

Using data to promote achievement

What do we mean by data?

When embarking on any consideration of the use of data to promote the learning of gifted and talented pupils in your school, it is helpful to ensure that you and your colleagues understand:

- the range of data available
- the strengths and limitations of different types of data
- how to use the various types of data meaningfully
- where to access up-to-date, accurate, appropriate data both in and outside school.

Introduction

In the last several years the use of data and associated target setting has grown hugely. It is, however, an area that has acquired a mystique of its own and many classroom practitioners may feel daunted by it. This is unfortunate because the understanding and appropriate use of the data already available in schools can help unlock students' potential in ways that can be life changing.

It is beyond the scope of this Launchpad to explain the full range of data that is used by secondary schools, but it does provide an overview so that practitioners can develop a more informed view of what is available to them. It also outlines information on aspects of data that frequently remain the preserve of senior management teams, so that practitioners such as Able, gifted and Talented Co-ordinators can develop an appreciation of the greater school picture. Much data received by schools is now in the public domain and information on accessing these types of information is provided in the Further Reading section at the end of this document. Although this Launchpad is focused primarily on data in secondary schools, primary teachers will also find much of the information relevant, especially the discussion of cross-phase monitoring mechanisms such as the Pupil Achievement Tracker.

Types of information available about school and student performances

Many of the following types of information are routinely available in secondary schools:

- Key Stage 2 test results
- results from NFER/Nelson Cognitive Ability Tests (CATs) used by schools mainly in Year 7
- University of Durham MidYIS tests used throughout Key Stage 3
- the Pupil Achievement Tracker (PAT), which incorporates the 'Autumn Package'
- the school-focused Achievement and Assessment tables (formerly known as the PANDA)
- University of Durham Yellis tests used throughout Key Stage 4
- EPAS data, provided by the Local Authority, which allows individual departments to compare their GCSE achievements against local and national gains

- school-based systems that have been developed 'in-house' to meet the needs of target setting
- other Internet-based sources ranging from the Department for Education and Skills (DfES) and the Standards Site to the BBC.

The language and uses of data

In order to get the most from the data that is available it is necessary to have an understanding of the terminology commonly used and the key ways data is used to give a picture of individual school performance and individual student performance.

The **mean** score, also called the **average** score, is arrived at by adding all of the components in a set of scores (for example those for a pupil's performance on a set of tests) and then dividing by the number of components. For example scores of 94, 100, 110, and 70 would give a **mean**, or **average** score of $374 \div 4 = 93.5$. Common sense tells us that one low score has distorted this number, and this issue must be borne in mind when looking at mean or average scores – a very high or low score can often distort the real picture. This is one of the reasons why comparative evaluations of a school's (or individual's) performance are based on results in the best 8 subjects.

The **median** score is the middle of a distribution: half the scores are above the median, and half are below it. The median is less sensitive to extremes at either end of the range than the **mean** and this often makes it a better measure when scores are highly skewed, as they often are with school data.

In the Autumn Package the DfES makes use of the **median** within the context of **percentiles** as shown in this example taken from the 2004 data.

Table 1. Percentage of pupils achieving Level 5 and above in Key Stage 3 SATS in the Free School Meal range of more than 21% and up to 35%

	95%	UQ	60%	Median	40%	LQ	5%
English	81	67	61	57	54	49	37
Mathematics	78	69	65	62	59	56	45
Science	71	59	55	52	50	46	35

In this table the median score for English is 57%, that is, half the schools in this Free School Meal (FSM) bracket did better, and half did worse. The percentage of children eligible for free school meals has been used for some time as an indicator of the socio-economic circumstances in the area served by the school. However, as of 2005, a more nuanced indicator, Contextual Value Added (CVA), has been introduced. This is based on a range of factors affecting a school's student population, including:

- prior attainment
- Special Educational Needs
- free school meals entitlement
- speaking English as an Additional Language
- ethnicity
- mobility
- economic deprivation.

Information about Contextual Value Added is available at:

<http://www.standards.dfes.gov.uk/performance/1316367/CVAinPAT2005/?version=1>

The other points on the table represent **percentiles**. These can be somewhat confusing for the uninitiated, so it is worth considering them in more detail. Percentiles are used in this context to

allow comparison between the performances in the full range of schools in this FSM bracket. For example, the 95th percentile is the percentage of Level 5s reached in the most successful 5% of schools (and **not reached** by 95% of schools in the comparison group). The 5th percentile is the percentage of Level 5s reached by 95% of the schools, and **not reached** by only the lowest-performing 5%.

