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ABSTRACT

This paper describes aspects of the design and implementation of "Learning How To Learn—in Classrooms, Schools, and Networks," a major development and research project within the Teaching and Learning Research Programme in the United Kingdom. It focuses on how a group of Cambridge academics and researchers, working in partnership with other universities, school districts, and schools, is attempting to meet the legitimate demands of these different communities for different kinds of knowledge. First, the paper describes the overall design of the project; it then looks at one element in more detail: the design and use of a questionnaire for school staff and how the results are used in feedback for development. The paper also summarizes some of the challenges that arise in such efforts. Appendixes discuss factors in terms of component questionnaire items, professional learning practices and beliefs, and school management practices and systems. (Contains 34 references.) (Author/SLD)

A Servant of Two Masters: designing research to advance knowledge and practice[1].

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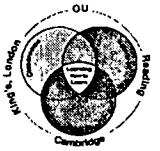
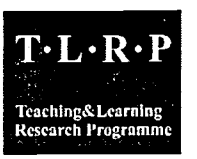
Abstract
This paper describes aspects of the design and implementation of 'Learning How to Learn – in classrooms, schools and networks', a major development and research project within the UK's Teaching and Learning Research Programme. It focuses particularly on how a group of Cambridge academics and researchers, working in partnership with other universities, school districts and schools, is attempting to meet the legitimate demands of these different communities for different kinds of knowledge. First we describe the overall design of the project, then we look at one element of it in more detail: the design and use of a questionnaire for school staff and how the results are used in feedback for development. Finally, we summarise some of the challenges that arise.

[1] This paper is based on the work of 'Learning How to Learn - in classrooms, schools and networks'. This is a four year development and research project funded from January 2001 to March 2005 by the UK Economic and Social Research Council (ref: L139 25 1020) as part of Phase II of the Teaching and Learning Research Programme (see http://www.tlrp.org). The Project is directed by Mary James (University of Cambridge) and co-directed by Robert McCormick (Open University). Other members of the team are: Carmel Burgess, Patrick Carmichael, David Frost, John MacBeath, David Pedder and Sue Swaffield (University of Cambridge), Paul Black, Bethan Marshall and Joanna Swann (King's College London), Leslie Honour and Richard Procter (University of Reading) and Alison Fox (Open University). Past members of the team are Geoff Southworth, University of Reading (until March 2002), Colin Conner, University of Cambridge (until April 2003) and Dylan Wiliam, King's College London (until August 2003). Further details are available at: http://www.learntolearn.ac.uk .





Introduction

Although Cambridge is perceived as one of the most academic universities in the UK, the Faculty of Education has a proud tradition of working practically with teachers, schools and school districts to promote better learning for students and teachers. In part this derived from the incorporation into the University of the former Institute of Education which was originally set up by the national Government to support in-service education of teachers in the East Anglian region of England. Over time those academics working within this tradition came not only to ground their work on evidence from research but also to contribute significantly to the knowledge base (see, for example, McCormick and James, 1983: Bradley, Conner and Southworth, 1994; James, 1998; Frost et al., 2000; MacBeath and Mortimore, 2001). With incorporation into an elite university and the pressures from successive rounds of a 'high stakes' national research assessment exercise, academics have sometimes experienced a tension between the desire to do research which has high relevance to practitioners and policy-makers and the aspiration to do research which is high quality in scientific terms as judged through peer review.

Working in Pasteur's Quadrant (Stokes, 1997), although a laudable aim, is not easily achievable away from the laboratory in the messy world of schools, although it is undoubtedly something worth striving for. Thus, the "Learning How to Learn – in classrooms, schools and networks" (L2L) Project is an attempt to design a collaborative development and research initiative with the twin goals of achieving high relevance and high scientific quality[2]. In essence this was an expectation placed upon the project through participation in the UK Economic and Social Research Council's Teaching and Learning Research Programme (TLRP) – the largest programme of research in education that has ever been funded in the UK. When Phase III of TLRP is launched in June 2003, more than 30 major projects will be supported under the Programme[3]. Each is expected to:

- work to achieve significant improvements in learning outcomes for identified groups of learners;
- work in authentic settings of teaching and learning;
- bring multi-disciplinary or interdisciplinary approaches to research, and, where appropriate, involve practitioners, learners and other potential beneficiaries in the research process;
- enhance the capacity for a research-based approach to education and training practices;
- work in partnership with practitioners, learners, policy makers and others in the research community, to achieve maximum impact through transformation of the research results into actionable strategies and practices;
- make research-based contributions to the fundamental understanding of teaching and learning.

For L2L this means that the project team is required to work with, and respond to, equally, the concerns of the communities of scholars and the communities of education policy and practice – to serve at least two masters.

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[2] 'Scientific' is understood here in a broad sense, not narrowly restricted to experiments, but nevertheless striving to meet the kind of criteria set out by the US National Research Council Committee (NRC, 2002).
[3] See http://tlrp.org

The development and research design

The origins of an idea

L2L is a four year project (Jan 2001-March 2005) involving four universities (Cambridge University, King's College London, the Open University, and Reading University) working in partnership with 43 elementary and high schools in seven school districts (Essex, Hertfordshire, Kent, Medway, Oxfordshire, Redbridge and Somerset). The idea for the project came from two sources, both intending to build on previous work of the researchers in the different institutions.

The first source was work on assessment for learning. James (Cambridge) was convenor of the UK's Assessment Reform Group (ARG)[4] at the time when it commissioned from Black and Wiliam (King's London) a review of research of the impact of assessment on classroom learning, in order to up date aspects of an earlier review by Crooks (1988). This new review (Black and Wiliam, 1998a), which paid particular attention to fairly carefully controlled, small scale, focused experiments, reported that there was conclusive evidence that formative assessment (now more familiarly referred to in the UK as 'assessment for learning') improves learning and attainment. Indeed, the gains in attainment appeared to be quite considerable and, with effect sizes from 0.4 to 0.7, amongst the largest ever reported for educational interventions. The dissemination of this review through publication in a user-friendly pamphlet (Black and Wiliam, 1998b), talks given to teachers by researchers, and follow-up publications from the Assessment Reform Group (ARG, 1999, 2002), contributed to an unusual level of take up of ideas by practitioners and policy groups. For example, the Government's recommended strategy for teachers of 11 - 14 year old students (ref: DfES 0350/2002) includes a module on 'assessment for learning in everyday lessons' that derives from this work. The Qualifications and Curriculum Authority has also dedicated a section of its website to this theme[5] .

