the decisions made national policymakers about priorities for educational reform.

> *The first step to improving systemwide learning is to put in place good metrics for monitoring whether programs and policies are delivering learning. Credible, reliable information can shape the incentives facing politicians. Most notably, information on student learning and school performance—if presented in a way that makes it salient and acceptable—fosters healthier political engagement and better service delivery. Information also helps policy makers manage a complex system. Measuring learning can improve equity by revealing hidden exclusions.*[2]

Experience from England supports this analysis and provides a case study for the first of the three recommended strategies: the systematic tracking of learning outcomes and the use of the resulting data as a guide to action at every level of the system.

This report tells the story of how the national Education Management Information System has evolved in England. They key components of the system are a regime of reliable tests taken by all students in all government schools at ages 11 and 16 and a National Pupil Database which links the test results to the background of each student. This link between background and academic outcomes is made possible through the use of the Unique Pupil Number (UPN). The UPN supports a comprehensive electronic record of the background every student in terms of gender, ethnicity, first language, poverty levels and special educational needs.

[1] World Bank, 2018 [2] Ibid., p.16

It is therefore possible to track the performance of students from different backgrounds and to benchmark the outcomes for every school, district and region in the country.

In the following pages the evolution of this system is described. One key feature is a high degree of public accountability based on data transparency. Official data on the performance of schools is shared with parents and the wider community. Test results for each school for 11 year-olds and 16 year-olds are published and since 1992 performance tables showing the results for all schools are made public. The publication of test results is closely associated with the publication of school inspection data and inspection reports.

The data system in England is heavily dependent on computer-based technology. Public data is hosted on websites. Confidential data is also available for school staff, school inspectors and others through a password-protected passport.

The development of the data system in England has not been without problems and some controversy. Publishing performance data can have unintended and sometimes negative consequences. Many teachers consider that there is too much data-based accountability in England and not enough support for their professional development.

The report describes some of the debates that have taken place in recent years. Should we use simple binary pass or fail measures or are there more comprehensive measures of learning outcomes? How should we address the fact that schools serving different communities will often have a different learning baseline? Should there be measures of progress and 'value-added' as well as 'raw performance scores?

One of the most important, and positive aspects, of the story told in this report is the way that the data system has been used for internal purposes of school self-evaluation and school development planning. A good data system can contribute to school improvement both through assisting external accountability and internally-driven changes led by school leaders. Our own research into the improvement of schools in London and the rapid turnaround of some schools in England has indicated how important data-based self-evaluation can be.

The English approach is not presented here as a blueprint for other countries. Every education system needs its own unique rote map to between student outcomes. While we are not advocating that people in other countries simply copy English practice, we are confident that policymakers worldwide will find aspects of the data story in England interesting and instructive.

Tony McAleavy
Director of Research and Consultancy
Education Development Trust

Chapter 1

Introduction

This report focuses on the development of England's national Education Management Information System.

Data has played an important role in England's recent school improvement journey. The evolution of the approach has not been perfect but the National Pupil Database has become a vital tool for health checking the education system, driving accountability, directing education policymaking and tracking the educational attainment of key vulnerable groups.

Within the United Kingdom, education is a 'devolved' responsibility managed at the level of each of the four national jurisdictions: England, Northern Ireland, Scotland and Wales. This report focuses on experiences in England, which is by far the largest of the four political units. There are more than 20,000 government schools in England and more than a half million pupils in each year group.

The school system in England is highly accountable. This has not always been the case but during the years 1988-1992 a relatively centralised system of accountability was put in place based on:

- new tests for pupils in all primary schools
- the publication of results of primary and secondary school test results
- a new tough school inspection agency, called Ofsted, which published its regular reports in to school quality.

The national accountability system evolved further in 1999-2002. A system of unique 'identifiers' were established for all pupils in government schools. This Unique Pupil Number (UPN), which was established in 1999, is a focal point for key data associated with every single student who goes to a government school. The value of the UPN system was enhanced in 2002 when a comprehensive survey of all students was established known as the Pupil Level Annual Schools Census (PLASC). Since then, the government in England has collected individual pupil data from all government schools for all pupils. This has been used to create the National Pupil Database (NPD): a rich and extensive longitudinal data set which is analysed by researchers, policy makers, national and local government officers, school inspectors and the schools themselves.

The national data set in England now includes information about tens of millions of current and former school pupils; for those who have graduated from the school system the data can be used to track progress during their entire school career. This data set is comprehensive, including all government schools. The information has, over time, become more detailed in content and enabled more sophisticated analysis. As a result, a considerable amount of information is now held about pupils 'tagged' to each individual's UPN. The UPNs act as identifiers allowing pupils to be tracked regardless, for example, of whether their families move to different parts of England during their school career. The UPN enables detailed data about individual

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pupils' progress to be collated and analysed. The system also facilitates the generation of data about the academic progress of specific cohorts of students (for example, girls versus boys, those living in poverty or those with special educational needs) to be extrapolated for analysis and tracking.

The system is now data rich. In addition to the national data set, schools also undertake considerable additional data collection about the performance of their own pupils. This is done for the purpose of tracking performance against targets and learning criteria. Additional school level information is not regulated by the government or any other national bodies, and is used by schools for their own internal diagnostic purposes. It is an expectation, however, that schools track and monitor pupils in this way and are able to use the rich data collected to assist with the school self-evaluation and improvement planning process.

Technology plays a key role in underpinning the national and more localised school collection, storing and analysis of data. The collection and processing of this data has been enabled by the widespread proliferation of lower cost computers and software available to the sector since the launch of personal computer and software, based upon graphical user interfaces both of which were used in schools from the mid-1980s and became more widespread in the 1990s.

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This report seeks to provide insights and lessons from the collection and use of data in England in recent years

The purpose of this report is to highlight some of the lessons learned and successes of the England national pupil data story. This report is based on the expertise and experience of its authors and draws on some relevant literature to support key points and provide illustrations. We do not intend to provide a detailed history or completely comprehensive account of the story of English education data. It is not our intention to suggest that England's system should be seen as a perfect example and used simplistically as a blueprint for others. Instead, this report is intended to offer insights for policymakers in other countries where a national pupil level data system is being developed or refined. By sharing England's story we hope also that others may be able to avoid some of the mistakes and unexpected consequences that were made in the last three decades of development in England.

Our report provides analysis of seven key lessons

1. The school accountability system in England benefits from a data infrastructure of national tests and information about pupil characteristics, supported by technology.

2. English experience demonstrates the risks of an over-simplistic approach to school performance data.

3. In England, there has been an important and lively debate about 'value-added' measures which take into account the starting points of pupils.

4. There is a need for a national accountability system that evolves over time.

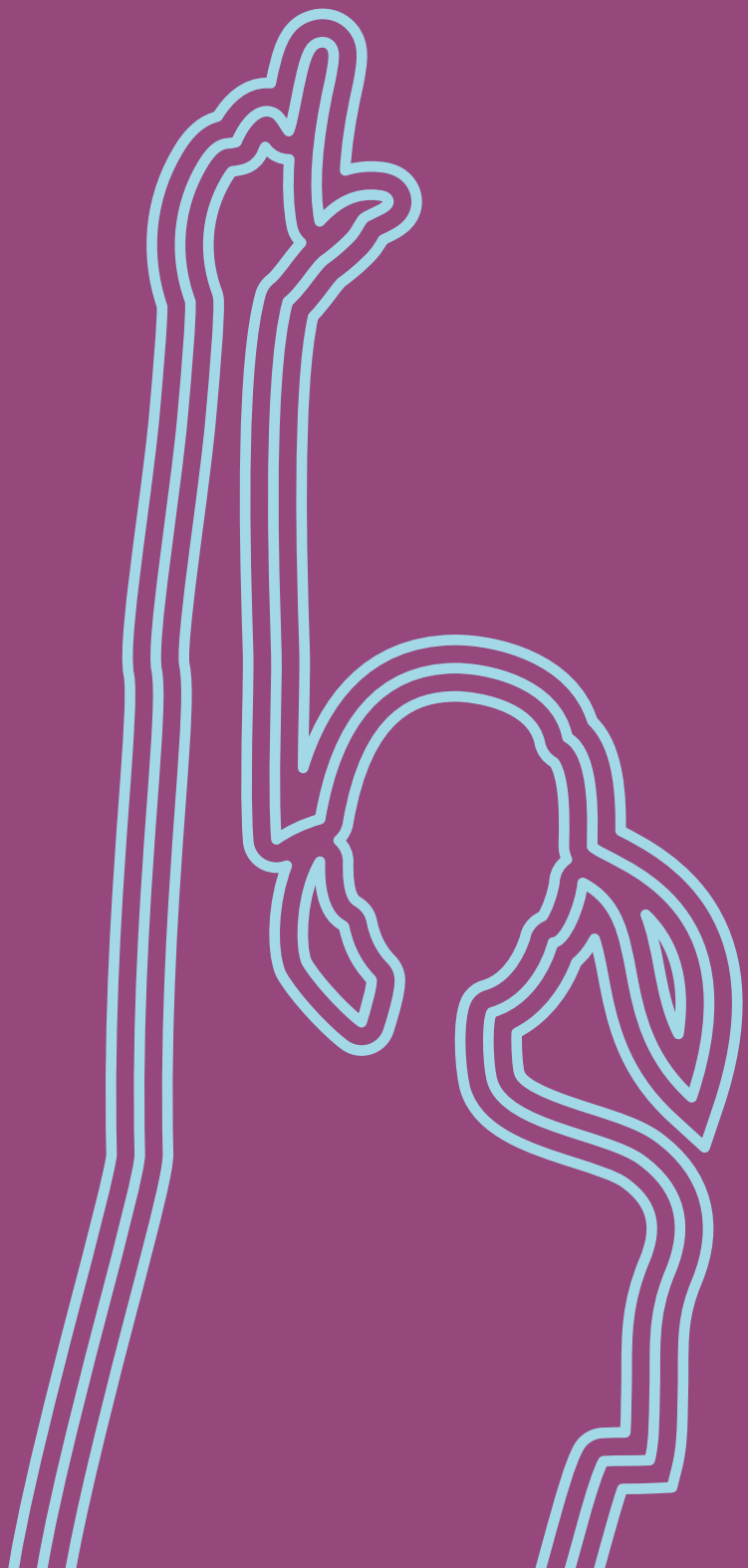
5. Accountability measures used in England have played a significant role in the development of school self-evaluation.