UQ stands for **Upper Quartile**, which is the score that only the top 25% of schools exceeded. **LQ** stands for **Lower Quartile**: the score that only the least successful 25% of schools fell below. The range from upper quartile to lower quartile represents the middle 50% of schools and is called the **Interquartile Range**.

This table illustrates the concept of the **benchmark**. For a school, the benchmark is a figure against which the school can measure its current achievement against other schools in similar circumstances. There are also benchmarks for individual students. At both school and pupil level, benchmarks are based on Contextual Value Added.

'**Value added**' (**VA**) is a measurement of the difference that education in a particular school has made to benchmarked student progress in each of the key stages. Value added scores are based around 100.0, so a school with a VA score of 100.0 has progressed students at the expected rate. Each whole number either side of 100 represents one school term of added value (in the case of numbers over 100), or a term of lost value (in the case of numbers less than 100). For example a school with a VA score of 101.0 has managed 10 terms-worth of improvement in the nine-term period of Key Stage 3 education.

At the end of Key Stage 4 schools are able to look at **residual** tables normally provided by the Local Authority. For the purpose of this discussion, 'residual' is crudely defined as the difference between the average achievement of the school in a subject, and the average achievement nationally. (The reality is somewhat more complex than this, but this definition is sufficient to give a general understanding.) The concept can also be used to compare a student in a particular subject against his or her own average achievement in all subjects. Ascribing a numerical value to GCSE grades makes this possible. Until 2005 GCSE grades were treated as follows: A*=8, A=7, B=6 etc. In 2005 the DfES adopted a different system to allow for the changing nature of qualifications at GCSE level and the following is now in use: A*=58, A=52, B=46 and so on.

Key issues

Data, when used appropriately, can have a cascading positive impact on a school and its individual teachers and students. Used inappropriately it can, and does, cause damage. The overarching issue, therefore, is how to use appropriate information in a school to inform understanding and enable successful planning for improvement both at school and individual level. Doing so can provide a platform for maximising success for all pupils, including the gifted and talented.

Data can be used to profile individual students, so that their needs can be identified and catered for. It can also be used to build up an accurate picture of the ability range in a year group, so that:

- teachers can plan and deliver suitable approaches
- the school can set itself realistic, stretching targets, based on evidence, and motivate teachers and students to achieve them.

Whenever dealing with data, it is essential to ensure that the information that you have is as up-to-date, accurate and complete as possible.

What might we do in school?

The use of data on entry to Year 7

When a student arrives at secondary school (usually at Year 7), they are accompanied by the data resulting from their Key Stage 2 tests in the May of Year 6. If these results are presented to a Gifted and Talented Co-ordinator simply as 'Level 4' or 'Level 5' they are of little use, and the finer detail of sub-levels (for instance, 4a, 4b or 4c) should be sought. This helps to build up a picture of students' individual abilities and characteristics (for example whether a student is as strong in one subject as another, or is more proficient in a particular subject area).

SATs results should be considered in conjunction with CAT or MidYIS data. These tests are often given to validate Key Stage 2 data. The rationale for this is that such tests add depth to individual students' profiles and indicate whether, for example, a marginal student may have slipped backwards in the 3½ months since testing. Common to both of these tests is the 'non-verbal reasoning' component that can provide a context within which performance in SATS tests and in the other elements of the ability tests can be viewed. Key Stage 2 results are the outcome of what has been taught and learned at primary school. The non-verbal component of CATs or MidYIS tests, however, indicates what students 'can do' on their own, as most have never encountered such tests before.

Major discrepancies between SATs results and cognitive ability tests such as CATs and MidYIS can indicate underachievement. For example, it is not uncommon for a student to arrive at secondary school with Key Stage 2 levels of, for example, 4, 5, 4 and then to achieve a non-verbal CAT score of 127 – a score that places that student within the most able 5% of the population. Such students are underachieving - in comparison with their true potential - because they lack a skill in language. Frequently an appropriate strategy of linguistic remediation can transform possibilities for such students. Students who have a discrepancy of 15 points or more between their verbal and non-verbal scores should be identified and provided with appropriate intervention strategies to improve their performance on verbal tasks.