Black and Wiliam subsequently undertook a development project involving 24 math and science teachers in six high schools in two school districts. This concentrated on promoting new practices in four aspects of effective assessment for learning: developing classroom dialogue, especially questioning; using narrative comments, rather than scores, in feedback on students' work; peer- and self-assessment; and, the formative use of summative tests. The results of this work indicate that teachers' and students' expectations, and classroom culture, can be changed and that these changes are associated with gains in attainment (in this case the average effect size was around 0.3). The researchers claim that, 'Such improvements, produced across a school, would raise a school in the lower quartile of the national performance tables to well above average' (Black, et al., 2002:4). Here's the rub! How does one spread knowledge and promote changes in practice across teachers and schools? Moreover, how can one achieve 'leverage' using minimum resource for maximum impact? These questions engage with a second field of educational research, associated with school improvement and, more generally, with educational change.

[4] See http://assessment-reform-group.org.uk
[5] See http://www.qca.org.uk/ca/5-14/afl/

As mentioned earlier, colleagues at Cambridge University have worked in the field of teacher professional development and school improvement for many years, both as educators and researchers. Much has been learned about ways to create the conditions for school improvement and there has been a discernible shift from an earlier emphasis on school structures and staff roles and responsibilities, which are at one remove from the primary processes of schooling, towards a more explicit focus on conditions and processes that support effective teaching and learning. For example, MacBeath and Mortimore (2001:21) argue that critical for school effectiveness and school improvement is a better understanding of the when and the how of learning. This may seem to be stating the obvious but it is remarkable how infrequently school improvement researchers have engaged with issues of pedagogy (and vice versa). These two fields of classroom-level research and school-level research are vast in themselves and bringing them into alignment may seem too difficult. However, unless some attempt is made to understand what effective learning looks like, what teaching practices promote this, and what kinds of professional development and institutional conditions and cultures help teachers to learn new practices, we have little chance of spreading and sustaining the kinds of improvements observed in the studies reviewed by Black and Wiliam.

The L2L Project was therefore set up to respond to this challenge: to take forward the classroom work begun by Black and Wiliam and link it with the school improvement work of Cambridge colleagues. Moreover, in anticipation of schools becoming only one site for learning in the electronic age, as the creation of dispersed but networked learning communities increases, the research interests of other colleagues from Reading University and the Open University, who are especially interested in electronic media for networking, were drawn in. This enabled a three level project to be designed which would seek to investigate what learning how to learn might mean for teachers and students in classrooms, in relation to organisational learning, and for learning across networks of teachers and schools. Specifically, the project aims to advance both understanding and practice of learning how to learn in classrooms (level 1), schools (level 2) and networks (level 3) and to:

1. develop and extend recent work on 'assessment for learning' into a model of learning how to learn for both teachers and pupils;
2. investigate what teachers can do to help pupils to learn how to learn;
3. investigate what characterises the school in which teachers successfully create and manage the knowledge and skills of learning how to learn;
4. investigate how educational networks, including electronic networks, can support the creation, management and transfer of the knowledge and skills of learning how to learn;
5. attempt to develop a generic model of innovation in teaching and learning that integrates work in classrooms, schools and networks.

Design assumptions and principles

The project design was based on a number of theoretical, methodological or practical assumptions:

- The concepts and practices underpinning 'assessment for learning' cohere theoretically with concepts and practices associated with 'learning how to learn'; thus work to

promote AfL is expected to enhance L2L although this hypothesis needs to be tested and the relationships properly examined.

- The development of new AfL/L2L practices need to be stimulated through some form of intervention because previous research indicates that they are not widespread in teachers' current practice.
- Intensive intervention by university people cannot be sustained in the long term and across whole systems therefore the intervention needs to be designed in accordance with a principle of parsimony.
- Adaptation of the intervention is likely, and to be encouraged[6], because the project has an interest in discovering and recording how teachers create new knowledge as they try out, and adapt, practices in their particular contexts i.e. in their schools, with their pupils, teaching an aspect of their subject.
- Development and research have an iterative relationship because the research design needs to be sensitive to these adaptations in context in order to capture them.
- In order to test portability of ideas and practices, implementation needs to be encouraged in a sufficient range of school contexts – urban/rural, large/small, mono-ethnic/multi-ethnic, elementary/high schools, and across different subject domains.
- Supporting development work in a large sample of schools (n.43), even on a parsimonious scale (with an allocation of two days of an academic's time per school per year) requires a large team, especially when this is added to research tasks.
- A large project team provides an opportunity for the creation of a multidisciplinary group who learn from one another and deepen their research capacity even if none can claim to be a "compleat researcher" (Gorard, 2002). This acknowledges that in any community, knowledge is distributed in ways that are functional to its survival.
- Implementation of project ideas over time needs to be monitored and described, requiring thick descriptions of practice in classrooms, of aspects of school policy, and of wider contextual influences that impact on classroom practice.
- Qualitative data need to be combined with quantitative data so that comparisons across schools and over time, in relation to important features, can be facilitated.
- Data need to be collected about defined outcomes, processes and contexts and the relationships among these explored.
- Explanation needs to address the issue of causality although association should not be taken to imply a causal relationship, nor the direction of causality.
- The activity of academics and researchers, and the differences among them in their approach, need to be taken into account through reflexivity.
- A theorised audit trail approach offers the best strategy for generating plausible explanations, linking processes to outcomes, in the complex setting of this project.
- Plausible rival explanations should also be deliberately sought to strengthen the scientific merit of project findings.

[6] We wanted, of course, to avoid 'lethal mutations' (Brown, 1992). Our characterisation of the support from academics as 'critical friendship' to schools provided a means of moderating teachers adaptations by reference to principles derived from previous research. For example, teachers who wanted to interpret 'sharing criteria of quality with students' as encouragement to distribute model answers for reproduction in examinations, could be challenged to consider the importance of a learning orientation, rather than a performance orientation, if students are to learn how to learn.

