

Smoking Out Underachievement

Guidance and Advice to Help Secondary Schools Use Value Added Approaches with Data



department for

education and skills

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This Booklet was prepared by the Fischer Family Trust working with the School Improvement and Excellence Division of the DfES.

Introduction

“Smoking Out Underachievement” has been written to provide schools with guidance, advice and examples to increase their understanding and use of ‘value added data’.

This approach to the use of data will enable schools to become information as well as data, rich. The guidance seeks to support professionals in knowing their pupils better and in the development of an accountability framework which puts more emphasis on pupil progress. Value added approaches contribute to our knowledge and understanding of between school variation, within school subject variation, within group variation and performance at an individual pupil level.

These approaches will provide a rich variety of benchmarks to aid and moderate **self review and evaluation** and will undoubtedly support the identification of aspects of practice where **collaboration** with other schools would prove beneficial.

Above all the use of this form of data and analysis will enable schools to know their pupils, know how well they are meeting their needs, their successes and to ‘smoke out underachievement’ in more illuminative ways.

The Materials

These guidance materials have been divided into sections designed to offer practitioners advice and guidance on a range of value added approaches. Additional exercises and examples to aid understanding and support training are available in the appendices.

Outcomes and Target Groups

The materials are designed for use by practitioners at all levels within the secondary schools system and are intended to raise knowledge, understanding and awareness concerning performance so that:

- monitoring activity becomes interpretation
- analysis moves from whole school to subject level to pupil individual level
- absolute scores move to value added information
- summative assessment moves to the formative use of data
- data is used for diagnostic purposes as well as for accountability
- data as statistics to data as information and intelligence
- externally required practice overtaken by self engaged professionals.

Value added analyses have the benefit of being able to confirm exactly what is good practice and what is working to improve pupils performance. This guidance should help staff in schools and LEAs to ask the right questions and bring a focus to self evaluation that moves from asking what has been done, to knowing whether it had an impact.

At the end of the guidance teachers should have developed their thinking from being a teacher of 10 classes of 30 pupils to being teachers of 300 individuals with individual learning needs and strengths.

The guidance should support them in analysing how pupils learn and encourage a move away from the haphazard approach of getting differentiated teaching and learning styles into each lesson. It should promote more meaningful and effective reviews with pupils and inform target setting and target getting.

It will broaden schools knowledge on past and current performance and give good indication of future performance.

Senior managers will be able to review performance and engage in planning in a way that reflects need and deploy the resources at their disposal in a more informed way

Governors will have their key questions answered in more illuminative ways aiding their decisions on the appropriateness of whole school priorities

Introduction to value-added data

There is often much variation in pupil achievement within schools as there is between schools.

“According to OECD ‘variation in performance within schools is four times as great as variation between schools’” Miliband D (Education Minister) in speech to NAHT 2002.

All schools are successful with some pupils, but few schools are successful with all pupils.

Successful schools understand how to use their data to make practical changes in the classroom. They peel away the overall school figures to identify pockets of underachievement within their school, and identify the pupils at risk of underachievement in the future. They use a more sophisticated approach to confirm and challenge expectations, identify good practice and strengths and change practice to meet a better understanding of pupils needs.

What data should a school use?

All schools use outcome figures, such as the percentage of pupils with 5+ A*-C GCSE grades.

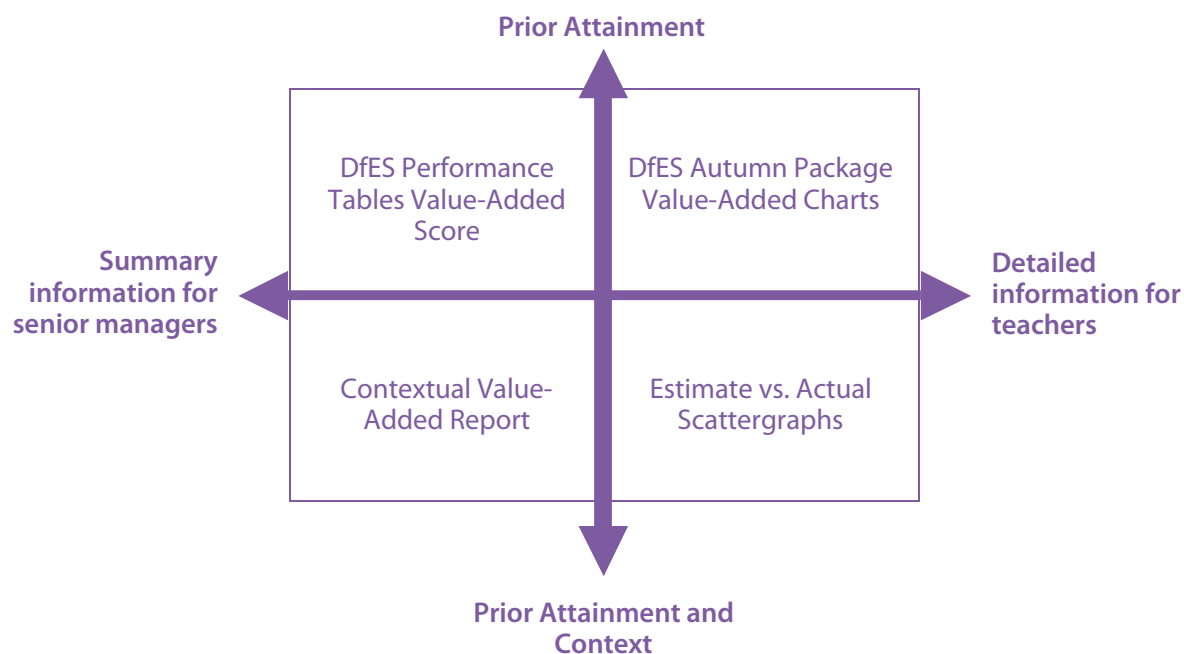
For example, in one school 40 percent of boys, and 60 percent of girls had 5+ A-C grades. A difference worthy of further examination, but when looking at prior attainment data, 40 percent of boys, and 70 percent of girls were likely to achieve 5+ A*-C grades. This puts the interpretation in a different light, for the boys did as well as could be expected, while 10 percent of girls underachieved.*

A further level of analysis is needed when using **value-added data** for pupils, groups of pupils and the whole school. The Ofsted PANDA contains grades measuring outcomes of achievement against schools with similar prior attainment. Many Local Education Authorities provided schools with value-added data, as do NFER-Nelson, the Curriculum Evaluation and Management Centre (CEM) at the University of Durham, and the Fischer Family Trust. For many years the DfES have published value-added charts in the Autumn Package and Interactive Autumn Package (now Pupil Achievement Tracker) for schools to measure the progress of individual pupils.

Things to remember when looking at data

- Different **methods of calculation** are designed to measure different things. Some measures only look at **raw progress**. *For example, a child has made one level of progress if they had attained Level 4 at the end of Key Stage 2, and Level 5 by the end of Key Stage 3. We do not know what has impacted on this progress, but we can measure the degree of progress made.*
- Other measures will look at **comparative progress**. All pupils will make progress over time. *For example we will want to know how much progress they have made over and above that which could have, reasonably, been expected to achieve. Such expectations are best derived from a pupil's prior attainment, and can also be modified to take account of the school's context, such as its socio-economic context, and the overall profile of pupil prior attainment.*
- The **method of presenting data** should vary according to the audience. **Value-added graphs** of individual pupils provide the detail needed by staff to diagnose achievement issues, while summary information such as **benchmark tables** give a useful overview to senior managers to identify where there might be pockets of underachievement or excellent practice.

Figure 1: Methods of calculation and methods of presentation



How will staff use data?

Value-added data is for everyone in school concerned with the progress made by pupils. Classroom practitioners will use data in different ways, as they will be asking different questions of it.

Teachers will want to know what progress has been made by the pupils they have taught and what they could achieve if barriers to learning could be overcome.

Some staff, Heads of year or Heads of Departments will require data aggregated, summarised and compared, while others will require data for individual pupils.

The data and assessment book "Releasing Potential, Raising Attainment: Managing Data in Secondary Schools" provides a useful calendar of assessment activity. It is available at www.standards.dfes.gov.uk/sie/si/SfCC/goodpractice/dm/

Data needs of different groups and the location of examples

	Governing Body	Headteacher or Senior Management Team	Head of Department	Teacher	Support Staff e.g. Learning Mentor	Pages
Value Added Data for the whole school <i>e.g. Value-added score</i>		✓				13-16
How value-added data in your school compares to other schools <i>e.g. Value-added score, Percentile Rank Contextual Value-Added</i>	✓	✓				17-24
Key strengths and weaknesses, be they subjects or groups of pupils <i>e.g. Est/Act Scattergraph</i>	✓	✓	✓	✓		26-28
Value-added data by teaching group <i>e.g. Est/Act Scattergraph</i>		✓	✓	✓		29
How a subject compares to others in the school <i>e.g. Average value-added by department</i>		✓	✓			30
Value-added data for individual pupils, to pick up where they might be underachieving compared to other subjects			✓	✓	✓	32-35

Presentation Matters

Data needs to be presented so that it is fit for purpose. Staff and other groups need data presented in ways that enable the 'right' questions to be asked.

Data managers should consider the preparation of data reports and the types of interrogation that different groups will require. Examples of different presentational approaches are given in the appendices.

Interrogation of data by different groups

Asking the right questions

Governing Body

- Are our standards high enough for pupils from all backgrounds?
- How do our standards compare with national standards and those of similar schools?
- Are our targets suitably challenging?
- Are our spending plans suitably focused?

Headteacher/Senior Management Team

- Are standards high enough for pupils from all backgrounds?
- Are pupils making suitable progress?
- Which are the strong/weak departments?
- Who might be the strong/weak teachers?
- Which teachers work best with pupils with different needs?
- What does the profile of the incoming cohort tell us about our priorities for improvement?
- How can we improve on past performance with similar pupils?
- Can we see any impact of new initiatives?
- What are our key strengths, and what do we need to do to maintain these?

Subject Leader/Head of Department

- How do overall standards compare with national standards and similar schools?
- What is happening to standards over time?
- What are the strengths of individual staff, with all pupils and with pupils of different ability levels and learning styles?
- How are we doing compared to other similar departments, nationally, and within the school?
- Can we see any impact of new initiatives?
- What are our key strengths, and what do we need to do to maintain these?

Class Teachers and Form Tutors

- Do I know pupils' prior attainment scores?
- Is progress good enough?
- Are pupils from all backgrounds making suitable/appropriate progress?
- Are my teaching approaches appropriate for all pupils?
- What are the barriers to learning?

Source: Releasing Potential, Raising Attainment: Managing Data in Secondary Schools (DfES 2002)

www.standards.dfes.gov.uk/sie/si/SfCC/goodpractice/dm/

Value added data and underachievement

If all schools within the lowest quartile were to perform at the current median, it is estimated that:

- their pupils would make, on average an extra year's progress through their time in school
- about 13,000 additional pupils would gain 5 or more A*-C grades each year
- These schools average 5+ A*-C grades would rise by 10 percent
- Their average Key Stage 3 points score would rise by 3 points.

One important approach is for all schools to use value-added data to identify whether there are any patterns of underachievement in the performance of their pupils.

- Is there underachievement in specific subjects, groups, sets or at individual pupil level?
- Do certain pupils underachieve each year?
- Which pupils are at risk of underachieving in the future?

Value Added Data can be used in this way and **early intervention planned, progress monitored and pupils supported in achieving more appropriately**. Value added data can also be used to identify pupils and **groups of pupils who have achieved more than expected, to help identify where strategies in the school or department have been successful**.

Asking the right questions

Comparing your school with other schools:

What our progress is like compared to other schools?

Which schools can we learn from?

What could other schools learn from us?

Compare subject departments with other departments:

How do departments compare within the school?

How do departments compare with other schools who we are working in partnership with?

Compare groups of pupils:

Do some groups of pupils with the school make different progress to others?

How do these groups compare with similar pupils nationally?

There are also a series of exercises available in the appendices, that you can use with your department in work based training.

SECTION 1

Comparing your school with other schools

This section will help you to answer the following questions.

- What is our progress like when compared with other similar schools?
- What are our strengths and what could other schools learn from us?
- Which schools can we learn from?

SECTION 1

COMPARING YOUR SCHOOL WITH OTHER SCHOOLS

Value-added score

All Primary and Secondary schools have a value-added score calculated and published by the DfES, summarising the progress made by pupils in a school between Key Stages.

For example, one schools value-added score for KS2 to KS3:

Total number of pupils with KS3 results in core subjects:	213
Total number of pupils found with matching KS2 results:	197
Calculated Value Added Measure	99.1

In this school, of the 213 pupils assessed at the end of Key Stage 3 only 197 had results at the end of Key Stage 2 (the other pupils would have been absent or disapplied), and the progress of these 197 pupils is slightly below the national average.

If we take the average progress of all schools as 100, every 1 point above or below 100 is equivalent to 1/6th of a level. In this school, the value-added score is almost 1 point below 100, which means that pupils in this school are making on average 1/6th of a level progress less than the average of other schools.

This is useful for Governors and Headteachers as it summarises the overall pupil progress relative to other schools, but it doesn't provide the diagnostic detail required by Heads of Department and teachers. For example, value-added scores do not reveal whether there are any differences between subjects.

Technical Commentary

How is the value-added score calculated?

This is calculated by comparing the progress made by each child against the progress made nationally by all pupils with the same prior attainment. Pupils in line with the national median have a value added score of 0. Pupils above the median have a plus score e.g. +2, depending on how many points they are above the median. Pupils below the median have a negative score e.g. -2. Then total up the pupil scores. If the pupils above and below the median cancel each other out, the total will be 0, but it is likely to be positive or negative depending on the balance of pupils. Finally, this score is divided by the number of pupils plotted. Then 100 is added to the figure.

For example, if there were 100 pupils, and the total score were +200, then the value-added score is $(+200 / 100) = +2$. Then add 100, totals 102

i.e. pupils progress at 1/3 of a level more than the average

Interpreting the score depends on the Key Stage. For KS1 to KS2, and KS2 to KS3 value added, each point is equivalent to 1/6th of a level, or one term's progress. For example, for KS1 to KS2 value added, a measure of 101 means that on average each of the school's pupils made one term's more progress between KS1 and KS2 than the median – or middle value – for pupils with similar KS1 attainment. Conversely, a score of 99 means that the school's pupils made a term less progress.

For KS3 to GCSE/GNVQ, each point is equivalent to one grade, so a score of 101 means that on average each of the school's students achieved one extra GCSE/GNVQ point than the median for students with similar KS3 attainment. Conversely, a score of 99 means that the school's students achieved one fewer GCSE/GNVQ point.

Key Stage 2: http://www.dfes.gov.uk/performancetables/primary_03.shtml

Key Stage 3: http://www.dfes.gov.uk/performancetables/ks3_03.shtml

Key Stage 4: http://www.dfes.gov.uk/performancetables/schools_03.shtml

For example, a school may have a KS2 to KS3 value-added score of 100, but if looking at the underlying value-added data, a school may find that pupils made above average progress in English, average progress in maths, and below average progress in science. So a school should not rely on overall value-added scores alone.

For example, this school has a KS2-KS3 value-added score of 99.4, but pupils tend to make better progress in English than in maths and science

