Using Value-added Data for School Self-evaluation: a case study of practice in inner-city schools

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ABSTRACT *This study demonstrates how value-added research undertaken at the local education authority (LEA) is used directly by heads and teachers in their efforts to raise standards in schools. It draws on a decade of experience of supporting schools in the effective use of performance data for school self-improvement. The article highlights the various approaches of feeding back research findings to schools, including illustrations of contextual and value-added information, and examples of working with schools to support school self-evaluation. This is followed by detailed discussions of key issues raised during the training sessions on the use of performance data and analysis of the views of headteachers, teachers and governors about the performance data feedback to schools. The main findings from this research suggest that schools use performance data and research findings effectively for school improvement purposes. Reasons for this success story in the LEA's schools are critically discussed. The article concludes that research which addresses headteachers, classroom teachers, governors and policy makers' concerns, as is the case with this study, is likely to attract their attention and be used for raising standards.*

Introduction

This article arises from two observations in recent national debate. First, various national agencies such as the DfES, OfSTED and QCA (DfEE 2000) provide schools with a vast amount of information with the stated aim of raising standards but little may have been used in schools because the information in Autumn Packages and PANDAs is not presented in a way that is accessible or easily interpreted by schools. In addition, guidance is lacking as to how classroom teachers and practitioners can use the data effectively (Elliot *et al.* 1998; Goldstein 1999; Elliot & Sammons 2001). Furthermore, the information in these reports does not rigorously provide details as to the background factors known to impact on pupils' achievement such as socio-economic background, fluency in English, mobility rate, special educational needs (SEN) and prior attainment for the purpose of school improvement

(Demie *et al.* 2002a). This contextual information is very useful to group schools into families of schools with similar characteristics and to identify those schools that are successful and which can serve as beacons of best practice to other schools. Unfortunately, in the words of Harvey Goldstein, there is no proper guidance on how to use the performance data and what emerges is 'a sorry of mixture of confusion, technical naivety and misleading advice' (Goldstein 1999).

Second, a number of previous researchers have highlighted successful examples of dissemination of research findings and of the use of performance data in schools to assist school self-evaluation (Hedger & Jesson 1998; Kendall & Hewitt 1998; Yang *et al.* 1999; Hayes & Rutt 1999; Thomas *et al.* 2000). Most of these researchers argue that local education authorities can be key players in the provision of clear performance data that can be readily used by schools in making judgements about the relative performance of their pupils, and to diagnose their strengths and weaknesses. With the emphasis on raising standards in schools, central government has also made it clear that LEAs are expected to play a vital supporting role in the provision of performance data to schools, including the establishment of systems for monitoring the educational achievement and progress of schools across the LEA, together with individual and specific groups of pupils. These new responsibilities have been outlined in the White Paper, *Excellence in Schools* (DfEE 1997), which also stresses the need for well-researched, evidence-based or evidence-informed approaches. Indeed, much of these data are now provided to schools through their LEAs with the main aim being to use the data to raise standards. A number of LEAs have established a Research and Statistics Group to play a unique role of bridging the gap between policy and practice. Much of the work of these professional groups is applied research and includes educational research, data collection and analysis, monitoring performance and supporting schools in the effective use of data for school improvement purposes (Rudd & Davies 2002).

In addition, there is very little empirical evidence in the literature which demonstrates the link between the use of performance data and improved school effectiveness, so this is another area requiring further research. Saunders and Rudd (1999) pointed out that whilst researchers of value-added have rightly been concerned with the methodological accuracy of statistical models for measuring value-added, there has been no research that has produced supporting empirical data which demonstrates how schools use the value-added data and any performance data available to them. Saunders and Rudd go on to pose questions as to whether the headteacher and the staff of schools actually understand the data they are presented with, particularly that which is based on complex multi-level modelling techniques. A recent NFER survey of headteachers echoed similar issues and identified a number of reasons that have prevented them from using research findings and performance data in schools. These include: 'lack of time to read research publications and implement new ideas; lack of access to research publications; academic languages and statistical analysis that are not fully understandable; lack of relevance of the research findings for practice and lack of enough personal experience as researchers to interpret the findings of any research or to translate the evidence to classroom settings' (see Hemsley-Brown *et al.* 2002: 2).

The aim of this research article is to demonstrate how performance data and value-added research undertaken in local education authorities is used by schools to raise standards. To do this, the article discusses the various approaches of feeding back research findings to schools, including illustrations of contextual and value-added information, and examples of working with schools in the effective use of performance data for school improvement. It also discusses in detail the results of the survey of the views of headteachers, teachers and governors about the performance data feedback to schools.

Background to the Case Study Schools

This LEA case study considers practice in the effective use of performance data in inner-city secondary schools. The LEA is one of the most ethnically, linguistically and culturally diverse boroughs in Britain. Some families are disadvantaged in material terms, while others are living in very difficult circumstances. Overall, 67% of the pupils are from black and ethnic minority groups, a reflection of the ethnic composition of the inner London population as a whole. The largest ethnic groups are those of Caribbean, African, English/Scottish/Welsh (ESW) and Portuguese. Language barrier is another factor. At Key Stage 3 (KS3), nearly 32% of pupils did not use English as their first language, and over 45% of pupils were on free school meals, according to the LEA survey. A total of 150 languages were identified by class teachers as the first language spoken by individual children in the sample. Pupil mobility in the LEA schools was also high. Many live in council house accommodation and their families move in and out of areas, rather than buying. On average, only about 80% of the LEA's pupils start and finish with the LEA's schools, so there are issues about pupil mobility. The present average mobility figure already conceals a wide variation between schools. The mobility can be as high as 39% and as low as 2% at GCSE (Demie 2002).

A number of researchers have also identified prior attainment as one of the single most influential characteristics affecting the performance of any pupil in the LEA's schools (Nuttall *et al.* 1987; Kendall 1997; Sammons *et al.* 1997; Demie 2001). This finding is supported by other studies (see Nuttal 1990; Jesson & Gray 1991) in other LEAs' schools. For example, Nuttal (1990) studied schools' examination results for the most able children and compared the results for children of different levels of prior attainment using three bands of the London Reading Test. Jesson and Gray (1991) also report evidence from prior attainment data. The results suggest that school performance varies differentially, with some schools narrowing the gap between students of high and low attainment. Hedger and Jesson (1998) also report some evidence of differential school effectiveness for pupils of different prior attainment levels as assessed by national curriculum key stage tests.