- In a climate of increasing work intensification, participating schools and teachers need to be convinced that there are benefits to be gained from their collaboration in the project. These do not need to be in the form of assurances that test scores will rise but they do need to be convinced that their professional needs are recognised and supported, and that the work will be useful to them.

In sum, certain principles for research design can be extracted from the assumptions outlined above: *collaboration, intervention, parsimony, utility, relevance, adaptability, iteration, portability, scalability, sustainability, generalisability, plausibility, theoretical coherence, multidisciplinarity, reflexivity.*

A design experiment?

We began work on the proposal for this project on 18th November 1999[7] We were bidding to be part of the Teaching and Learning Research Programme, which was set up specifically to respond to public concerns about educational research quality, so we were cognisant of the debates surrounding research design, including those in the US. However, we never explicitly described our proposal as an attempt to create a 'design experiment'. Indeed the Design-Based Research Collective in the US was only forming at the same time (Kelly, 2003) although the work of Ann Brown(1992) was known on our side of the Atlantic. Now that the design experiment, as an approach to educational research in complex settings, has been more fully explored (see the special issue of *Educational Researcher,* 32(1) January/February 2003), the resonance between these ideas and our own attempts to construct at project, which will be both scientifically rigorous and practically useful, are remarkable. We would claim that it has all the characteristics of design experiments[8] described by Cobb, Confrey, diSessa, Lehrer and Schauble (2003). It is *iterative, process-focussed, interventionist, collaborative, multileveled, utility oriented and theory drive.* Our additional principles suggest that other characteristics may need to be considered also.

We are puzzled however that some of the current debate implies that design experiments 'rely on narrative accounts as data for modifying theory' (Shavelson, Phillips, Towne and Feuer, 2003). Our experience suggests that through combining qualitative and quantitative approaches (though not necessarily taking the prototype back to the laboratory, as these writers suggest), it is possible to integrate narratives of the evolving design process with more traditional studies comparing outcomes, with some controls, to warrant a causal claim. Of course, we are still a long way from completing our project so whether we will be successful in this remains to be seen. (A further paper on this specific issue will be given at another symposium in this conference[9].)

Project Plan

In so far as all projects within the TLRP have a principal aim to research ways of enhancing outcomes for learners[10] , we needed to decide what outcomes are of interest and how we might

[7] It was more than a year later that we were informed that we had succeeded in the ESRC competition and could start work.

[8] 'Design studies' according to those who object to this appropriation of the term from natural science.

[9] 'Deepening capacity through innovative research design: researching learning how to learn in classrooms, schools and networks' by Mary James, Paul Black and Robert McCormick, in the BERA Symposium, 'The UK's Teaching and Learning Research Programme: responding to challenges for educational research' 24th April 2003.

[10] In our project, learners are construed as both students and teachers, and even schools as organisations.

measure them. We accepted that one measure would need to be students' scholastic attainment as currently measured in schools through nationally prescribed key stage tests and examinations (at age 7, 11, 14 and 16). Participation and engagement as indicated by school attendance records are also relevant. However, our interest in learning how to learn as an outcome, as well as a process, led us to develop a dynamic assessment instrument. Although the nature of this instrument prevents us from using it on a wide sample in the current study, we will examine the relationship between some students' performance on this measure and the standard measures of attainment that most children in England now undergo. We make the assumption that these outcomes are, at least in part, the result of classroom interactions with teachers, peers and other tools and artefacts, and that these classroom interactions and practices are influenced by teachers' and students' beliefs about learning. In the same way, we hypothesise that teachers' and students' individual and collective beliefs and practices are themselves outcomes and, at least in part, the result of their experience of professional development, school culture, management practices and networking opportunities both within and across schools. Through this process of backward-mapping we have constructed a 'causal model' with process and outcome links that we intend to investigate (see Figure1).

Figure 2 provides more detail of the data we are collecting and the specific role these elements of data are expected to have in illuminating the impact of interventions on practice and outcomes. Thus we make a distinction between those data that are measures of antecedents and outcomes, and those that are principally indicators of mediating or contextual variables. In general, the former, derived from survey or test instruments, will render longitudinal (pre- and post-development) quantitative information both within and across schools. The latter, drawing on mainly narrative sources, will provide data that will be used to investigate the nature of links indicated by correlations. We intend to place most emphasis on comparisons between cases (e.g. different schools with different rates and patterns of development) but it may be possible to make some use of control schools, which have no contact with the project, by drawing a matched sample from a large national data-set available to Cambridge researchers. Case comparisons will be important because the 'intervention' is not tightly controlled. This has been quite deliberate because we are particularly interested in how schools and teachers take up, adapt and implement project ideas and what conditions promote effective practice and enhanced outcomes.

In Figure 2, we also distinguish between the locus and the focus of the intervention of the project team. Our primary intervention was in the form of an initial in-service session for a school or group of schools, followed by audit of practice and action-planning. The focus of this session was presentation and discussion of research and ideas for encouraging learning how to learn through assessment for learning[11]. What happened next depended to an extent on schools' own analysis of their needs although follow-up workshop activities, on: questioning, feedback, sharing criteria of quality, and peer- and self-assessment, were made available. These all focus on classroom practice.

Feedback of the results of the staff questionnaire is the key intervention focusing on school policy and practice. This questionnaire has a dual purpose (see below for more detail). On the one hand it is designed to provide the research team with data of staff perceptions and values in

[11] Development materials and other project resources are publicly available on our project website: http://learntolearn.ac.uk

relation to school assessment practice, professional learning, and management systems and practices. On the other hand, results can be used as diagnostic tools for schools in self-evaluation. Further materials for follow up activities are made available to schools to help them respond to the issues for school-level policy and practice that this instrument reveals.

One of the principles underpinning the project strategy is that research instruments should be useful to teachers and schools as well as useful to researchers. Thus there is an intention that all instrumentation should be in a form that can be 'left behind' for teachers to use, alongside more familiar forms of in-service resources. In order to manage this, the role of the project website has developed in the expectation that it will become an expanding resource of materials, instruments and examples of practice that teachers can use and exchange. For this reason, the website is itself a kind of intervention, which principally operates at network level, having a role in knowledge creation and exchange between teachers and schools.