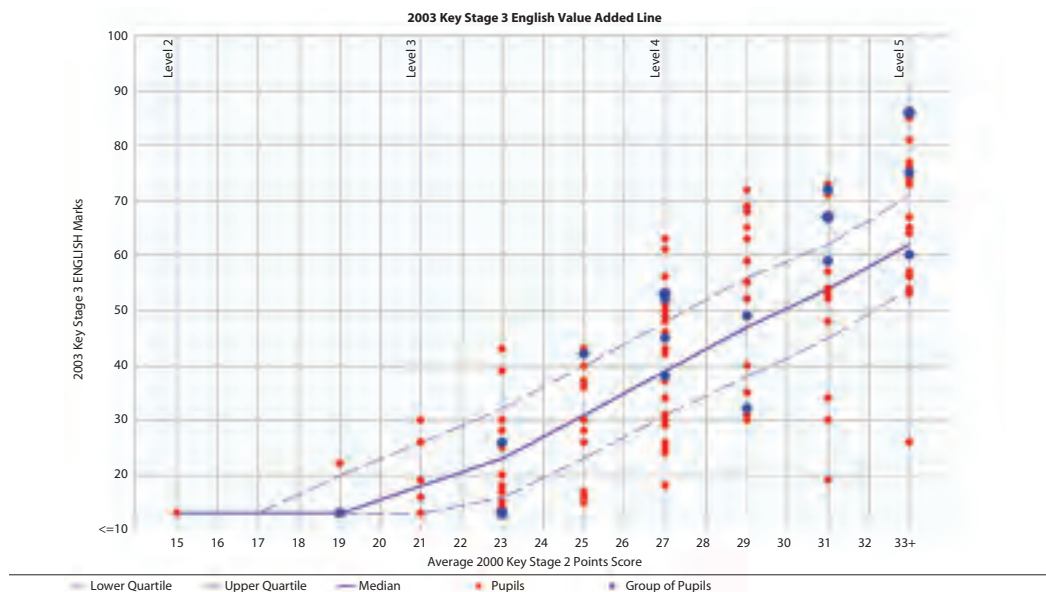
English

42 pupils above the upper quartile

52 pupils between the upper and lower quartiles

24 pupils below the lower quartile

25 pupils not plotted



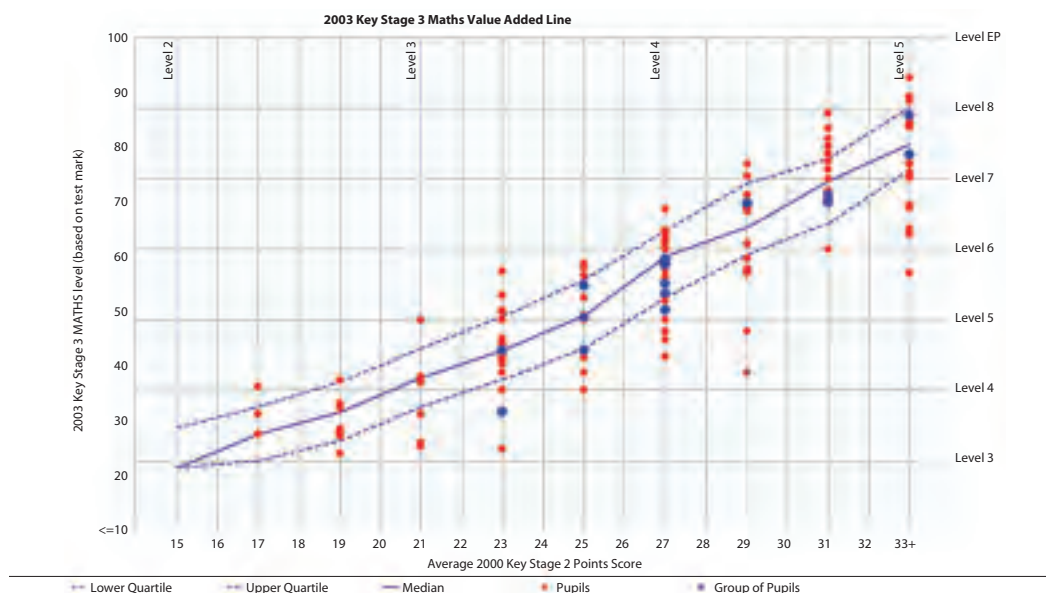
Maths

21 pupils above the upper quartile

77 pupils between the upper and lower quartiles

35 pupils below the lower quartile

10 pupils not plotted



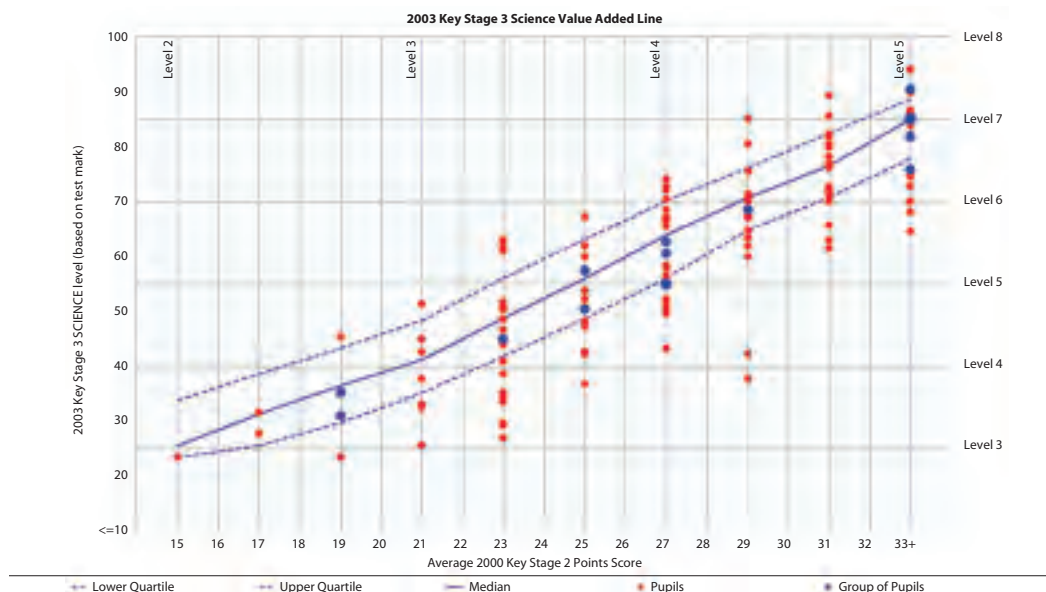
Science

18 pupils above the upper quartile

69 pupils between the upper and lower quartiles

44 pupils below the lower quartile

12 pupils not plotted



By adapting the DfES Performance Tables approach schools can calculate a value-added score for each group of pupils. This will allow them to judge which subjects and for which groups of pupils their practice is most effective, and to adjust what the school does in the future. The accompanying booklet of exercises shows how to calculate a value-added score for each pupil, which is then aggregated and averaged for each group.

The table below is an example of how this data could be presented for a school which is looking at the progress made by boys and girls, and also by different prior attainment groups.

Pupils	Number of pupils	Value-added score
Boys	60	99.0
– Low prior attainment	30	98.5
– Middle prior attainment	20	99.33
– High prior attainment	10	99.16
Girls	60	101.0
– Low prior attainment	20	101.0
– Middle prior attainment	20	100.5
– High prior attainment	20	101.5

For example, in this school, boys made less progress than girls, and pupils with middle and high prior attainment are making better progress than pupils with low prior attainment.

Questions to ask

Why are boys with low prior attainment making the lowest progress?

What can be learnt from the progress made by the girls with low prior attainment?

Why are high prior attainment boys making less progress than middle prior attainment boys?

Why don't the girls results reflect this trend?

Benchmarks

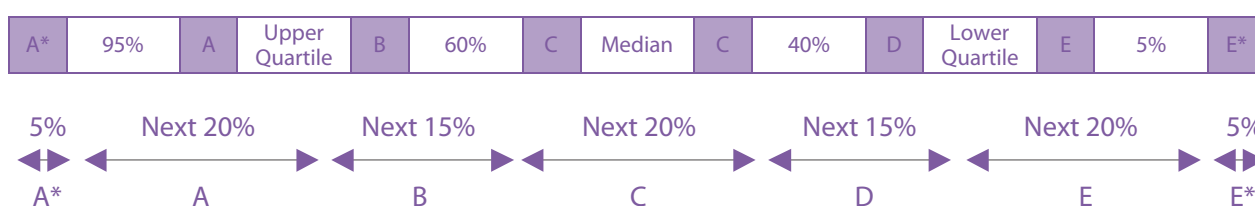
As an alternative to calculating multiple value-added scores, schools have ready access to comparative benchmarks in the DfES Autumn Package and Ofsted PANDA using:

- All schools
- Free school meals
- Prior attainment

Schools will typically use the tables comparing their results with those of schools with similar free school meals.

For example, a school with results higher than 95 percent of schools will be in the top 5th percentile of that group of schools.

These tables are also used by Ofsted in the PANDA, but the values are converted to grades ranging from A* (top 5th percentile of schools) to an E* (results are in the bottom 5th percentile of similar schools), as shown in the table below.



When looking at these tables, it is helpful to show the school mark compared with other schools. For example, in the Ofsted PANDA reports and the Pupil Achievement Tracker, the results for the school are shown in a table showing the range of results in the group of comparative schools.

Percentage of pupils achieving Level 5 and above in KS3 tests in 2003 for non-selective schools with more than 35% and up to 50% FSM

	A*	95	A	UQ	B	60	C	50	C	40	D	LQ	E	5%	E*
English		74		58		50		46	42	42		36		25	
Maths		67		57		54		51		48	47	43		31	
Science		63		53		48		44		41	39	37		28	
ICT		77		60		53		48	45	41		31		7	

In the above example, the 42 percent in English and 45 percent in ICT are between the 40th and median percentiles, and therefore a C.

This booklet does not deal with the **free school meals tables**, as it looks at the **progress** made by pupils compared to other schools.

Prior attainment tables summarise and interpret the progress made by pupils compared to schools with a similar intake, but they should be used with care. The band of similar schools is based only on the results of pupils with prior attainment grades, while the school mark also includes pupils without any prior attainment data. Schools should also refer to the Autumn Package to see how many other schools are in their band, and where their prior attainment is close to another table, to use the next set of tables either above or below their band.

For example, if the Key Stage 2 average point score was 25.1, then a school could look at the benchmark table for scores of at least 24 but less than 25 points, and also the table for scores of at least 25 but less than 26 points.

Percentage of pupils achieving Level 5 and above in KS3 tests in 2003 for schools with 2000 average KS2 point score of at least 24 but less than 25

	A*	95	A	UQ	B	60	C	50	C	40	D	LQ	E	5%	E*
English		62		51		44	42	42		38		33		23	
Maths		61		52		48		46		45		41		32	
Science		59		48		43	47	41	39	39		34		28	
ICT		75		54		46	45	39		34		27		10	

This school's English Level 5+ results are graded a C, as at 42 percent, they are between the 60th and median percentiles.

However, the school's English Level 6+ results are graded an A, as at 19 percent, they are between the 95th percentile and the upper quartile.

Percentage of pupils achieving Level 6 and above in KS3 tests in 2003 for schools with 2000 average KS2 point score of at least 24 but less than 25

	A*	95	A	UQ	B	60	C	50	C	40	D	LQ	E	5%	E*
English		26	19	16		13		11		9		7		2	
Maths		35		28		25		23	21	21		18		12	
Science		27		20		16		15	13	13		10		7	
ICT		29		14		8		5	4	3		1		0	

In this school most pupils made average progress, but the English department was outperforming Maths and Science at achieving Level 6 and above, even though English Level 6+ (19 percent) was lower than Maths (21 percent).

Also, within the Pupil Achievement Tracker a school can calculate results for groups of pupils e.g. by gender or ethnicity, and look at their outcomes using the same set of national data in a benchmark table.

For example, the table below compares the outcomes of **boys** compared with all pupils in all schools:

Percentage of boys achieving Level 5 and above in KS3 tests in 2003 for schools with 2000 average KS2 point score of at least 24 but less than 25

	A*	95	A	UQ	B	60	C	50	C	40	D	LQ	E	5%	E*
English				51		44		42	40	38		33		23	
Maths		61		52	48	48		46		45		41		32	
Science		62		48		43		41	39	39		34		28	
ICT		75		54		46		39	39	34		27		10	

It is important to show comparative data over time, such as looking at the English benchmarks for the past three years.

Questions to ask

Are the benchmarks in line with what you expected, or are there some surprises?

If the benchmarks are low, when did the analysis of your data alert you to this?

What strategies have you put in place to ensure pupils made good progress?

What worked with which pupils?

Are there any significant differences between pupils performance in different subjects?

Are there any differences between indicators? *For example, is Level 5+ C/D, while Level 6+ is A*/A?*

What has contributed to the differences?

Contextual value-added

As mentioned at the beginning of this booklet, there are two approaches to value-added calculations. One measures the raw or absolute progress made by pupils. *If a child moved from Level 4 to Level 5, that is an improvement of one level.*

The other measures comparative progress and may take account of school factors.

If the same child was likely to achieve a level 6, but achieved a level 5, then although they have still progressed by one level, it is less than anticipated.

The contextual value-added approach developed by the Fischer Family Trust estimates the achievement which pupils could make after taking a number of factors into account:

- Prior attainment, taking into account teacher assessment, marks awarded, and differences between subjects;
- Gender;
- Month of birth;
- Mean National Curriculum attainment level and distribution of the school's intake;
- School context, such as percentage of pupils eligible for free school meals.

Looking at the difference between estimated outcomes and actual achievement provides a measure of pupil progress, similar to the value-added score. However, contextual value-added also takes into account school context, and a more nuanced approach to prior attainment.

For example, if 70 percent of a cohort of pupils were anticipated to achieve Level 5+ in English, but actually 80 percent were successful. This is 10 percentage points above the estimate.

The school should be asking:

- How does this compare to other schools?
- Is a 10 percent difference unusual, or do lots of schools achieve this or better?

Using a **percentile rank** of the differences, tells us how well a school compares to others. Schools in the top 25 percent of schools have a percentile rank between 1 and 25, while schools in the bottom 25 percent of schools have a percentile rank of between 76 and 100.

Looking at **contextual value-added data** over time allows a school to understand the progress made by pupils across a range of indicators. The example below looks at progress from KS2 to KS3, KS3 to KS4, and KS2 to KS4, using a range of indicators. In the case of KS2 to KS3, the:

- percentage of pupils attaining level 5 or higher in all 3 core subjects
- mean level achieved across all 3 core subjects

For KS3 to KS4 and KS2 to KS4 the:

- percentage of pupils achieving 5 or more A*-C GCSE/GNVQ passes
- capped GCSE/GNVQ points score (best 8 subjects)

To draw attention to certain percentile ranks, those in the top 25 percent are highlighted in blue, while those in the bottom 25 percent are highlighted in red.

KS3	KS4	Percentile Rank (based on Matched Pupils)						% of pupils	
		Value-added KS2 -> KS3		Value-added KS3 -> KS4		Value-added KS2 -> KS4		Actual KS4	
		Core Subjects Level 5+	Overall Points Score	5 or more A*-C Passes	Capped Points Score	5 or more A*-C Passes	Capped Points Score	% 5+ A*-C	% No Passes
1999	2001	34	60	15	34	12	34	40	3
2000	2002	89	88	91	97	96	98	17	10
2001	2003	75	58	60	90	73	92	30	1
2002	2004	87	88						
2003	2005	81	95						

For example: this schools pupils made good progress in terms of the value added achievement throughout Key Stage 3 and 4. In 2001 they achieved 40 percent 5+ A*-C as a result of the good progress made from Key Stage 2 to Key Stage 3, which was also sustained during Key Stage 4. The percentile rankings are either average, or upper quartile (15 percent and 12 percent).

The following year (2002), the number of pupils gaining 5+ A*-C grades fell to 17%. Poor progress had been made by pupils from Key Stage 2 to Key Stage 3, which was compounded during Key Stage 4. The percentile ranking never rises above the lowest 12 percent for all schools.

In trying to address these problems, the school concentrated on its C/D borderline pupils, and in 2003 30% of pupils achieved 5+ A*-C grades. The value-added for 5+ A*-C cohort of pupils was average (60 percent and 73 percent), but the value-added for other pupils remained low, given the lower quartile rankings for GCSE capped point score (90 percent and 92 percent).

Given that the value-added for Key Stage 2 to Key Stage 3 remained within the lower quartile in 2002 and 2003, the schools response to what the data is telling them may not be sufficient if they continue to concentrate the best teachers and resources on targeting pupils on the C/D boundary, rather than improving teaching and learning across the ability levels.

Schools would want to use historical and comparative data such as contextual value-added or benchmarks to ask questions such as:

Questions to ask

Does your school ensure pupils make good progress across all key stages, or is value-added low from KS2 to KS3, but better from KS3 to KS4?

Is your school better at threshold indicators such as 5+ A*-C than broader measures such as a capped point score? (Possibly indicating that some pupils are being successfully targeted to achieve published targets, but other pupils are not being ignored and underperforming).

Conversely, is your school better at the broader measures, such as the capped points score? (Possibly indicating effectiveness with the broad majority of pupils, but some pupils may just be missing the threshold indicators, or they are missing the threshold in one subject).

Are there any indicators with sustained upper quartile progress over a number of years, and do you know what has contributed to this success?

Are overall 5+A*-C results good compared to similar schools in benchmark groups, but the value-added measures are lower quartile, possibly indicating underachievement with some pupils?

Headline figures for the whole school provide a general impression of achievement, but there is a need to look at the attainment of different groups of pupils in order to plan future strategies.

For example, this table has the Key Stage 3 results for a school including the number of boys and girls with low (L), middle (M) and upper (U) prior attainment highlighted in orange where the value-added is significantly low, or green where it is significantly high.

Key Stage 3 English

Year	Pupils	Actual Level 5+	Difference to estimate	Percentile Rank	Boys			Girls		
					L	M	U	L	M	U
2001	155	55%	-10%	90	28	15	15	25	31	27
2002	200	80%	5%	40	22	21	36	23	25	42
2003	205	70%	-5%	62	28	26	34	32	28	50

This school had low value-added in 2001. Fifty-five percent of the pupils achieved 5+A*-C grades, which was 10% below the estimate, which put them in the 90th percentile, only the upper ability boys made good progress. The school took action, and in 2002 results went up to 80%. However, there was still a problem given the poor progress in value-added terms of lower ability boys. The school continued to change practice, targeting pupils with different learning needs more appropriately, and in 2003, no group of pupils had significantly low value-added, while the middle and upper ability girls had good value-added. However, overall value-added was slightly down on the previous year.

Contextual value-added data compares the progress made by each pupil with the average progress made by similar pupils in similar schools. The figures calculate the average progress made by all pupils in the school, if we are to identify pockets of underachievement, we need value-added data at an individual pupil level.

SECTION 2

Comparing subject departments with other departments

This guidance section will help you answer the following questions.

- How do departments compare within the school?
- How do departments compare with other schools nationally and within a selected group (e.g. A LIG collaborative)

SECTION 2

COMPARING SUBJECT DEPARTMENTS WITH OTHER DEPARTMENTS

Disaggregating by groups

Whole-school data can be used to see differences between subjects in terms of outcomes or progress, but it cannot tell us which groups of pupils make very good or very poor progress. *For example, a school may have high value-added, but this figure hides underachievement by boys with middle prior attainment.*

We need to look at the results for different groups of pupils compared against their potential or what they would have been estimated to achieve.

English Level 5+		Actual – for pupils matched to KS2 data		A Difference between actual and estimates using prior attainment		B Difference allowing for the performance of pupils in similar schools	
		Test	TA	Test	TA	Test	TA
All Pupils	220	43%	39%	-7%	-10%	-1%	-4%
Boys	120	34%	31%	-8%	-8%	-2%	-3%
Boys – Lower	70	7%	4%	-5%	-7%	-2%	-4%
Boys – Middle	35	54%	59%	-13%	-4%	-5%	4%
Boys – Upper	15	93%	75%	2%	-15%	6%	-11%
Girls	100	54%	47%	-6%	-12%	-1%	-6%
Girls – Lower	60	29%	22%	-4%	-10%	1%	-4%
Girls – Middle	20	78%	65%	-4%	-14%	1%	-9%
Girls – Upper	20	100%	100%	2%	3%	4%	5%

Overall, pupils make less progress than would be estimated taking into account prior attainment

There is a significant difference between the test and teacher assessment for boys with upper prior attainment

In this example, data from the Fischer Family Trust shows value-added data for pupils grouped by prior attainment, there are 220 pupils, of whom 120 are boys, and 100 are girls.

The pupils are grouped into Lower, Middle and Upper prior attainment based on the distribution of pupils in 1998. In this school, there are 70 boys who have low prior attainment, compared to 15 boys with high prior attainment.

For each group, we compare the actual results, against what would have been estimated, after taking into account national results that year. For example, 14 out of the 15 boys with upper prior attainment achieved a level 5 (93 percent), and this was 2 percent above the estimate, once national results have been taken into account.

Any significant differences taking into account the number of pupils are highlighted in dark blue.

Estimate and Actual results – Scattergraphs

Alternatively, a more visual approach is to compare the estimated fine grades using the marks awarded and actual fine grades for groups of pupils.