6. Schools can benefit from comparing their own students' performance with that of the national database through item level analysis.

7. There should be an alignment between data-based support for internal school improvement and external school improvement through inspection.

Chapter 2

The lessons learned



Lesson 1: The school accountability system in England benefits from a data infrastructure of national tests and information about pupil characteristics, supported by technology.

In recent years, the prime purpose for school performance data in England has been to enable schools to be held to account and, through data-driven accountability, to generate an increase in educational standards. Whilst the data is also available to researchers and academics, this access is additional to the prime need to provide public accountability for the performance of government schools funded through public taxation. The data system has enabled successive governments to drive an agenda of national reform and to attempt to improve teaching and learning.

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The current national data infrastructure in England has, as an essential component, high stakes tests which can be analysed at the level of the individual pupil, the school, the district, the region and the whole country.

The government defines performance indicators for school quality and publishes these in an annual 'Statement of Intent'. Educational data is politicised. Performance indicators are decided by ministers and, of course, often reflect their political priorities. Ministers may, for example, be of the view that some subjects are more important than others and choose to emphasise these subjects in a measure that they approve. Past ministers have remarked that these accountability measures are one of the 'big national levers of change' available to them.[3]

In England current examples of government indicators are based on expectations that:

- Pupils should attain an 'expected standard' at the end of primary schools (Key Stage 2, age 11) in reading, writing and mathematics.
- Pupils should attain a 'good' outcome at the end of secondary school (Key Stage 4, age 16) in the five subject areas termed collectively 'the English Baccalaureate' (English, maths, the sciences, history or geography and a language).[4]

The purpose of setting such expectations and using these as public indicators of performance is to incentivise school leaders and teachers to bring about good student outcomes as defined by these measures. Much school performance data is placed in the public domain. The system is highly transparent. The systematic publication of 'performance tables' for public examination and test results, which began in 1992, is now an established feature of the educational system in England. The performance tables are sometimes referred to as 'league tables'. The publication of results in 1992 coincided with the establishment of the national

[3] Estelle Morris, 2014 [4] DfE, 2016a

school inspectorate, Ofsted, which publishes its inspection findings. Published test results and published inspection reports have, ever since 1992, been part of the accountability infrastructure.

In England, all pupils attending government schools take part in tests and other national assessment activities throughout their school careers. The most important assessment measures are tests undertaken by almost all 11 year olds at the end of Year 6, and examinations (known as the GCSE: the General Certificate of Secondary Education) undertaken by most 16 year olds at the end of Year 11. The school level results for these tests and examinations are published.

With regard to data from these tests, the government has identified key thresholds – in effect pass or fail judgements – that can be used to measure the academic success of all pupils. For pupils leaving primary school, the 2017 attainment thresholds are:

- attaining the 'expected' standard in reading, writing and mathematics
- attaining 'greater depth' in reading, writing and mathematics.

For 16 year olds at secondary school, the 2017 attainment thresholds are:

- attaining a good pass in English and mathematics
- attaining a good pass in five subjects that are collectively known as the English Baccalaureate.

Published 'league tables' of school level academic results have existed in England since 1992. In the years that followed, there was some dissatisfaction with a system that compared different schools using 'raw' attainment data and largely ignored the question of 'value added' compared to baseline on entry. In 1997, the report of the Value Added National Project was published, following almost two years of study from researchers at the University of Durham.[5] A significant recommendation of this report was the need to establish Unique Pupil Numbers (UPN) that would allow the progress of individual pupils and groups of pupils to be tracked. Today's UPN system was introduced in 1999. UPN was eventually linked to an authoritative annual survey of the government school population known as the Pupil Level Annual Schools Census (PLASC)[6] which was introduced in 2002.

Careful consideration had to made of data protection issues and processes put in place to secure the data and decide who should be granted access.

Today, each student enrolled in a government school is given a UPN in the form of a unique 13-character identifier which is used to track attainment during the pupil's school career. The following guidance issued by the government in 2013, and updated in 2017, explained the purpose of the UPN system:

> *'The system was introduced to enable accurate and timely data sharing between schools, Local Authorities and central government, strengthening procedures for target setting and monitoring, policy evaluation and monitoring, thereby contributing to the raising of standards.'*[7]

The design and use of the UPN system is governed by strict confidentiality rules that comply with data protection legislation. The system is compulsory for government schools and optional for private schools.

Each student enrolled in a government school is given a UPN in the form of a unique 13-character identifier which is used to track attainment during the pupil's school career

[5] Fitz-Gibbon, 1997 [6] In England PLASC was replaced by the National Pupil Database in 2006/7 – see https://nationalpupildatabase.wikispaces.com/ [accessed 11th Dec 2017] [7] DfE, 2013

The National Pupil Database (NPD) is based on a national aggregate of UPN data. It tracks the academic performance of all pupils and can be analysed at national, regional, district and school levels. The patterns of performance can also be segmented at each of these levels according to the background of groups of pupils. This is because each UPN is 'tagged' so that in addition to academic attainment, the following information for pupils is recorded:

- age
- ethnicity
- gender
- socio-economic status as indicated by entitlement to free school meals
- the wealth or poverty levels of the pupil's immediate neighbourhood as indicated by each pupil's 'post code' which indicates precisely where they live
- first language
- whether the pupil has any recognised Special Educational Needs.

The data infrastructure is supported by technology: a public system for parents and the community, and a confidential system for school staff and inspectors.

Today, any parent or other member of the public can access the overall school performance tables[8] and look at a range of key information about any school in England. This insistence upon public transparency is intended to:

- apply pressure on professionals to improve performance
- enable parents to access detailed school performance information when choosing a school for their child to attend.