Some of the parts of this plan were described in the project proposal but much of the detail has become clear only as the project has evolved in the iteration between development and research, and in the attempt to balance what might be methodologically desirable with what is practically feasible and manageable. We see this as appropriate, if not inevitable. As we arrive at the half-way mark in our time-scale we are reasonably confident that we have all the components for development and data collection in place, so we can turn more of our attention to analysis and theory development. Of course, our instrumentation was developed on the basis of existing theory, and the 'substantive' theory implicit in our causal model, which we intend to test and modify. But we also hope to build some new theory and to examine how our findings might illuminate, or be illuminated by ,'formal' theories such as activity theory (Engeström, 1987), distributed cognitions theory (Salomon, 1993), or communities of practice theories (Wenger, 1998). The final right-hand column of our plan (Figure 2) records some of the theoretical resources we expect to bring to this task. Given the fact that the team is made up of academics and researchers with different backgrounds we decided not to locate this study in a single narrow theoretical framework but to create a project which would enable us to test a number of analytical perspectives. We believe that the phenomena we are interested in can be viewed through a number of lenses that each can enrich and deepen our vision.

In the remainder of this paper, we turn from the general design of our project to one particular aspect of it, in order to illustrate more clearly how one of our instruments has been developed and used to meet some of our scientific goals as well as to make a contribution to enhanced educational practice.

The design and uses of the staff questionnaire

The staff questionnaire is an example of a tool with both research and development functions. In this section, the development, design, preliminary findings and uses of the staff questionnaire are outlined as a way of exemplifying some of the issues involved when the service of both research and development are equally paramount within the design and applications of a single instrument.

Instrument development and underlying assumptions

At the school level we are interested in developing understandings of the organisational conditions of schools that promote changes in teachers' and students' learning how to learn beliefs and practices. An important assumption that we make is that schools themselves need to develop the processes and practices of organisations that are learning how to learn if they are authentically to embody the conditions that, according to our theory, promote changes in teachers' and students' behaviours. To obtain comprehensive measures of such conditions, we need to go beyond questions of conditions that operate at the purely organisational level, such as school policies and the formulation of school improvement plans, and to incorporate a focus on teachers' professional learning practices and their adoption of classroom practices that we theorise to promote learning how to learn knowledge, dispositions and practices among students. Reflecting an emphasis on learning how to learn processes at all levels of the school organisation, the staff questionnaire has been designed to provide antecedent, outcome and change measures of school climate and culture in relation to teachers' classroom assessment practices (section A), teachers' professional learning practices and beliefs (section B) and school management practices and systems (section C).

Section A of the questionnaire consists of thirty statements relating to teachers' classroom assessment practices. These statements reflect assumptions we make about the coherence between the concepts and practices of assessment for learning and learning how to learn. The statements in section A are based on a set of principles of practice developed by the Assessment Reform Group (2002) which build on the Black and Wiliam review (1998a). These principles can be summarised as a model of assessment practice in service to students' needs and in recognition of the importance of their critical participation in the processes of their own learning, and in the planning of the next steps in their learning. Thus assessment for learning is seen as an integral part of effective planning of teaching and learning and of routine classroom practice. Promoting understanding among students of learning objectives and criteria of assessment are viewed as important modes of critical learning engagement. Teachers arrange for the involvement of students in the processes of assessment. Students are encouraged to reflect on their own learning processes, their strengths and their weaknesses and to recognise the importance of both effort and error in making progress.

Section B consists of 28 statements relating to teachers' professional learning practices and beliefs. Statements in this section recognise the reciprocal importance between school development and the professional learning of teachers (Bradley, Conner and Southworth, 1994; Hargreaves, 1994) and draw on a range of principles, which according to our theory, characterise teachers who themselves are learning how to learn. Informed by notions of reflective practice (e.g. Schön, 1987, Pollard and Tann, 1993), teachers who are learning how to learn sustain an engagement with innovation and are disposed to reflect critically on their practice. We understand such reflective practices as incorporating both social and individual learning processes (e.g. Salomon, 1993). Teachers engage collaboratively with a wide range of sources and evidence, for example from peer observations, joint planning, experimentation and team teaching with colleagues, from consultations with students, and from research reports and web-based resources. They reflect on and modify their classroom practice in ways that relate to such

different kinds of available evidence. These kinds of collaborative learning processes are fostered in a culture of support and trust in which teachers' inter-personal capacity (Mitchell and Sackney, 2000), to deepen the bonds of learning with colleagues, are further enhanced. Teachers who are learning how to learn are not only models of learning how to learn for their students, but are also committed to and confident in the development by their students of learning how to learn knowledge, skills and practices.

Section C consists of 26 statements relating to school management systems and practices. Statements in this section reflect a range of frameworks as follows: (i) conditions for school improvement, developed as part of the 'Improving the Quality of Education for All' project (Ainscow, Hopkins, Southworth and West, 1998), (ii) principles of organisational learning how to learn that emphasise the importance of double loop learning (Argyris and Schön, 1978), school self-evaluation (MacBeath, 1999), and the importance to organisational growth of increases in personal, interpersonal and organisational capacities (Mitchell and Sackney, 2000) and (iii) the central role of knowledge creation and management in schools to the successful promotion of innovation and change (Hargreaves, 1999).

The importance of inclusive and self-critical processes of decision-making is recognised in a widening of participation in decision-making processes through open communication combined with the fostering among teachers of critically reflexive skills to question the underlying values of established modes of school decision-making. Instrumental research and inquiry skills are also important facets of the school as a learning how to learn organisation. Thus acquisition by schools of skills and methods of systematic research and inquiry as a means of generating relevant data to inform organisational level decision-making is a key dimension of a school's reflexivity. In taking seriously the expertise of their staff, schools that learn how to learn use professional knowledge audits about specific aspects of expertise as a way of mapping what staff know about teaching and learning. This acknowledges to staff the value of their learning and knowledge to school planning and development. A final assumption about schools as learning how to learn organisations refers to their recognition of the importance to their learning of intra- and inter-school networking as a process of promoting knowledge creation within and across schools. Schools optimise knowledge transfer within the school and seek to gain access to knowledge from and exchange knowledge with other schools through developing the skills and readiness to learn through networking and to promote networking as a mode of learning among staff.