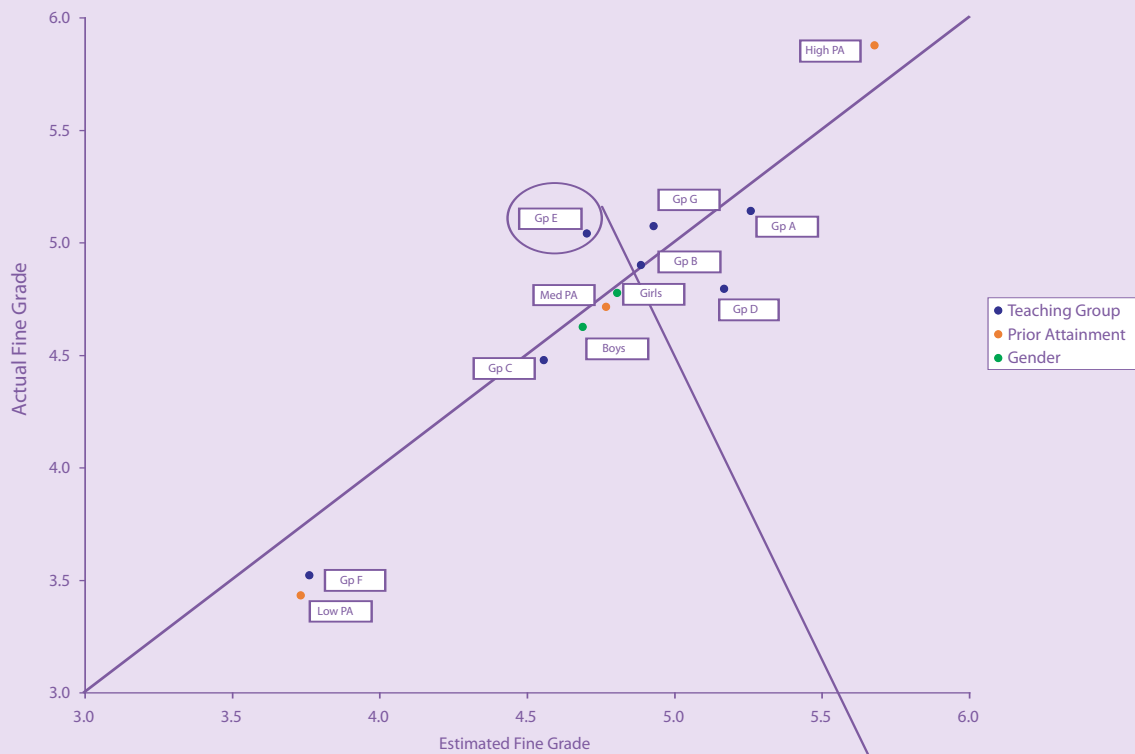
The x-axis plots the average of the fine grade estimates for the group of pupils, taking into account prior attainment and school context. The y-axis plots the grade attained as a fine grade level, derived from the marks, this type of graph could also be used with a school's own estimates or targets and actual grades.

If the actual results for any group of pupils were exactly in line with the estimate, then the group would be plotted on the diagonal line running from bottom left to top right.

Where the actual is below the estimate, then the group is plotted below this line.

Where the actual is above the estimate, then pupils are plotted above the line.

Here, boys and girls are achieving in line with their estimates with a small gap in performance between them. It may be useful to look at how different class groups have performed.



Group F containing pupils with the lowest prior attainment, their outcome achievement is just below the estimate.

Groups D and A have two of the highest estimates. Group D is some way below the estimate, whereas in Group E pupils achieve above the estimates.

Technical Commentary

How fine grades are calculated

The Fischer Family Trust use Fine Grade Levels, which converts the mark awarded to a decimalised level, and where the test level is missing e.g., the pupil was absent, uses a fine grade for the Teacher Assessment based on the median of the fine grades awarded for that level. This is a more detailed approach than sub-levels which splits the mark range for any given level into three equal parts.

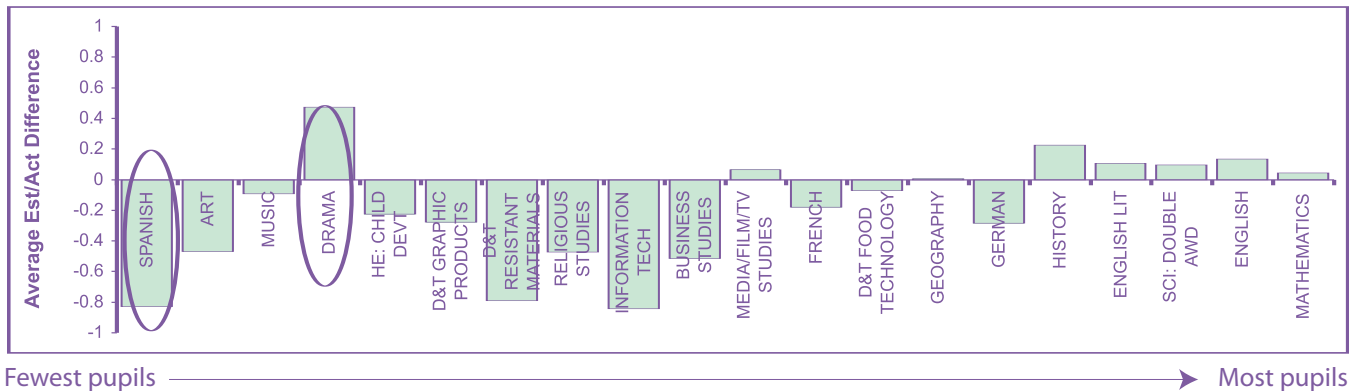
Within School Performance

Headteachers, Governors and Heads of Department will require an overview of the progress made by pupils in each subject.

Comparison can be made using the actual point score achieved by pupils from 8 (A*) to 1 (G) against either the estimated grade or target grade, again using the same point score. *For example, a pupil who achieved a B but was estimated to achieve a C would have a score of +1 (6 for a B grade minus 5 for a C grade).*

In this example, pupils taking Spanish on average achieve 0.8 of a grade less than estimated, while pupils taking Drama on average achieve 0.5 of a grade better than estimated.

Average difference between estimate and actual per entry



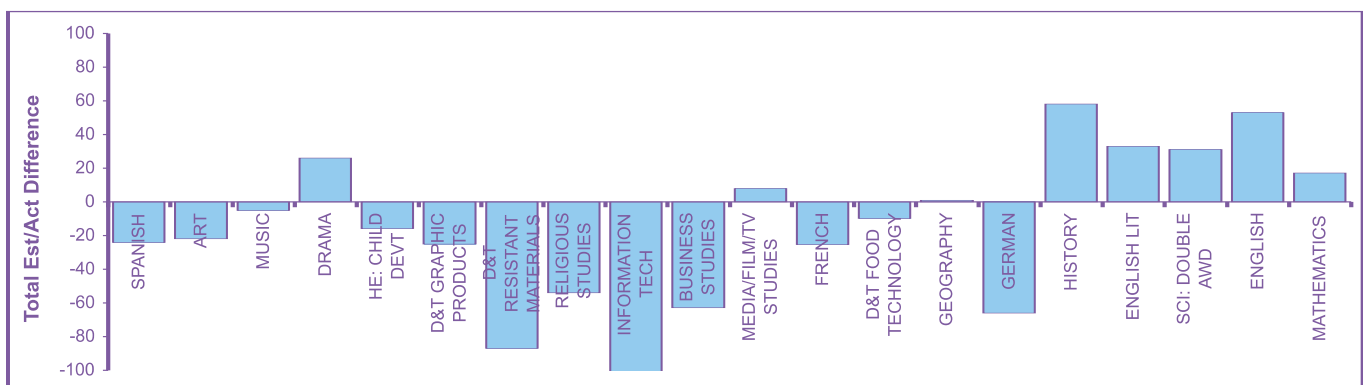
But very few pupils took Spanish or Drama in this school. The subjects are arranged on the graph by the number of entries, from Spanish and Art with the fewest to English and Mathematics with the most.

When considering priorities, the school would have to balance issues of equity and impact. While the pupils taking Spanish are furthest from their estimates or targets, the smaller differences for other subjects cumulatively have more impact on whole school outcomes.

The graph below takes the difference between the sum of all the estimates and actuals for pupils taking the subject.

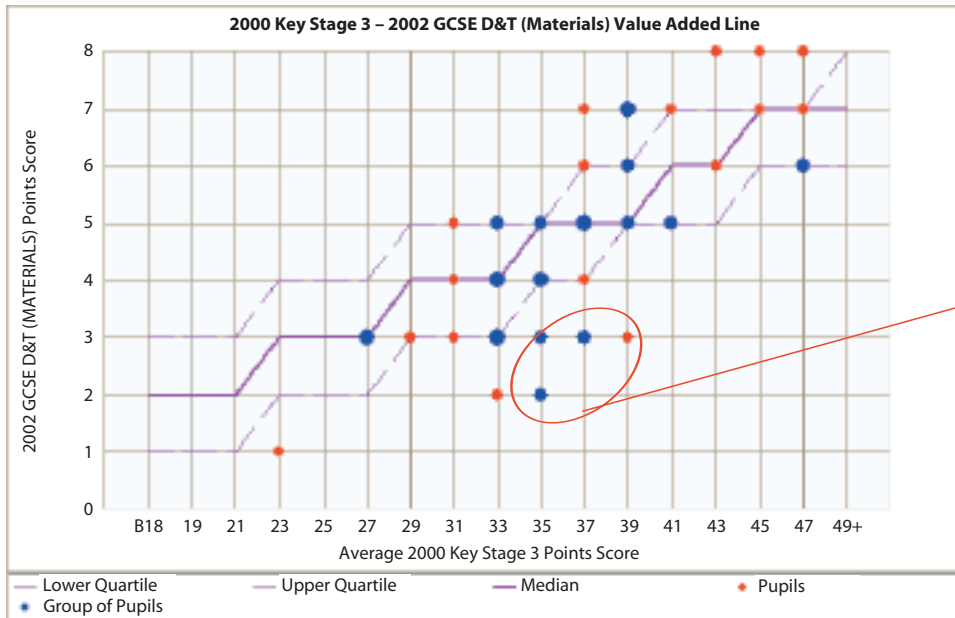
In the example, D&T Resistant Materials, Information Technology and German would be amongst the subjects to focus upon, while in subjects such as English and Mathematics, the small per pupil difference between the estimate and actual, is still significant overall bearing in mind the number of pupils.

Difference between estimate and actual for all entries



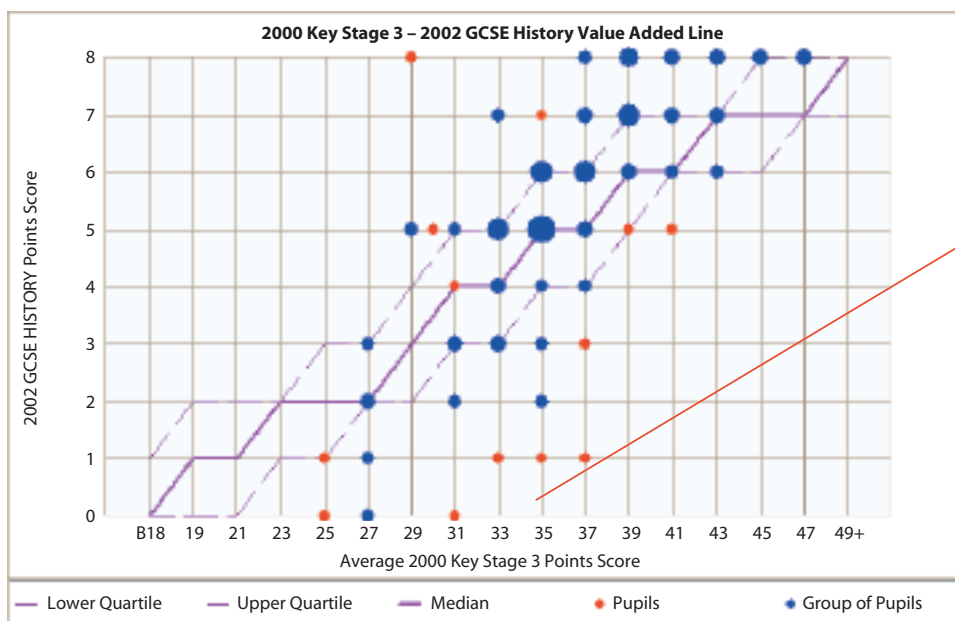
This analysis is useful for gaining an overview, but subject departments and teachers would also want to see the comparative progress made by pupils. This can be done using these value-added graphs from the **DfES Pupil Achievement Tracker**. (See section 3 – Scattergraphs) Here, each red 'dot' is a child, while each blue 'blob' is proportionate to the number of pupils who made identical progress.

D&T Resistant Materials



For example, D&T Resistant Materials has a number of pupils with mid-attainment at the end of Key Stage 3, who underachieve by a couple of grades....

History



...while in History, a subject with **overall** better value-added, a few pupils significantly underachieve

SECTION 3

Comparing groups of pupils

This guidance section will help you answer the following questions.

- Do some groups of pupils within the school make different progress to others?
- How do these groups compare with similar pupils nationally, locally and within similar schools?

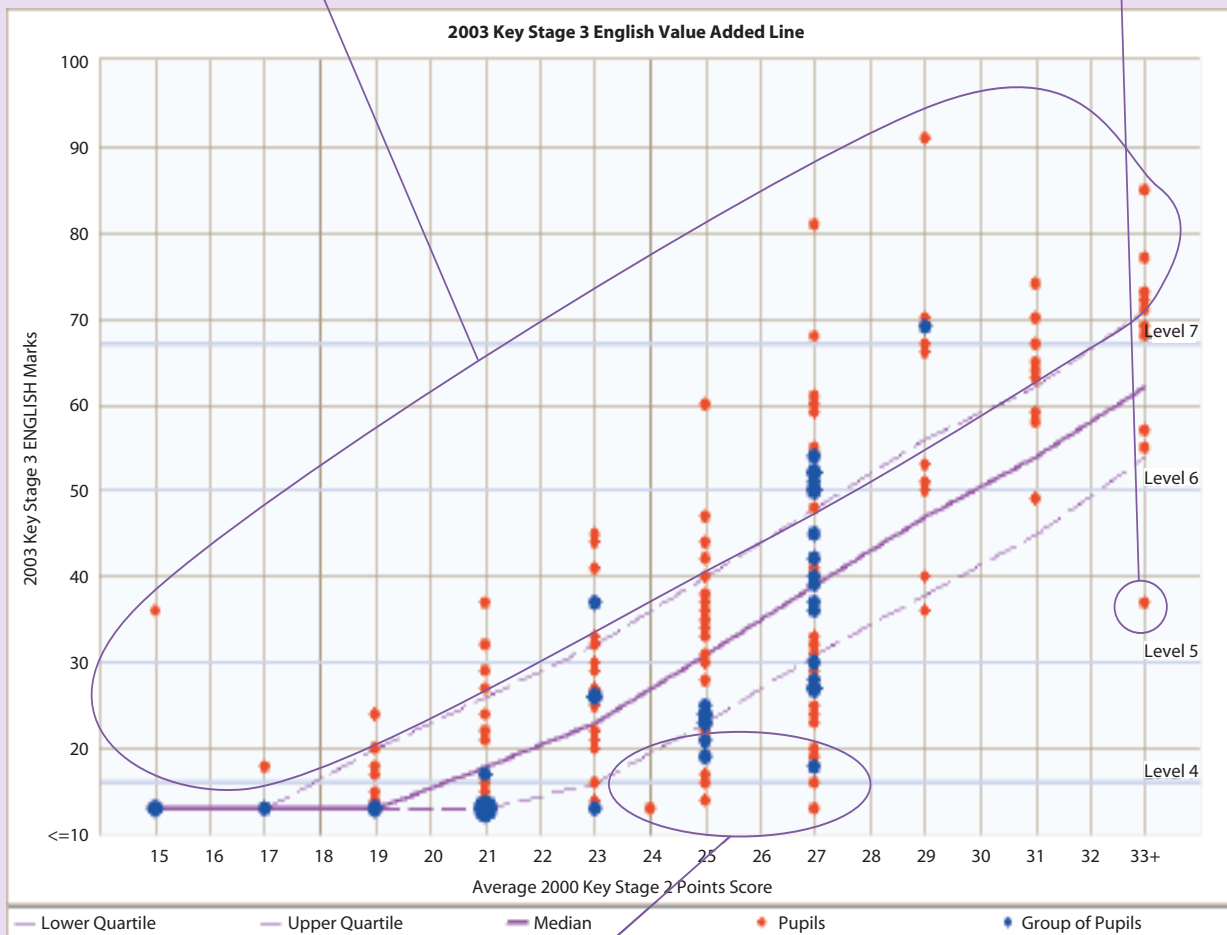
SECTION 3 COMPARING GROUPS OF PUPILS

Value added scattergraphs

Scattergraphs are a visual and accessible way of showing the progress made by pupils, and can be created by many Management Information Systems, or by using the **DfES Pupil Achievement Tracker**. Here each red 'dot' is a child, while each blue 'blob' is proportionate to the number of pupils who made identical progress.

As you would expect with any value-added data, not all the pupils are between the upper and lower quartiles, and some pupils across the range of prior attainment are making above-average progress....

...while pupils with high prior attainment do very well. Only one pupil (highlighted) underachieved;



The school would want to ask questions about the progress made by pupils on 25 and 27 points. For example, there are a number of pupils with an average of level 4 at the end of Key Stage 2, who remain on Level 4 at the end of Key Stage 3 in English.

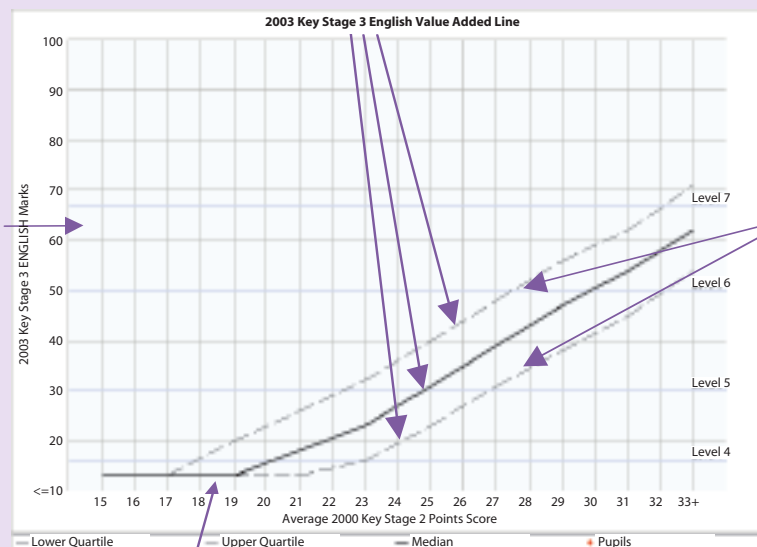
Looking at the spread of pupils from left to right, a good proportion are below 27 points, and therefore arriving at the school probably below Level 4 in all three subjects.

