

# **Data, Information and Questions of Pupil Progress**

## *Food for Thought, Challenges for ICT*

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**Abstract:** Developments in management information systems (MIS) have been well suited to the collation, storage and dissemination of summative assessment data and have reached a point where data can now be used for comparative purposes at national, local and individual pupil levels. Trends in assessment in English secondary schools have focused primarily on its use for purposes of monitoring and accountability. Recently, there has been a resurgence in interest in using assessment data formatively to improve teaching and learning: this poses challenges to designers and users of MIS. This paper considers literature in educational assessment, and current trends and rhetoric in assessment practices and purposes, to identify the changing needs of potential users of MIS for learning purposes. The adequacies of MIS in meeting the needs of teachers and pupils in the context of assessment for learning purposes are then considered. From this discussion further challenges for the design and development of MIS for handling useful assessment information are identified.

**Key words:** Assessment, data, learning.

## **1 INTRODUCTION AND BACKGROUND**

Advances in management information systems (MIS) in recent years now mean that many schools are 'data rich'. In particular, there have been significant developments in MISs to support the administration of schools in the context of increasing school management autonomy. A large-scale study of the use of one MIS in English schools showed that the predominantly used MIS had positive effects in some key aspects of school administration (Visscher et al. 2003). But Visscher et al. also reflected on the dominance of MIS usage for 'clerical' activities rather than strategic uses; they argued for

the need to find ways to promote more strategic use of MIS to support policy making (Visscher et al. 2003, p 364). Conceptions of the educational uses of MIS have also begun to embrace their potential use in the classroom, but this is problematic (Newton and Visscher 2003).

The dominance of administrative uses of MIS in English schools is arguably a reflection of developments in information technology and the concomitant raised awareness, in software designers and users, of the potential of these technological advances to fulfil certain administrative functions. But it is also a reflection of contexts in which MISs have evolved where localised management has driven schools to find ways of using ICT to support administration. Therefore developments in MIS software and its use can be viewed as largely needs-led.

In the contemporary context, there is a strong focus on raising educational standards and so it is appropriate to ask what MISs can do to support this endeavour, which, after all, is the core purpose of educational institutions. In the rhetoric of the so-called 'standards debate' it is all too easy to become focused on whole-school data and notions of school performance at the possible expense of recognising that performance data represent the achievements of individual pupils and their teachers. Raising educational standards means raising the attainment of the individual pupils who are the members of classes, cohorts and whole-school pupil populations. For teachers, the contribution that they make to raise educational standards is based upon their work with the individuals and groups of pupils they teach. For this reason a key question in the use of MIS to support teachers' work is whether (and how) the data made available through these systems can be used to support teachers' decisions about teaching and learning, and how MISs might be developed to manage new kinds of useful data. Thus the link between pupil performance data and pedagogy needs to be established by exploring how data can be used *as information* to support the teaching-learning process.

## **2 DATA, DATA EVERYWHERE...**

The approaches to assessment that have been adopted in recent years in English schools have focused primarily on monitoring pupils' attainment in core national curriculum subjects. The outcomes of these assessment practices have provided summative data on pupils' attainment against so-called 'level descriptors' in these subjects. Prior to the inception of the national curriculum in England and Wales, there had been many years' work on projects that had explored and developed the use of assessment information for the purpose of directly supporting learning (Black and

Wiliam, 2003). These developments necessarily placed high value on teachers' knowledge of their pupils' progress and conceptualised aspects of the assessment process as instrumental in fostering pupils' learning. Despite initially embracing the principles of these so-called 'formative' assessment practices and the role of teachers in the assessment process, successive UK governments, in the 1980s and 1990s, allowed these aspects of assessment to fade (Black and Wiliam *ibid.*). So, for a significant period of time, the assessment agenda in England and Wales has been driven by the need to serve the purposes of monitoring and accountability, rather than the use of assessment for learning purposes. However, recently there has been a resurgence of interest in the role of assessment for learning purposes, especially in middle years education during key stage 3 (ages 11 to 14 years). I will return to this issue later in the discussion.