Design

The staff questionnaire has a double scale structure throughout the three main sections. In this way it has been shaped by assumptions similar to those that informed the design of the 'teacher questionnaire' used in the Improving School Effectiveness project - ISEP - (MacBeath and Mortimore, 2001). The use of two likert-type scales throughout the questionnaire is a useful means of eliciting staff perceptions of *current practices* (scale X) at their school, on the one hand, and their *values* (scale Y) regarding the importance of different practices and beliefs for creating opportunities for students to learn, on the other. 'Where the school is now' (*current practice*) and 'Where staff would like the school to be' (*their values*) are questions that form the basis for indicating gaps between current practice and values at the school as they relate to teachers' classroom practices, their professional learning, and management systems and

practices. Feeding back questionnaire data to individual schools so that they can identify a range of patterns, including gaps between the values and practices of staff, represents an important school level developmental intervention. This intervention is mediated by the critical friend allocated to each of the participating schools (see below).

In thinking through the design and uses of the questionnaire we were influenced by the work in ISEP of Robertson, Sammons, Thomas and Mortimore (2001:44). The use of the dual scale structure and the strategy of feeding back data to schools individually reflects principles of organisational learning and development based on models of self-evaluation (MacBeath, 1999) where the emphasis rests on the needs of individual schools, continuous review and self correction (Dalin and Rust, 1996), systematic self-assessment strategies and instruments, and the use of external consultants or critical friends.

Analysis

Discussion of the staff questionnaire here is based on the responses of a sub-sample consisting of 779 members of staff from 20 schools (11 primary and 9 secondary). These data were collected between September and November 2002 after trialling the instrument with 370 staff at 9 schools between March and June 2002.

For preliminary analytical and data feedback purposes three broad distinctions were made between staff at different levels of the school organisation as follows: (i) learning support staff, (ii) teachers with little or no managerial responsibilities, and (iii) middle and senior management staff. Our first analytic task was to disentangle the complexity of the data generated by responses to 176 questionnaire items. Clusters of variables were developed from a combination of statistically generated factors based on responses to staff's perceptions of current practices (scale X on the questionnaire) and theoretical groupings based on the conceptualisation that informed the development of the questionnaire. Factor analyses were carried out for each section of the questionnaire separately for managers on the one hand and teachers and learning support staff [12] on the other. High correspondence was found for the factor structures of both groups of staff[13]. The reliability analysis showed a generally high level of reliability based on Cronbach's alpha for the factors identified for all three sections. Reliability coefficients for the three factors in section A were.8634, .4736 & .5313; for the four factors in section B were .8614, .7401, .6746, & .6200; for the four factors in section C were .8998, .8847, .8238 & .7520. Full discussion of this analysis will appear in a separate paper. We found high correspondence between the factor structure derived from our statistical analyses and the groupings developed from our theoretical frameworks in all three sections. Following an iterative process of comparing results from the factor analysis with our theoretical assumptions we arrived at a set of groupings of variables as follows. The list of factors derived from the statistical analysis combined with our theoretical formulations are listed below. Descriptions of each factor in terms of their component questionnaire items appear in Appendix 1.

[12] The decision to combine teachers' and learning support staff's responses was due to an inadequate sub-sample of learning support staff at the time of the analysis.

[13] The statistical factors that we identified were based on staff responses to questionnaire items on the X scale (*current practice*).

Classroom assessment practices (section A)
Factor 1: Making learning explicit
Factor 2: Promoting learning autonomy
Factor 3: Teacher-centred, performance orientation

Teachers' professional learning practices and beliefs (section B)
Factor 1a: Inquiry: using different sources of knowledge
Factor 1b: Inquiry: reflection and change
Factor 2: Collective learning
Factor 3: Mutual support and reassurance
Factor 4: Valuing learning

School management systems and practices (section C)
Factor 1: Deciding and acting together
Factor 2: Developing a sense of where we are going
Factor 3: Inquiry
Factor 4: Supporting professional development

Uses of the questionnaire data
The primary research purposes of the data analysis is to describe trends in the data across staff at different levels of the school organisation and across different schools in the sample[14]. The factor structure that we have developed forms the basis for the main part of this analysis. And yet there are clear dilemmas in using such survey instruments. Like the ISEP team before us (Robertson, Sammons, Thomas and Mortimore, 2001:44), we recognise the tension in designing a research instrument capable of being used reliably across a range of schools but also amenable to the provision of feedback which is relevant to the context and needs of each of the schools in our sample.

The development task is to arrive at a number of different descriptive representations of the data that cater to the different questions and preferences that schools might have. Thus we prepared data reports for each school that compared responses of managers, teachers and LSAs. Data from the rest of the sub sample were included to provide an optional basis of comparison (see Appendix 2 for a small selection of examples). Raw data tables and bar charts present questionnaire item responses separately under each of the three sections of the questionnaire and listed under the headings of the factors identified for each section. From these tables, schools can then read the distribution of responses for any item for managers, teachers or learning support staff, compare mean responses and compare differences between the mean practice-value responses. Rank order tables were also developed to enable schools to identify which practices have the highest and lowest practice-value gap. Grouped data in the form of standardised scores for each factor were used to show distributions of scores for the three broad categories of staff in the form of histograms and reverse cumulative percentage charts.

[14] We plan a second administration of this questionnaire at the end of the project to analyse change over time, both for the sample as a whole and for each school.