Below is an example of the information about schools made available to parents enabling them to compare performance. The website also links to inspection

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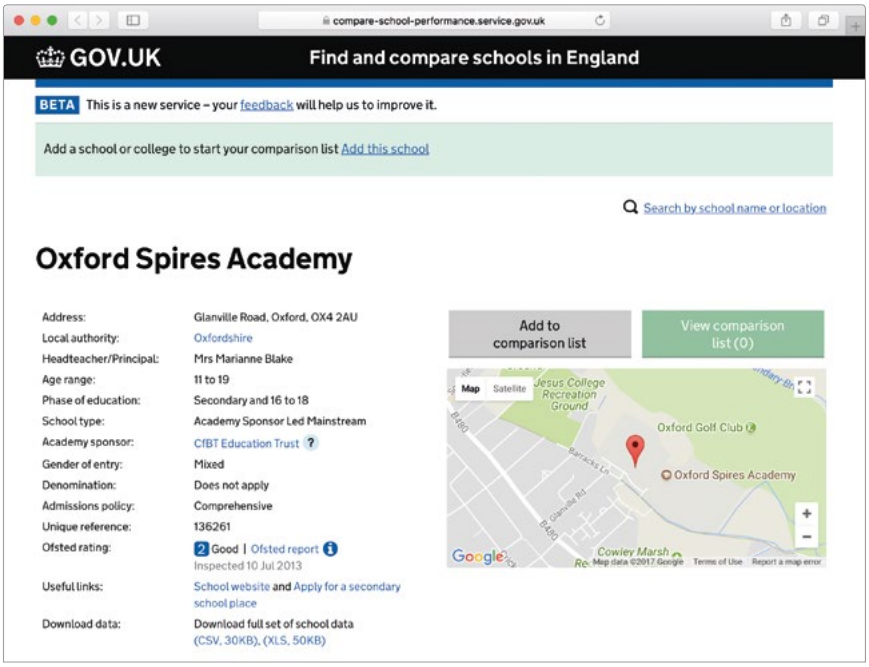
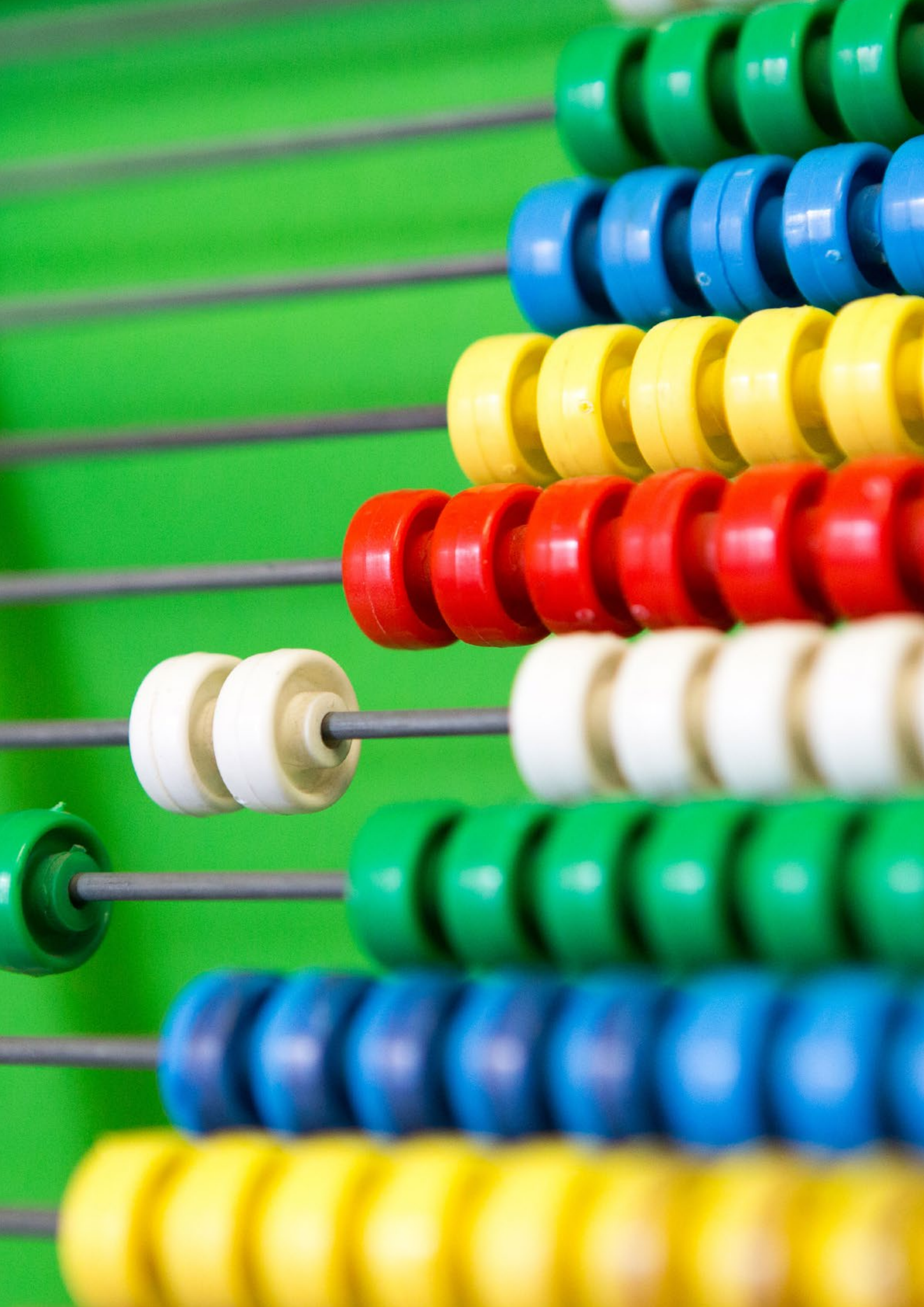
FIGURE 1: AN EXAMPLE OF INFORMATION MADE AVAILABLE ABOUT SCHOOLS



[8] See https://www.compare-school-performance.service.gov.uk/ [accessed 8th Dec 2017]



reports and gives access to detailed school performance data. For full details visit the compare school performance webpage.[9]

While school level results are published, detailed group and individual pupil performance data is confidential and available to school staff and school inspectors only. Teachers and inspectors use a single secure access website. This was known as RAISEonline until it was replaced by the Analyse School Performance website from 1 August 2017.[10] Secure access ensures protection of sensitive pupil data through the use of username and password access.

The full name for RAISEonline was Reporting and Analyses for Improving School Self Evaluation. It was a web-based system providing data to support school self-evaluation and to assist data informed school inspection. The intended users were school staff, Ofsted inspectors and other professional stakeholders, but not the public. Access to the system was protected by usernames and passwords. This access was differentiated according to the user so that only school staff could see pupil identities, whilst other users of the system had access to the vast majority of the data but were denied access to the pupil identities.

The revised web-based data system, Analyse School Performance, can only be accessed from the government's secure access site.

While school level results are published, detailed group and individual pupil performance data is confidential and available to school staff and school inspectors only

[9] The webpage can be accessed at https://www.compare-school-performance.service.gov.uk/school/136261 [accessed 8th Dec 2017]
[10] See http://www.forschoolseducation.co.uk/analyse-school-performance-raiseonline-replacement/ [accessed 11th Dec 2017]

Lesson 2: English experience demonstrates the risks of an over-simplistic approach to school performance data.

Experience in England has highlighted some of the potential but also some of the possible pitfalls of national data systems.

The notion of a single indicator, or a very small group of indicators, able to provide the basis for an overall judgement of school quality may have some attractions to policymakers, but schools are complex organisations and good schools must ensure multiple outcomes. School performance needs to be measured using multiple dimensions and this requires different types of indicators.

It is also important to see performance indicators as the beginning rather than the end of a reflection on school effectiveness. Performance indicators make possible further questions about a school's performance and effectiveness, but by themselves are not sufficient to draw definitive judgements 'from a distance'.

Performance indicators make possible further questions about a school's performance and effectiveness, but by themselves are not sufficient to draw definitive judgements 'from a distance'

Binary pass or fail measures are often used in data systems, and we call these measures 'threshold indicators'. Such threshold indicators are not without value. They have proved useful in clearly articulating government expectations for student outcomes. However, while threshold measures are easily understood, the resulting data can be misleading. Schools can have different data in terms of threshold performance but drilling down into the underlying pupil data may show that the difference is explained by the performance of a very small number of pupils, and that the actual differences between the schools are much smaller than it first appears. This is particularly true for small schools. Threshold data does not always provide a very nuanced view of performance. Knowing that, for example, 70% of pupils have attained the 'expected' standard tells us nothing about *how much* better than 'expected' the pupils attained, and it tells us little about the specifics of the attainment of the 30% of pupils who did not meet the 'expected' standard. Did they fail narrowly to meet the target? Or was there a wider variety of performance levels within this group?

The use of averages is an alternative to a threshold measure but averages can also be misleading. Average attainment indicators, such as 'average score or grade attained', offer the advantage of describing all the outcomes for a pupil or school regardless of whether any outcome met a particular standard. However, this makes the measure less accessible for a range of users.

Consider the following example (Table 1) in which five pupils score outcomes on a scale of 1 to 8 and a good pass is a score of 5 or more:

TABLE 1: THE NECESSITY TO REQUIRE BOTH THRESHOLD AND AVERAGE MEASURES, ILLUSTRATED BY FIVE PUPILS SCORE OUTCOMES ON A SCALE OF 1 TO 8

	School 1	School 2
Measure: Pupil outcomes	2, 3, 4, 5, 6	1, 1, 5, 5, 8
Threshold measure: % attaining a good pass	40%	60%
Average score	(2+3+4+5+6)/5 = 4	(1+1+5+5+8)/5 = 4

Although the above example may seem trivial, it illustrates the necessity of requiring both measures – threshold and average – in order to better understand performance.