In English schools, the use of data is seen as providing a powerful means of raising pupil achievement and driving forward the agenda to achieve 'World Class' education. For example, it has been suggested that '*regular enquiry and the use of data to inform teaching and learning*' are key features of school leadership to support high levels of achievement (Specialist Schools Trust 2003a, page 5). Moreover, in the English state school system, the use over many years of statutory Standard Attainment Tests or 'SATs' at the end of key stages of education (at ages 7, 11 and 14 years) means that there is an increasing mass of data on pupil performance. Of course, information technology provides a valuable means of storing and interrogating this information, and communicating it more widely. Notably, developments in technology have led at least one influential educational body in England to articulate a vision of "*Teachers using ICT as an aid to manage pupils' learning, every pupil with an individual education plan, accessible to pupils and parents on line.*" (Technology Colleges Trust, 2000 p31). The availability of individual performance data signals its potential to support a more individualised approach to teaching but the nature of any relationships between performance data and the selection and implementation of learning and teaching approaches need to be examined.

Since the late 1980s successive UK governments have supported the establishment of schools designated with specialist status, including 'Technology College status' where there is an expectation of strong emphases on the use of ICT to support teaching and pupil learning. The achievements of specialist schools have proved to be influential in educational policy. The current UK government has signalled its intention to extend the network of specialist schools in England, albeit in a reformed system (DfES 2003) and ICT figures prominently in these plans. One ambition is that ICT will help schools to develop '*more individualised learning and assessment programmes for every child*' (*ibid.* p47). This is further evidence of the contemporary focus on individual pupil progress and

the role of ICT, and ways need to be found to enable teachers to respond to this drive.

In a recent lecture, the UK Secretary of State for Education and Skills described a data management initiative known ‘Pupil Achievement Tracker’ or ‘PAT’ system and its potential to provide individualised and comparative pupil performance data (Specialist Schools Trust, 2003b). This development has become possible since, in England, pupils have been allocated unique reference numbers that allow their progress to be tracked through the education system. It is argued that pupils’ performance on national tests at key stage 2 (taken at age 11 years) are strong predictors of their future performance. Thus developments in the management of assessment data in England mean that data is now available at the international, national, school, group and individual levels. With the PAT system, it is envisaged that teachers will be able to use comparative data to identify under-performing pupils and to better tailor their teaching to the needs of individual pupils. However, the question remains of what precisely is the relationship between data and individualised pupil action planning? To indicate to a pupil that they have achieved level 5 in a key stage 3 test and that their target grade should be level 7 tells the pupil nothing of how to reach the target grade.

### **3 DATA RICH BUT INFORMATION POOR?**

Performance data collected from SATs is just one source of data currently available in English secondary schools. There is by no means universal agreement that the SAT system provides a reliable or valid means of assessing pupil progress. Indeed, in 2003, the devolved government in Wales launched a review of testing and league tables to explore whether they should be abandoned in favour of teacher assessment in key stage 2 (age 11 and key stage 3 (age 14). In its final report (Daugherty, 2004) there is a recommendation that tests at the end of key stage 3 should be phased out over time. Nevertheless, national testing using SATs has remained a cornerstone of successive governments’ monitoring and accountability measures and there are even proposals to extend testing at age fourteen in England.

Improvements in whole school attainment are predicated upon the achievements and improvements of individual pupils, as revealed through the instruments used for assessment purposes. Taken together, there is now a wealth of data available to schools and teachers on their pupils’ current performance and indications of their future potential. There is a genuine sense in which schools can be viewed as data rich. However, data only

becomes *information* when it is interpreted for a particular purpose. It is legitimate to ask the question of whether data of particular kinds is universally suited to a range of interpretations. In the context of assessment, it has been argued that summative data may too coarsely grained or ill-timed to support meaningful interpretations for the purposes of guiding individual pupils' learning (Wiliam and Black, 1996).

### **3.1 On Assessment and Learning**

Improving pupils' performance is about developing their knowledge, understanding and skills in a range of subject disciplines. It is about pupils developing their skills as learners and their understandings about how they think and learn. A key question therefore, is how the wealth of available data can be used as information to support teachers (and pupils) in making progress in these areas. The focus of teacher and pupil action needs to be directed towards using information to enlighten and develop the processes of teaching and learning in meaningful ways. In the argument presented here, it is suggested that this link is not currently well made and there is considerable ambiguity in the relationships between data, information and the needs of teachers and learners.