Technical Commentary

Here is a value-added graph from the DfES Pupil Achievement Tracker, which plots the progress made by pupils against national averages.

Three national lines are drawn for the upper quartile, median and lower quartile of pupils nationally.

The y-axis shows the total number of marks awarded for the Key Stage 3 English papers.



For any given point on the graph, 50 percent of pupils nationally were between the top dotted line and the bottom dotted line.

The x-axis shows prior attainment i.e. the Key Stage 2 average point score calculated from the English, Mathematics and Science Levels.

For example, 50 percent of pupils nationally with an average point score of 27 (Level 4 English, Level 4 Mathematics and Level 4 Science, or the combination 5, 3, 4) go on to achieve between 32 and 48 marks on the Key Stage 3 English paper, and therefore a Level 5. However, another 25 percent of pupils go on to achieve more than 48 marks, and therefore a Level 6 or above, while another 25 percent of pupils go on to achieve fewer than 32 marks, and therefore a Level 4 or below.

This information can also be presented as a transition matrix which provides the numbers and percentages of pupils grouped by prior attainment and outcomes:

Key Stage 2-3 School Transition Matrix for 2000-2003 (National figures shown in brackets)

	A	D	B4	4	5	6	7	8	5+	6+
Below Level 3 (19 pupils)	0% (12%)	0% (2%)	68% (49%)	16% (33%)	11% (5%)	5% (0%)	0% (0%)	0% (0%)	16% (5%)	5% (0%)
Level 3 (54 pupils)	0% (6%)	0% (0%)	41% (13%)	41% (36%)	19% (39%)	0% (6%)	0% (0%)	0% (0%)	19% (45%)	0% (6%)
Level 4 (92 pupils)	0% (3%)	0% (0%)	3% (1%)	33% (11%)	36% (47%)	21% (29%)	8% (9%)	0% (0%)	64% (85%)	28% (38%)
Level 5 (19 pupils)	0% (1%)	0% (0%)	0% (0%)	0% (1%)	11% (19%)	37% (40%)	53% (36%)	0% (2%)	100% (97%)	89% (79%)
Total (184 pupils)	0% (4%)	0% (0%)	21% (9%)	30% (21%)	26% (39%)	15% (19%)	9% (7%)	0% (0%)	49% (65%)	24% (27%)

This shows the progress made by your pupils and the national equivalents (in brackets)

For example, there were 92 pupils with an average of a Level 4 in English, Maths and Science at the end of Key Stage 2...

...and 33 percent of these went on to achieve a Level 4, 36 percent a Level 5, and 21 percent a Level 6.

Questions to ask

What has contributed to the low value added of certain groups?

Why are pupils underachieving across the ability range?

Mapping a new intake of pupils

So far attainment and performance have been looked at retrospectively. Different techniques are required when presented with a new intake of pupils, such as how to set targets and track their progress towards them through the school.

Judgements about the potential of a new intake of pupils should not only use their prior attainment data to **inform** your target setting, but it is important to look at the **progress** made, in the past, by comparable pupils in your school. This historic view of what the schools past practice was able to achieve with particular pupils will not only identify groups of pupils at risk of underachieving but also highlight the scope and type of provision required by this year group. Knowing this will allow the senior managers to reassess priorities and provision, making the necessary changes to more closely reflect needs.

For example, a Secondary school would use Year 7 data to:

- set initial targets for the end of Year 9
- identify pupils for the Key Stage 3 Strategy catch-up elements e.g. to ensure 50% of pupils with a Level 3, achieve Level 5 by the end of Key Stage 3
- teachers would also want to look at the marks awarded and the teacher assessment, as if there were a number of pupils towards the top end of Level 3, the school may be looking to target even more pupils to Level 5.
- to set interim indicators for the end of year 8
- identify pupils who had made good progress from KS1 to KS2
- identify pupils who may not have made good progress from KS1 to KS2
- compare the intake into Year 7 with that of previous years to get a sense of whether it is different, and whether the intake into the school is changing over time.

One useful exercise is to look at the profile of the Year 7 intake over time. Here a school has created a table of the Key Stage 2 results in English at the end of Year 6 for its current Year 7, and also the other year groups currently in the school.

	Pupils	Number of pupils at each KS2 Level								% 4+
		Absent	Disapplied	Below level of test	No level	2	3	4	5	
Y11	168	4		4	1	2	44	86	27	67%
Y10	188	2	1	5	4		42	83	51	71%
Y9	184	1		3	2	1	28	84	65	81%
Y8	192			2	1		30	93	66	83%
Y7	190			2	3		30	85	70	82%

In this school there have been a consistent number of pupils on Level 4, but the number of Level 5 pupils has increased from 27 in Year 11 to 70 in Year 7, prompting the school to reassess their methods of grouping and teaching in KS3.

SECTION 4

Bringing it all together

This section deals with some of the broader aspects of schools data systems

- It will allow teachers and schools to consider what data will be most useful to them for different purposes.

SECTION 4

BRINGING IT ALL TOGETHER

So far we have looked at how to interrogate value-added data to “smoke out underachievement”. It is important to recognise that beneath the headline figures there are differences between subjects, indicators of attainment and information on groups and individual pupils as well as information concerning the past performance of the school in supporting pupils to achieve their best.

We have also looked at the different techniques for presenting value-added data.

Some are **simple measures which summarise**:

- Value-added measure in Performance Tables
- Prior Attainment Benchmarks in the Autumn Package/OFSTED PANDA

Other measures give the **detail required by a school to diagnose a problem**:

- Value-added scattergraphs in the Pupil Achievement Tracker

Finally, there are measures which **combine detail and an overview**, giving a school an idea of where the issues have been over time, what the potential problems may be in the future, and guiding them towards the need for more detailed data:

- Fischer Family Trust Contextual Value-added.

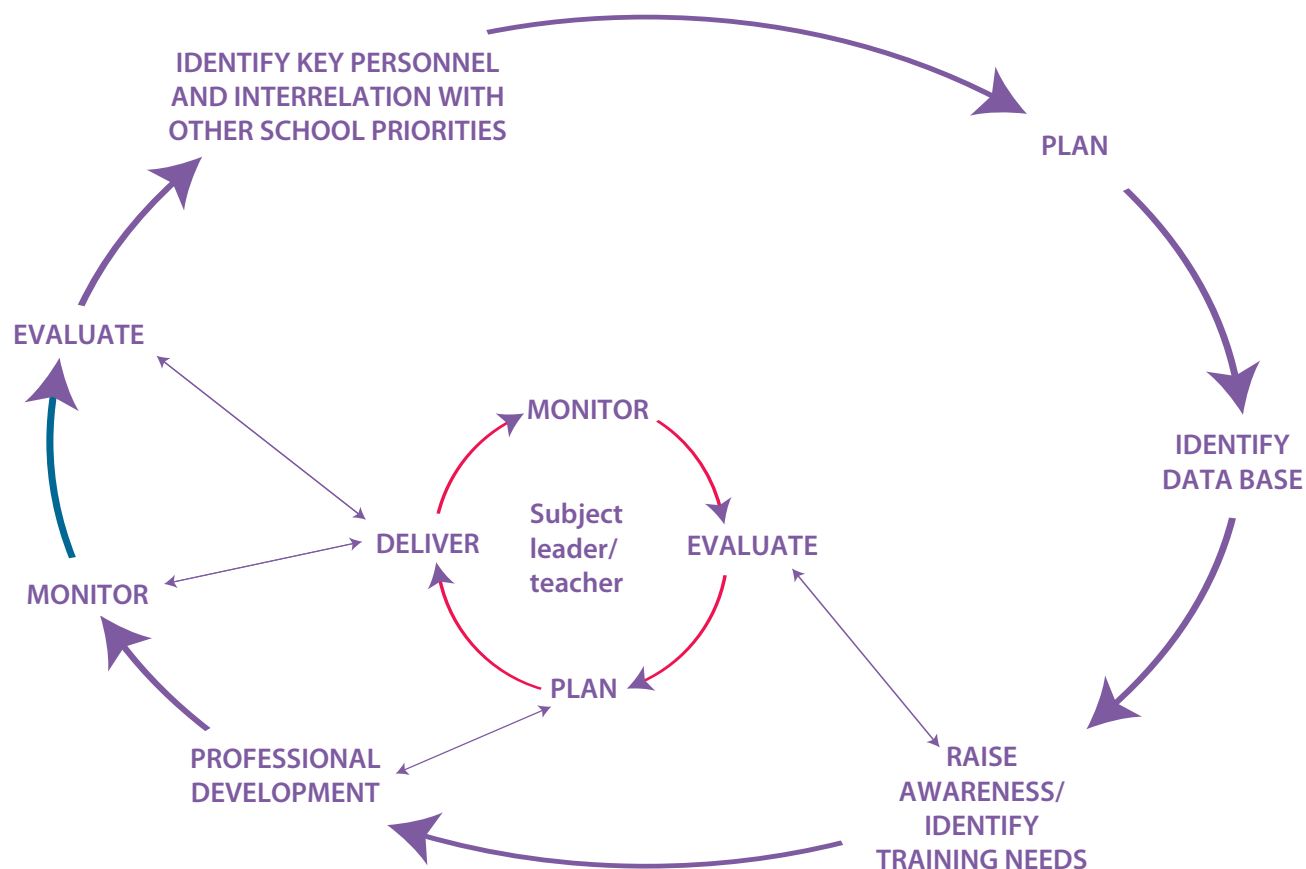
Above all a data informed school will need to adjust its planning cycle to more closely reflect their annual data collection process. Advice on annual calendars of data activity can be found in ‘Releasing potential, raising attainment: managing data in secondary schools’ (DFES/0722/2002).

<http://www.standards.dfes.gov.uk/sie/si/SfCC/goodpractice/dm>

Essentially a more informed school will need a more responsive planning cycle. Shorter term action plans which allow for change in practice-based on data collected. For schools to quickly respond to their more sophisticated knowledge of pupils’ needs and to address new and emerging trends in performance data needs to inform future planning and not only be used retrospectively.

Each of the stages identified in the inner action planning cycle below can and should be supported by the collection, collation and interpretation of appropriate data sets.

Planning cycle



Source: Paul Buck: Learning Together; Achieving Success

On-going tracking

This guidance has described the use of value-added data from National Curriculum tests, because it applies to all pupils and all schools. However, when monitoring progress, measures will need to be taken at different times using a mixture of methods; teacher assessment, coursework, and many schools use externally provided tests. e.g. CATs, MidYIS, YELLIS.

Schools will need to select an appropriate calendar of assessment activity to meet their needs.

This cycle of data and information should allow for:

- data to be collected
- reports to be produced
- planning and professional discussion to take place
- practice to be changed and remedies sought
- outcomes and impact to be assessed
- resources to be targeted more appropriately.

This implies that schools will have to be more responsive in their ability to reflect new information in changes in practice, systems and structures.

School based Self Evaluation can be supported and evidenced through an appropriate cycle of data capture and interpretation. The concept of the “average” school is not helpful when seeking ways of presenting data that will provide staff with better focused information at times when change in practice can affect outcomes and achievement

Schools will need to consider how best to use their existing systems for the collection and provision of intelligence that will allow for this more detailed look at aspects of performance.

All schools will collect teacher assessment about academic performance; some will also look at behaviour, motivation, attendance, effort, homework etc. Some will collect estimates of likely achievement in addition to targets. Schools need to be coherent and systematic in the collection and use of data, allowing them to make changes in practice based on evidence and to justify the redeployment of resources that may follow.

Staff will need support and training both in the use and interpretation of data as impact measures and in providing evidence to support self evaluation.

The ability of a school to observe its own practice is crucial. Good quality data, supplied at the right time, can provide staff with a key support in confirming what good practice is and perhaps more importantly knowing what is not.

Schools with Good Practice in Data Management

- Gather Key Stage 2 data as early as possible and analyse carefully (including analysis by gender, ethnicity and mobility), supplemented by other test data (such as in English, mathematics or verbal reasoning), when available, for cross-referencing
- Identify pupils with special educational needs (SEN) or those learning English as an additional language (EAL) and plan action to enable smooth transfer from their primary school
- Establish sets of data which are used as a baseline to monitor and review individual pupils' progress, especially to identify signs of underachievement or unusual potential, and to help set targets for the pupils and subject departments
- Devise and invest in an effective information management system which allows individual departments and teachers to access information independently and in a way tailored to their needs, and also allows new data to be easily entered and processed when required
- Support subject teachers and tutors in their use of data and other assessment information to review the performance and expectations of pupils, maintaining a productive dialogue with the pupils about their progress
- Ensure test results and teacher assessments are analysed to illuminate aspects of pupils' performance and the extent to which progress is consistent with earlier data
- Develop human resource management systems that are supported by the analysis of the performance of class groups is used to identify strengths and weaknesses in aspects of teaching, which are then addressed through performance management and professional development, and departmental structures.

Source: Good Assessment in Secondary Schools.

Ofsted March 2003

The application of new knowledge acquired through better analysed data will need to be supported within schools at all levels.

Middle Leaders in particular will:

- Need to have a secure understanding of what different teaching and learning strategies look like in practice.

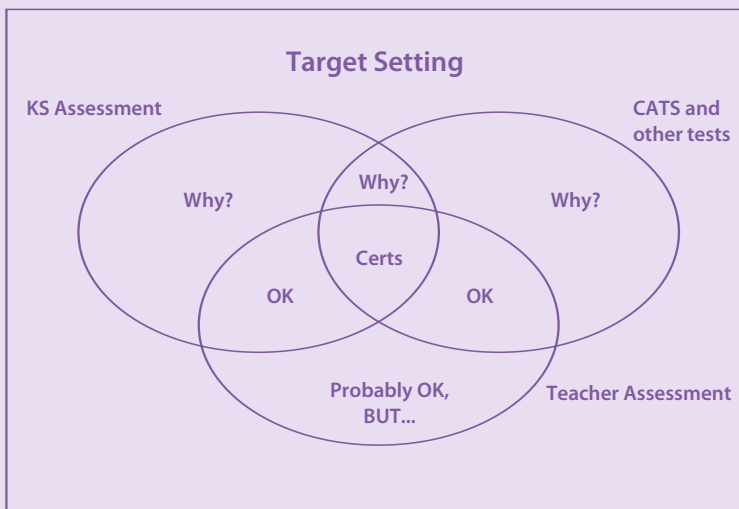
And be able

- To understand progress and achievement anomalies from data sources.

Perhaps the greatest challenge comes from the need

- To recognise differentiation in achievement via observation within the classroom as well as from the analysis of outcome data

Making Sense of it all by Using Venn Diagrams



An effective school should make use of a number of different predictors of pupils' performance to establish its targets e.g.: Key Stage 2 APS, Key Stage 3 APS, predictions from standardised tests, e.g. [CATs/MidYIS] and teacher assessments. These predictions are not always a perfect match.

Some children can be predicted to attain by one predictor but not others. One way of making sense of this conflicting information is to plot the various predictions on a Venn diagram, with each set of predictions being the focus of one of the diagram's hoops. In this example, the names of each pupil predicted to gain 5+ A*- Cs from KS3 Assessments, Standardised Tests and Teachers Assessments could be plotted in each of the three hoops. Pupils whose names appear in only one hoop are predicted to attain 5+A*-C by one measure. Those whose name appears in two hoops are predicted to attain 5+A*-C by two measures and so on. Those pupils whose names are in all three hoops are most likely to attain 5+A*-C. The easiest target for the school to attain is that which includes only those pupils encompassed by all hoops. The most challenging target would include any pupil encompassed by at least one hoop. This analysis can also help identify underachievement

Source: Releasing Potential, Raising Attainment: Managing Data in Secondary Schools (DfES 2002)

www.standards.dfes.gov.uk/sie/si/SfCC/goodpractice/dm

Remember data is not a precise tool requiring, as it does, analysis, interrogation and interpretation.

While there is a need to measure against the 'national data set' to see comparisons with other schools, there is also a need to collect and use a range of data that reflects your school's priorities and context

This booklet has described different techniques for presenting value-added data, however no system should depend entirely on the data from assessments, informed professional teacher judgement is fundamental to the process. The best schools combine the two, to identify pupils with more potential than the data would suggest, then changing and targeting their practice accordingly. Data is never used as an excuse!

APPENDICES

Exercise 1: Using Progress Charts

Exercise 2: Unpacking Prior Attainment Data

Exercise 3: Accounting for school context

Exercise 4: Accounting for past trends

Exercise 5: Using estimates to set targets

Exercise 6: Target setting and the Key Stage 3 Strategy

Exercise 7: Using data with students

Exercise 8: Measuring value-added

Exercise 9: Identify department and cohort underperformance

Exercise 10: Dividing pupils into sets/teaching groups

Exercise 11: Using value-added scores

Exercise 1: Using Progress Charts

Purpose: How to use Progress Charts from the DfES Autumn Package to inform target setting, and identify pupils at risk of underachievement.

Each year the Autumn Package contains a series of Progress Charts showing the outcomes achieved by pupils of similar prior attainment. Schools can use these charts as a starting point to **estimate** what their pupils are likely to achieve, and from these set **targets** based on what the school aims to achieve.

For this exercise we are going to use the results of Anna Grapefruit, Sam Oregano and Ivan Banana. At the end of Key Stage 2 each achieved Level 4 in the English, maths and science tests, while Ivan, Anna and Sam achieved a level 3 in English but a level 5 in maths.