Headline whole school data often hides important internal variations. A mature approach to evaluating performance across a system like a school demands a range of indicators which enable us to answer questions such as 'what was the average attainment across particular group of pupils?'.

Both threshold measures and averages fail to show the level of progress that students have made during a course of study. Headline aggregate threshold measures and averages also fail to shed light on the relative performance of different groups of students such as boys or girls, or those from different socio-economic backgrounds.

During the last three decades, there has been considerable discussion in England about the relative merits of different types of measure and this has led to some interesting but also controversial experimentation in the field of 'value added' data which is described in lesson 3, overleaf.

There has been considerable discussion in England about the relative merits of different types of measure and this has led to some interesting but also controversial experimentation in the field of 'value added' data

Lesson 3: In England, there has been an important and lively debate about 'value-added' measures which take into account the starting points of pupils.

The academic performance of a school is determined in part by the pre-existing achievements of pupils before they join the school. Teachers have, of course, always been aware of this and that some schools serving socially advantaged communities, and in which the academic starting points of pupils was relatively high, can have lower rates of progress than other schools with poorer initial intakes. Schools with higher rates of progress compared to baseline attainment are surely more effective. There is a strong case, therefore, for an adjustment of attainment scores based upon a baseline of the intake achievements of pupils. This adjustment, leading to 'value-added' scores for schools, is now a well-established principle and accepted formally by the government in England, but the exact mechanisms for calculating 'value added' remain contested.

The academic performance of a school is determined in part by the pre-existing achievements of pupils before they join the school

The first 'league tables' of school performance in England published in 1992 did not include a 'value added' dimension. There was a public debate about the need for a fairer 'value added' approach throughout the mid-1990s. The University of Durham published a report based on a Value Added National Project.[11] This report called for 'the development of a national system of value-added reporting for schools based on prior attainment, which will be statistically valid and readily understood'. After a pilot phase for secondary schools from 1998 onwards, 'value added' scores were published for all secondary schools in England in 2001 and for all primary schools from 2003.[12]

A National Audit Office report in 2003[13] suggested that this was not enough and recommended that school performance information should take into account not just prior attainment, but also 'other external influences on performance', based on UPN data, which provided data about the characteristics of individual pupils such as ethnicity, poverty levels or gender. In 2005, following a process of consultation involving academics, statisticians at the DfE, schools, local government and others, a 'Contextual Value Added' (CVA) score was published on a pilot basis in the performance tables. CVA results for all secondary schools were published in 2006. The CVA calculation adjusted the 'estimate' for the performance of pupils by considering a range of factors including a pupil's gender, date of birth, ethnicity, special educational needs status and poverty levels. Many considered this to be a fairer method for evaluating school effectiveness, and proved useful in challenging schools with advantaged intakes whilst providing a measure that offered schools with very challenging intakes a way of demonstrating their effectiveness with their pupils. With CVA scores, schools could no longer argue that a set of results was poor because there were more boys than girls that year or that they had a high proportion of pupils with special educational needs.

[11] Fitz-Gibbon, 1997 [12] DfEE, 1998; Ray, 2006 [13] The National Audit Office, 2003

From the beginning, the CVA system was controversial. Some people thought that the CVA formula was too complex and mysterious, understood only by statisticians. The earlier Durham University National Project had advocated simple statistical approaches and not more complex, multi-level models such as CVA. Others thought that the CVA approach encouraged lower expectations for pupils from different backgrounds. They argued: why should we have lower expectations based on gender or ethnicity?

As the CVA approach was implemented a growing concern developed that some schools were playing or 'gaming' the system. Some 'contextual' information could be altered. An example was special educational needs categories for pupils, which at the time was subject, to some extent, to alteration at the discretion of school staff. There was a growing perception that *some* schools where choosing to over identify pupils on the special-needs action register, which was known to have the beneficial side effects of improving the CVA score for a school. Additionally, some schools began entering pupils for what were perceived by some to be 'easier' qualifications in the examinations for 16 year olds, which also had the effects of improving CVA scores.

As the CVA approach was implemented a growing concern developed that some schools were playing or 'gaming' the system

In 2010, the government policy paper 'The Importance of Teaching',[14] called for an end to the CVA measure in England and it was phased out from 2011. In its place, the government developed new 'value added' measures for secondary schools. The Progress 8 measure that is used for secondary schools today has reverted to a methodology based on prior attainment without any reference to the particular background of individual students in the school cohort.

Recent guidance[15] on the use of performance data recognises the significance of 'value added' but takes a much a simpler approach than that adopted during the CVA years:

> *'In the performance data, we group pupils at key stage 2 and key stage 4 as low, middle or high attainers, depending on their attainment at the end of key stage 1 and key stage 2.'* [16]
>
> *'You should consider how well a school's low, middle or high attainers are progressing. This is an indication of whether a school is equally effective at helping all of its pupils meet their potential rather than, for example, just high attainers.'* [17]

[14] DfE, 2010 [15] DfE, 2016b [16] Ibid. [17] Ibid.

Lesson 4: There is a need for a national accountability system that evolves over time.

In an ideal world, changing official key indicators for the measurement of school quality should be avoided. Teachers and headteachers can be annoyed by frequent change, especially if they are unconvinced by the rationale behind any change. New indicators may require a lead-in time of several years before outcomes can be measured as it takes time for pupils to move through the system. Substantial changes to indicators also make any national time series analysis difficult, thereby limiting the scope for the authoritative evaluation of the effect of national policy changes over a long period of time.

New indicators may require a lead-in time of several years before outcomes can be measured as it takes time for pupils to move through the system

Despite these caveats, there can be a strong case for a national education data system to be modified. Over the last twenty years, the system in England has been reformed on several occasions. New pupil assessment activities have been added; one relatively recent example is the Phonics Screening Check that was introduced for the first time in 2012. This is a compulsory assessment of all children in government schools in Year 1 – typically aged 6 – to ascertain their reading proficiency. Similarly, in 2014, the government reformed the assessment system and abolished the so-called 'Levels' (the numerical grading system that was used to assess pupils at ages 7 and 11) on the grounds that they promoted a rather simplistic understanding of student progress.

In the remainder of this section, we reflect on some of the ways that the analysis of secondary school performance data has been changed in recent years, in response to both the priorities of politicians and a desire to provide a more comprehensive system that went beyond threshold measures.

A case study in the evolution of the English data system

There was a change of government in the UK in 2010. The new Cabinet minister for Education in England immediately established a new school performance measure called the English Baccalaureate (EBacc). It allowed people to see how many pupils in each school achieved a high grade across five traditionally 'academic' subjects which the minister considered to be 'core' subjects:

- English
- Mathematics
- History or geography
- Science
- a foreign language.

The reform was driven by a concern that too many students were stopping their study of a foreign language or a humanities subject, in the form of history or geography, at the age of 14. There was, of course, an element of subjectivity and political judgement in the decision to privilege these five subject areas. Advocates of other curriculum areas – such as the arts and physical education – were very disappointed.

The story of the introduction of the EBacc is an interesting case study in how performance indicators can change behaviour. Some, but not all, schools altered their curriculum in response to the EBacc performance measure. In 2016, The Sutton Trust, a research charity, assessed the impact on pupils in those schools which had significantly adjusted their educational offer following the introduction of the EBacc.[18] Their view was positive. They studied 300 secondary schools – termed curriculum change schools – which had transformed their Key Stage 4 curriculum between 2010 and 2013 in response to the new government policy, achieving a rise in the proportion of pupils entering the EBacc from 8% to 48%. In the view of The Sutton Trust, able students from disadvantaged backgrounds benefitted from this change because it provided them an opportunity to achieve in subjects highly valued by top universities.

The story of the introduction of the EBacc is an interesting case study in how performance indicators can change behaviour

The Attainment 8 and Progress 8 reforms

For many years, the highest profile secondary school performance indicator was a percentage measure of pupils attaining five 'good' General Certificates of Secondary Education (GCSEs) by the age of 16. The GCSE qualifications were of a 'good' standard if a pupil attained a grade A (later including a new grade of A*), B or C only (the full range was A through to G). This 5+ A*-C percentage incentivised schools, teachers and pupils to attain these higher grades in five separate subjects, but has also had unintended consequences and accidentally introduced perverse incentives.