There are undoubtedly other factors that influence performance. Research in the LEA has demonstrated that social background factors such as gender, ethnic background, fluency in English, free school meals and mobility rate can influence overall school levels of attainment (Demie *et al.* 2002a, b; Demie 2001, 2002). The extent of differences in performance due to these factors has been extensively

researched in recent years within the LEA and under-achievement by these groups is a cause for serious concern. It is not necessary to go over the details of factors influencing performance here as there are several research publications which have provided this information for the LEA schools (Demie *et al.* 2000a, b, c, 2002a; Demie, 2001, 2002).

Method

Methodological Approach for Measuring Value-added

Value-added in education concerns the relative progress pupils make in school from one stage of education to another, compared with the progress of other pupils with similar attainment at the start of the period. Measuring value-added is a complicated task. To undertake value-added analysis it is essential to have a measure of a pupil's prior attainment (i.e. their starting point) and a measure of pupil outcome (their finishing point), large individual pupil pooled data from a number of schools and a statistical technique to derive a regression line, representing average progress. However, there is little agreement among researchers on the methodology of measuring value-added. For example, Schagean and Goldstein (2002: 15) describe multi-level modelling as 'the best quantitative analysis technique' which can take into account all relevant factors including prior attainment, contextual background factors such as types of schools and socio-economic composition of pupils . Others argue the case for the use of simple regression in value-added analysis and how this technique completely replicates multi-level modelling. For example, the analysis of five large datasets by Fitz-Gibbon (2001) using both standard regression and multi-level modelling shows that the two sets of results from each dataset correlated at around 0.99. Gorard (2002) further argued that 'even when the results of the two approaches differ there is no way of deciding which is one is better. Approximately the same amount of variance is explained by the same variables with multi-level modelling as without' (25). Jesson further contends Schagen and Goldstein (2002) arguments by pointing out the complexity of using multi-level modelling and why in most cases of value-added analysis simple regression and aggregate are used. Although much energy has been devoted to the promotion of the multi-level modelling techniques over the last 15 years, there is some disappointment because the results cannot be communicated easily to practitioners and policy makers (Gorard 2002). It is fair to argue 'some of the active practitioners in value-added do not use the multi-level models and so the debate about "appropriateness" of the technique still continues' (Jesson 2002: 80).

Despite criticisms from some academics, the simple or multiple regression based value-added analysis has advantages over more sophisticated methods of calculating the 'value-added' by schools. Most people can understand and find fault with simple linear or curvilinear regression. This is not only sufficient to prompt discussion, it also allows those with only a basic understanding of statistics to participate. For schools with negative residuals this discussion can yield both the safety of saying 'this isn't the answer, there must be another reason why we appear

to be doing badly' and the impetus to look at what is really happening in the classroom.

In some ways this is the crux of the argument. As argued by Kelly (1995: 13):

> multi-level modelling is the province of the statistician; it is complex, and by taking a large number of factors into account it appears to give an accurate answer, although over-complexity can lead to 'over-fitting' data, which in turn produces spurious results. This can have the effect of deskilling practitioners. However, no statistical analysis can truly explain the differences between schools. This requires the judgement of education professionals. The statistics should be the starting point for asking educational questions, not the final word on the subject. Many of the proponents of multi-level modelling would probably agree with this point and would want to see their analyses used as the basis for professional debate. The problem is that since few practitioners can understand multi-level modelling, they are hesitant about questioning its results.

Unfortunately, the debate of value-added is dominated by one side of the argument that there is one best way, i.e. multi-level modelling (see Schagen & Goldstein 2002). The experience of working with schools using multi-level modelling for at least four years in the LEA's secondary schools suggests that those who accept this as the best practice in value-added analysis have yet to persuade policy makers, teachers and researchers not involved in this field to take their point of view. For these reasons this study has used a standard regression technique as the analytical tool for measuring value-added. There are other reasons why the use of simple regression is better than other models for value-added initiatives. As will be discussed later, evidence from working with schools suggests that it is very easy to produce value-added information; it can easily be viewed or understood as an average progress line; it is very easy to calculate value-added residuals; schools are becoming familiar with what value-added graphs mean and look like. The value of data based on simple regression is great as it is now a fact that at least one in three secondary schools are using value-added service based on this technique across the country and many LEAs also use the same approach in supporting schools (Fitz-Gibbon 2001; Jesson 2002).

Approaches Used for Feedback of Performance Data to Schools

One of five 'doors' to improvement put forward by a leading researcher in the improvement tradition (Joyce 1991) is for a school's staff to study research findings related to effective school practice and the process of change. Another is for teachers to collect and analyse information and data about their classrooms and schools and their students' progress. A problem with this is that there are a lot of data that could be collected, and the analysis of a large dataset requires considerable expertise, interpretative skills and appropriate software.

Yet another approach to improving schools has been developed at the Univer-

sity of Durham (Fitz-Gibbon 1996). By providing an information system to schools they are able to assist schools in self-evaluation of examination and test results.

Services to assist schools with these tasks are now also increasingly available from LEAs. Rudd and Davies (2002), in recent LEA studies on the LEA's role in data collection, analysis and use, pointed out that there was considerable variation in the ways that LEAs carried out these activities. However, the following patterns were observed in the NFER studies:

- The LEA collects the relevant data from schools and national sources
- They turn this data into a package for each individual school, a school profile
- The profile, which includes value-added data, is sent to schools in the autumn term
- Guidance notes and key questions for the school are included in the school profile
- Visits are made to schools by link inspectors or statisticians, who assist with interpretation, action planning and target setting
- Short training courses in data interpretation and use are provided
- Statistician or advisor will follow up any further school enquiries (9)

The findings of the NFER study confirm that schools were, on the whole, very happy with the statistical analyses and guidance on the effective use of data from their LEAs. He concluded that 'there has been a revolution in the use of data … any teacher will be aware of what is happening. Using data and acting upon data was seen both in the schools and the LEA as a process, on going dialogue' (iii).

To meet this challenge, research officers in the case study LEA have also established a strong tradition of providing a comprehensive analysis of performance data for local schools. The increasing emphasis on evidence means that the need to have high quality research data has become even more important in the drive to raise standards in schools. A key feature of the LEA's support in the effective use of data is the provision of different kinds of data at different stages of analysis. Each school is supported in a number of ways with its own customised raw data, contextual and value-added data including in the extensive training on the effective use of the performance data.

School Profiles

The LEA issues all its governors as well as all headteachers and teachers with a School Profile: *Making Figures Speak for Themselves* (for details see Demie *et al*. 2000a: 1–21). The school profile provides a comprehensive set of benchmarking data to support governors and headteachers in developing their roles and exercising their responsibilities for the strategic management of schools, and identifies possible strengths and weaknesses of the school. The LEA school profile provides each school with a range of comprehensive performance indicators, given in Table I.