	KS2 Teacher Assessments			KS2 Test Levels			Average Point Score
	English	Maths	Science	English	Maths	Science	
Anna Grapefruit	4	4	4	4	4	4	27
Sam Oregano	4	4	4	4	4	4	27
Ivan Banana	3	5	4	3	5	4	27

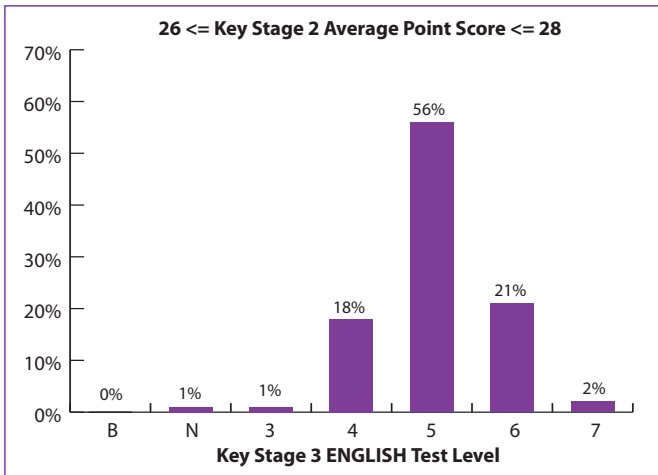
However, they each have an average point score of 27 points, calculated using the following values:

KS2 2000 Points Scores			
Test Outcome	English	Maths	Science
A - Absent	Disregard	Disregard	Disregard
D - Disapplied	Disregard	Disregard	Disregard
B - Working below the level of the test N - Below Level 2 threshold Compensatory Level 2	15	15	15
Level 3	21	21	21
Level 4	27	27	27
Level 5	33	33	33
Level 6	39	39	39

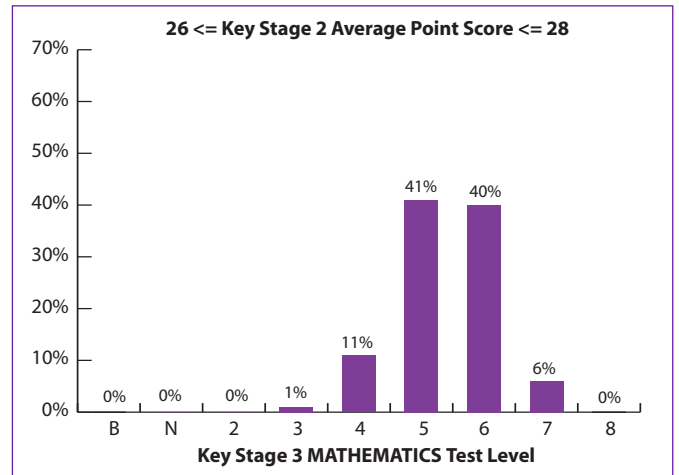
Source: DfES Autumn Package 2003

Progress Charts are available for different point score ranges, and we need to look at the charts for pupils who have achieved between 26 and 28 points at the end of Key Stage 2. There are charts for English, maths, science, reading and writing.

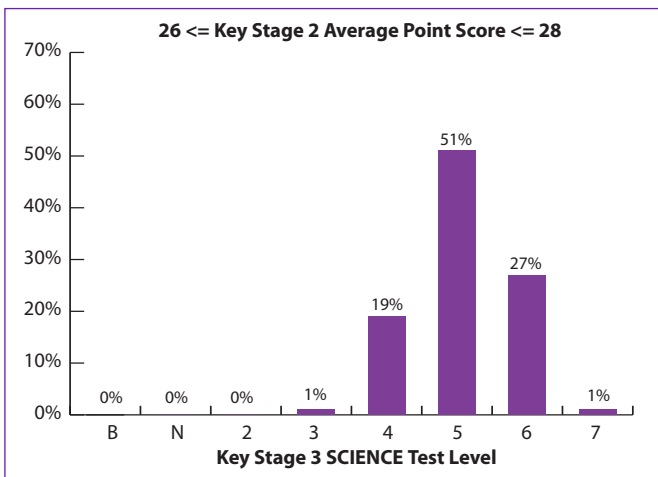
English



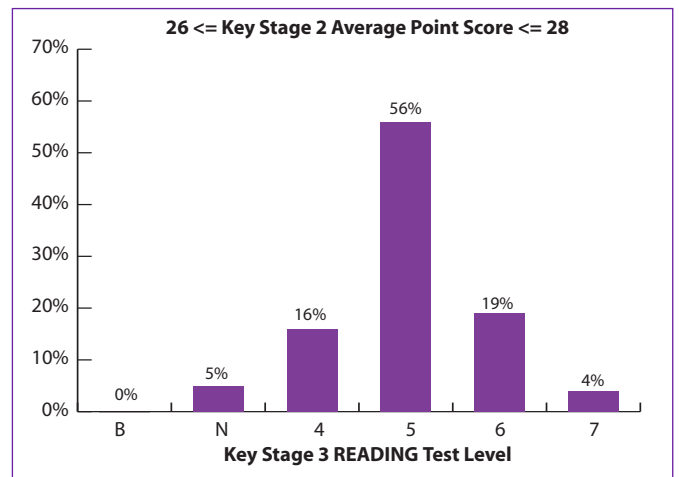
Maths



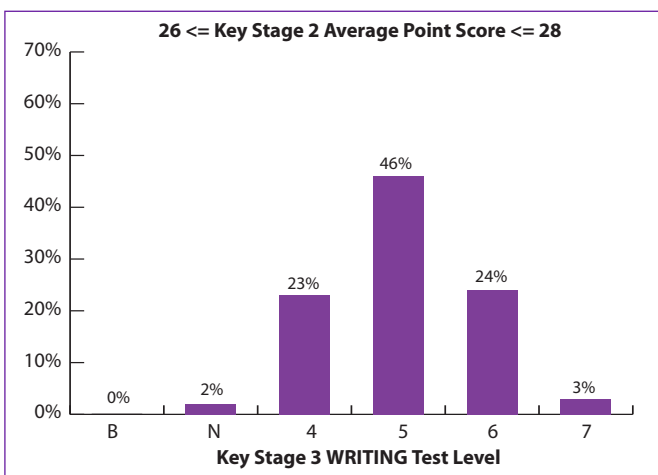
Science

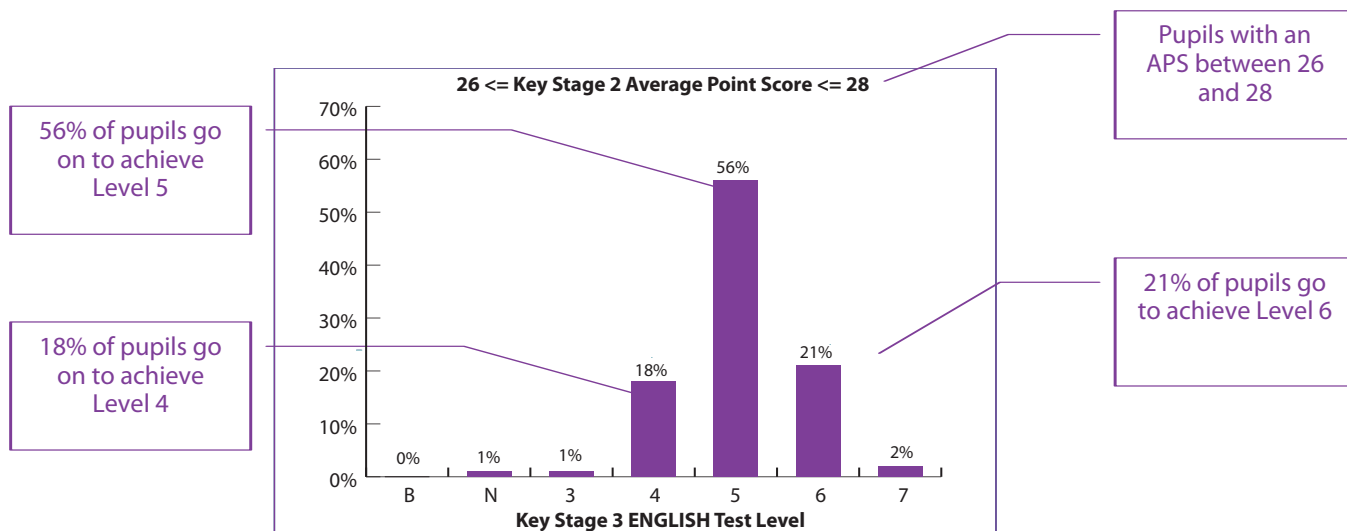


Reading



Writing





The English chart tells us 56% of pupils with an average point score of 27 at the end of Key Stage 2 (e.g. a Level 4 in each of the three subjects), go on to achieve English Level 5 by the end of Key Stage 3, and another 21% a Level 6.

Importantly for target setting, 79% of such pupils go on to achieve at least a Level 5, but we also know there is a risk of underachievement, as 19% of pupils achieve a Level 3 or Level 4.

The figures for all KS3 core subjects are summarised in the following table:

	% of pupils achieving Level 5	% of pupils achieving Level 6	% of pupils achieving Level 5 and above	% of pupils achieving Level 6 and above
English	56%	21%	79%	23%
Maths	41%	40%	87%	46%
Science	51%	27%	79%	28%
Reading	56%	19%	79%	23%
Writing	46%	24%	73%	27%

Around 1 in 5 pupils do not progress to at least a Level 5 in English, Science and Reading, while around 1 in 4 such pupils do not progress to a Level 5 in Writing, and 1 in 10 pupils in Mathematics.

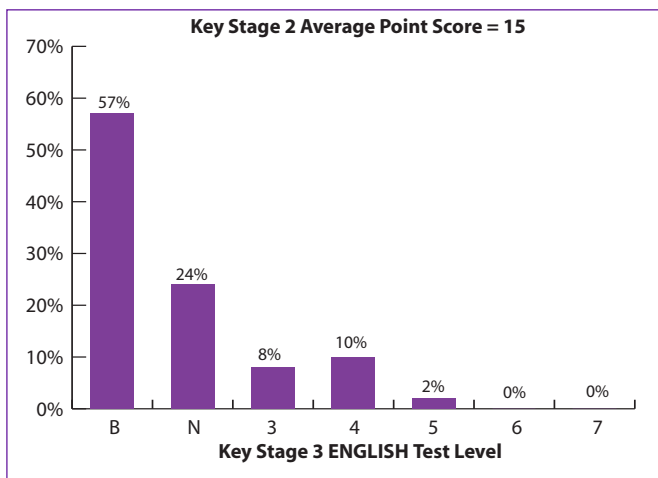
For our three pupils from these charts we would expect at least a Level 5. We also know that around 1 in 5 such pupils achieve a Level 6, even more in Maths. We also know there is a risk that such pupils may still achieve a Level 4 by the end of Key Stage 3.

Task: Using the Progress Charts

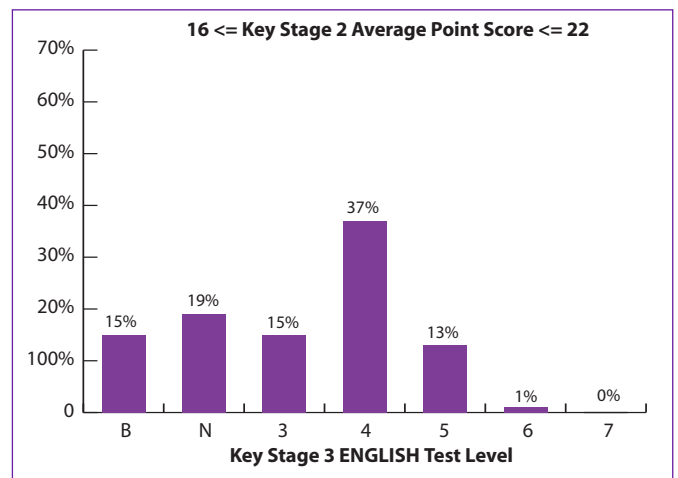
Using the KS2 results of five pupils, use the following Progress Charts to calculate estimates for KS3 English. What targets would you set for these pupils? What targets would you set for pupils with:

- higher teacher assessments than test levels?
- a **higher** level in English than maths or science?
- a **lower** level in English than maths or science?

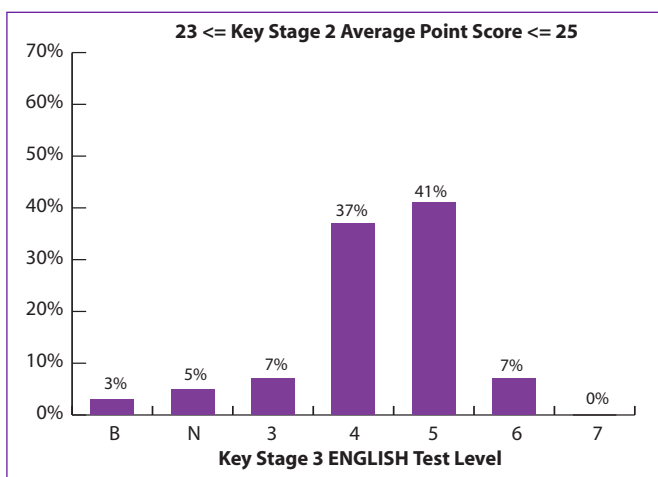
Average Point Score = 15



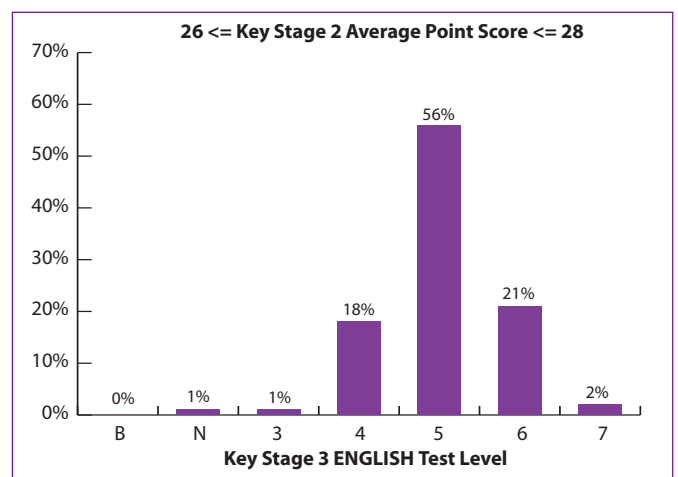
Average Point Score between 16.0 and 22.9



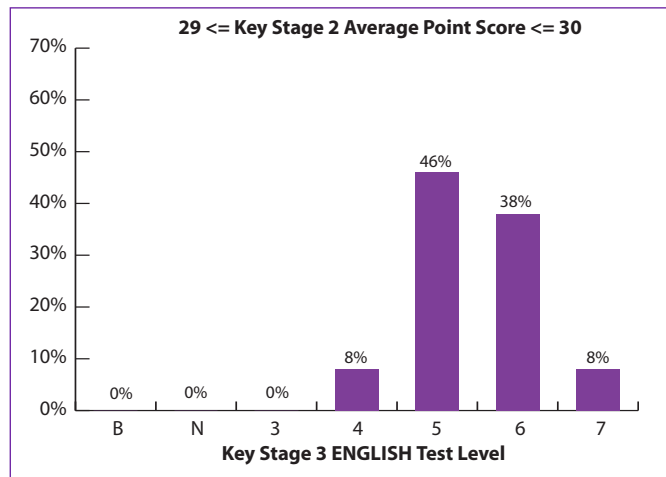
Average Point Score between 23 and 25.9



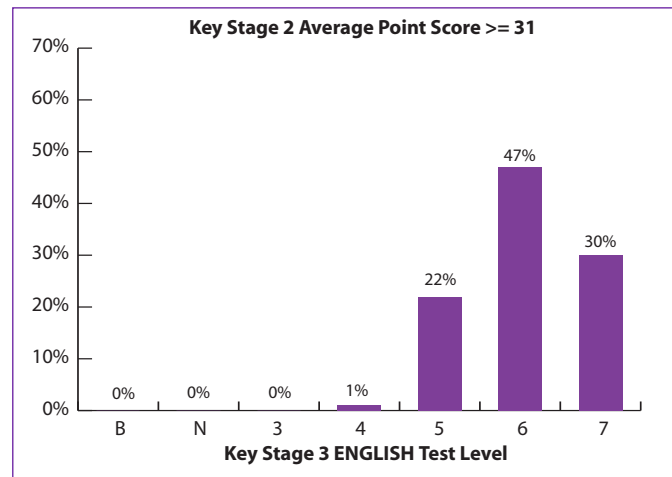
Average Point Score between 26.0 and 28.9



Average Point Score between 29.0 and 30.9



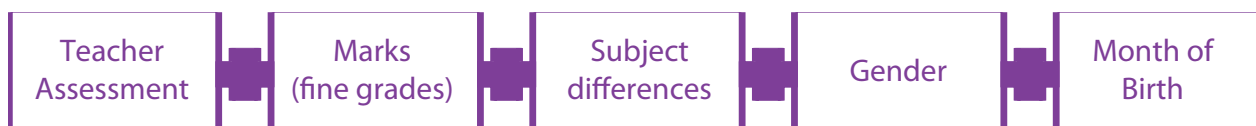
Average Point Score 31.0 and above



Exercise 2: Unpacking Prior Attainment Data

In the first exercise, we simply used attainment in the tests to form estimates using Progress Charts, but you will find it harder to set targets for some pupils. For example, if a pupil is a Level 3 in English, Level 5 in maths and Level 4 in science, they have an average point score of 27, but should they have a higher estimate for maths, and a lower estimate for English? And how do we ensure there are targets in place to help the pupil with their language skills?

In this exercise we will look at factors which ought to inform teachers when they set targets. Such factors will either need to be considered when using Progress Charts, or they are already taken into account when using estimates provided by the Fischer Family Trust, which uses:



Using such information will sometimes lead to higher expectations, or it will identify additional barriers to learning.

Teacher Assessment

Teacher assessment should be noted. Where it is the same as the test level, then it is confirming a pupil's achievements. Where it is higher or lower than the test level, then this difference *may* help identify barriers to learning. For example, if the teacher assessment is lower than the test, this may indicate the pupil may struggle if we used the test level alone, while if the teacher assessment is higher than the test, this may indicate the pupil has underachieved on the test paper.

Marks (Fine Grades)

Some level thresholds are very broad. For example, in 2003 Key Stage 2 English Level 3 ranged from 23 to 43 marks, Level 4 ranged from 44 to 68 marks, and Level 5 ranged from 69 to 100 marks. By using whole levels, one mark can make a dramatic difference. For example, Pupil A who attains 43 marks is Level 3, Pupil B who attains 44 marks is a Level 4, while Pupil C who attains 65 marks is also a Level 4. Pupils would seem to be of similar attainment as they both achieved a Level 4, but in fact the difference between pupils B and C is greater than the one mark difference between pupils A and B. Using marks allows us think where within a level a pupil has attained.

Subject Differences

Pupils with the same overall attainment may have very different combinations of levels. For example, pupils with an average point score of 27 at the end of Key Stage 2 could have a Level 4 in English, maths and science, or a Level 3 in English, a Level 5 in maths, and a Level 4 in science, or any other combination of Levels 3, 4 and 5. The Level 3 is probably going to impact on estimates, particularly in that subject, as is the Level 5.