The measure emphasised the importance of five subjects being passed at a good standard, but did not specify the subjects themselves. A further assumption was that a grade C and above was the same standard across all subjects and that any five subjects would do. School leaders in the system responded accordingly, maximising the 5+ A*-C grades to impress the local community and the school inspectorate. In some cases, schools realised that they could achieve this by having pupils succeed in subjects that were not necessarily of sufficiently high value and would not provide the best basis for further study or personal development. In other words, the pupils' best interests were not always considered first and foremost. Furthermore, it became clear that some schools were seemingly doing well but on closer inspection essential subject areas such and English and maths were not being prioritised for all pupils. It is widely accepted that high standards in literacy and numeracy improve the life chances of students worldwide. Many pupils attaining 5+ good grades were not doing well in these core subjects areas. The government took action. In 2004 the accountability measure was redefined so that the five good qualifications had to include both English and mathematics.

[18] Allen and Thompson, 2016

This change seemed to encourage schools to prioritise English and maths, but those still seeing a need to play the system focused attention on the borderline grade C pupils instead. There was a strong incentive to focus on interventions for, and direct resource towards, those pupils close to the C/D borderline. There was much less incentive to focus interventions or teaching resource elsewhere. For example, on the A/B or F/G grade boundaries. There was also the widespread view that these measures emphasised 'teaching to the test.'

Trying to avoid or address perverse incentives in setting performance measures

All performance indicators have the potential to introduce such perverse incentives and these concerns can only be mitigated by either introducing other additional indicators alongside or by rethinking the principles behind the accountability measures.

Following the 2010 election and a change of government in England, as mentioned earlier, the accountability measures for English secondary schools were reconsidered. Fundamental assumptions about the curriculum were re-examined. The number of qualifications being used to hold schools to account was deemed to be too small, with only five counting. This was fundamentally revised into a new performance measure, now known as Attainment 8,[19] which would count eight separate subjects.

Additionally, the qualifications themselves were reviewed. Many were judged to be of low value and removed from the list of qualifications approved for accountability purposes.[20] However, schools were able continue to offer these qualifications if they wished. Of the eight high value qualifications that were to be counted, these had to include English, mathematics, science, a foreign language, a humanities subject and three others. Compared to other subjects, English and mathematics were given a double weighting in the calculation of each school's overall performance.

Following the 2010 election and a change of government in England... the accountability measures for English secondary schools were reconsidered

Planning a large scale national change, such as the introduction of Attainment 8, required long term planning. Schools leaders needed time to adapt their curriculum, deploy specialist teachers and adjust timetables. The new measure changed behaviour at school level. It has succeeded in schools changing their curriculum to maximise the number of pupils entered for these qualifications, with the first national results published in 2016.

Attainment 8 is not a so-called 'threshold measure' based on a key mark or threshold that constituted a 'pass or fail' mark. Progress 8 does not count the percentage of pupils attaining certain grades with certain qualifications. A lesson learnt from the previous concentration on grade C and the perverse incentives it had created was that the new accountability measure should value all the grades a pupil attained and not simply those of a type. The introduction of point scores required grades to be categorised numerically rather than alphabetically, as had been the case previously. A new number-based grading system was introduced for the GCSE examination in 2016.

[19] Further details can be found at https://www.gov.uk/government/publications/progress-8-school-performance-measure [accessed 8th Dec2017] [20] Wolf, 2011

TABLE 2: GRADE CONVERSION POINTS IN THE NEW ATTAINMENT 8 SYSTEM*

Previous grade for the GCSE examination	New point score (for teaching from 2016)
A*	9
A	7/8
B	6
C	5
D	4
E	3
F	2
G	1

*The new point scores for GCSE qualifications are in the process of further change in order to give greater weight to the highest gradings.

Table 3 explains the full range of quality indicators that are currently used to measure secondary school quality in published performance tables.

TABLE 3: 2017/18 PERFORMANCE TABLES HEADLINE INDICATORS FOR SECONDARY SCHOOLS IN ENGLAND

Indicator	Type of indicator	Description
Attainment 8	Average score	Calculated across 8 qualifying subjects
Progress 8	Value added score	Compares the performance of pupils with similar pupils nationally across 8 qualifying subjects
English Baccalaureate (EBacc)	Threshold indicator	Percentage attaining a good grade in English, mathematics, two sciences, a humanity and a language
English Baccalaureate (EBacc)	Percentage of pupils entered for the qualifying qualifications for the EBacc	A percentage of those entered for the EBacc (includes those who did not attain good passes)
English and mathematics	Threshold indicator (displayed as a percentage)	Percentage of pupils attaining a good grade (5+) in English and mathematics only
Destinations	Count and percentage	Statement about the percentage of students staying in education or employment after key stage 4
Pupil groups	All indicators are shown for specific pupil groups in a school	Prominence is given to disadvantaged pupils

The headline data set out in Table 3 is published via the performance tables, which can be located on the 'find and compare schools in England' web pages.[21]

[21] See https://www.gov.uk/school-performance-tables [accessed 11th Dec 2017]

FIGURE 2: AN EXAMPLE OF THE DEPARTMENT OF EDUCATION'S 'FIND AND COMPARE SCHOOLS' WEBPAGE

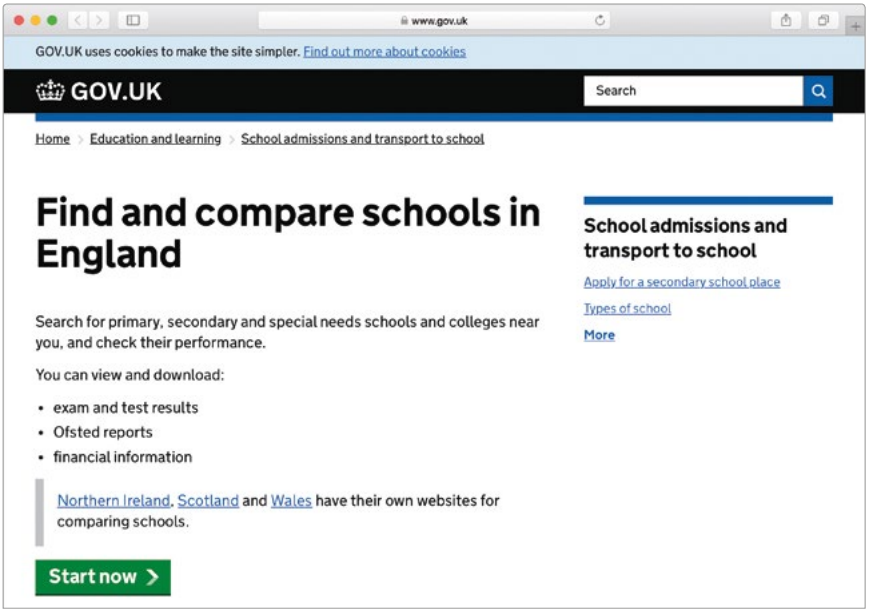
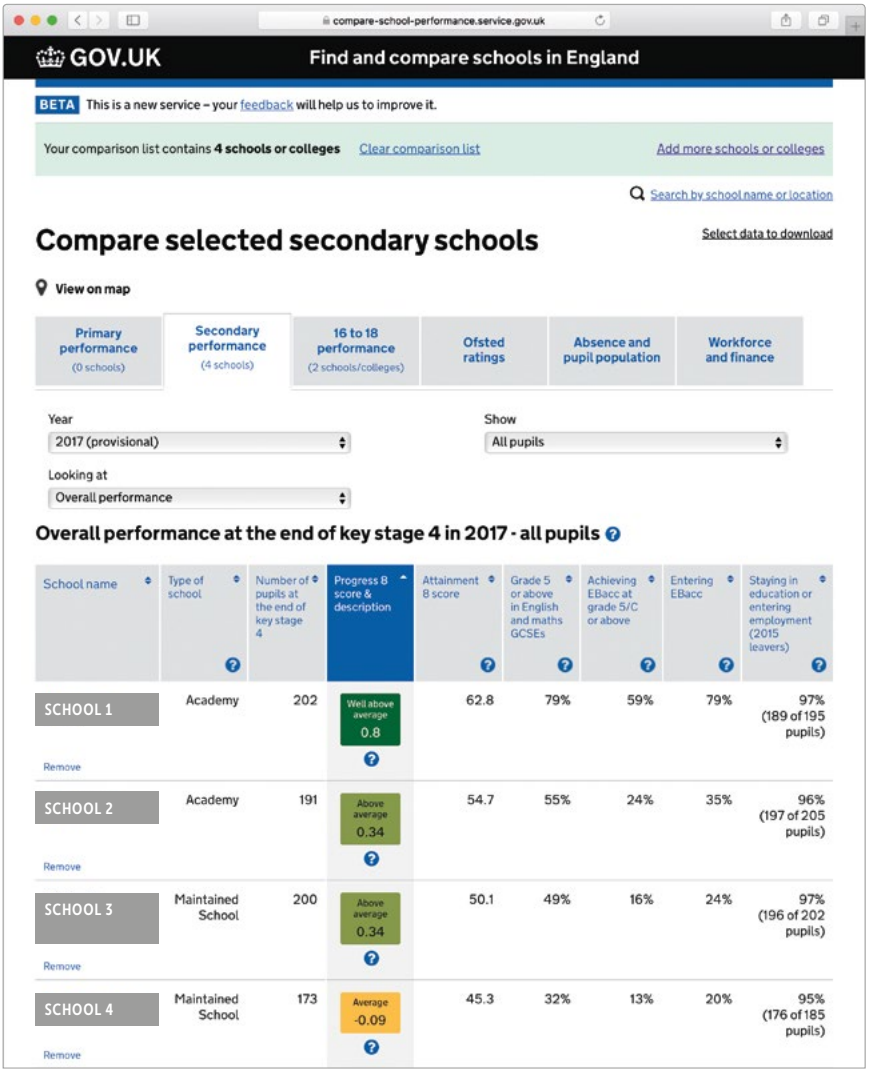


