

Autonomy, conditions and constraints: some cross-cutting themes from ‘Learning how to learn – in classrooms, schools and networks’

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Abstract

The project aimed to link research conducted across organisational levels – in classrooms, in schools and across networks. This paper provides an overview of the project at the end of the funding period. Although analysis had focused particularly on the separate levels, and some cross level analysis remains to be done, several cross-cutting themes, linking our levels, have emerged:

1. *Autonomy and agency.* Our theoretical analysis led us to consider the development of learning autonomy as a central concept in learning how to learn (LHTL). Promoting learning autonomy also emerged as a key factor in our quantitative survey of teachers and is confirmed by our interviews and videos of classroom practice. All data sources point to the importance of teachers’ own sense of agency as crucial in creating the conditions for pupils’ voices to be heard and their autonomy to be enhanced. The application of formative principles in teachers’ own learning emerges as a strong theme.

2. *Conditions for classroom change: support for teachers’ in-class learning* Teacher learning and school support for such learning are key preconditions for the sustained promotion of LHTL in classrooms. Our data indicated that the conditions in project schools appeared to be conducive to teachers’ learning out of the classroom but less amenable to teachers’ learning with colleagues in the classroom. Yet, it was teachers’ in-class learning practices that were most strongly associated with their classroom promotion of LHTL. School conditions that underpinned teachers’ in-class learning practices centred on the development of a clear sense of direction, the promotion of staff development, the auditing of teachers’ expertise and support for teacher networking.

3. *Compliance and subversion as responses to the policy context.* Interviews with headteachers and school co-ordinators revealed their concerns about leading learning in their schools within the context of prescriptive government policy. All schools were implementing government policies but with varying degrees of enthusiasm, locating themselves on a spectrum of compliance to subversion. Government policies were successful in leaving a depth of imprint on school practice and shaping the discourse which accompanied it. However, the greater the external pressure, the greater was the desire for flexibility, diversification and agency.

Keywords: *Learning how to learn, formative assessment, agency, autonomy, policy context, teachers’ professional learning, networking, learning, pupil voice.*

Background

The project was designed to build on two main areas of existing research. The first was research on assessment for learning (AfL). Interest in this, amongst researchers, policy-makers and practitioners, had been building since the publication of Black & Wiliam's (1998a) review of research and their subsequent development work with 48 teachers in six schools (Black et al, 2003), known as the King's, Oxfordshire and Medway Formative Assessment Project (KMOFAP). The appeal of the findings of this research for policymakers derived from the bold claim that implementing AfL in classrooms raises standards significantly. Thus, in England, the DfES made AfL a key strand of its Key Stage 3 Strategy and the Primary National Strategy. There are related policy developments in the other countries of the UK and elsewhere e.g. Hong Kong. Most of these initiatives focus on changes in the classroom. However, claims for the effectiveness of assessment for learning raise a number of further questions for research, which go beyond the classroom. For example, how does one spread knowledge and promote changes in these specific practices across teachers and schools? The teachers in KMOFAP were provided with exceptional levels and quality of training. This could not be replicated across the system as a whole. Thus there were also important sustainability issues to be addressed, associated with 'scaling up' of innovations.

These questions engage with a second field of educational research, associated with teachers' professional development and school improvement. Some members of the Learning how to Learn (LHTL) team had extensive experience of research in this second area (Bradley, Conner and Southworth, 1994; Frost et al, 2000; James, 1998; MacBeath and Mortimore, 2001). The principal aim of the project was, therefore, to bring these two areas of research together in order to investigate the *conditions* in classrooms and schools, that would promote better learning by pupils through the development of AfL practices by teachers. The project team believed that unless some attempt was made to understand what the classroom conditions for effective learning look like, what teaching practices promote this, and what kinds of professional development and institutional conditions and cultures help teachers to learn these new practices, there is little chance of spreading and sustaining the kinds of improvements observed in classroom studies. To our knowledge, no previous studies have brought school improvement research into alignment with such a specific but important area of pedagogical innovation

Furthermore, schools are not isolated units but part of an educational community. One of the results of the development work that Black et al (2003) undertook was requests that project teachers share their learning with colleagues in other schools. Thus they became involved in knowledge sharing within and across schools. This phenomenon is relatively uncharted territory in educational research; there is even less understanding about how knowledge is created and shared across schools. In anticipation of the creation of dispersed but networked learning communities (Hargreaves, 2003) colleagues from Reading University and the Open University, who are especially interested in electronic media for networking, were drawn in. This enabled a project to be designed which would seek to investigate what assessment for learning, and by extension, learning how to learn, might mean for teachers and pupils in classrooms, in relation to organisational learning, and for learning across networks of teachers and schools.

