Technology Enhancing Learning

Limited data handling facilities limit educational management potential

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Abstract: This paper considers the role of management information systems (MISs) in supporting practices that can lead to enhanced achievement. In England, MISs have not been provided centrally by government or government departments, but have been purchased by schools. MISs have offered resources focused largely for use by managers rather than teachers. That formative assessment can be used by teachers to enhance attainment has been well studied, and a clear link has been recognised. National agencies have, since about 2000, promoted concepts of assessment for learning in educational practice across schools. MISs can provide a key means for schools and teachers to handle, review and monitor formative assessment data. Although some schools use MISs for this purpose, most schools recognise limitations with the system they have, and studies increasingly identify issues and specific limitations. A pilot project shows how innovation can address issues. However, it is clear that there is need for further innovation and development. National policies will need to consider the entire range of challenges, if teachers are to use MISs to support and enhance learning achievement effectively.

Keywords: Formative assessment; management information systems; innovation; learning attainment

1. INTRODUCTION

This paper is concerned with ways in which management information systems (MISs) can support educational practices (at a classroom or pupil level) that can lead to enhanced achievement. In England, MISs have not been provided centrally by government or by government departments, but supplied by a number of companies and purchased by schools. These commercial systems have offered resources focused largely for use by managers rather than teachers.

Formative assessment can be used by teachers to enhance attainment. This fact has been well studied, and a clear link has been recognised. Black

and Wiliam (1998), in reviewing the research literature, looked at some 30 studies, which used experimental and control groups, pre-and post-tests, and provided numerical data about learning gains. They found firm evidence that formative assessment was an essential component of classroom work, and that effective practice and use could raise standards of achievement (with gain sizes in the order of 0.4 to 0.7 of an attainment level obtained when formative assessment practices were used). The Department for Education and Skills (DfES) in England introduced a focus on 'Assessment for Learning', and in 2002, the Key Stage 3 initiative (for pupils aged 11 to 14 years) stressed the importance of taking an 'Assessment for Learning' approach. A part of that emphasis led to the publication of a booklet focusing specifically on data management use (Releasing Potential, Raising Attainment: Managing Data in Secondary Schools, DfES, 2002).

The Qualifications and Curriculum Authority (QCA) outlines on its web-site resources (2005), the importance of taking an 'Assessment for Learning' approach. It states that: "Assessment for learning is the process of using classroom assessment to improve learning, whereas assessment of learning is the measurement of what pupils can do. In assessment for learning: teachers share learning targets with pupils; pupils know and recognise the standards for which they should aim; there is feedback that leads pupils to identify what they should do next in order to improve; …". It goes further by stating that: "Assessment for learning is one of the most powerful ways of improving learning and raising standards. Actively involving all pupils in their own learning, providing opportunities for pupils to assess themselves and understand how they are learning and progressing, can boost motivation and confidence".

MISs have been a key means to help schools manage formative assessment data. A recent research survey that looked at school uses of data for teaching and learning (Kirkup, Sizmur, Sturman and Lewis, 2005) found that: "the impact of data on teaching and learning operates at two levels: directly by means of interventions targeted at individual pupils; and indirectly by means of whole-school approaches". They went on to say that: "Commonly reported uses for data in all schools were: to track pupil progress; to set targets; to identify underachieving pupils for further support; to inform teaching and learning and strategic planning. … At the classroom or pupil level, effective use of data enabled schools to: highlight specific weaknesses for individual pupils; identify weaknesses in topics for the class as a whole; inform accurate curricular targets for individual pupils; provide evidence to support decisions as to where to focus resources and teaching".