For example, pupils with average point score of 27, but with a Level 3 in English have lower estimates for English at the end of Key Stage 3.

Data for England 2001/02 and 2002/03 Combined

Key Stage 2 Test Level			Number of Pupils	% pupils KS3 Level 5+		
English	Maths	Science		English	Maths	Science
4	4	4	263796	82%	89%	81%
3	4	5	5027	39%	67%	86%
4	3	5	4154	75%	96%	79%
5	3	4	3739	97%	58%	86%
3	5	4	1939	48%	75%	74%

Source: Fischer Family Trust

Lower English estimate for pupils with Key Stage 2 Level 3 but an APS of 27.

Gender

Nationally there are differences in achievement between boys and girls, and including these in the estimates helps indicate where gender differences may arise, and so give early warning and help to decide where intervention to raise attainment to narrow the achievement gap should take place.

Month of Birth

Throughout schooling, even at Key Stage 4, on average Autumn born pupils tend to have higher achievement than Summer born pupils. For individual pupils the difference in estimates is minor, but for a class of pupils, it is significant if there are more than average numbers of Autumn born or Summer born pupils.

Returning to our three pupils, while they have the same average point score, Ivan only has a Level 3 for English, and Anna has lower English and maths marks than Sam.

	KS2 Teacher Assessments			KS2 Test Levels			KS2 Test Marks		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Anna Grapefruit	4	4	4	4	4	4	49	51	57
Sam Oregano	4	4	4	4	4	4	62	77	64
Ivan Banana	3	5	4	3	5	4	42	84	48

This does have an effect on the percentage estimates, whether these would lead to different conclusions depends on the particular factors included in prior attainment. In this instance, the Level 5+ estimates are broadly similar to the Autumn Package, for even after taking teacher assessment, marks, subject differences, gender and month of birth into account, we would still expect progress from Level 4 to Level 5.

	Autumn Package estimate Level 5+			Fischer Family Trust estimate Level 5+ (using Type A)		
	En	Ma	Sc	En	Ma	Sc
Anna Grapefruit	79%	87%	79%	75%	75%	79%
Sam Oregano	79%	87%	79%	85%	99%	95%
Ivan Banana	79%	87%	79%	40%	99%	75%

Ivan has a lower KS3 English estimate due to Key Stage English Level 3

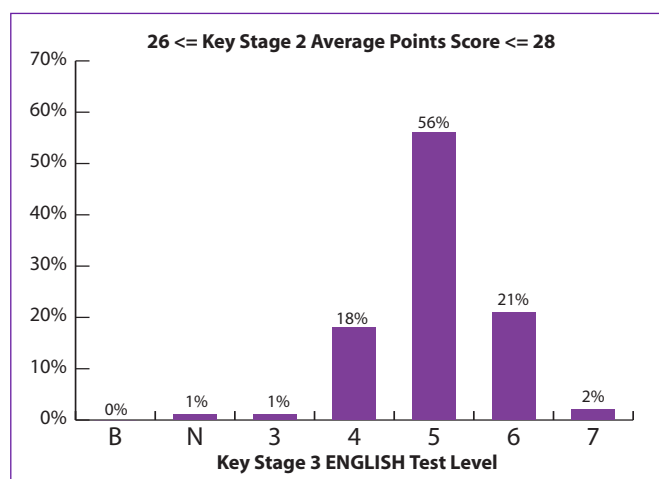
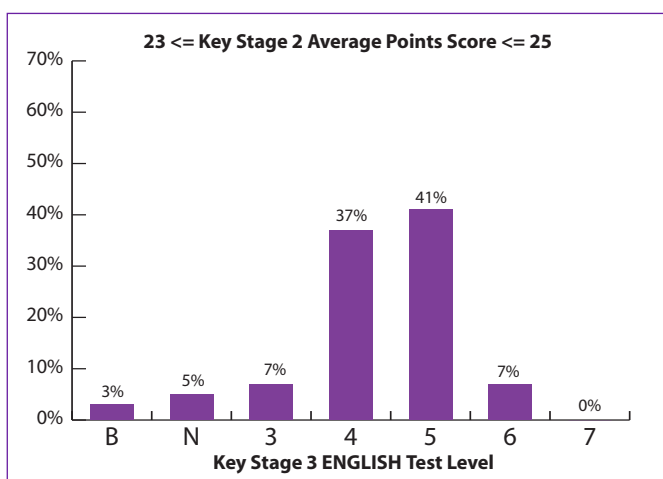
But using marks indicates Sam and Ivan ought to achieve a Level 5 in Maths (99%), but Ivan is at risk of not achieving a Level 5 in English without intervention. 40 percent of pupils like Ivan go on to achieve a Level 5, but 60 percent at present do not.

Further differences emerge when looking at the Level 6+ estimates. Both Sam and Ivan have very strong estimates for a Level 6 in maths, and maybe should be considered for Level 7 targets, while Anna's maths estimate is lower than the Autumn Package once we've taken her marks into account.

	Autumn Package estimate Level 6+			Fischer Family Trust estimate Level 6+ (using Type A)		
	En	Ma	Sc	En	Ma	Sc
Anna Grapefruit	23%	46%	28%	15%	19%	16%
Sam Oregano	23%	46%	28%	29%	86%	47%
Ivan Banana	23%	46%	28%	3%	84%	14%

This helps to confirm what teachers would already judge to be the case when they look at marks. With Fischer Family Trust data, teachers know these factors have been taken into account. Alternatively, if using Autumn Package Progress Charts, you can either adjust estimates, or use a different chart. For example, for Ivan's English estimate, knowing he has a Level 3 English teacher assessment and test level, we could use the progress chart 23 to 25.9 instead of 26.0 to 28.9, which gives a 48% estimate of a Level 5 in English.

Average Point Score between 23 and 25.9 Average Point Score between 26.0 and 28.9



Task: Using the Progress Charts

For the same five pupils used in Exercise 1, looking at their marks, teacher assessments and subject differences what targets would you set for Key Stage 3 English, maths and science?

Exercise 3: Accounting for school context

Using historical data for how pupils have achieved in the past either nationally or in our school tells us what could happen if history were to repeat itself. Of course, just looking at past trends doesn't account for either national or school aims for improvement, and you also need to take into account the element of additional challenge that comes with target setting. The Key Stage 3 Strategy exists to improve progress from Key Stage 2 to Key Stage 3, and so target setting should use historical rates of progress as a baseline for the future, and not as an end point.

Both the Pupil Achievement Tracker and Fischer Family Trust data allow schools use the results of similar schools in their estimates. The Pupil Achievement Tracker contains a series of transition matrices using the most recent national data for the progress made by schools grouped by the average point score of their intake. To give a couple of examples, if Anna Grapefruit went to school A with a low average intake, and Sam Oregano went to School B with a high average intake, even if they had the same prior attainment, Sam would have slightly higher estimates. For example, his Key Stage 3 English estimate would be 91%, compared to 86% for Anna. You would still end up with a Level 5 target for each pupil, but these minor differences can be significant across the whole school.

School A: Median of the top 25% of schools with an average point score of 25–26

	Key Stage 3 English									
	A	D	B4	4	5	6	7	8	5+	6+
Below Level 3	11%	5%	53%	25%	4%	0%	0%	0%	5%	0%
Level 3	6%	0%	16%	39%	34%	3%	0%	0%	38%	4%
Level 4	4%	0%	1%	9%	48%	32%	6%	0%	86%	38%
Level 5	2%	0%	0%	1%	11%	49%	37%	0%	98%	86%
Total	5%	1%	8%	17%	37%	25%	8%	0%	70%	33%

Anna has an 86% estimate

School B: Median of the top 25% of schools with an average point score of 29–30

	Key Stage 3 English									
	A	D	B4	4	5	6	7	8	5+	6+
Below Level 3	9%	7%	42%	31%	11%	0%	0%	0%	11%	0%
Level 3	4%	0%	12%	38%	41%	4%	0%	0%	46%	4%
Level 4	2%	0%	1%	7%	43%	40%	8%	0%	91%	48%
Level 5	1%	0%	0%	0%	11%	47%	41%	0%	99%	87%
Total	2%	0%	1%	5%	28%	41%	23%	0%	92%	64%

Sam has a 91% estimate

The Fischer Family Trust school context model uses the percentage of pupils entitled to free school meals, the average attainment of the school intake, and also the distribution of that attainment. This is then used in **addition** to the prior attainment factors listed in Exercise 2 to give Type B estimates (prior attainment + school context), Type C (Type B estimates adjusted for national or LEA targets), and Type D (Type B estimates adjusted to equal the progress made by the top 25% of schools).

For our three pupils, if they attend a school with high free school meals and a low intake, their estimates are slightly lower:

Type B Estimate

	Probability of Level 5+			Probability of Level 6+		
	En	Ma	Sc	En	Ma	Sc
Anna Grapefruit	63%	66%	67%	9%	13%	8%
Sam Oregano	76%	99%	90%	18%	79%	32%
Ivan Banana	28%	98%	62%	2%	76%	7%

Schools can use the Type B model to underpin their target setting, knowing that pupils should at the very least achieve in line with similar schools.

The Fischer Family Trust 'Type D' estimate gives us slightly higher estimates, and is useful for schools wanting to set ambitious targets, or whose value-added is already good, and they want to know what to consider in order to sustain good progress. For our three pupils, still in the same schools with high free school meals and low intake:

Type D Estimate

	Probability of Level 5+			Probability of Level 6+		
	En	Ma	Sc	En	Ma	Sc
Anna Grapefruit	80%	76%	78%	13%	17%	12%
Sam Oregano	87%	99%	94%	27%	86%	45%
Ivan Banana	40%	99%	75%	2%	84%	10%

Again, the overall conclusions and targets remain the same, but Ivan Banana's probability of achieving a Level 5 in English is affected by being in this type of school. If we only considered prior attainment (Type A) it is 40%, but drops to 28% when also including school context (Type B), and rises back to 40% if progress is in line with the top 25% of schools after also accounting for school context.

At this point, we either have from Progress Charts, the Autumn Package or the Fischer Family Trust an estimate for each child, which can be used as a basis for target setting, which in turn will reflect the aspirations of the school. For example, the Key Stage 3 strategy aims for more pupils to progress from Level 3 to Level 5, so we would use the estimates and prior attainment to identify pupils who have a chance of a Level 5 e.g. a 20% to 60% estimate, and look to set targets for a Level 5 based on a programme of intervention and support.

Exercise 4: Accounting for past trends

It is important for schools to look at the typical progress made by their pupils. Progress may be much higher than nationally, and so using national data for estimates may feel a little low. Alternatively, progress may be much lower, and so the school needs to use the national data as a floor to aspire to.

One school looked at the progress made by a group of 18 pupils with 'similar' prior attainment at the end of Key Stage 2, as they all had a Level 4 in the English, maths and science tests. They had a list of teacher assessments at the end of Key Stage 2, the marks converted to a fine grade (a pupil on the bottom of Level 4 was 4.0, a pupil with a mark in the middle 4.50, up to 4.99 for the maximum marks to obtain a level 4), and the Key Stage test levels.

For example, Robert Apricot had a mid-level 4 for KS2 English, and low level 4 for maths and science, yet by the end of Key Stage 3 had progressed to a Level 5 in maths.

Meanwhile, Jenna Cinnamon had high marks for KS2 English and science. She at least progressed to a Level 5 in all subjects at the end of Key Stage 3, but could she have achieved a Level 6?

Look at the remaining 16 pupils, and highlight any subjects where they may have underachieved. What general conclusions would you draw for these 18 pupils?

	KS2 Teacher Assessments			KS2 Fine Grades			KS3 Test Levels		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Robert Apricot	4	4	4	4.4	4.1	4.1	4	5	4
Jenna Cinnamon	4	4	4	4.9	4.4	4.9	5	5	5
Siobhan Satsuma	4	4	4	4.7	4.5	4.0	A	A	A
Sarah Apple	5	4	4	4.9	4.6	4.6	7	6	5
Ricky Peppercorn	3	4	4	4.1	4.2	4.3	5	5	4
Aimee Parsley	4	4	4	4.4	4.5	4.1	A	A	A
Ashley Oregano	3	4	4	4.3	4.6	4.4	4	5	5
Chelsea Watermelon	4	3	4	4.7	4.2	4.3	5	4	4
Katrina Tumeric	3	4	4	4.3	4.1	4.0	5	3	4
Leon Mango	4	4	4	4.1	4.2	4.5	6	5	5
Katrina Olive	4	4	4	4.4	4.3	4.1	A	4	3
Chloe Garlic	4	4	4	4.2	4.2	4.2	5	5	4
Darren Ginger	4	4	4	4.0	4.9	4.6	4	4	4
Mark Mace	4	4	4	4.4	4.6	4.7	4	5	4
Maria Mango	3	4	4	4.3	4.5	4.6	6	6	5
Elizabeth Satsuma	4	4	4	4.6	4.3	4.1	7	5	4
David Tumeric	3	4	4	4.3	4.1	4.4	4	5	4
Harry Cumin	4	4	4	4.5	4.8	4.8	4	6	5

When the school did this exercise they highlighted the pupils who didn't achieve a Level 5 (shaded in red)

	KS2 Teacher Assessments			KS2 Fine Grades			KS3 Test Levels		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Robert Apricot	4	4	4	4.4	4.1	4.1	4	5	4
Jenna Cinnamon	4	4	4	4.9	4.4	4.9	5	5	5
Siobhan Satsuma	4	4	4	4.7	4.5	4.0	A	A	A
Sarah Apple	5	4	4	4.9	4.6	4.6	7	6	5
Ricky Peppercorn	3	4	4	4.1	4.2	4.3	5	5	4
Aimee Parsley	4	4	4	4.4	4.5	4.1	A	A	A
Ashley Oregano	3	4	4	4.3	4.6	4.4	4	5	5
Chelsea Watermelon	4	3	4	4.7	4.2	4.3	5	4	4
Katrina Tumeric	3	4	4	4.3	4.1	4.0	5	3	4
Leon Mango	4	4	4	4.1	4.2	4.5	6	5	5
Katrina Olive	4	4	4	4.4	4.3	4.1	A	4	3
Chloe Garlic	4	4	4	4.2	4.2	4.2	5	5	4
Darren Ginger	4	4	4	4.0	4.9	4.6	4	4	4
Mark Mace	4	4	4	4.4	4.6	4.7	4	5	4
Maria Mango	3	4	4	4.3	4.5	4.6	6	6	5
Elizabeth Satsuma	4	4	4	4.6	4.3	4.1	7	5	4
David Tumeric	3	4	4	4.3	4.1	4.4	4	5	4
Harry Cumin	4	4	4	4.5	4.8	4.8	4	6	5

Generally progress was lower than anticipated. For example, using Autumn Package data or equivalent, they anticipated some 70-80% of these pupils going on to achieve a Level 4 in English, but only 9 out 18 did, and 3 pupils were absent. However, some pupils made very good progress. For example, both Sarah Apple and Elizabeth Satsuma both achieved a Level 7, and the school picked up early on that Sarah was already a Level 5 in English from her teacher assessment, having just missed out on a test Level 5 by a few marks.

They concluded there was a lot of within-school variation. Pupils of similar attainment taking the same subject didn't always progress to at least a Level 5, while some did better than expected, and with the exception of Darren Ginger and Katrina Olive, pupils attained at least one Level 5. The school felt that better target setting backed up by intervention and support, with early indicators of possible underachievement would help to ensure such pupils in the future would at least attain a Level 5.

Exercise 5: Using estimates to set targets

The school then looked at the pupils who would start this Autumn Term with a Level 4 in English, maths and science. Whereas last year there had been just 18 pupils, now there are 36, but we shall just look at the first 10.

	KS2 Teacher Assessments			KS2 Test Fine Grades			KS3 Level 5 Estimates			KS3 Level 6 Estimates		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Abigail Peppercorn	4	4	4	4.9	4.6	4.7	96%	96%	89%	53%	62%	29%
Abigail Thyme	4	4	4	4.1	4.7	4.8	82%	95%	87%	22%	59%	25%
Anna Pear	4	4	4	4.0	4.0	4.6	75%	74%	79%	15%	19%	16%
Ashley Bay Leaf	4	4	4	4.2	5.0	4.7	70%	99%	91%	14%	81%	33%
Bethany Garlic	3	3	4	4.2	4.1	4.8	75%	65%	69%	16%	12%	10%
Colin Orange	4	4	4	4.3	4.1	4.6	67%	80%	83%	12%	25%	20%
Colin Satsuma	4	5	4	4.4	4.8	5.0	81%	99%	97%	23%	85%	56%
Dale Strawberry	3	4	4	4.7	4.7	4.6	81%	95%	84%	23%	56%	21%
Daniel Lemon	4	4	4	4.3	4.7	5.0	74%	97%	93%	17%	70%	39%

What targets would you set for these pupils?

	English	Maths	Science	Comments
Abigail Peppercorn				
Abigail Thyme				
Anna Pear				
Ashley Bay Leaf				
Bethany Garlic				
Colin Orange				
Colin Satsuma				
Dale Strawberry				
Daniel Lemon				

This is what the school did, but the teacher was also using her professional judgement and knowledge of the pupils to be informed by the data, but to modify it in light of other factors.

	English	Maths	Science	Comments
Abigail Peppercorn	6	6	6	Aptitude for Science
Abigail Thyme	5	6	5	
Anna Pear	5	5	5	Attendance problems
Ashley Bay Leaf	5	6	5	
Bethany Garlic	5	5	5	
Colin Orange	5	5	5	
Colin Satsuma	6	6	6	High CATs scores indicated greater potential
Dale Strawberry	5	6	5	
Daniel Lemon	5	6	5	

Exercise 6: Target setting and the Key Stage 3 Strategy

The school then looked at the pupils with at least one Level 3 in the KS2 tests

	KS2 Teacher Assessments			KS2 Test Levels			KS2 Test Fine Grades			KS3 Level 5 Estimates		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Abigail Apricot	1	2	2	N	2	3	2.7	2.8	3.0	8%	1%	1%
Adam Pomegranate	3	3	3	3	3	3	3.1	3.6	3.7	9%	16%	15%
Anna Cumin	2	2	2	3	3	N	3.2	3.3	2.6	19%	4%	1%
Ashley Cinnamon	2	2	2	N	3	3	2.7	3.5	3.7	3%	8%	6%
Ashley Sage	2	3	3	2	3	4	2.8	3.6	4.0	4%	15%	19%
Chelsea Grapefruit	3	2	2	4	N	3	4.0	2.6	3.4	53%	1%	5%
Chelsea Lemon	3	3	3	3	3	4	4.0	3.9	4.8	60%	37%	51%
Christian Bay Leaf	3	3	3	3	3	4	3.2	3.4	4.3	11%	14%	34%
Christina Onion	3	3	3	3	N	3	3.6	2.4	3.1	34%	0%	4%
Christopher Lime	2	2	2	N	N	3	2.8	2.4	3.0	3%	0%	2%

There were 70 pupils in total, and the first 10 are listed here.