The school profile also provides benchmarking data to its schools to share good practice and for comparing their performance with families of schools with similar characteristics. Schools have been placed in four LEA defined family groups based

TABLE I. Range of indicators in the LEA's school profiles [2]

1. *Background Data:*

- Socio-economic characteristics of school population as indicated by free school meals, inward mobility, level of fluency in English, pupils with statements and English as a second language
- Staffing resources: school roll, pupil teacher ratio and average class size
- Financial Resources in the education service: budget share and financial expenditure including the percentage of budget planned to be spent on teaching staff, support staff, maintenance, energy, school allowances, balances and contingencies

2. *Raw Performance Data*

- Data on exclusions, attendance rate, unauthorised and authorised absence
- KS3 performance: maths, English and science results by all levels including Level 5 +
- KS3 performance: percentage of pupils attaining Level 5 + in English, maths and science compared to LEA and national average over time
- GCSE Performance: details of GCSE results including average point score per subject, total point score; percentages of 5 + A⋆ − C, 5 + A⋆ − G, A⋆ − C, A⋆ − G, 1 + A⋆ − G
- GCSE performance by subjects: details of GCSE A⋆ − C and A⋆ − G and 1 + A⋆ − G for main subjects including English, English Literature, maths, French, geography, history, science (double), religious studies and art & design
- GCSE performance by grades: details of GCSE results including all subject grades A⋆ to G.
- GCSE performance trends: percentages of pupils attaining 5 + A⋆ − C, 5 + A⋆ − G, A⋆ − C, A⋆ − G, 1 + A⋆ − G in the school compared to LEA and national average

3. *Contextual Performance Data*

- GCSE performance data by gender: percentage of boys, girls attaining 5 + A⋆ − C, 5 + A⋆ − G, A⋆ − C, A⋆ − G, 1 + A⋆ − G
- GCSE performance data by ethnic groups: pupil numbers and percentage of pupils in different ethnic groups including African, Caribbean, Bangladeshi, English/Scottish/Welsh, Chinese, Indian, Pakistani, Vietnamese, Greek, Turkish, Portuguese, Other Black and Other White attaining 5 + A⋆ − C,5 + A⋆ − G, 1 + A⋆ − G
- GCSE performance data by free school meals and paid meals: pupil numbers and percentage attaining 5 + A⋆ − C, 5 + A⋆ − G
- GCSE performance data by level of fluency in English, i.e. Bilingual Stage 1, Bilingual Stage 2, Bilingual Stage 3, Bilingual Stage 4 and English Speakers only: number and percentages of pupils attaining 5 + A⋆ − C, 5 + A⋆ − G
- GCSE performance data by pupil mobility i.e. joined in Year 11, joined in Year 10, joined in years 7, 8 and 9: number and percentages of pupils attaining 5 + A⋆ − C, 5 + A⋆ − G
- KS3 performance data by gender: percentage of boys and girls attaining Level 5 +
- KS3 performance data by ethnic groups: pupil numbers and percentage of pupils in different ethnic groups, including African, Caribbean, Bangladeshi, English/Scottish/Welsh, Chinese, Indian, Pakistani, Vietnamese, Greek, Turkish, Portuguese, Other Black and Other White attaining Level 5 +
- KS3 data by free school meals: pupil numbers and percentage attaining Level 5 +
- KS3 performance data by level of fluency in English, i.e. Bilingual Stage 1, Bilingual Stage 2, Bilingual Stage 3, Bilingual Stage 4 and English Speakers only: number and percentages of pupils attaining Level 5 +
- KS3 performance data by pupil mobility i.e. pupils joined in Year 11, joined in Year 10, joined in years 7, 8 and 9: number and percentages of pupils attaining Level 5 +
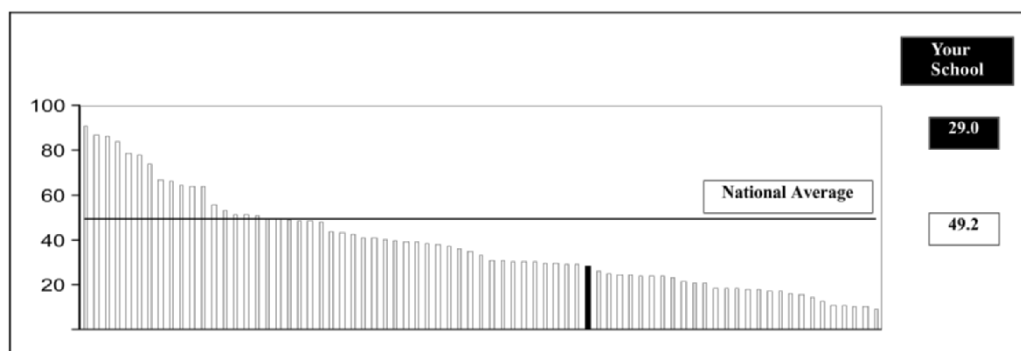
F<small>IG</small>. 1. Sample of School Profile Charts: GCSE $5 + A^\star - C$ in Inner London.

Source: School Profile: making figures speak for themselves, Research and Statistics Unit, Lambeth Education, December 2000: 12.

on a disadvantage index. Z- score is used to calculate a disadvantage score using FSM, mobility rate and English fluency (Not fluent in English) [1]. The 25% of schools with the highest levels of disadvantage are placed in the Upper Quartile (Group 1) and the 25% of schools which are least disadvantaged are placed in the lower Quartile, Group 4 (for details about disadvantage index see Demie *et al.* 2000a: 21; Demie *et al.* 2002a).

One of the clear advantages of the LEA's school profiles is that they provide schools with easily manageable performance data through user friendly charts, tables and reports (Demie *et al.* 2000a). The schools are compared with other schools, the LEA average, national average and similar schools. Each performance indicator is represented by a bar graph of decreasing performance across the borough's schools and national average. Each school is then represented by means of a darkened bar so that its performance and position in the LEA can be easily seen by governors and headteachers (for the details of graphs see Demie *et al.* 2000a and Figure 1). It is significantly easier for individuals to interpret and understand this data in comparison with official national published performance data and research reports which are often cumbersome to use.

The graphs and tables in the school profiles show the comparative position for each school on a variety of indicators as listed above. They are designed to:

- trigger a series of questions and suggest areas of discussion once headteachers and governors have compared their own performance with those in the bar graphs, LEA averages and families of schools with similar characteristics.
- suggest targets and form the basis for discussion with teachers about classroom practice.