The use of data in Year 9 to set appropriate targets

Year 9 is the year of Key Stage 3 testing. The DfES has developed an excellent piece of software called the Pupil Achievement Tracker (PAT) that enables schools to import and analyse their own pupil performance data against national performance data. There are four main areas of analysis possible in the PAT:

- **School level analysis**, which compares the school's results in the key stages and optional tests against national comparators
- **Pupil-level value added**, which compares the progress of individual students or groups of students between key stages with progress nationally, taking account of prior attainment and other contextual factors
- **Target setting**, assisting the school to set targets for individual students in the light of projections based on progress by similar students in the best performing schools with a similar baseline
- **Question-level analysis**, allowing schools to analyse by individual, subject-based SAT question how their pupils performed in the National Curriculum tests and optional tests, compared to performance nationally (DfES 2005).

The Pupil Achievement Tracker can be accessed from <http://www.standards.dfes.gov.uk/performance/>.

This website enables schools to conduct very detailed analysis and target setting. The Autumn Package, which forms part of the Pupil Achievement Tracker, allows co-ordinators quickly to set appropriate targets for **all** departments at Key Stage 3. The following example illustrates this (again using the Key Stage 3 data from 2004).

Percentage of pupils achieving Level 5 and above in the Free School Meal range of more than 21% and up to 35%

	95%	UQ	60%	Median	40%	LQ	5%
English	81	67	61	57	54	52	37
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Science	71	59	55	52	51	46	35

If we imagine that the figures in red illustrate a school's achievement in the current year, we can use the table to set minimum targets for the core subjects in the following year. In this instance a minimum target would be that established by the 60th percentile – the indicator that is 'a little bit better than average'. This is appropriate as long as notice has also been taken of other appropriate indicators, for example, the targets established by the Local Authority with the school's Governing Body.

Percentage of pupils achieving Level 6 and above in the Free School Meal range of more than 21% and up to 35%

	95%	UQ	60%	Median	40%	LQ	5%
English	44	28	23	19	17	14	7
Mathematics	55	44	40	37	35	32	21
Science	37	25	21	19	18	16	8

For level 6, the same process is undertaken and again the 60th percentile is used as the minimum target. Having identified **what** the targets are, it is now important to decide **who** the targets are, that is, which students in the school can be expected to achieve level 6, with appropriate teaching and support. This is done simply by translating the percentage targets into real student numbers. For example, in a year group of 180 students, the English Department will need to ensure that 41 students reach level 6. Assuming that students have been grouped into ability sets, this means that the whole of the top group, and a sizeable proportion of the second group, will need to reach at least level 6. It is also sensible to also target students for level 7 and, in Mathematics, level 8.

The non-core subjects have always found it more difficult to target students accurately. This system can also be used in the non-core subjects if all language-based subjects adopt the targets set for English, and all technology-based subjects adopt those for Science.

Having evidence-based targets that map against individual students encourages departments and teachers to focus on planning and delivering suitable teaching for students at the higher end of the ability range, and not simply those on the C/D borderline. This helps the school meet its responsibilities to the full range of students, including gifted and talented students, so that these individuals can achieve not simply 'a good pass' but the best pass they are capable of.

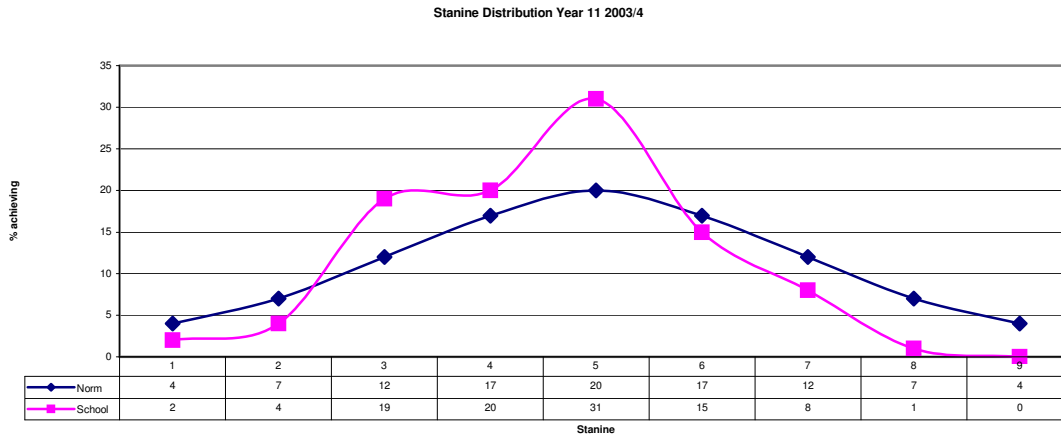
The use of data to establish aspirational targets in Year 11

The careful use of data from cognitive ability tests can be of great value in discerning potential within a year-group cohort as a whole, for example in the run-up to GCSEs in Year 11. This is illustrated in the following real example.