FIGURE 3: AN EXAMPLE OF COMPARATIVE SCHOOL DATA PRODUCED (IDENTITY OF SCHOOLS HIDDEN)




Believe
SMART Notebook
View
Insert
Format
Draw

Lesson 5: Accountability measures have played a significant role in the development of school self-evaluation.

During the evolution of the data system in England in recent years, people have often asked the question: does the data only exist to make accountability possible, or can it also be used for the purpose of internal reflection and improvement planning? If the data system has these two purposes, then how can we ensure that the system provides useful management information for school leaders?

There is no doubt that many school leaders in England have made very substantial use of the national data systems to support their work as agents of change at school level. The work of Melanie Ehren, at the Institute of Education, UCL, has shown how many school leaders in England have internalised expectations derived from the external accountability infrastructure. In Ehren's study of the impact of accountability in six different European jurisdictions, she described the positive direct effect of accountability mechanisms, such as inspection, on 'setting expectations' and the marked extent to which headteachers in England appeared to view the external accountability landscape as a source of expectations that could be used internally for the purpose of self-evaluation and improvement.[22] Ehren also described how the accountability framework could be used to improve self-evaluation and build school level capacity. For Ehren, school leaders in England typically saw their role as one of 'institutionalising' norms derived from external accountability.

There is no doubt that many school leaders in England have made very substantial use of the national data systems to support their work as agents of change at school level

This analysis is also supported by recent Education Development Trust research into the improvement of schools in London, and the rapid turnaround of some schools in England. In our 2016 study of London schools, the internal use of data was highlighted as a key driver of school transformation:

> *'One of the most important developments in London since 2000 has been the growth in the use of education performance data and improved data literacy among education professionals. In extensive interviews with experts and serving teachers we found virtual unanimity in the identification of data analysis and data literacy as key to the transformation. This preoccupation with data was not the exclusive property of any particular group and all the major initiatives seemed to have strong foundations in the use of educational metrics. The different actors in the London story are therefore linked by a common preoccupation with the effective use of educational data as an instrument for transformation. The use of data made possible a better concept of school leadership, based on a relentless focus on the quality of learning outcomes and the action needed to improve these outcomes.'* [23]

[22] Ehren, et al., 2015 [23] McAleavy and Elwick, 2016, p.10/11

While the internal use of data has been a positive element within the story of the improvement of government schools in England, the current data systems give greater priority to the requirements of external scrutiny and pressure rather than internal self-improvement. Performance against the current Attainment 8 and Progress 8 measures for secondary schools is, to some extent, beyond the control of school leaders because it is a retrospective, comparative measure. People often talk about the importance of monitoring and evaluation as if the two concepts, 'monitoring' and 'evaluation', were essentially synonyms. This is not the case. Schools need to evaluate retrospectively, but they need to monitor in real time. Accountability measures need to be defined in such a way that schools can monitor their performance in real time. This is necessary if professionals are to have the time to intervene to adjust performance before students undertake summative tests.

Schools need to evaluate retrospectively, but they need to monitor in real time

Data and data literacy are preconditions to improvement but they are not sufficient. Whilst performance data can alert school leaders to problem areas, schools also need diagnostic skills to create answers to the questions: 'Why did this happen?', 'What should we do to solve this problem?'. The data alone will not provide answers to these questions. So, schools need data literacy but they also need access to evidence-based solution design.

School level capacity to make use of externally provided data depends upon internal data literacy, and effective training for effective data literacy.

Data literacy requires the ability to go beyond the obvious explanation. Consider the case below, which is the better school?

TABLE 4: COMPARISON SHOWS THE NEED FOR DATA LITERACY TO GO BEYOND OBVIOUS EXPLANATION

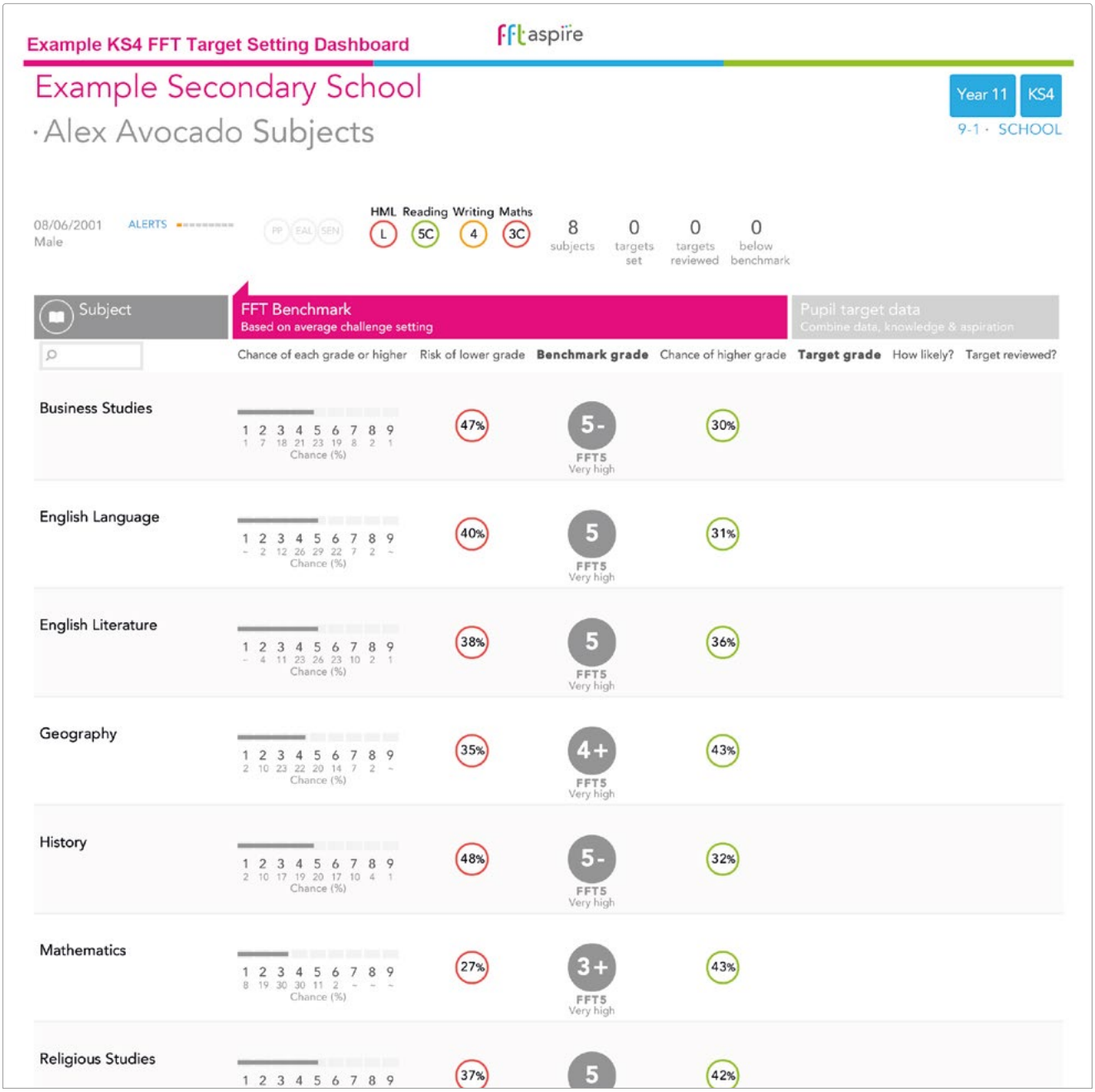
Measure	School A	School B
% of pupils attaining 'expected' standard	**70%**	**85%**
Average attainment of all pupils regardless of whether they achieve a threshold such as 'expected' (measured as a scaled score)	**102.1** (Average attainment)	**101.9** (Average scaled score)

Data literacy at school level in England is supported both by government action and a market for private support, provided on a commercial basis. Private providers of support for data analysis help school systems to undertake target setting and improvement planning. One significant example of a private provider of support is the data support provided by The Fischer Family Trust (FFT). The FFT Aspire web-based system is now widely used, particularly in secondary schools, for school, subject and pupil target setting data. Issues of ethnicity, disadvantage, and special educational needs, among other factors, were intentionally excluded from the model because of the possible lowering of expectations that consideration of these factors might encourage.