Overall, the school profile offers an important tool to governors and headteachers in identifying possible strengths and weaknesses of the school and asking a number of questions such as 'what does it tell me about my school? Do we know why we are in that position? Are we happy to be where we are? Where do we want to be in one or two years and how do we get there?'

Contextual Reports

In addition to school profiles, the LEA also provides its secondary schools with customised *Contextual KS3 and GCSE Reports* including analysis by factors such as gender, ethnic background, fluency in English, free school meals and mobility rate (for details of the report, see Demie *et al*. 2000b, c). These reports also include trend performance data for each school, compared with LEA and national averages, as well as 'families' of schools with similar characteristics. The school and governors use each individual key stage contextual report to monitor progress over time and to identify factors influencing performance, to identify key areas of action to ensure improvements and to set targets and address issues of under-performing groups of pupils. The LEA also uses the data to identify whether improvements have or have not been made, and whether the attainment gap between under-achieving groups and their peers is being reduced.

The LEA have provided school profiles and contextual reports to schools since 1997 and each school now has five years of trend data (see Demie *et al*. 2000a, b, c). The important advantage for schools from this type of analysis is that they can see how they have performed over a reasonable length of time and whether or not their underlying trend is an improving one. They can also see the factors influencing performance from the contextual reports. However, this analysis is based on raw data, which means that it does not tell schools if they are achieving the best possible results for the pupils they are educating. It takes no account of the ability of pupils on their entry to secondary school.

Value-added Data to Support School Self-evaluation

A dominant trend with British education during recent years has been an increasing emphasis on the use of value-added data in school improvement and self-evaluation. The LEA has started providing value-added analyses to its schools. Value-added information is seen by the LEA, along with other pupil performance information outlined above, as essential to enhance teachers' abilities to analyse their effectiveness in terms of the progress pupils have made and to enable them to take necessary steps for improvement. They have considerable value diagnostically in making it possible to track the progress of individual pupils. To this end, since 2000, the LEA has also provided its secondary schools with value-added measures of the relative performance of each school, showing pupils' progress from KS2 to KS3 and KS3 to GCSE. It will be argued in this section that value-added information, when combined with simple raw and contextual data highlighted above, is of considerable value for monitoring progress and tracking individual pupils' performance.

To provide an illustration of school self-evaluation activities using value-added data, a sample of value-added data provided to LEA schools has been given. Where appropriate, evidence was also drawn from a case study of one of the LEA's secondary schools. The case study school was selected on the basis of illustrating good practice in using performance data to understand the problems they faced. Most importantly, the school started to grapple with issues concerning the system-
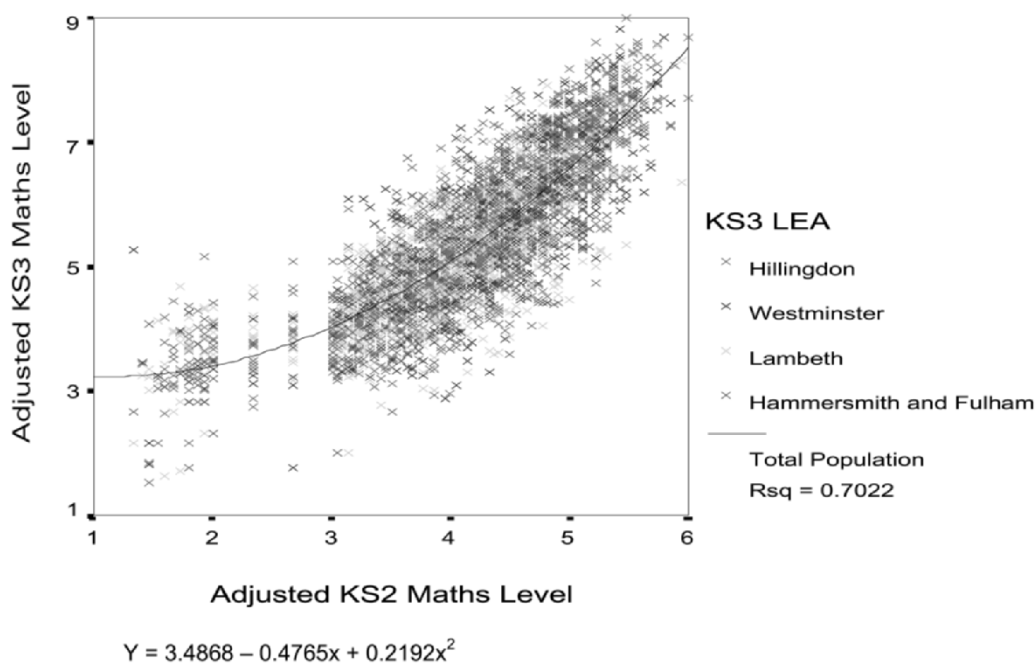
$$Y = 3.4868 - 0.4765x + 0.2192x^2$$

Fig. 2. KS2 to KS3 value-added scatterplot.

atic individual monitoring of all pupils as part of the self-evaluation process and improvement initiatives with which the LEA is helping at present.

Example of Value-added Scatterplot for Schools: overall pupil progress

As argued above in the methodology section, we need to use straightforward measures and directly interpretable statistics that are appealing to headteachers, parents, policy makers and the public. The most readily understandable and simplest standard technique is to use simple regression in which a line of best fit is created to represent the relationship between the input and output measures for the population. Each pupil's expected score is calculated from the line and the difference between actual and expected achievement is the value-added (or subtracted). An example of simple regression being used to calculate value-added is illustrated in Figure 2, which shows individual pupils' progress between KS2 and KS3 for maths compared with similar pupils in London schools. This type of scatterplot was also produced separately for English and science and provided to the LEA's schools.