The feedback of data in these forms provide school management teams with a range of different perspectives for 'seeing' their own individualised data sets. How they respond to the data carries important implications for both research and development dimensions of our study. Understood as a strategy for change, the data can feed into a school's improvement planning, policy and staff development. Where the data are understood as an opportunity for a school to learn more about itself, opportunities arise for researching how schools make use of such data. MacBeath (2001:3-4) identifies three levels of school response to questionnaire data that reflect authentic, double loop self-critical learning that we assume to underpin organisational learning how to learn:

> At the technical level a school might ask of itself – What did we learn about design, data, data gathering, validity, the nature of 'data', the context in which it is gathered, and about alternative ways in which we may gather data in the future? At the cultural level a school may ask – What did we learn about my/our responses? What are our defences? How habitual, and habit-forming are these? How deeply are these embedded in the way we do things round here? [At the structural level we may ask] – What have we learned about the structures within which we gather and use data? What is there about those structures that facilitate and inhibit the gathering and use of data in a way that enhances our capacity to learn?

To the extent that we are able to research how schools make sense of and use the data that we develop, the developmental application of the staff questionnaire data can be recognised as a powerful opportunity to study the processes by which schools step out of the single learning loop and enter the less certain and riskier double loop of learning how to learn.

Feedback of data to schools by 'critical friends'

Feeding back the data from the staff questionnaire is undertaken by the school's 'critical friend': one of the university academics attached to the school. Before taking the data back to the schools, the critical friends themselves needed to be familiar with them and confident in handling and explaining them. Team members shared their experiences and insights of feeding back data in similar contexts. On this basis we developed a guide to reading the data that could both be used by critical friends and left behind in the school. However, the guide was regarded as a 'prop' and not a prescription. Critical friends were encouraged to adapt it if they wished and to take school colleagues through the data in which ever way seemed most appropriate.

Although critical friends are only able to allocate two days of direct contact to each school per year, most had some contact with the schools in the initial stages of the project, usually through leading professional development sessions. So, when the time came to feed back the questionnaire data a relationship had begun to be established between the critical friend and senior school colleagues. Critical friends were beginning to know the school, and, hopefully, school colleagues had developed a degree of trust in their critical friend. Trust, understanding and providing data are elements of Costa and Kallick's (1993) description of a critical friend.

The design of the staff questionnaire was such that it revealed school managers', teachers' and learning support assistants' views about assessment practices, teachers' professional learning,

and perhaps most sensitively, school management practices and systems. For this reason critical friends fed back the data to a small group of senior staff first, generally the school principal and school project co-ordinator, before it was decided how to share the data more widely.

To help school colleagues understand and come to terms with the data, critical friends typically started by making reference to the format of the staff questionnaire, with its three sections and X and Y scales. In the current UK scene where schools now receive large quantities of performance data from both national and local government, staff are becoming more and more sophisticated in their understanding and use of quantitative data. However, depth of understanding still varies between individuals and schools. Critical friends therefore needed to gauge staff familiarity with data presented in different forms, and adapt their presentations accordingly. They also had to be prepared for a variety of possible reactions to the data, including denial of the validity of the data and demands to know how individual members of staff had completed the questionnaire. In practice these reactions were rare but critical friends needed to be prepared for them and to respond appropriately.

Once school colleagues were comfortable with the presentation of the results of the staff questionnaire, they then began to explore the messages contained in the analysis. For example, the critical friend may have pointed out instances of large discrepancies between the responses of different groups' and initiated a discussion about the possible meanings of those discrepancies. Often, however, schools were keen to take the data away, examine them themselves, and take the necessary time to identify and reflect on the issues raised. The nature of the intervention by the critical friend then changed, from explaining the origin and format of data, to asking provocative questions (another element in Costa and Kallick's description of a critical friend) about the data the school has chosen to focus upon, about the way they interpreted them, and about their proposed course of action.

The L2L team also developed a pack of materials, or a 'toolbox' of instruments and activities, to support further inquiry into the issues emerging from the analysis. Some tools relate directly to the questionnaire, for example providing a structure for reflecting upon the data, whilst others support development in an aspect of school practice that may have been identified through the questionnaire (see the 'focus of intervention' column in Figure 2). The critical friend may have suggested particular tools to use or adapt, thus initiating another form of intervention at school level.

All these choices and actions are logged, either by the critical friend or by the school co-ordinator, or by both, on a restricted access part of the project website, thus providing narrative data for the interpretation of change in beliefs, practices and outcomes over time. Thus, as the research feeds into development, so evidence of development feeds back into the research in an iterative cycle.

Challenges

We continue to be excited by this opportunity to be involved in a ground-breaking Project within a unique research Programme. Although the challenges are very great, and not a little daunting,

we believe that we should be prepared to take risks and try to work with colleagues to pioneer new designs for educational research that will be both practice-enhancing and scientifically credible. There are, of course, a number of threats to the achievement of these goals. Some derive from resource constraints, others from issues surrounding the management of large project teams, with inevitable personnel changes during a four year timescale, others from the political climate which has, at times, been hostile to educational research, or doubtful of its capacity to produce trustworthy and useful findings.

Another challenge derives from the shifting contexts in which we work. We cannot hold the educational world still while we examine it, so we have to create designs that take shifting contexts into account. This is very challenging, especially when different groups of users make demands for different kinds of knowledge. We agree with David Berliner (2002) that educational research is the 'hardest science of all'. We know that there are areas in which we will fail but we are also certain that we will learn a great deal from this project and have something valuable to contribute both to 'science' and to practice.

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FIGURE 1: L2L 'CAUSAL' MODEL