As we saw above, the comparison of individual students' verbal and non-verbal scores allows us to identify underachieving students from whom we can expect more – provided that the right intervention strategies are brought into play. For the year group as a whole, comparing mean scores (the averaged scores of each pupil's verbal, non-verbal and quantitative reasoning tests) with national norms, allows us to create a picture of the ability range of the entire year group; a picture that allows us to plan for that cohort's future attainment.

Both MidYIS and CATs tests allow scores to be graded through the use of **stanines**, nine groups of marks that range from Stanine 1, the scores of the least able 4%, to Stanine 9, those of the most able 4%. When the mean scores are converted to their stanines and plotted on a graph, the distribution of ability in the cohort becomes clear, as shown in Table 2.

Table 2. Stanine distribution for Year 11, 2003/4



The square-dotted line on the graph shows the distribution of ability, on entry, of students in a school that, three years earlier had been facing 'Challenging Circumstances'. (It was attaining less than 25% 5A* to C passes.) The picture shown of the year group is an interesting one. It is easy to see:

- that the right-hand (high ability) side is under-represented when compared with the norm
- the over-representation of students at stanines 3 and 4
- the predominance of students who are 'average'.

What is less clear at first glance is the opportunity that this graph highlights.

Over 50% of the students at the school are of average or above-average ability, and consequently could expect – and were entitled – to achieve at average or above-average levels. This message was repeated over and over again to staff, to students and *to parents*.

It could be pointed out that the school lacked students at the most able end of the ability range (stanine 9). In terms of normal distribution that is true, but the graph also reveals the 1% in this ability range that were present in the school. These students, whatever percentage they represent in a particular year group, are part of the school's gifted and talented population. Revealing their presence can help to raise aspirations and motivate teachers and school management to establish appropriate provision.

The expectation of this school's local authority was that a target of just over 30% A* to C passes at GCSE was reasonable. The school set its aspirations higher and was delighted when 54% of the year gained 5 A*-C grades, with some 7% of the year gaining 5 grade A's or better – a testament to the way data can be used to promote achievement.

At the beginning of Year 11 it is often useful to ask teachers in each subject to submit the highest grade they believe a student to be capable of, and to collate these estimates on an A2 sheet in the staff room. This encourages the establishment of targets at A* and A especially, and widens the focus beyond the C/D borderline. It also allows subject teachers to see how their aspirations for a student tie in with those of their colleagues.

The use of data after GCSE results

There are many tools available to help schools analyse their GCSE results, including the Pupil Achievement Tracker and the detail on subject residuals (see page 3) as supplied by EPAS (Educational Performance Analysis System) through Local Authorities. A simple table showing subject results based on the numerical value of the grades helps the comparison of achievement across the subject base and highlights both strong and weak performances.

The publication of schools' results in league tables has been standard for some time, but schools need to be aware that from 2007 GCSE percentages will be based on Grades A*-C, including grades in Maths and English. Schools that have relied heavily on GNVQs to boost their percentages may suffer a sudden drop in apparent performance when the new system comes into force. Schools might be well advised to prepare for this by including Maths and English in their planning, monitoring and evaluation systems as a matter of course.

References

DfES (2005) Pupil Achievement Tracker 'Welcome' page. Available at <http://www.standards.dfes.gov.uk/performance/>

Further reading

The following introduction to data use is invaluable.

Jesson, D. and Hedger, K. (1998), *The Numbers Game: Using Assessment Data in Secondary Schools*, Shrewsbury, Shropshire Education Publications. Available from: The Publications, Design & Web Page team, Shropshire Education Publications, The Shirehall, Abbey Foregate, Shrewsbury SY2 6ND Tel: 01743 254321

Relevant websites publishing schools-related data

- Department for Education and Skills: <http://www.dfes.gov.uk/>
- The Standards Site: <http://www.standards.dfes.gov.uk/>
- Performance Achievement Tracker: <http://www.standards.dfes.gov.uk/performance/>
- School Achievement & Attainment Tables: http://www.dfes.gov.uk/performancetables/schools_04.shtml
- BBC Education website comparing school results both with and without Maths & English: <http://news.bbc.co.uk/1/hi/education/default.stm>
- Ofsted: <http://www.ofsted.gov.uk/>
- EPAS (Educational Performance Analysis System): <http://www.bathdata.com/epas.php>