A line of best fit (or regression line) is drawn, with crosses denoting the numbers of pupils on, above and below the line. Those above the line have performed better than the average and those below worse than the average. How far above or below is known as the 'residual'. Schools or departments within a school are compared by calculating averages and measures of dispersion of pupil's residuals. In the above example, prior attainment appears to account for 70% of the variance in KS3 mathematics scores. However, the proportion of the residual
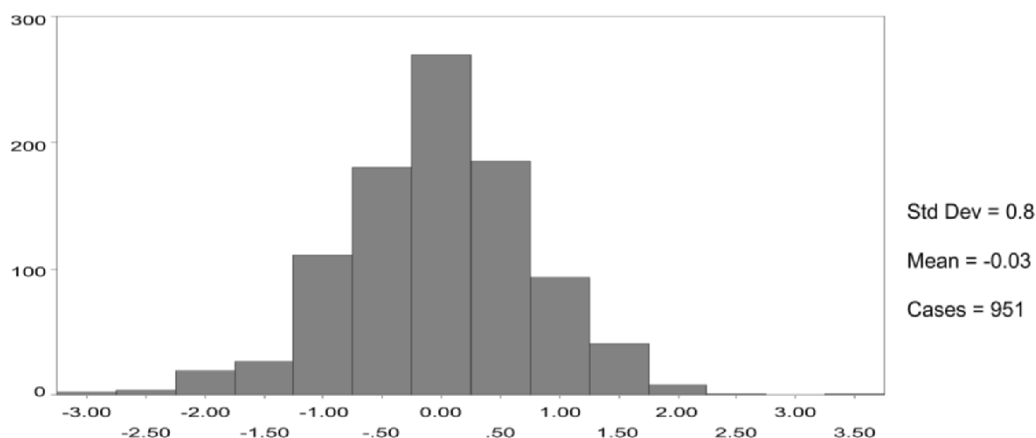
FIG. 3. Histogram of residuals (or value-added) for average of maths, English and science Levels KS2–KS3.

variance which can legitimately be attributed to differences between schools remains unknown.

Individual Pupil Report and Progress Measure

Table II provides an example of the pupil level value-added report and lists the expected level at KS3 for English, maths and average test level for each pupil, based on their KS2 results [3]. The average levels for KS2 and KS3 were calculated by adding the test levels attained in English, maths and science and dividing by the number of valid entries (typically 3). For each pupil, actual and predicted marks are given. The difference between the actual and predicted results, as displayed for each pupil, is the amount by which that pupil did better or worse than a hypothetical average pupil with the same KS2 result.

Table II also includes information on pupil progress compared with similar pupils in the LEA. The progress measure for pupils is based on their residuals. The distributions of residuals for all pupils were plotted, and are shown in the histogram (Figure 3). It clearly shows that residuals are normally distributed, with the majority close to 0 (implying performed as expected). To determine the cut points for each statement we have used the standard deviation (SD). Pupils with a residual within 1 SD are as expected, within 2 SD are above/ below expected, and more than 2 SD are much higher/lower than expected.

Pupil Progress Chart: comparison with progress made nationally

Figure 4 compares the relative progress made by pupils in the case study school with the progress made nationally by all pupils in England between KS3 and GCSE. In Figure 4 the solid black lines show the median and represent the relationship between KS3 and GCSE. On the graphs, 50% of pupils nationally fall on or below this line, with the remaining pupils falling above. Pupils whose plots fall within this

TABLE II. Example of value-added pupil report produced for schools [4]

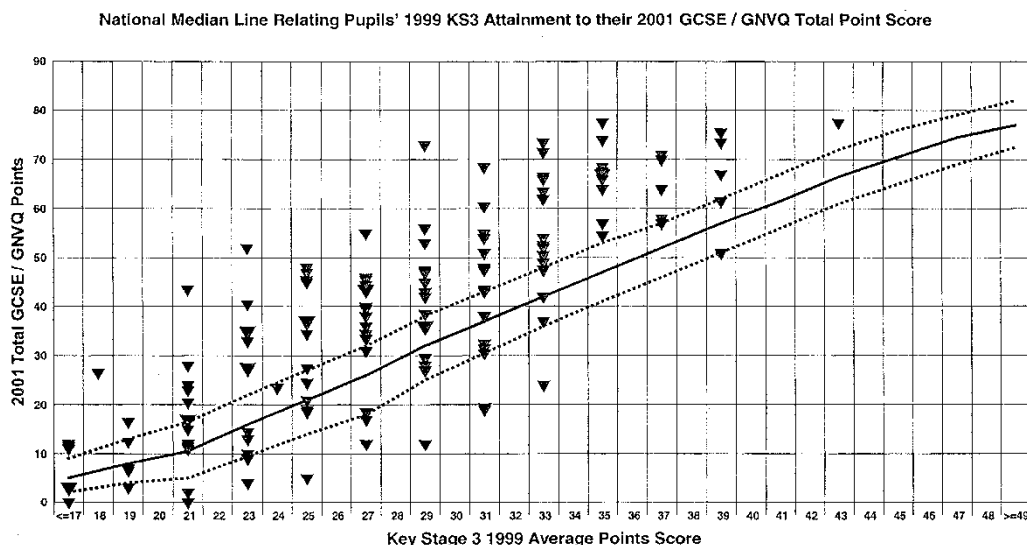| Pupil information		English		Mathematics		Average Level				Progress
Surname	Forename	KS2 Actual	KS3 Actual	KS2 Actual	KS3 Actual	KS2 Actual	KS3 Actual	Predicted KS3	Residual	
PALMER	BENJAMIN	4	7	4	7	4.3	7.0	5.4	1.6	much higher than expected
DORAN	JAMIE	B	N	B	3	0.0	2.7	1.3	1.4	higher than expected
WANZALA	MILTON	5	7	4	7	4.3	6.7	5.4	1.3	higher than expected
BEGUM	MUMTA	4	5	4	7	4.0	5.7	5.1	0.6	as expected
THOMPSON	DIEGO	3	4	4	4	3.3	4.0	4.4	− 0.4	as expected
RODRIGUES	SONIA	B	B	B	A	0.0	0.0	1.3	− 1.3	lower than expected
DROGBA	JESSICA	3	3	3	B	3.0	2.0	4.1	− 2.1	much lower than expected

FIG. 4. Pupils KS3 attainment to their 2001 GCSE point total point score: example for case study school.

area are considered progressing in line with the current average rate of progress in the country more or less as expected given their prior performance. The two dotted lines represent the upper and lower quartiles indicating that the 25% of pupils whose plots fall in the upper quartile are doing better than would be expected and the 25% of pupils in lower quartile are doing less well than would be expected.

The LEA started providing its schools with the additional comparative national median line starting in the autumn term 2001 to help schools to see whether they are doing better or worse than other pupils nationally.

The finding from the case study school suggests that the pupils in this school have made good progress in terms of value added. About 63% of the pupils in the case study school are in the upper quartile, indicating that their progress is greater than would be expected given the average rate of progress. Twenty-six per cent of the pupils progressed as expected and 13% are in the lower quartile and progressed less well than expected. This evidence from the national median line was also used by schools to ask questions such as which pupils have made progress significantly better or worse than others and to identify the reasons for this.