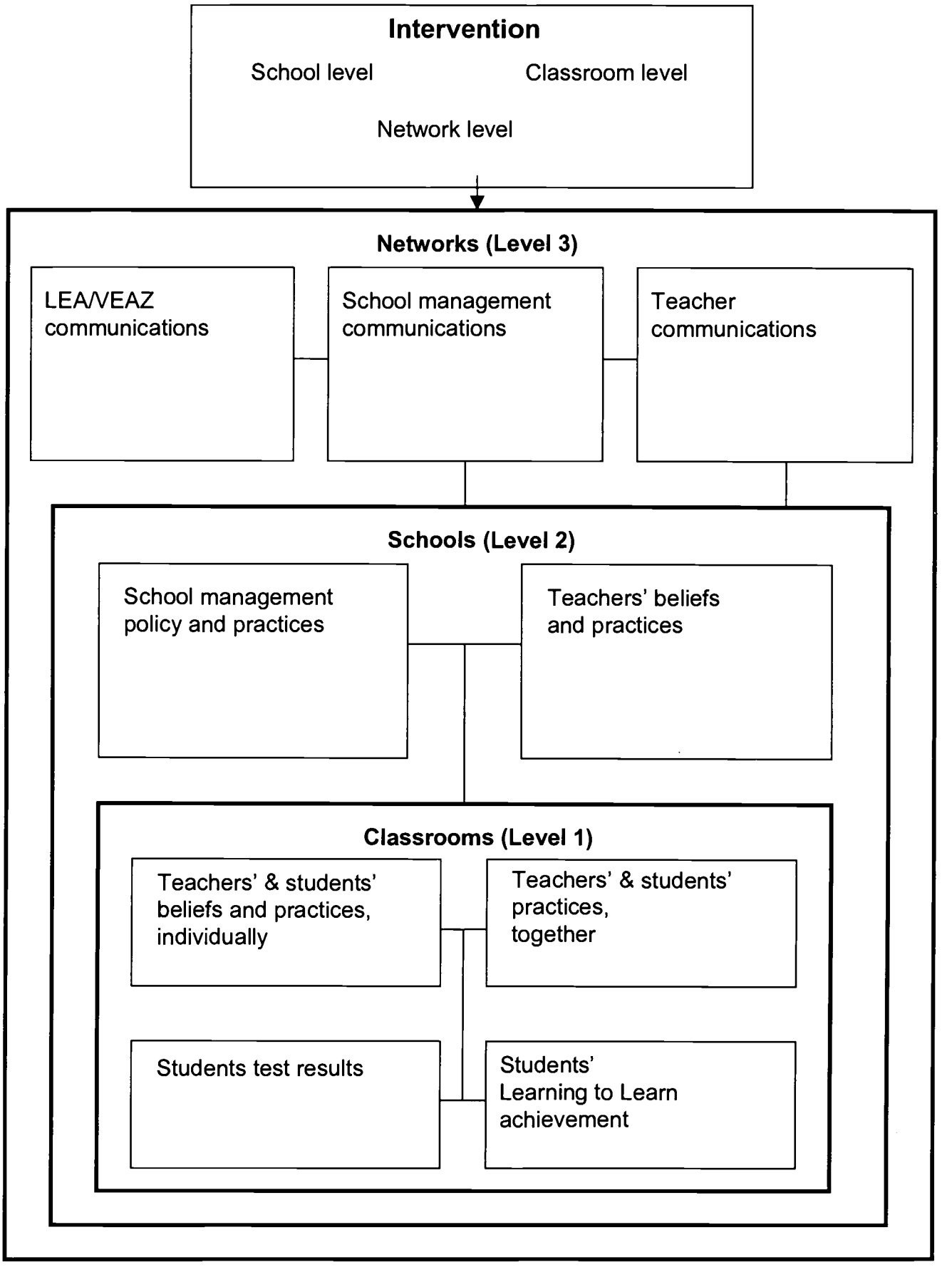

Figure 2: L2L Development and Research Plan

	LOCUS OF INTERVENTION	FOCUS OF INTERVENTION & DEVELOPMENT	MEASURES OF ANTECEDENTS/OUTCOMES & CHANGE OVER TIME	DATA TO ELICIT MEDIATING & CONTEXT VARIABLES	THEORETICAL RESOURCES FOR INTERPRETATION
Level 1: CLASSROOM	L2L Team provide inset and critical friend support to groups of teachers and schools	Initial Inset: L2L thro' AfL Workshops: • Questioning • Feedback • Sharing criteria • Peer and self-assessment • other(s)	Teacher and student learning: • Teachers' beliefs about learning (TBL) • Students' beliefs about learning (SBL) • Students' attainments (key stage test and GCSE data), attendence	• Professional development practices (PD) • Teachers' classroom practices (TCP) • Lesson materials • Students' Learning to Learn' (SLL) • Teachers' Learning (interviews incl. critical incidents)	• *Making learning explicit* • *Autonomy/dependency* • *Performance orientation/ learning orientation* • *Teacher-centred/learner-centred* • *Inquiry approach* • *Accepting/avoiding challenge* • *Motivation and rewards*
Level 2: SCHOOL		Feedback results of staff questionnaire Follow-up activities: • sch. cultures • force field • NQT/LSA view • leadership • peer observation • working with parents/govs. • student voice • AfL policy dev. • Sch. meetings	Organisational learning: • School climate/culture (Staff questionnaire): - Professional learning - Management systems - Assessment/T&L policy	• Sch. co-ordinator perceptions (interviews and logs) • Headteacher perceptions (interviews) • Sch. policy (docs.) • LEA/VEAZ adviser perceptions (logs) • Critical friend perceptions (interviews and logs)	• *Collective learning* • *Deciding and acting together* • *Sense of direction (vision)* • *Mutual support and reassurance* • *Individualistic, Balkanised or collaborative culture* • *Human capital/social capital/intellectual capital* • *Trust* • *Autonomy* • *Constraints and affordances* • *Inquiry* • *Leadership* • *Supporting prof. development*
Level 3: NETWORK		Website resources Opps. for sharing: • L2L co-ord. mtgs • LEA mtgs • Inter-school mtgs • Web-based discussions • Web. instruments	Network community learning: • Knowledge creation and exchange (tracking transaction objects) • Network activity	• Co-ordinator mapping and logs • Headteacher interviews and mapping • LEA/VEAZ co-ordinator mapping and logs • Staff questionnaire • Web measures • School network audit	• *Communities of practice* • *Activity systems* • *Distributed knowledge* • *Distributed leadership*

Appendix 1: Definition of factors in terms of component questionnaire items

Section A: Classroom Assessment Practices

Factor 1: Making Learning Explicit

Questionnaire items	*Questionnaire statements*
1	Assessment provides teachers with useful evidence of students' understandings which they use to plan subsequent lessons
4	The feedback that students receive helps them improve.
10	Students are told how well they have done in relation to their own previous performance.
11	Students' learning objectives are discussed with students in ways they understand.
14	Teachers identify students' strengths and advise them on how to develop them further.
15	Students are helped to find ways of addressing problems they have in their learning.
16	Students are encouraged to view mistakes as valuable learning opportunities.
17	Students are helped to think about how they learn best.
18	Teachers use questions mainly to elicit reasons and explanations from their students.
20	Students' errors are valued for the insights they reveal about how students are thinking.
21	Students are helped to understand the learning purposes of each lesson or series of lessons.
22	Assessment of students' work is mainly in the form of comments.
26	Students are helped to plan the next steps in their learning.
27	Pupil effort is seen as important when assessing their learning.
28	Assessment criteria are discussed with students in ways that they understand.
30	Teachers regularly discuss with students ways of improving learning how to learn.