Figure 4, opposite, provides an example of benchmarks generated by FFT Aspire[24] for some of the subjects taken by a single pupil. The prior attainment, date of birth and gender used to generate these benchmark estimates is shown at the top. The typical outcome for the grade in each subject is shown with chance of a higher grade and the risk of a lower grade.

[24] See https://fft.org.uk/ - accessed 11th Dec 2017

FIGURE 4: FFT BENCHMARKS



In England, several relatively small companies have offered products to the school market to support the collection and processing of school pupil performance data. These companies provide School Management Information Systems (SMIS) designed to assist schools in the capture, storage, processing, analysis and reporting of data. Some SMIS provide specialist support in particular areas, such as the analysis of 'attendance' or 'item level' question response. Other SMIS products provide comprehensive support or reinterpret school and national data. They aim to provide the full range of monitoring and tracking reports that schools perceive they need.

Lesson 6: Schools can benefit from comparing their own students' performance with that of the national database through item level analysis.

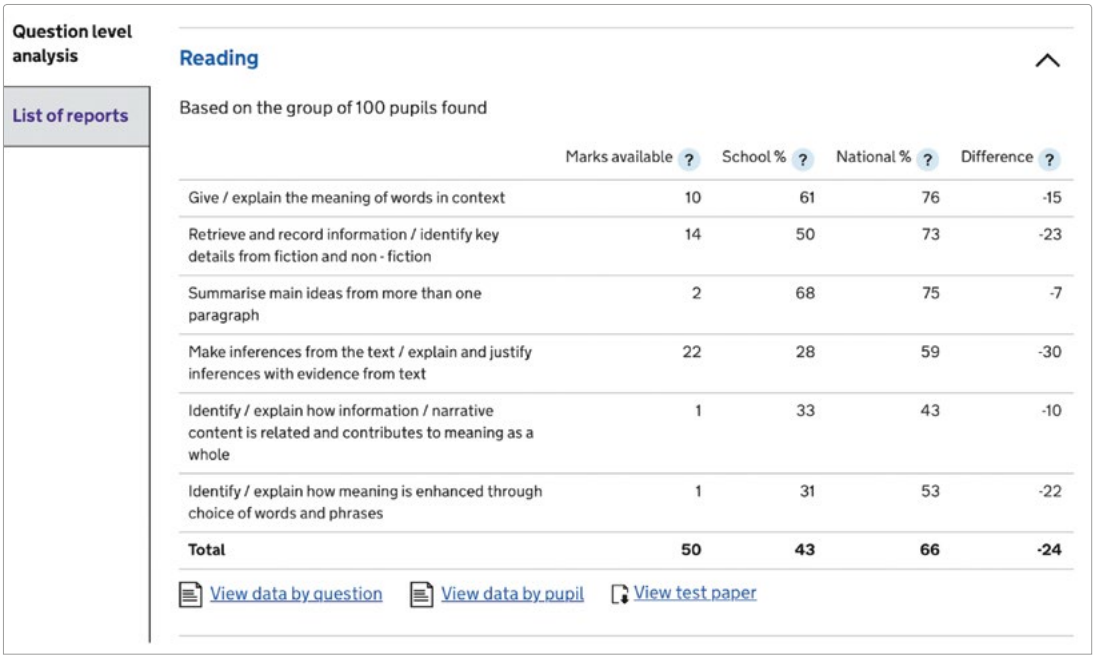
One significant area for any national data system is the provision of advice on pupil performance at the level of individual test questions – known as 'items'. Item level analysis can help teachers to understand specific and characteristic barriers to learning. This has recently been an area of reform in England. For the first time, in 2016, all the national Key Stage 2 tests in reading, mathematics and English grammar, punctuation and spelling, had the item level data collected electronically for each test question.

This item level data was published, with accompanying analysis to help teachers. The analysis allowed schools to compare their own pupils' performance with the national performance in the individual test questions. The same information – at the level of individual students – was also made available to those secondary schools receiving primary pupils as their new intake. For the first time, secondary school teachers were able to access this item level detailed information about what pupils could and could not do.

The following example of 'item level' analysis is taken from the 2017 release of data in 'Analyse School Performance'.[25]

> Item level analysis can help teachers to understand specific and characteristic barriers to learning

FIGURE 5: AN EXAMPLE OF ITEM LEVEL ANALYSIS



[25] See http://www.forschoolseducation.co.uk/analyse-school-performance-raiseonline-replacement/ [accessed 11th Dec 2017]

Item level analysis of individual performance in primary school tests, facilitates detailed self-evaluation and potentially improves transition arrangements from primary to secondary schools. This is a new development and such data has only recently become available for national use in England.

Lesson 7: There should be an alignment between data-based support for internal school improvement and external school improvement through inspection.

England's school inspectorate, the Office for Standards in Education (Ofsted), is a key part of the accountability system in England, and relies heavily on the nationally-available data. Ofsted publishes detailed information about historic school performance, highlighting both overall school performance and data which focuses on the performance of distinct pupil groups. The inspection system is 'high-stakes', and a wide range of judgements about the school are consequently published for schools, parents and the public.

The inspection system is 'high-stakes', and a wide range of judgements about the school are consequently published for schools, parents and the public

Schools are currently judged in terms of four areas: pupil attainment, leadership and management, behaviour, and teaching. There are strong links between the national pupil database (NPD) and the data that underpins the work of the inspectorate. Data from the NPD, together with that collected by the schools, is considered very carefully in the inspection process, and forms a key part of the judgements that are subsequently made about the school. Such is the pressure of and consequences of the inspection system, that schools engage in extensive data collection and analyses themselves to prepare and defend themselves during the challenging inspection process.

Ofsted emphasise pupil progress and apply this analysis to a range of pupil groups, including: disadvantaged pupils, those with special educational needs and gender. These groups are currently considered to be national priority groups for closing the attainment gaps that are known to persist between the disadvantaged and advantaged.

Figure 6 illustrates the first page of an Ofsted inspection dashboard for inspectors, analysing quality in a secondary school.

Ofsted share their 'inspection dashboard' with both their own inspectors and schools. Both the data and the analysis are shared with schools so that both inspectors and school staff have a common understanding of the data. Figure 7, overleaf, illustrates this data.

FIGURE 6: EXAMPLE OF INSPECTION DASHBOARD CONTENT FOR A SAMPLE SCHOOL[26]

Inspection dashboard (overview)

The inspection dashboard is designed to show at a glance how well previous cohorts demonstrated characteristics of good or better performance. It contains a brief overview of progress and attainment for 2016 and other data for the last three years. It shows progress first, including from the main starting points.

It includes the key groups: disadvantaged pupils, those who have special educational needs (SEN), girls and boys. Achievement of disadvantaged pupils is compared with the national performance of other (non-disadvantaged) pupils, overall and by prior attainment. SEN group progress is compared with the national for all pupils, which is zero.

The front page summarises strengths and weaknesses based on only the 2016 data shown in the dashboard. The strengths give an indication of some features of good or better performance in 2016, highlighting consistency across starting points and subjects.

Strengths in 2016

- Progress 8 was not significantly below average* overall or for any prior attainment group.
- Progress 8 was not significantly below average* overall or for any prior attainment group in English or mathematics.

**and not well below average.*

Weaknesses in 2016

- Progress 8 in English or mathematics was significantly below average and in the lowest 10% for the group: disadvantaged high.
- Progress was significantly below average and in the lowest 10% in at least one of EBacc or open elements or science, languages or humanities for the group: disadvantaged middle.
- Attendance was low for the group: SEN support (in the lowest 10%).
- Persistent absence was high for the group: SEN support (in the highest 10%).