## **4 KNOWING THAT AND KNOWING HOW**

Contemporary ideas about learning have been heavily influenced by constructivist and social constructivist psychology. These perspectives put pupils at the centre in learning situations; thus in structuring learning activities for pupils, a key step is to determine what the pupils already know and understand about the topic to be learned. In constructivist teaching approaches, it is necessary to make learners' prior ideas (and misconceptions) explicit, so that these can be used as the basis for building new understandings that move the learner on. Teachers use a range of strategies to probe and elicit pupils' understanding. These approaches are essentially used for diagnostic purposes in order to help the teacher understand the starting points of pupils in a group and to design learning experiences that will take account of these and address progress. Assessment can itself be viewed as a cyclic process (Wiliam and Black, 1996) within the constructivist paradigm of elicitation, interpretation and action. Feedback to the learner from the interpretation of data needs to 'close the gap' between what is already known and understood, and the desired knowledge and understanding (Wiliam and Black, 1996 p543).

It is interesting to note that the introduction of the national curriculum in England and Wales in the late nineteen eighties has been described by Black and Wiliam (2003, p625) as beginning the “*decline of the development in formative assessment*” practices; so that by 1995, as Black and Wiliam put it: “*nothing was left of the advances made in the previous decades*” (ibid., p626). Against this background, where assessment for summative purposes has dominated the agenda, it is perhaps paradoxical that ‘assessment for learning’ has become one of the central themes in contemporary English secondary education, in particular during middle years education at Key Stage 3 (age 11-14 years). The supremacy of summative assessment has brought with it an undue focus on ‘ends’ as opposed to the means by which these ends are achieved. It is possible that current interest in how the processes of assessment can link to learning represents a shift in policy.

Assessment for learning (AfL) requires clarity about what is to be learned and the use of carefully framed targets that will enable pupils to move towards achieving the learning goals. However, evidence from the English Office for Standards in Education (Ofsted), quoted by the Specialist Schools Trust, (2003b p15) indicates that less than 40% of schools are ‘good or better at using assessment data to inform teaching and learning practice and school improvement policies’.

Diagnostic assessment is recognised as a feature of good assessment practice (Ofsted 2003a p86). At its best, this assessment information can be used formatively, leading to targets for pupil action. There is a significant body of literature on assessment but of particular importance in the UK and elsewhere, has been the work of Black and Wiliam (1998) on formative assessment. In formative assessment, pupils can be viewed as partners in the assessment process. Its value for learning lies in the understanding that pupils gain through the process of assessment. Pupils learn what they need to do in order to improve their knowledge, understanding and skill. But it is about more than pupils being able to understand just what they need to do; it can also concern how to achieve it. Thus effective formative assessment practices help move pupils forward both in terms of learning content and learning skills.

A related issue in pupils’ learning skills, is that ‘thinking skills’ are intended to be embedded in national curriculum subjects in England and Wales. Space does not permit a detailed discussion of this dimension to pupil learning but in addition to providing explicit opportunities to develop these skills an important feature of the teaching approach (as with other constructivist approaches to learning) is to help pupils to gain metacognitive insights into the processes involved in a range of thinking skills and practice in their application in new contexts.

## **5 ASSESSMENT FOR LEARNING**

As we have seen, assessment *for* learning (AfL) is different from assessment *of* learning in that its focus is closely linked to the processes of classroom learning. At the core of AfL is pupils' understanding of the purposes of the learning, their current understanding in relation to what is to be learned and of how to achieve this new learning (Assessment Reform Group, ARG 1999). In order to develop AfL strategies in classrooms, teachers need to develop a repertoire of approaches in their teaching that serve to contextualise expected learning outcomes and to elicit pupils' current understanding through active approaches that engage them and encourage them to take responsibility for their learning (ARG, 2002). In England there is a range of support material available to teachers to help identify effective teacher behaviours to foster assessment for learning (Qualifications and Curriculum Authority QCA, 2003). Not all these teacher behaviours are obviously or directly supported by management information systems, yet if the potential of ICT to support teachers' work and pupil learning is to be realised, thought needs to be given as to how the capabilities of ICT and the contemporary needs of teachers to handle assessment information can be usefully aligned.

## **6 GOOD PRACTICE IN ASSESSMENT: IMPLICATIONS FOR MIS**

Recent reports from the Ofsted have identified features of good assessment practice from a group of case study schools (Ofsted 2003b). Of particular interest to the present discussion are the following points:

- Emphasis on the use of baseline data to monitor and review individual pupils' progress and to set targets
- A holistic approach to monitoring and support that involves subject and pastoral concerns, and encompasses attitudinal and developmental matters.
- Use of efficient and accessible information systems to reduce the burden on teachers.