Differential Subject Performance

Research officers also worked with the school on aspects of differential subject performance and provided the management with evidence to identify those departments where under-achievement was most extensive and to develop appropriate targets to eliminate it. The subject results have been analysed and all have been compared with LEA and national averages. Table III shows the residual for each

GCSE subject. A school's residual for a given subject is the average of the individual pupil's residuals for the subject. This is arrived at by adding together the pupil residuals for the subject and dividing by the number of pupils entered for the subject by the school. The main finding from this analysis was the significant variation in subject differences at the case study school. The range of performance between different departments was substantial and the school could see from this analysis that they had some strong departments, such as English, English Literature, French, arts and design, music and dance. However, they had weak departments such as history, geography and media. Mathematics and science have been identified as a cause of concern for the school based on raw data. First, because they are core subjects and as everybody should be entered for them, they should be subjects where the school is relying on a reasonable proportion of pupils attaining $A^\star - C$ grades. In 2000, only 20% of pupils at the school attained $A^\star - C$ in mathematics and 46% in English (Demie *et al.* 2000a). One of the main outcomes from the analysis was that the school has now started using the subject residual indicator as an aid to monitoring subject performance and diagnosing weaknesses.

Training on the Use of Data for School Self-evaluation

As part of its school improvement strategy the LEA supports its schools through organising conferences as well as school-focused training courses on the use of

TABLE III. GCSE subject differences analysis: example for case study school

Subject description	School subject entries	School subject residual	LEA subject residual	National subject residual	Adjusted school − LEA subject residual	Adjusted school − national subject residual	
Sci: Double Awd A	133	− 0.11	− 0.17	− 0.02	0.06	− 0.09	
Sci:Double Awd B	133	− 0.11	− 0.17	− 0.02	0.06	− 0.09	
Mathematics	132	− 0.23	− 0.37	− 0.20	0.14	− 0.02	
English	131	0.51	0.48	0.26	0.03	0.26	+
English Literature	131	0.76	0.32	0.16	0.44	0.61	+
French	100	0.13	− 0.32	− 0.23	0.45	0.36	+
History	87	− 0.85	− 0.50	− 0.18	− 0.35	− 0.68	−
Media/Film/TV Stds	56	− 0.18	0.02	0.24	− 0.20	− 0.43	−
D&T Resist. Materials	51	− 1.41	− 0.89	0.04	− 0.52	− 1.45	−
Geography	40	− 0.83	− 0.47	− 0.12	− 0.36	− 0.71	−
Art & Design	39	1.19	0.93	0.58	0.26	0.61	+
Religious Studies	37	− 0.08	− 0.14	− 0.25	0.06	0.16	
D&T Textiles Tech.	25	− 0.68	− 0.16	0.10	− 0.52	− 0.78	−
D&T Food Technology	21	− 0.88	0.07	0.14	− 0.95	− 1.02	−
Drama	20	0.97	1.29	0.65	− 0.32	0.32	
Music	20	1.96	0.70	0.03	1.26	1.93	+
Dance	18	0.62	0.59	0.13	0.03	0.49	+
Information Technology	8	− 1.18	− 0.30	− 0.20	− 0.88	− 0.98	−

TABLE IV. Headteachers, teachers and governors view about the feedback: customer satisfaction survey for primary and secondary schools*

Questions	Respondents	Very useful %	Useful %	Not useful %	Total No. of respondents
Q1 How do you rate your school profile and contextual key stages reports	Headteachers	77	23		65
	Governors	65	35		104
	Teachers	48	51	1	67
	All	63.6	36	0.4	236
Q2. Please indicate how useful you found the training on the use of performance data for school self-evaluation	Headteachers	36	64		25
	Governors	58	42		43
	Teachers	19	77	4	78
	All	34	64	2	146
		Strongly agree	*Agree*	*Disagree*	*Total*
Q3**. To what extent do you agree that the presentation of the school profile information in graphs and tables is readily understandable?	Headteachers	24	69		44
	Chair of Governors	37	58	5	63
	Other	50	50		4

Notes: *Customer feedback survey in autumn term, 1998–2001. Data was also collected after training sessions
** School Profiles Consultation survey, autumn term 1998.

performance data for school self-evaluation and target setting. This support includes a presentation to headteachers and the senior management team, presentations to the governing body, using the information in school profiles, contextual key stage reports and value-added information as discussed above. Research officers have also delivered training to governors and senior managers of the schools. The main purpose of the training programmes is to improve the effective use of performance data to inform target setting and school development planning. The training programme covered a presentation on the role of governors, key issues in target setting and school improvement, how best to understand and interpret school profiles, contextual and value-added data and key issues raised from the data. This was followed by a workshop where headteachers, teachers and governors were asked to look carefully at key issues for school improvement and draw action plans to that end. The discussion in the workshop and self-review for the case study school focused on the following key issues raised in their school profile, contextual KS3 and GCSE reports and value-added data (for details see Demie *et al.* 2000a, b, c):

- How does the school compare to schools in the same family group in respect of overall performance?
- What does trend KS3 and GCSE performance tell me about my school compared to other authority schools, inner London and national averages? Does the same picture emerge for all subjects?
- How does the school compare to other borough schools in respect of free school meals, pupil mobility, E2L, pupils with statements of special educational need (SEN), exclusions and attendance rate? How do these factors influence the schools KS3 and GCSE performance? Identify groups which are under-performing
- What are the overall strengths and weaknesses of the school?
- What issues might you want the school to address as a result of your school contextual factors and your KS3 and GCSE performance?
- Draw up action plans?

There was now a clear understanding of the need to use data well to set expectations in the LEA schools. A comment from a headteacher during the research officer's and senior manager's meeting to discuss the use of value-added in one of the schools captures the climate:

> We need to be more data literate and use performance data well to inform our lesson planning so that our teaching supports under-performing groups in school.

The school is now at the point where it holds data on the new intake and other year groups by key stage level and reading tests. Individual pupil data provided by the LEA through school profiles, contextual KS3 and GCSE reports and value-added analysis also guide teacher and senior manager planning. Using this information the school gives additional support to children who are not achieving as well as expected. Almost all schools now have a deputy headteacher or assistant head-

teacher with specific responsibility for effective use of performance data for target setting and school self-evaluation in the LEA schools. It remains a challenge for the schools to encourage all teachers to use value-added data, including its use in their own classroom forecasts for informing and improving classroom teaching practice.

Throughout this process, the expertise of the research officer and the leadership of the headteachers has been key in raising the level of expectations in the school of what could be achieved through the effective use of data for self-evaluation and to target improvements.

The next phase of the work of the LEA research officer and link adviser in all the LEA schools is to look at strategies to develop monitoring of the quality of the teaching and learning with senior managers. The intention is to extend training to all classroom teachers on how to use value-added data for tracking pupil performance and target setting.