Weaknesses are indicated for cohorts of at least six. Data for very small groups should be treated with caution. Where a group is identified as in the highest or lowest 10%, it has been compared with the highest or lowest 10% of schools based on the figures for all pupils, and not the figures for the group nationally. Where progress is said to be 'not well below average', it is not in the lowest 10%. In progress strengths, 'significantly' refers to statistical significance based on a 95% confidence interval.

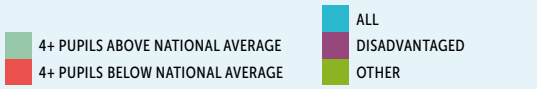
2016	School	National floor	National coasting
Progress 8	-0.09	-0.5	-0.25
Above?	N/A	Yes	Yes
Coasting elements	**2014**	**2015**	**2016**
Above?	Yes	Yes	Yes

[26] See https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/633596/16_to_19_study_programmes_inspection_dashboard_anonymised_school_final_June_2017.pdf for details

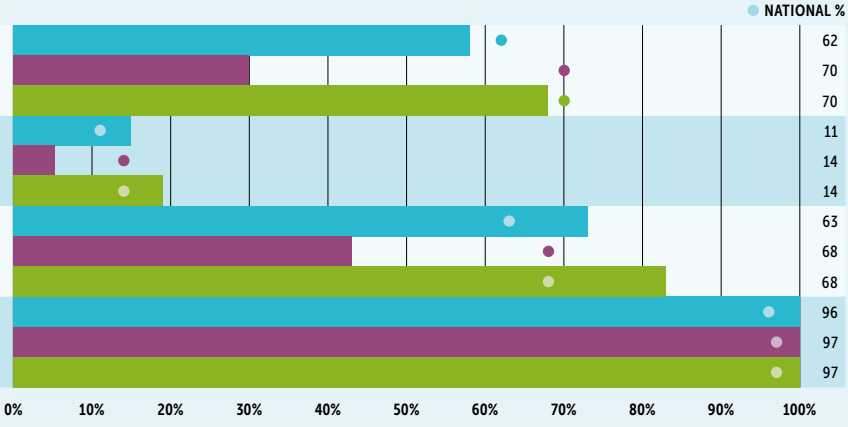
FIGURE 7: AN EXAMPLE OF DATA DASHBOARD CONTENT

In each group, data is shown overall and for pupils with low, middle and high prior attainment. National figures are shown by dots. The tables show the percentage of the cohort that attained the grade C threshold. The difference from national is shown as the number of pupils it represents and, for prior attainment groups, shaded green if three or more above red if three or more below.

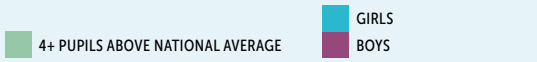
% ATTAINED ENGLISH AND MATHEMATICS, ALL/DISADVANTAGED/OTHER COMPARISON



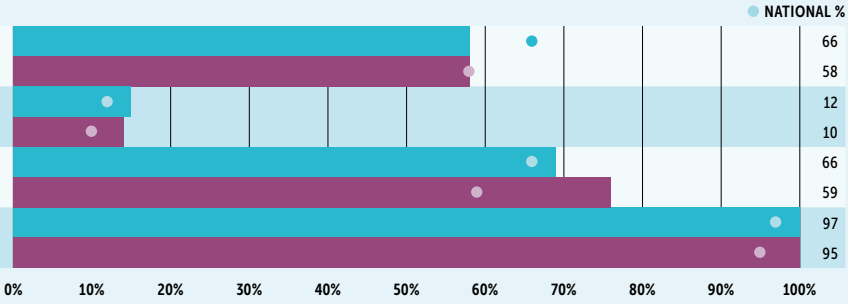
	%	DIFF NO.	COHORT	ENTRY NO.	ENTRY %	NATIONAL %
OVERALL	58	-7	174	170	98	62
	30	-17	44	42	95	70
	68	-2	130	128	98	70
LOW	15	2	55	52	95	11
	5	-1	19	18	95	14
	19	2	36	34	94	14
MIDDLE	73	9	92	91	99	63
	43	-5	23	22	96	68
	83	10	69	69	100	68
HIGH	100	1	25	25	100	96
	100	0	2	2	100	97
	100	0	23	23	100	97



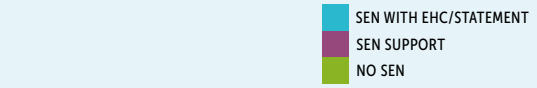
% ATTAINED ENGLISH AND MATHEMATICS, GENDER COMPARISON



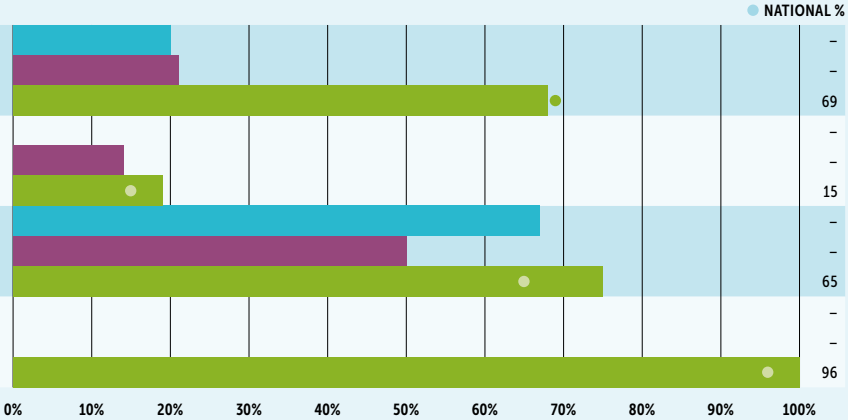
	%	DIFF NO.	COHORT	ENTRY NO.	ENTRY %	NATIONAL %
OVERALL	58	-7	85	82	96	66
	58	0	89	88	99	58
LOW	15	0	27	25	93	12
	14	1	28	27	96	10
MIDDLE	69	1	42	41	98	66
	76	8	50	50	100	59
HIGH	100	0	16	16	100	97
	100	0	9	9	100	95



% ATTAINED ENGLISH AND MATHEMATICS, SPECIAL EDUCATIONAL NEEDS COMPARISON



	%	DIFF NO.	COHORT	ENTRY NO.	ENTRY %	NATIONAL %
OVERALL	20	–	10	7	70	–
	21	–	28	28	100	–
	68	–	136	135	99	69
LOW	0	–	7	4	57	–
	14	–	22	22	100	–
	19	–	26	26	100	15
MIDDLE	67	–	3	3	100	–
	50	–	6	6	100	–
	75	–	83	82	99	65
HIGH	–	–	0	0	–	–
	–	–	0	0	–	–
	100	–	25	25	100	96

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Chapter 3

Final thoughts

The purpose of this overview has been to describe England pupil level data story with the intention of sharing some of the most important lessons that have been learned.

The development of a data rich system that allows analysis of performance at pupil level is a core pillar of the school improvement infrastructure in England. This report has shown the development of the system has not been without challenges and dangers.

While it is not our intention to suggest that England's system should be seen as a perfect example and used simplistically as a blueprint for others we hope this report will provide interesting reading for policymakers in other countries where a national pupil level data system is being developed or refined. By sharing England's story we hope that others may be able to avoid some of the mistakes and unexpected consequences that were made in the last three decades of development in England.

We invite readers to visit our website and explore our rich library of research and insights – www.educationdevelopmenttrust.com/research.

We hope this report will provide interesting reading for policymakers in other countries

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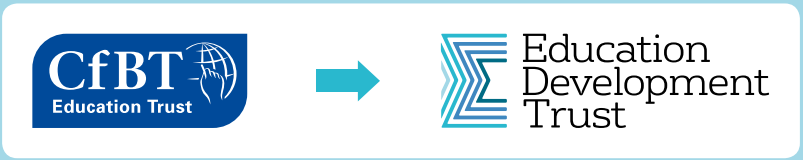
We changed our name from CfBT Education Trust in January 2016. Our aim is to transform lives by improving education around the world and to help achieve this, we work in different ways in many locations.

CfBT was established nearly 50 years ago; since then our work has naturally diversified and intensified and so today, the name CfBT (which used to stand for Centre for British Teachers) is not representative of who we are or what we do. We believe that our new company name, Education Development Trust – while it is a signature, not an autobiography – better represents both what we do and, as a not for profit organisation strongly guided by our core values, the outcomes we want for young people around the world.



Education
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