2. ISSUES: THE REALITY

In 2002, research undertaken by the author into MIS practices in a key range of schools across a number of local education authorities (LEAs), indicated that although the potential support that MISs could offer schools in

terms of enhancing formative assessment practices was high, the reality was that the information technology (IT) systems in place were not functioning in ways to support teachers and schools (Somekh et al., 2002a). The report stated that: " What is needed is a fine level analysis of the issues and the approaches that could be adopted when designing the MIS. … Currently, lack of sophistication of analysis is leading to a blurring of needs, and is limiting possibilities". Overall, functionality to support teacher curriculum needs was not fundamentally central to the systems observed, data of all forms was held in a single system, differential access was not adequately provided, and, hence, there was no integration of approach based on specific user needs. The report indicated issues that schools faced: "Currently there is a major focus upon data gathering, data input, data records, and data output (rather than upon data transfer and data analysis). The systems often do not allow ease of transfer of data, and analysis of data is often limited to large numerical tables that teachers find difficult to handle and to interpret. While the Pupil Level Annual School Census (PLASC) has enabled data to be recorded in electronic form, schools often experience difficulty in transferring data from the MIS to PLASC. Their understanding of the value of this for their school is often not clear despite the investment of time and effort in carrying out manually what could in theory have been undertaken electronically".

The final report on IT practices across the ten key LEAs, all involved in implementing the major national IT National Grid for Learning (NGfL) roll-out (Somekh et al., 2002b), suggested that innovative approaches needed to be taken: "The NGfL Programme had the potential to revolutionise an LEA's ability to access, manage and make use of information about its schools and their pupils. In practice, however, this is an area where the NGfL has been slow to make an impact". At that time some LEAs were moving towards more central systems, but issues were identified with those approaches: "As with other areas of centralisation, however, the impact on individual teachers in schools is not always immediately beneficial. One school ICT co-ordinator complained that her own MS Excel-based record system was more efficient for tracking pupils' progress and performance than the new system, which the LEA had recently provided".

The recent research survey (Kirkup, Sizmur, Sturman and Lewis, 2005), shows that the situation is in practice similar to that found 3 years earlier. The report highlighted practice associated with effective uses of MIS. For example, it stated that: "Schools reported that effective use of data resulted from meaningful dialogue between staff, and was supported by user-friendly systems". The report indicated that many schools were developing their own methods to account for the limitations they experienced: "Rather than closed data analysis packages, school-devised systems and Excel spreadsheets were the most popular data management tools because they tracked individual pupils and allowed schools the flexibility to input internally generated data such as interim assessments and targets; i.e. such tools were easier to customise to the school and its particular needs and circumstances". Even

systems provided centrally by the DfES were not found easy to use by all schools: "Users of the Pupil Achievement Tracker software (PAT) provided by the DfES generally made positive comments about the visual presentation of data and the ability to compare groups of pupils. However, many questionnaire respondents and focus group participants found PAT very difficult to use and were confused as to how to input data". The report concluded that: "All schools wanted data management systems that: are easy to use; produce outcomes that are easy to interpret; allow flexibility of input; have compatible school management and assessment components; offer comprehensive training and support; are accessible to staff; encourage engagement and ownership".

Becta, in a recent review of the state of MISs in England (2005), echoed many issues raised in previous studies. They focused particularly on commercial and management aspects that might enable MISs to be developed further. Becta stated that: "… we estimate that the total cost of providing and supporting MIS systems in schools in England is at least £180 million annually, and could be much higher. We confirm that there are considerable impediments to maximising the potential value for money flowing from that expenditure. Those impediments span all aspects of the current arrangements including the contractual landscape, the technical environment, the support arrangements and the statutory returns process". On the issue of interoperability, Becta reported that: "We find that interoperability arrangements are effectively dependent on the dominant supplier, which sets the detailed technical, financial and legal framework within which interoperability takes place. We consider that, if unchecked, such arrangements for interoperability have the potential to impede competition and choice not only in the provision of MIS solutions but also in the market for Virtual Learning Environments (VLEs) and Managed Learning Environments (MLEs), and hinder the effective delivery of wider policy objectives in relation to personal learning spaces".

3. LIMITING FACTORS: THE CHALLENGES

In 2001, the Standards and Effectiveness Unit of the DfES set up a project called the Schools facing Extremely Challenging Circumstances project (SfECC), the aim being to look at ways that this group of eight schools could work together, with an appropriate support structure, on an improvement agenda. Because the schools were similar in particular background contexts, but widely spread geographically, this presented challenges of how schools could share practice and ideas. The author undertook an in-depth review of how these eight schools were using MIS, as a part of their support for pupils. The report to the DfES (Passey, 2002), highlighted a number of specific issues: schools did not use the same data input devices for management data; they did not have a master data file for holding input data, and for accessing data; the data needs of schools, the

DfES, the QCA and Ofsted were not the same; data transfer was not easily accomplished, and was very time consuming; forms of data output from data management systems were not constructed for teachers to use easily for analytical purposes; data files contained no links to pupil work; and analysis of records of pupil attainments were not linked to a means to review how lesson delivery was undertaken.