Overall, the LEA schools are uniquely well placed to find answers on issues of self-evaluation and school improvement. They can draw on a wealth of information, from a range of performance data produced by the LEA to national OfSTED inspection reports to monitor and analyse their own performance. They have the means to diagnose strengths and weaknesses. Sharing this type of information with the case study school has provided a major impetus in their drive to secure school improvement. It has helped the school to identify areas of under-achievement, to focus on improving quality of teaching and learning at classroom level and to set individual pupil level targets.

Schools and Governors' Views about the Feedback: evidence from consultation and customer satisfaction survey

A key feature in the LEA strategy in the provision of value-added data to support school improvement is to provide different types of feedback at different stages of analysis, reflecting sophistication. The LEA believes looking at pupil performance in different ways can reveal valuable information about different aspects of a school's performance. Raw data provided through school profiles and contextual reports each year in the autumn term is essential to establish the school's current levels of performance compared to the LEA, nationally and families of schools, to identify trends over time and to evaluate the impact of local and national policy initiatives (Demie *et al.* 2000a, b, c).

Headteachers, governors and teachers were asked how they rated the LEA school profiles, contextual key stage analyses and value-added reports as part of a customer feed back survey. As can be seen from Table IV, the vast majority of respondents felt that the information provided in the school profile and contextual key stages reports was either very useful or useful.

The value-added feedback is also valuable for monitoring factors influencing performance, to identify under-performing groups, to assess individual pupil progress and to provide evidence of whether a school is performing above or below

expectation in terms of a specific outcome over a particular period. Each of the analyses and the feedback approaches may give slightly different perspectives on schools and some may offer an unexpected insight. Taken together they can be used to build a more comprehensive picture of overall school performance.

LEA support in the process of using performance data for school self-evaluation is on-going. A series of school level customised training sessions, presentations and LEA wide briefing sessions are held every year, as well as those specifically for governors. However, LEA schools are still in the process of learning about the most effective use of performance data for the purpose of school improvement, as this is still a new initiative. Our experience of provision of performance data to schools over the last four years suggests that the presentation of results, supporting explanation and training on the use of performance data for school self-evaluation is more important than an understanding of precisely how the results are derived.

The key question for researchers is why this approach was so successful in disseminating research findings. There are a number of reasons:

- There was, and still remains, a huge demand from schools for performance data since the publication of league tables.
- The service has been developed in close consultation and collaboration with headteachers and governors. For example, for school profile and contextual key stage reports the LEA consulted all officers, headteachers, chairs of governors, the governors' forum and headteachers' council. In addition to the normal means of consultation, the LEA also carried out a presentation to the LEA governors' forum and headteachers' conference.
- The information provided to schools and governors is in a clear and accessible format and it is easy to understand and use for school improvement purpose.
- The LEA provides detailed and comprehensive performance data feedback to schools within a confidential framework for school self-evaluation and as a tool to raise questions rather than make judgements about the schools. Heads and governors are asked to draw their own conclusions and act accordingly. There is authority guidance on how to do this and governors and school staff are trained to use performance data.
- Research evidence produced by the LEA research officers was taken very seriously by schools because it was provided at a time when policy makers and senior managers in schools and the LEA needed to look at their performance and draw action plans in their school development planning.
- Finally, there has been a strong leadership in the LEA with a clear focus on school improvement and the use of data supported by well-focused effective research and statistics team to support schools.

Conclusions

This article highlights the various methods of feeding back research findings to schools and discusses how performance data is used for school self-evaluation. There are three messages in this article.

First, the message that comparative information triggers more questions than it provides answers for. They are tin openers not gauges. All that the performance data in school profiles, contextual analysis *and* feedback to schools could do was to trigger a series of questions which headteachers, teachers and governors could ask themselves once they looked at the pupil level evidence and compared their own schools with similar schools in the charts:

- what does it tell me about my school?
- do we know why we are in that position?
- are we happy to be where we are? If yes, why? If no, where would we like to be?
- how are we going to get there?

Second, the old message that the only good research is that which is communicated. The contextual and value-added feedback to schools meets the test of good research, policy and practice. The information from school profiles and value-added analysis has been communicated directly to teachers, headteachers, governors, advisors and policy makers and has been used effectively for self-evaluation and target setting in schools and LEAs.

Third, that what we have done so far is providing research information that can be readily used by schools, and that much more research could be done to improve the effective use of research findings. The information provided to schools and governors shows the data for each school using simple tables and charts. It is easy to understand, accessible and usable compared to information published by QCA, DfEE and OfSTED. Some of the national publications and research reports are too complex to understand the details and can be daunting for teachers and schools to use. Schools prefer to see clearer and more manageably presented research data, preferably like the London underground map rather than the full length British Rail Timetable. With all its limitations, the provision of performance data to schools and governors was a success in the LEA schools. Information such as the *School Profiles: making figures speak for themselves* and contextual reports were used effectively by schools for improvement purposes and to investigate the reasons why there is under-performance in particular areas.

Policy Implications

The growth of interest in the use of data in schools has been striking. The willingness of the LEA schools to engage with data and involve research officers, as 'critical friends' was strong in the schools. The overall findings of this research show that value-added feedback to schools provides an authoritative account of the progress made by pupils in particular schools and offers practical support to classroom teachers. Using straightforward, manageable techniques of data analysis, it aims to help busy teachers interpret the information and use it to support improved teaching and learning. It has considerable value for monitoring progress and tracking the performance of individual pupils. Furthermore, the example of

value-added information illustrated in this article provides compelling information, which leads headteachers and teachers to pose questions:

- How many pupils appear to be achieving less than the expected levels at the end of KS3 tests?
- Are there any common characteristics of the pupils who appear to be achieving less well than expected at KS3? For example, is there a high proportion of pupils of one particular ethnic origin, or a high proportion of boys?
- Why is the school not making progress, compared with other schools in the LEA, for KS2 to KS3?
- What are the reasons for difference in subject effectiveness at GCSE?
- What are our weaknesses and strengths?
- What must be done to improve?

These are questions which headteachers, governors and teachers should ask themselves as a basis for self-evaluation and raising standards in schools. However, care should be exercised when making comparisons between schools and pupils and drawing conclusions using value-added data. It is important to note that the relative performance of a school in a particular indicator may be due to a number of factors. Value-added analysis on its own cannot tease out all aspects of the unique contribution made by particular schools from all other influences. It needs to be supplemented by other contextual information, detailed monitoring and review in schools by headteachers and classroom teachers.