Which of these pupils would you set a Level 5 target for?

Which pupils are at risk of not achieving a Level 4?

What other information would you want about these pupils?

This is what the teacher did

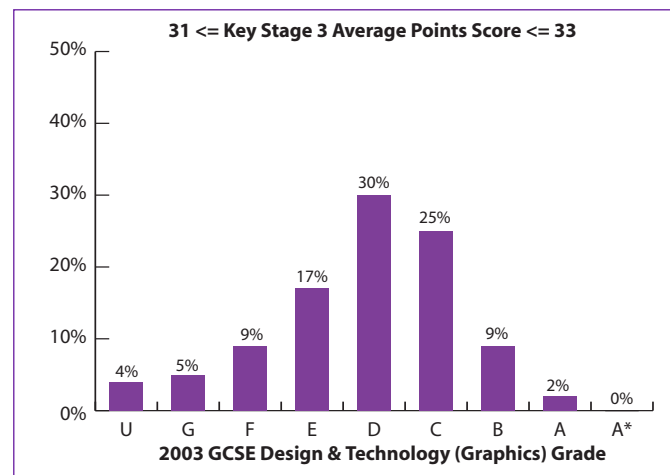
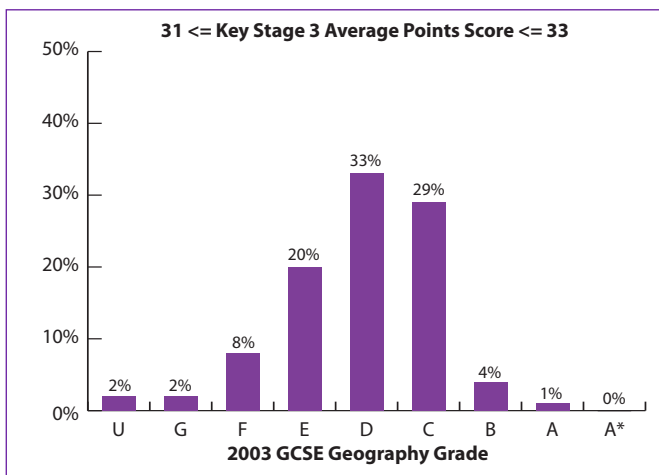
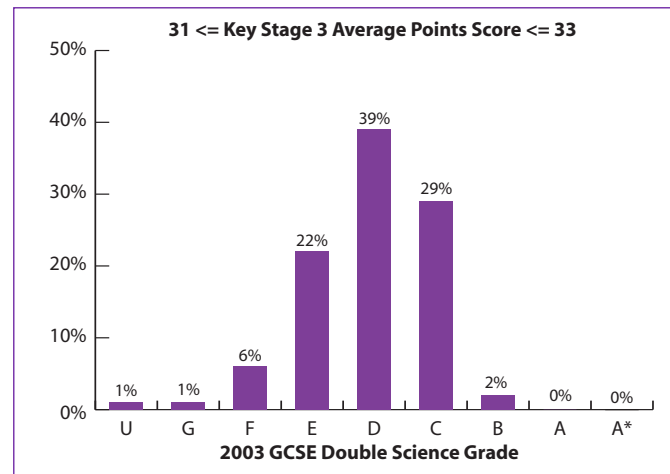
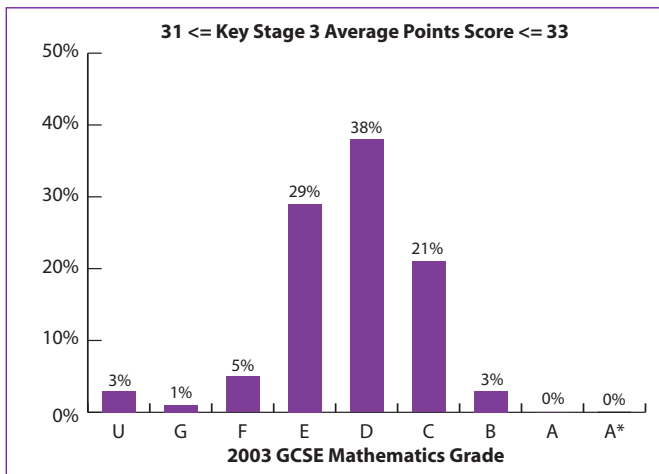
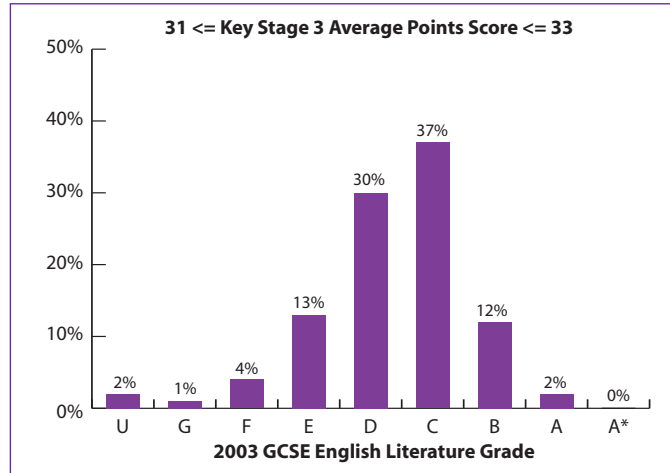
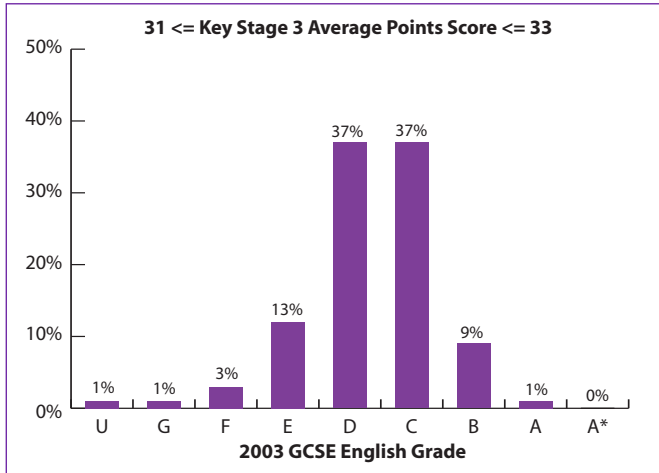
	English	Maths	Science	Comments
Abigail Apricot	3	3	4	
Adam Pomegranate	5	5	5	Key Stage 1 to 2 value-added suggested underachievement at Key Stage 2
Anna Cumin	4	4	4	
Ashley Cinnamon	4	4	4	
Ashley Sage	4	5	5	
Chelsea Grapefruit	5	4	5	
Chelsea Lemon	5	5	5	
Christian Bay Leaf	5	5	5	
Christina Onion	5	5	5	Maths teacher assessment and early work indicated potential of Level 5
Christopher Lime	3	3	4	

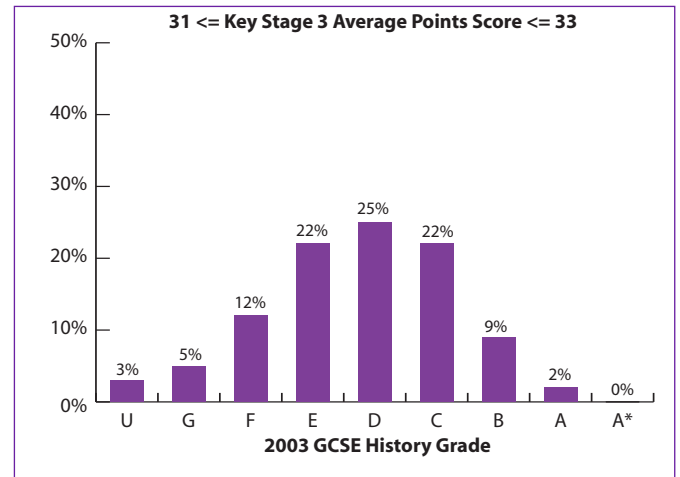
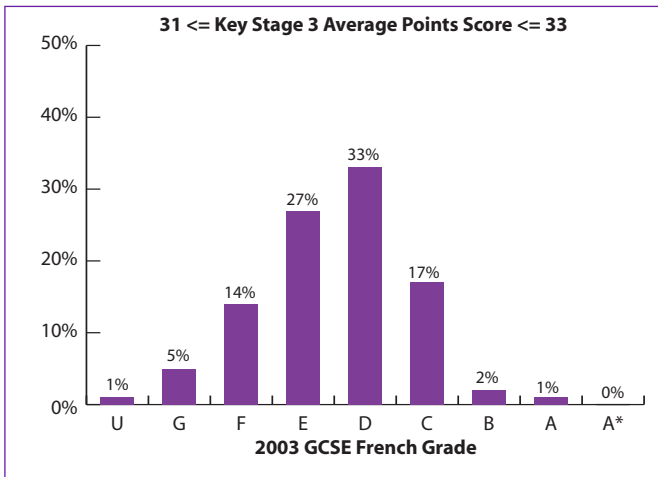
Exercise 7: Using data with students

Schools can use progress charts with students when identifying potential progress

Student A: Bethany Onion

Bethany Onion achieved a Level 5 in English, maths and science at the end of Key Stage 3, and she is taking GCSEs in 8 subjects:





The charts suggest Bethany is most likely to achieve a grade D or C in most subjects, but this doesn't take account of her aptitude for those subjects, nor the typical progress that pupils currently make in the school. However, her teachers can use the graphs to suggest which grades are achievable. For example, Bethany is currently on course to achieve a grade D in English Literature, but her teacher uses the chart to suggest she should aspire for a C grade, as almost 40% of pupils like Bethany currently achieve a C grade.

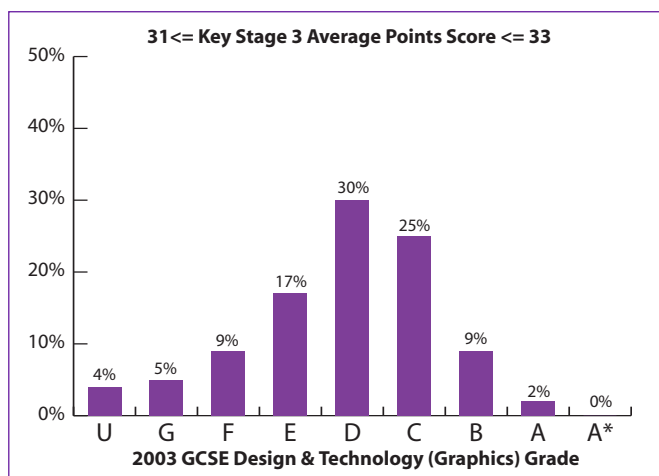
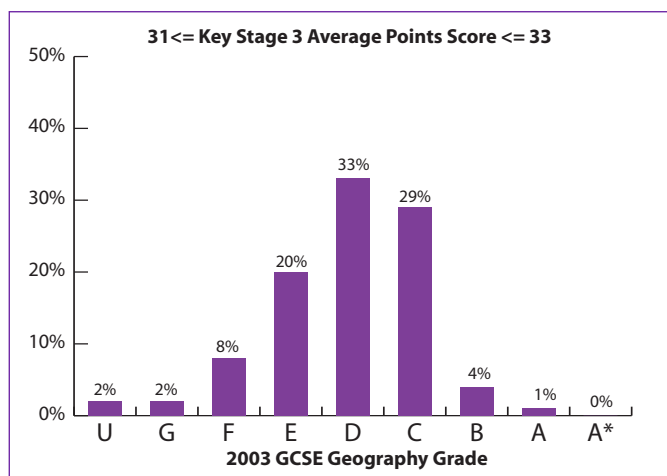
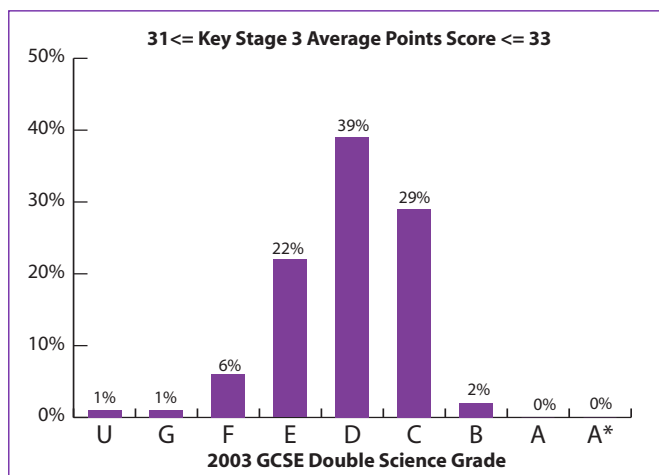
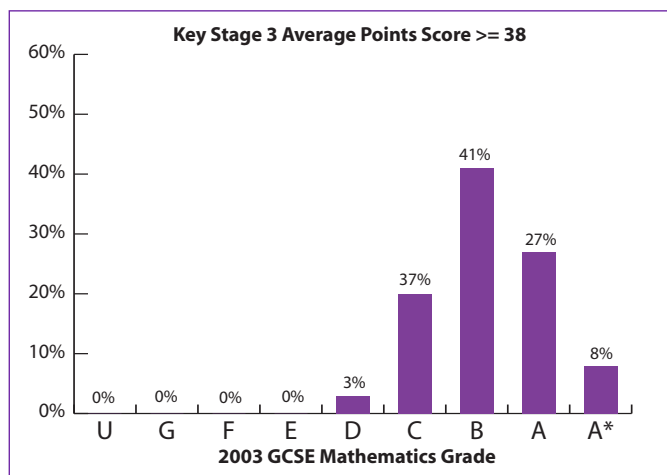
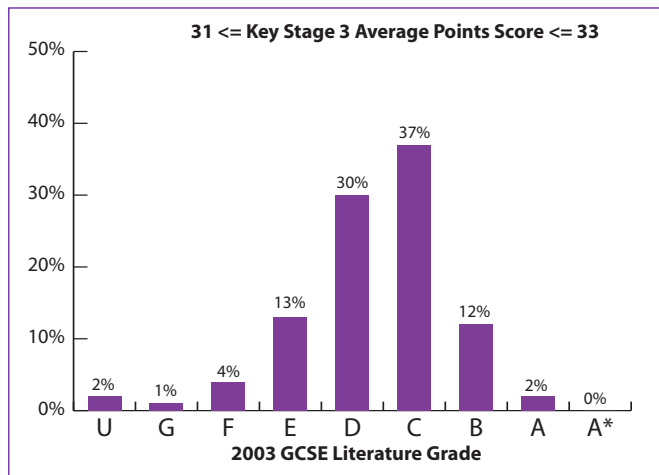
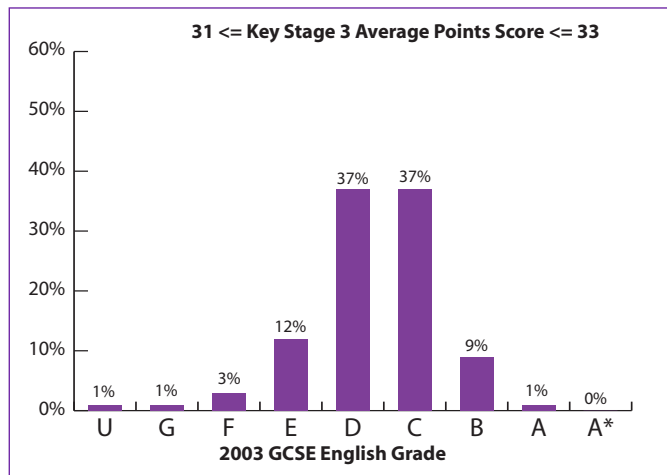
By the end of Year 10, Bethany had the following target grades for the end of Key Stage 4, and a series of current grades estimating what she could achieve at the end of Key Stage 4 given her current achievement. The current grades reflect her coursework and marks, and while some improvement could be expected during Year 11, they are a good estimate of what she could achieve by the end of Year 11.

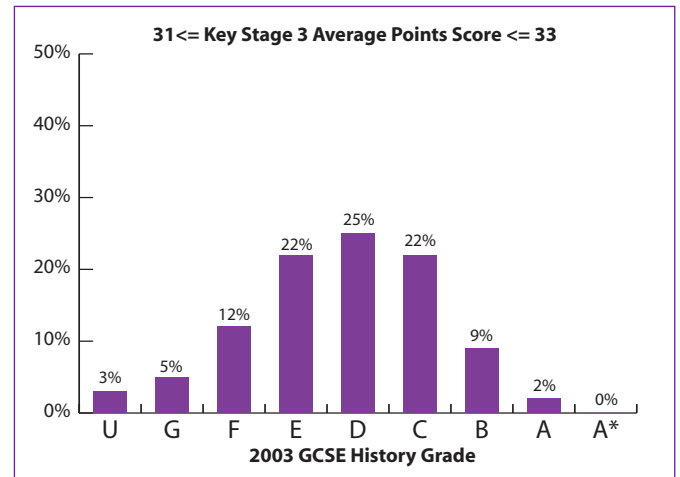
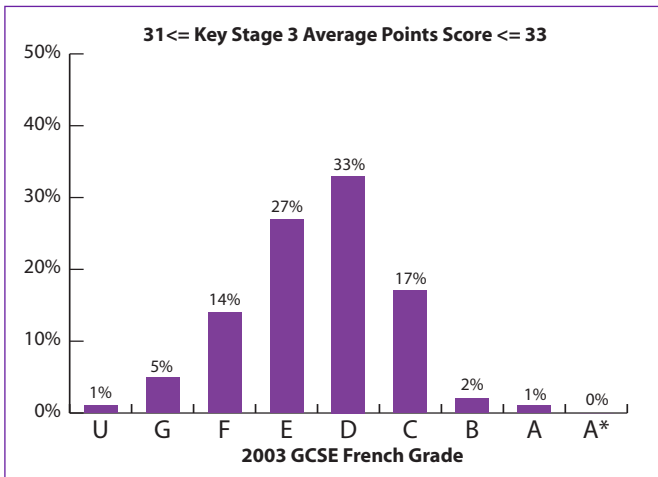
Subject	Target Grade	Current Grade
English	C	C
English Literature	C	D
Maths	C	E
Double Science	D/C	C
Design and Technology (Graphics)	C	B
French	D	D
History	D	D
Geography	C	D

Bethany has a particular aptitude for design and technology, and is on course to achieve a C in English and Double Science. The school wants Bethany to achieve at least one more C grade, but also has to raise achievement in mathematics, which is currently two grades below target.