It is broadly accepted that there is scope for improvement in assessment practices that support learning. It is clearly the hope of politicians and others in England that the best practices of formative assessment will be more widely implemented in schools and that pupils will benefit as a result. However the present use of MIS for management of data appears to support this goal in only limited ways.

Many English schools currently make use of the assessment management tools of MIS to handle summative assessment data. In addition, the government has developed software tools to support diagnosis and analysis of summative data. For example, the PAT system described above and the 'Online autumn package' which provides data on national curriculum statutory assessment. In addition, the QCA has developed software to enable teachers and school managers to carry out diagnostic analysis of statutory and optional tests.

Current management information systems provide efficient ways of managing data in the form of summative test and grade scores. As summative measures of attainment, these scores represent relatively coarse-grained data. In a narrow sense there is scope for summative assessment information made available through current MISs to be used formatively, for example in providing information about current achievement and in using this to set target minimum grades for pupils to work towards. But coarse-grained information is of limited use in relation to the operational processes that will help pupils to secure the target grade; nor is it particularly helpful to the teacher in the nuanced adjustments required in teaching approach. Moreover, the kind of information that supports assessment for learning reflects something of the social and behavioural aspects of learning as well as knowledge and understanding. In broad terms, information derived for formative assessment purposes needs to focus more on the strategies and actions required of learners for improving their performance. It also needs to relate closely to the context of subject knowledge, understanding and skills to be learned. This kind of information is much more finely grained than summative test scores and may require different conceptions of the features and functionality of an MIS if the power of ICT is to be harnessed to support teachers in the classroom.

## **6.1 Challenges to MIS Designers**

So key challenges for MIS to support learning remain. What are the useful alignments between pedagogy, standards based curricula and assessment? Standards based curricula and assessment can be usefully aligned to provide summative assessment data. However, pedagogy is concerned with the processes of teaching and learning and these are only partly informed by summative information. We need information of other kinds to inform pedagogical processes including data that will embrace pupils' learning skills. Systems are needed that will enable qualitative data to be recorded and managed for developmental purposes. There are questions here about ownership of and access to such data that need to be addressed. It would be valuable for teachers and pupils to make use of a shared repository



of information for the purposes of negotiated personal action planning to support pupils' progress. Such systems are already in use in higher education where students are expected to take significant responsibility for managing their own learning. It could be possible to use similar systems with pupils in ways that support their fuller involvement in the assessment process and this would also support key principles of AfL including helping pupils to develop these skills in self-appraisal (ARG, 2002).

Can the social dimensions of teaching and learning be reconciled with data? At the level of day to day classroom interaction, it is not easy to conceive of how MIS can directly support the teaching-learning dynamic. Nevertheless periodic reviews with pupils where their achievements and approaches to learning are foci of discussion could provide opportunities to embrace further principles of AfL and ICT can provide a means of recording and sharing this information. Performance data are partial reflections of these dimensions but they are viewed through the prism of the assessment instruments that generate test and grade scores. Can such data be used to drive AfL without the risk of 'the backwash effect' of teaching to the test? To achieve this it will be necessary to break the link between formative assessment processes and statutory assessment requirements if MIS are to be used to support use of qualitative data for learning.

So, what other kinds of data would be useful to teachers? Assessment for learning focuses on individuals' achievements as well as attainment. Can useful systems be designed to provide achievement data for individual pupils to reflect their progress towards attainment targets taking account of their different starting points? Can target banks be developed that are closely aligned to curriculum statements that reflect attainment goals? Can learning skills be identified and used as a stimulus for discussion with pupils about next steps towards learning goals? Can target systems be developed that take account of affective as well as cognitive domains? Can systems be designed that enable pupils to take ownership of their progress by recording and managing target setting processes?

In each of these areas it is possible to think of ways in which ICT could be used to achieve these goals. But a key issue rests in the functionality and usability of any software developed for these purposes and whether its usefulness outweighs any overheads in its use and management. By finding answers to these questions, it is possible that MIS may reach a new level of usefulness to teachers in managing pupils' learning and improving their progress.

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