While the schools were reasonably well equipped with IT, their data management systems and their uses were more limited. The schools generally were not at the stage of being able to use information provided from curriculum data management systems: there was no central means to collect and send data; analyses and presentations were not aimed at the classroom teacher or specific curriculum users, or in agreed forms to share with others; curriculum analyses and presentations provided by LEA personnel were not easily accessible; a large amount of time was spent by teachers, support staff and senior managers copying, pasting or recreating data that appeared in other places; the systems in use did not analyse or present information in ways to share or link to practice.

Based on the issues identified, a conceptual framework for IT development was constructed. Illustrated in Figure 1, this shows a sequence of pedagogic processes (that move initially from left to right), each linked implicitly with data management and data handling needs. Evaluation processes, through data review, link back to support subsequent lesson preparation.

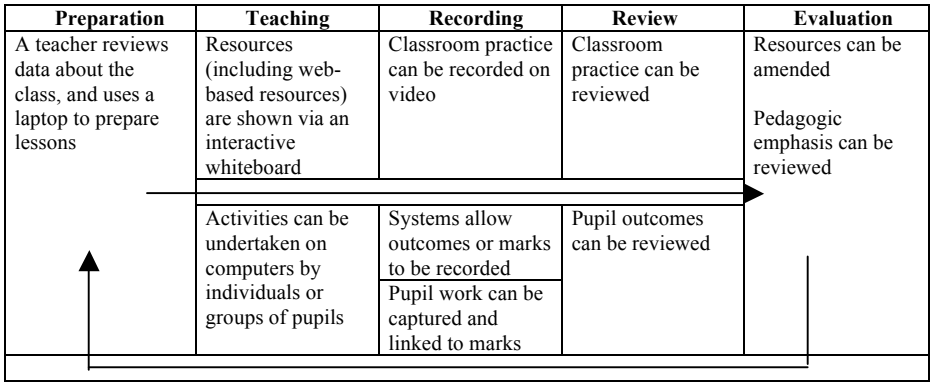

Figure 1: A framework to develop an integrated IT system to support assessment for learning practices

4. WAYS FORWARD: THE INNOVATION

A pilot project to address data handling limitations for this group of schools emerged in this context. An important aim was to produce a system that would enable a sharing across the eight schools, with data being handled in consistent ways to help inform and share practice. The initial method used to trial this idea was a linked spreadsheet system. However, this system did

not address data entry and data flow issues that schools faced. A system now being developed and piloted, called Supporting Teachers in Assessing, Reporting and Tracking (START), addresses these needs far more.

START was, and is being, developed as a data management facility that will act in the form of an umbrella; it is designed to work with existing data management systems and data management elements, to integrate multiple facets of data management that exist in different places. It is designed to be easy to use, aimed at the classroom teacher specifically, but also the form tutor, head of department, and school managers. A key element in the development has been liaison with teachers and head teachers in schools, and key officers in LEAs. The system provides facilities and features suggested by teachers and managers to support their needs. Overall, the concept of START is based on the proposition that IT can help to support integrated systems far more effectively than has previously been possible.

The START resource provides access to a range of Key Stage 3 and 4 analyses and presentations that offer views of class, form, subject and year group data. The facility takes the user through a series of logical steps, so that data uses are considered in a coherent way: looking at background results, of previous Key Stage attainments, to compare results across subjects; choosing estimated likely outcomes, from a range available, including those in PAT, and those from the Fischer Family Trust; setting targets for each pupil in each subject, by selecting appropriate estimated likely outcomes, or by making an informed decision; reviewing a target summary, to see which targets have been set, and whether they are similar across subjects; checking target history, to see the stage of the process reached, and whether targets match estimated likely outcomes; entering teacher subject assessments on an agreed number of occasions across the year; reviewing teacher assessments, including those for behaviour, attendance, effort, and homework; monitoring results, and seeing how attainment is matching a progression towards targets; looking at added value, calculated on the basis of actual results compared to target levels set; looking at analyses that could inform classroom practice, such as analyses of pupil learning approaches arising from the NFER Cognitive Abilities Tests.