Section A: Classroom Assessment Practices

Factor 2: Promoting Learning Autonomy

Questionnaire items	*Questionnaire statements*
6	Students are given opportunities to decide their own learning objectives.
9	Teachers' assessment practices help students to learn independently.
13	Teachers provide guidance to help students assess their own work.
19	Teachers provide guidance to help students to assess one another's work.
24	Teachers provide guidance to help students assess their own learning.
29	Students are given opportunities to assess one another's work.

Factor 3: Teacher-centred, Performance-orientation

Questionnaire items	*Questionnaire statements*
2	The next lesson is determined more by the prescribed curriculum than by how well students did in the last lesson.
3	The main emphasis in teachers' assessments is on whether students know, understand or can do prescribed elements of the curriculum.
5	Students are told how well they have done in relation to others in the class.
7	Teachers use questions mainly to elicit factual knowledge from their students.
8	Teachers consider the most worthwhile assessment to be assessment which is undertaken by the teacher.
12	Assessment of students' work consists primarily of marks and grades.
23	Students' learning objectives are determined mainly by the prescribed curriculum.

Section B: Professional Learning Practices and Beliefs

Factor 1a: Inquiry: Using Different Sources of Knowledge

Questionnaire items	*Questionnaire statements*
2	Staff draw on good practice from other schools as a means to further their own professional development.
3	Staff read research reports as one source of useful ideas for improving their practice.
4	Staff use the web as one source of useful ideas for improving their practice.
5	Students are consulted about how they learn most effectively.
6	Staff relate what works in their own practice to research findings.

Factor 1b: Inquiry: Reflection and Change

Questionnaire items	*Questionnaire statements*
7	**Staff are able to see how practices that work in one context might be adapted to other contexts.**
9	Staff reflect on their practice as a way of identifying professional learning needs.
10	Staff experiment with their practice as a conscious strategy for improving classroom teaching and learning.
11	Staff modify their practice in the light of feedback from their students.
12	Staff modify their practice in the light of published research evidence.
13	Staff modify their practice in the light of evidence form self-evaluations of their classroom practice.
14	Staff modify their practice in the light of evidence from evaluations of their classroom practice by managers or other colleagues.

Section B: Professional Learning

Factor 2: Collective Learning

Questionnaire items	*Questionnaire statements*
15	Staff carry out joint research/evaluation with one or more colleagues as a way of improving their practice.
16	Staff regularly collaborate to plan their teaching.
17	Staff regularly observe each other in the classroom and give each other feedback.
18	Staff engage in team teaching as a way of improving practice.
21	Teachers make collective agreements to test out new ideas.
22	Teachers discuss openly with colleagues what and how they are learning.
23	Staff frequently use informal opportunities to discuss how students learn.
28	Staff discuss with colleagues how students might be helped to learn how to learn.

Factor 3: Mutual Support and Reassurance

Questionnaire items	*Questionnaire statements*
19	If staff have a problem with their teaching they usually turn to colleagues for help.
20	Teachers suggest ideas or approaches for colleagues to try out in class.
24	Staff offer one another reassurance and support.

Section B: Professional Learning

Factor 4: Valuing Learning

Questionnaire items	*Questionnaire statements*
1	Staff as well as students learn in this school.
25	Staff believe that all students are capable of learning.
26	Students in this school enjoy learning.
27	Pupil success is regularly celebrated.

Section C: School Management Practices and Systems

Factor 1: Deciding and Acting Together

Questionnaire items	*Questionnaire statements*
5	There are processes for involving all staff in decision-making.
6	Teachers' professional know-how is used in the formulation of school policy and goals.
7	Teachers' professional know-how is used in the formulation of school policy, even where this leads to a questioning of established rules, procedures and practices.
8	Opportunities are provided for teachers to critically evaluate school policy.
9	Staff are actively involved in evaluating school policy.
10	Staff participate in important decision-making.
11	There are processes for involving students in decision-making.
B8	Staff use insights from their professional learning to feed in to school policy development.

Section C: School Management Practices and Systems

Factor 2: Developing a Sense of Where we are Going

Questionnaire items	*Questionnaire statements*
1	Senior management communicates a clear vision of where the school is going.
2	Staff have a commitment to the whole school as well as to their department, key stage and/or year group.
3	Senior management promotes commitment among staff to the whole school as well as to the department, key stage and/or year group.
4	There is effective communication between senior management and teachers.
12	Staff have a good working knowledge of the School Development Plan.
13	Staff see the School Development Plan as relevant and useful to learning and teaching.
14	Staff development time is used effectively to realise School Development Plan priorities.
15	Staff development time is used effectively in the school.

Section C: School Management Practices and Systems

Factor 3: Inquiry

Questionnaire items	*Questionnaire statements*
21	Management supports teachers in sharing practice with other schools through networking.
22	Information is collected from teachers on those aspects of their work that they themselves think they do effectively.
23	Information is collected from teachers on effective ways they promote learning to learn skills and knowledge among students.
24	Information is collected from teachers on informal teacher networking in which they play an active role.
25	Teacher-initiated networking is an integral element of staff development.
26	Learning how to learn is an issue discussed in staff development time.

Factor 4: Supporting Professional Development

Questionnaire items	*Questionnaire statements*
16	The school provides cover to allow staff joint panning time.
17	Teachers are encouraged to experiment with new ideas as a way of promoting professional growth.
18	Formal training provides opportunities for teachers to develop professionally.
19	Teachers are helped to develop skills to assess students' work in ways that move their students on in their learning.
20	Teachers are helped to develop skills to observe learning as it happens in the classroom.

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