Student B: Ricky Pomegranate

By the end of Key Stage 3 Ricky had achieved a Level 4 in English, a Level 6 in maths, and a Level 5 in Science. He also had a Level 7 Teacher Assessment for maths. While his average point score is 33 points $((27 + 39 + 33)/3)$, the school needs to take account of Ricky's aptitude for maths.





So although Ricky has the same overall point score as Bethany, the school uses a different progress chart. Though it is difficult to decide which one to use because they are based on the average point score, the school decides to use the graph for score of 38 or more, as his point score for maths is 39 and the teacher assessment 45.

Exercise 8: Measuring value-added

Contextual value-added data compares the progress made by pupils by comparing them with similar pupils in similar schools, and then giving the resulting difference a percentile rank from 1 to 100.

If a school is in the top 25% of schools, then their value-added is significantly positive. Conversely, if a school is in the bottom 25% of schools, then it's value-added is significantly low.

Rather than use one year's data for one Key Stage, the approach looks at progress from KS2–KS3, KS3–KS4, and KS2–KS4 over a number of years.

School A:

KS3	KS4	Percentile Rank (based on Matched Pupils)						% of pupils	
		Value-added KS2 -> KS3		Value-added KS3 -> KS4		Value-added KS2 -> KS4		Actual KS4	
		Core Subjects Level 5+	Overall Points Score	5 or more A*-C Passes	Capped Points Score	5 or more A*-C Passes	Capped Points Score	% 5+ A*-C	% No Passes
1998/99	2000/01	80	68	20	67	15	80	40%	5%
1999/00	2001/02	45	63	30	62	25	70	42%	6%
2000/01	2002/03	30	45	40	40	40	50	49%	2%
2001/02	2003/04	50	45						
2002/03	2004/05	38	34						

In school A, in 1998/99 pupils made low progress from KS2 – KS3, which the school had to remedy in KS4. It managed to do for the 40% of pupils who achieved 5+ A*-C grades, but the value-added using a capped points score was slightly below average. Since then, the school have improved value-added from KS2–KS3 across both the threshold indicator and the overall points score, as it tries to ensure all pupils make good progress.

School B:

KS3	KS4	Percentile Rank (based on Matched Pupils)						% of pupils	
		Value-added KS2 -> KS3		Value-added KS3 -> KS4		Value-added KS2 -> KS4		Actual KS4	
		Core Subjects Level 5+	Overall Points Score	5 or more A*-C Passes	Capped Points Score	5 or more A*-C Passes	Capped Points Score	% 5+ A*-C	% No Passes
1998/99	2000/01	53	40	40	35	40	38	40%	2%
1999/00	2001/02	58	37	42	56	52	49	42%	1%
2000/01	2002/03	80	77	60	37	60	52	49%	1%
2001/02	2003/04	67	40						
2002/03	2004/05	30	25						

In school B, the value-added across all indicators was average, but dropped in 2000/01 for KS2–KS3. The school could have chosen to focus only of the 5+ A*-C pupils, but still ensured pupils were entered for exams, and kept it's number of pupils with no passes low, and the value-added for the capped points score average. In 2002/03 it managed good value-added from KS2–KS3, which it hopes will feed through to improvements at KS4 in two years time.

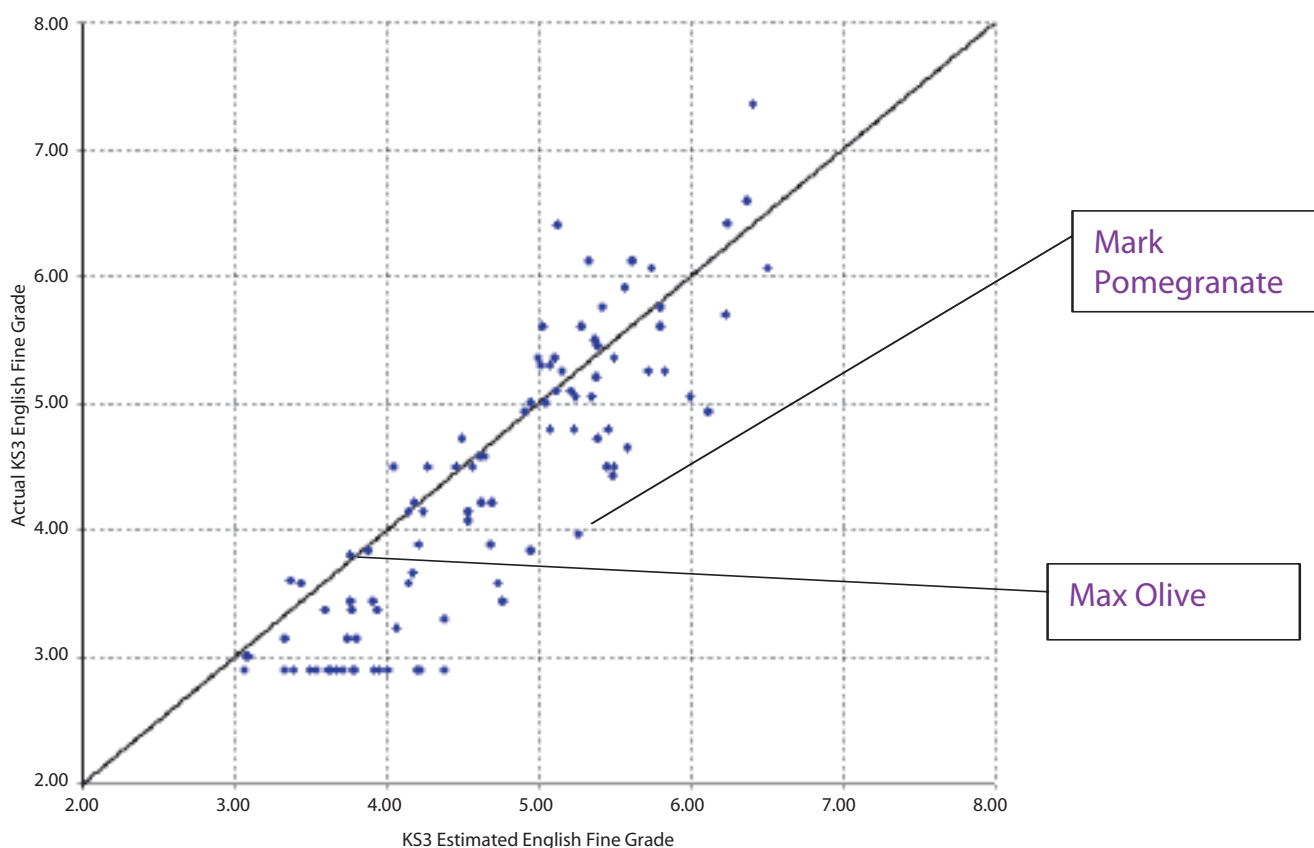
Exercise 9: Identify department and cohort underperformance

In our example school of 100 pupils, we can compare estimate against actual results. In this case, we will look at English. For each pupil, using their prior attainment, we have an estimated fine grade, and from their actual marks a fine grade.

	Estimated Fine Grade	KS3 English Marks	KS3 English Level	KS3 Fine Grade (using marks)	Residual (+/-)
Max Olive	3.77	11	3	3.80	0.03
Chelsea Grapefruit	4.69	19	4	4.21	-0.48
David Orange	4.15	18	4	4.14	0.00
Mark Pomegranate	5.27	15	3	3.96	-1.31
Abigail Tarragon	5.81	42	5	5.60	-0.21
Total	23.68			21.72	-1.97
Average	4.74			4.34	-0.39

Figures subject to rounding

For example, Max Olive has a mean grade estimate of 3.77, and his 11 marks equate to 3.80, a very slight difference of 0.03. The only pupil of significant difference of the five is Mark Pomegranate estimated to achieve 5.27, but actually achieved 3.96. The school then plotted all the estimates and actuals on a graph.



We can also look at the same differences grouped by different groups

Either as a table

	Estimate	Actual	Difference
Boys	4.51	4.13	-0.38
Girls	4.85	4.52	-0.33
Set 1	4.32	3.89	-0.44
Set 2	4.75	4.31	-0.44
Set 3	4.63	4.36	-0.27
Set 4	4.88	4.59	-0.29
Overall	4.65	4.33	-0.32

Or as a graph



This **may** be a useful way of approaching the data, to see if there are any patterns or specific groups to focus on.

Exercise 10: Dividing Pupils into Sets/Teaching Groups

The school looked at prior attainment in order to inform decisions about setting.

Such decisions take account of:

- Supportive parents
- Pupil potential
- Knowing what a teacher can do with particular pupils
- Learning styles
- Group pupils in productive groups
- Match teacher intervention

It is important to know what a teacher can do with particular pupils. Some may be better at developing the potential of certain pupils, but all should aim to be able to work with all types of pupil, including the high fliers, those certain of obtaining threshold indicators, and those at risk of underachievement.

For example, this school had 100 pupils each year which it setted into four groups:

- Set 1, with the pupils generally with the lowest prior attainment, had more pupils achieving a level 4 by 2003
- In Set 2, more pupils were achieving a level 4 or level 5 by 2003
- In Set 3, while more than 50% of pupils achieved a level 5, this was some 20% (5 pupils) below the estimate for 2002 and 2003
- In Set 4, nearly all pupils achieve a level 5 by 2003.

It is then important to review the outcomes of setting.

Key Stage 3 English: 2001

Set	Pupils	Number of pupils at each level								% estimate Level 5+	% actual Level 5+	Diff
		A	B	N	3	4	5	6	7	Est	Act	
Set 1	25	3	10	10	2					3%	0%	-3%
Set 2	25	2	6	6	1	9	1			21%	4%	-17%
Set 3	25	2	1	1	2	5	13	1		59%	56%	-3%
Set 4	25	2			1	5	11	5	1	82%	68%	-14%
Total	100	9	17	17	6	19	25	6	1	42%	32%	-10%

Key Stage 3 English: 2002

Set	Pupils	Number of pupils at each level								% estimate Level 5+	% actual Level 5+	Diff
		A	B	N	3	4	5	6	7	Est	Act	
Set 1	25	1	5	10	8	1				0%	0%	0%
Set 2	25	2	1	5	3	5	9			48%	36%	-12%
Set 3	25	1		1	5	3	10	5		80%	60%	-20%
Set 4	25				1	3	15	4	2	80%	84%	+4%
Total	100	4	6	16	17	12	34	9	2	52%	45%	-7%

Key Stage 3 English: 2003

Set	Pupils	Number of pupils at each level								% estimate Level 5+	% actual Level 5+	Diff
		A	B	N	3	4	5	6	7	Est	Act	
Set 1	25		4	3	3	14	1			0%	4%	+4%
Set 2	25	1	1	1	4	10	8			28%	32%	+4%
Set 3	25			3	5	3	12	2		76%	56%	-20%
Set 4	25	1				1	19	4		96%	92%	-4%
Total	100	2	5	7	12	28	40	6	0	50%	46%	-4%

Questions:

Did my groupings or settings work?

We can use the data to look back at outcomes. For example Set 4 contained some of the pupils with the highest prior attainment and estimates, yet some pupils remained on a level 4.

	KS2 Test Fine Grades			KS2 Teacher Assessment			KS3 Test Levels		
	En	Ma	Sc	En	Ma	Sc	En	Ma	Sc
Abigail Tarragon	4.9	4.6	4.7	4	4	4	5	5	5
Ashley Pomegranate	4.5	4.9	5.5	4	4	4	5	6	6
Bethany Onion	5.0	4.7	5.2	4	4	4	5	5	5
Colin Pear	4.4	4.8	5.0	4	5	4	5	6	5
Dale Cumin	4.8	4.4	5.2	4	4	4	A	5	5
Dale Oregano	5.0	5.7	5.5	5	5	5	5	7	6
Daniel Ginger	5.0	4.9	5.5	4	4	4	6	6	7
Danielle Orange	4.8	4.3	4.5	5	4	4	5	5	5
David Olive	4.7	5.0	4.9	4	4	4	A	A	A
Dougal Orange	4.7	4.7	4.8	4	4	4	4	6	5
Emily Banana	3.9	4.6	4.1	4	4	4	5	5	4
Emily Bay Leaf	4.6	4.2	4.8	4	4	4	4	5	5
Ian Coriander	5.3	5.3	5.5	5	5	5	7	7	6
Jay Dill	4.5	4.4	4.8	4	4	5	6	6	5
Jay Orange	5.2	5.5	5.6	5	5	5	6	7	6
Katherine Dill	4.5	5.3	4.7	4	5	4	5	7	5
Mark Banana	4.1	5.4	5.1	4	4	4	5	7	6
Mark Pomegranate	4.5	5.2	4.8	4	4	4	3	4	5
Max Pear	4.3	4.3	4.9	4	4	4	4	6	5
Neil Parsley	5.4	5.6	5.7	5	5	5	6	7	6
Ricky Pomegranate	4.3	5.5	5.3	4	5	5	4	6	5
Sam Oregano	4.6	4.9	4.9	4	4	4	5	6	6
Sarah Bay Leaf	5.1	5.0	4.8	5	5	4	6	6	5
Sarah Olive	5.1	4.6	4.8	4	4	5	4	5	5

Exercise 11: Using value-added scores

To calculate a value-added score per pupil, which can be aggregated for any group of pupils, use the tables in the DfES Performance Tables site at <http://www.dfes.gov.uk/performance/tables>. The following example is for Key Stage 2 to Key Stage 3 Value-added in 2003.

KS2 average point score	KS3 median average point score
0	21
15	21
17-18	21
19	23
21	25
23-24	27
25	31
27	35
29-30	37
31	39

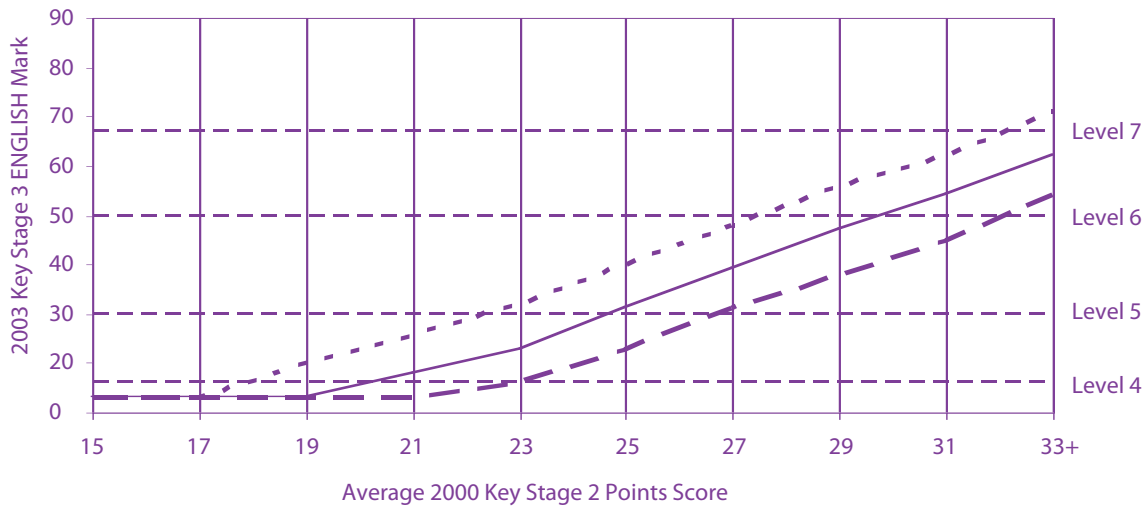
For each pupil, calculate their average Key Stage 2 and Key Stage 3 point score using their test levels.

	Key Stage 2				Key Stage 3				Value-added	
	En	Ma	Sc	APS	En	Ma	Sc	APS	Estimate	Residual
Max Olive	3	3	3	21	3	4	4	25	25	0
Chelsea Grapefruit	4	N	3	21	4	3	4	25	25	0
David Orange	3	4	4	25	4	6	5	33	31	+2
Mark Pomegranate	4	5	4	29	3	4	5	27	37	-10
Abigail Tarragon	4	4	4	27	5	5	5	33	35	-2
Total				123				143	153	-10
Average				24.6				28.6	30.6	-2

For example, Max Olive has an average point score of 21 at the end of Key Stage 2, and would be estimated to achieve 25 points by the end of Key Stage 3, which he managed, giving a residual (difference) of 0. Across the five pupils, the average difference was -2 due to the low progress of Mark Pomegranate.

To calculate an approximate value-added score in each subject, take the national value-added line for each subject. This example will use Key Stage 3 English, but the same is applicable to the tiered papers for Maths and Science, and the Key Stage 4 subjects, which will use grades instead of marks.

2003 KS3 English Value Added Line



The values for the median line are:

KS2 Average Points Score	Median
15	13
17	13
19	13
21	18
23	23
25	31
27	39
29	47
31	54
33+	62

Using five pupils as an example,

	Key Stage 2 Test Levels				Key Stage 3 English		Residual (+/-)
	En	Ma	Sc	APS	Median (estimate)	Actual KS3 Mark	
Max Olive	3	3	3	21	18	11	-7
Chelsea Grapefruit	4	N	3	21	18	19	+1
David Orange	3	4	4	25	31	18	-13
Mark Pomegranate	4	5	4	29	47	15	-32
Abigail Tarragon	4	4	4	27	39	42	+3
Total				123	153	105	-48
Average				24.6	30.6	21	-9.6 marks

For each pupil calculate an average point score from the test levels. Then look up the estimated mark (the median) from the table of values. For example, Max Olive with an average point score of 21 would be estimated to achieve 18 marks. Then insert the actual marks achieved, and subtract the actual mark from the estimate. In the case of Max Olive, he achieved 7 marks below the estimate. Repeat for each pupil, and then average across the number of pupils.

While this doesn't provide a value-added score as used in Performance Tables, it does give an overall value for any group of pupils, and while of comparative use within a school, can't be compared with national figures.