START has been reported by teachers and managers involved in the trial as being easy to use (Figure 2 shows an exemplar page). Regular discussions with teachers and managers involved, and an independent review conducted by Becta, have highlighted ease of use. START is web-based and on-line (to offer ease of access), is dynamic (offering up-to-date subject views), allows users to enter data (and to export data into MS Excel systems), provides analyses and presentations (including those recommended by the DfES), works to a background data management calendar, provides alerts and reminders (when data management functions have not been fulfilled), takes the user through a logical sequence of data management events, allows target setting to be done on-line (in a range of ways), enables users to ask questions about the data and information that is seen, when it is seen, and

enables users to be responsive, to suggest ideas to those developing the system.

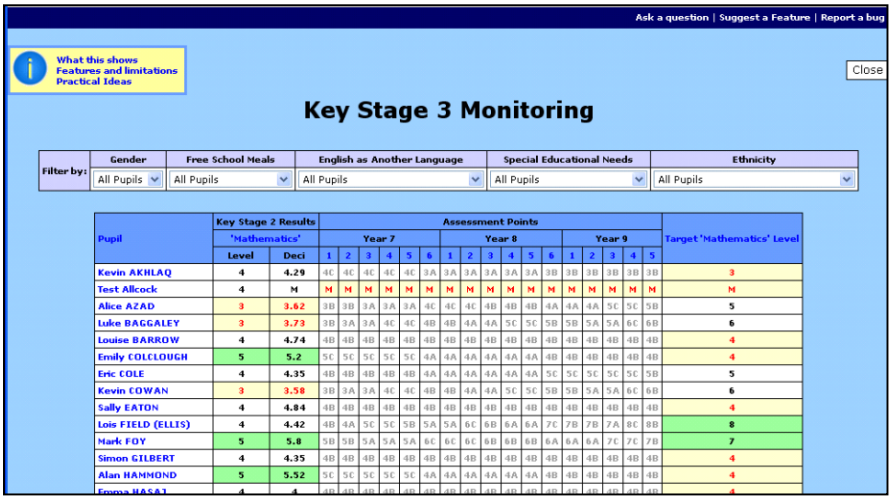

Figure 2: Exemplar page that teachers have reported as supporting their classroom practice

The purpose of the START pilot was largely to explore whether issues identified by teachers and managers could be addressed. Through the work of the pilot it is possible to see that many issues can be addressed. Since the outset of the pilot, there have been other significant developments: in forms of data presentation and analysis offered by some MIS and e-learning resource providers; forms of estimated likely outcomes from the Fischer Family Trust; and learning to learn analyses developed by individual schools. Further issues still remain, and moving forward will only be easily possible if the climate is concerned with data flow and transfer, rather than data creation, analysis or presentation.

5. CONCLUSIONS

What has been achieved by a pilot that has sought to address key concerns with the linkage between data management systems and informing teachers at an assessment for learning level is: the creation of an on-line system that teachers find easy to use; analyses and presentations in formats that non-statistical specialists can understand and use; analyses and presentations that can inform teacher practice in classrooms; the import of data from a range of sources, so that access occurs through a single facility; a system that works to a background calendar, and takes teachers through a logical sequence of data management events; data entry linked to presentation so that views are up-to-date; facilities that allow teachers to ask questions via email about the data, as they see it; and a system where teachers can make further suggestions and recommendations.

What has yet to be achieved, and should be a firm focus in the future for any further pilot or national development work is a need to: address data flow, so that data flows from one system to another, to update as changes take place, to avoid duplication; address forward and backward data flows, so that updates are provided no matter where teachers enter data; provide a central repository, so that data can be reassigned, so that pupil data can be seen by a current school, and reassigned to the pupil's next school; provide the means to case study examples of effective practice of data, and make this accessible via the system itself; create a rapid response mechanism, so that new needs can be incorporated rapidly into the system, so that teachers have access within limited periods of time to new ideas and facilities; and create an archive system, so that data can be reviewed to show progress and shifts effectively.

6. REFERENCES

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