Some Caveats

The article is a useful contribution on how data is actually used and disseminated by the LEA in schools. Despite this, there are some clear areas for cautious interpretations of some of the data and analysis. The methodological approach used in the provision of performance data acknowledges by its very crudity that statistical analysis whether it is based on simple raw data or contextual or value-added data is not the final verdict on a school's results and should be interpreted with extreme care. There will always be other factors that affect performance, and statistical data should be the starting point for asking questions, rather than appearing to provide the definitive answer. While there are some justifiable criticisms of this approach, the theme of this article is that the careful analysis and interpretation of performance data can be a useful enterprise in the continual monitoring of the performance of schools. The experience from the case study suggests looking at pupil performance in different ways can reveal valuable information about different aspects of school performance and contributes to strengthening headteachers and teachers self-evaluation skills and their knowledge of comparative data.

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NOTES

[1]   The disadvantage index was calculated using z-scores and is the sum of scores of free school meals, fluency in English and mobility rate.

[2]   Strict criteria were used in selecting and checking the reliability of the indicators used in the school profile and they were selected with particular regard to significance as performance indicator overtime, ease for recording and collection, easy to verify and moderate in schools and objectivity. Most of the information contained in the profile is collected as part of statutory returns and assessments and are carefully checked by schools for accuracy of the data.

[3]   For value-added analysis and measuring individual pupil progress between KS2 and KS3 the following codes have been used for each National Curriculum level: 1–8: National Curriculum Levels; N: Pupils who took the tests but who failed to register a level; W: Working Towards level 1; A: Absent; D: Disapplied; B: Pupils who were assessed by teacher assessment only.

[4]   Schools are sent their pupil reports on a confidential basis with additional information on date of birth; gender, SEN, free school meals, fluency in English and mobility rate. Names and value-added figures in this report are fictitious and do not relate to any pupils.

REFERENCES

Demie F (2001) Ethnic and gender difference in educational achievement and implications for school improvement strategies, *Educational Research*, 43(1), 91–106.

Demie F (2002) Pupil mobility and educational achievement in schools: an empirical analysis, *Educational Research*, 44(2), 197–215.

Demie F, Taplin A & Butler R (2000a) *School Profile: making figures speak for themselves*, Customised Individual School Report, London: Research and Statistics Unit, Lambeth Education.

Demie F, Taplin A & Butler R (2000b) *Contextual Analysis of KS3 Pupil Performance 2000*, Customised Individual School Report, London: Research and Statistics Unit, Lambeth Education.

Demie F, Taplin A & Butler R (2000c) *Contextual Analysis of GCSE Pupil Performance 2000*, Customised Individual School Report, London: Research and Statistics Unit, Lambeth Education.

Demie F, Taplin A & Butler R (2002a) Educational achievement and the disadvantage factor, *Journal of Educational Studies*, 28(2), 101–110.

Demie F, Taplin A & Butler R (2002b) *Under-performing Groups of Pupils in Schools and Implications for Raising Standards in Lambeth*, RS65/01, London: Research and Statistics Unit, Lambeth Education.

DfEE (1997) *Excellence in Schools*, London: Department for Education and Employment, HMSO.

DfEE (2000) *The Autumn Package: pupil performance information*, London: Department for Education and Employment.

Elliot K & Sammons P (2001) Using pupil performance data: three steps to heaven? *Improving Schools*, 4(1), 54–65.

Elliot K, Smees R & Thomas S (1998) Making the most of your data: school self-evaluation using value added measures, *Improving Schools*, 1, 59–67.

Fitz-Gibbon CT (1996) *Monitoring Education: indicators, quality and effectiveness*, London: Cassell.

Fitz-Gibbon CT (2001) *Value-Added for those in Despair: research matter*, London: British Psychological Society.

Goldstein H (1999) *The DfEE Autumn Package*, update January 2000, London: http://www. IOE. Ac.Uk/hgpersonal/the-DfEE- Autumn-Package.Htm.

Gorard S (2002) Let's keep it simple: the multi-levelling model debate, *Research Intelligence*, 81, 12–15.

Hayes S & Rutt S (1999) Primary analysis for secondary schools: an LEA research officer's perspective on helping secondary schools interpret assessment data for school improvement purposes, *Improving Schools*, 2, 44–52.

Hedger K & Jesson D (1998) *The Number Game: using assessment data in secondary schools*, Shrewsbury: Shropshire LEA Advisory Service.

Hemsley-Brown J, Wilson R & Easton C (2002) *How are LEAs Helping Schools to Use Research and What are the Benefits*, Slough: NFER, http://www.ncer.ac.uk

Jesson D (2002) Response to the article by Schagen and Goldstein, *Research Intelligence*, 80, 16–17.

Jesson D & Gray J (1991) Slants on slopes: using multi-level models to investigate differential school effectiveness and its impact on pupils' examination results, *School Effectiveness and School Improvement*, 2(3), 230–247.

Joyce B (1991) The doors to school improvement, *Educational Leadership*, 59–62, May.

Kelly A (1995) *Free School Meal Contextualisation of GCSE Examination Results*, Report of the National Consortium for Examination Results, January, Stockport: Stockport LEA.

Kendall L (1997) *Examination Results in Context: report on the analysis of examination results*, London: Association of Metropolitan Authorities.

Kendall L & Hewitt D (1998) *Examination Results in Context: a report on the analysis of 1997 GCSE results*, Slough: National Foundation for Educational Research.

Nuttall D (1990) *Differences in Examination Performance*, RS 1277/90, Research and Statistics Branch, London: ILEA.

Nuttall D, Goldstein H, Prosser R, & Rasbash J (1989) Differential school effectiveness, *International Journal of Educational Research*, 13, 769–776.

Rudd P & Davies D (2002) *A Revolution in the Use of Data: the LEA role in data collection, analysis and use and its impact on pupil performance*, LGA Research Report 29, Slough: NFER.

Sammons P, Thomas S & Mortimore P (1997) *Forging Links: effective schools and effective departments*, London: Paul Chapman Publishing.

Saunders L & Rudd P (1999) *Schools' use of value added' data: a science in the service of an art?* Paper presented at the British Educational Research Association Conference, University of Sussex, Brighton, 2–5 September.

Schagen I & Goldstein H (2002) Do specialist schools add value? some methodological problems, *Research Intelligence*, 80, 12–15.

Thomas S, Smees R & Elliot K (2000) Value added feedback for the purpose of school self-evaluation in S. Askew (ed) *Feedback for Learning*, London: Routledge.

Yang M, Goldestein H, Rath T, Hill N (1999) The use of assessment data for school improvement purposes, *Oxford Review of Education*, 25(4), 469–483.

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