The phrase 'learning how to learn' (LHTL) was chosen for the title of the project because the team perceived that the practices of interest were broader in their scope than some interpretations of AfL. Assessment for learning was viewed by the team as a pervasive and integral part of teaching and learning, therefore the team was

particularly interested in changes in the way that the roles of teachers and learners are conceptualised and enacted, and in changes in the locus of control of learning. The phrase 'learning how to learn' shifts attention to the learner and provides the ground for the focus on learner autonomy that emerged as a central theme in the research.

Objectives and research questions

More specifically the project aimed 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.

The team construed Aim 1 as primarily concerned with conceptual development. To this end, it established a sub-group to consider this issue, and the theoretical issues underpinning Aim 5. Work on Aim 5 is still to be completed because it requires consideration of findings from all the across-level analyses.

Aims 2, 3 and 4 relate to the work at the project's three organisational levels: Aim 2 relates to Level 1 – classrooms; Aim 3 relates to Level 2 – schools; Aim 4 relates to Level 3 – networks. We formulated a lead research question for each of these levels and a set of subsidiary research questions.

Level 1- classrooms

Initially the classroom-focused element of the research aimed to address three main issues. The first cluster of questions considered the type of strategies teachers employed in the classroom and their efficacy; this included looking at subject differences. The second cluster asked what effects these had on both pupils and teachers in terms of changing their beliefs about, and attitudes towards, learning and influencing practice. One question asked about any measurable learning outcomes of the intervention. As the research progressed it became evident that the first and second clusters of questions were potentially related so the question of whether there was any relationship, and what its nature might be, became another issue to examine. All these questions were addressed, although the question about effects on pupils' motivation, was not dealt with fully; motivation is a complex concept and we judged that we could not deal with this properly within our resources.

Level 2 – schools

Our aim at school level was to develop understandings in relation to our lead question: What characterises the school that successfully manages how teachers create the knowledge and skills of learning how to learn for both teachers and pupils? Specific questions related to organisational conditions, structures and cultures that promote or hinder the creation and application of new pedagogical knowledge, especially policies and practices for teachers' professional development and opportunities for sharing their knowledge across boundaries. Two questions of a different order invited the project to engage with theory and research on organisational and professional learning and knowledge creation outside the field of education.

Level 3 – networks

Our lead question at this level was: How can the knowledge and skills of learning how to learn be effectively transferred within educational networks? This was to be addressed in two ways. Firstly, we would explore 'how the knowledge and skills of learning how to learn could be transferred' and secondly we would judge effectiveness. The original proposal assumed that the use of technologies might be the basis for the networks. Some of the sub-questions focused on this use, and were optimistic about the role of ICT in supporting teachers' learning. We included two Virtual Education Action Zones (VEAZs) in our sample on the assumption that their schools were most likely to represent 'ICT-rich learning environments' for teachers. It soon became evident that, although there was adequate access to ICT in VEAZ schools and evidence of its use within the classroom, there was little use to support teacher learning.

We therefore had to determine the nature of existing networks, which two of the questions had assumed was understood. This entailed new ways of conceptualising networks, and of collecting data on them.

Methods

Overall

Previous research had revealed a 'poverty of practice' (Black & Wiliam, 1998b, p. 5) so the development of AfL/LHTL practices needed to be stimulated in many school settings. Thus the project was conceived initially as research and development (R&D) but latterly as development and research (D&R). The team sought to stimulate activity through a limited number of 'interventions' at the school level, of similar scale to the activities that a school might routinely carry out as part of its school development plan. There was no direct team involvement in the classroom; instead team members worked with teachers and school leaders using INSET activities of various kinds.

Most of this work was conducted with individual schools but opportunities for network development were also provided by regular meetings for school co-ordinators, and through opportunities to share practice through the website— see 'Assessment for Learning in Action' on the website <http://www.learntolearn.ac.uk> - although these latter were rarely used. What, and how much, activity schools engaged in was not prescribed; teachers and school leaders were encouraged to take responsibility for the pattern of development in their school. Variation was accepted and the research sought to examine the relative effectiveness of the different ways in which schools, and networks of schools, implemented ideas and developed practice.

From September 2002, the project worked with 40 primary and secondary schools. However, sub-samples of pupils and teachers were delineated for different purposes and, in 2003 in discussion with our Advisory Group, the 40 schools were

divided into a 'main' sample of 20 and a 'supplementary' sample of 20 in order to make data collection and analysis more manageable. Fieldwork in classrooms was carried out in the main sample only.

As the aims indicate, the project was designed to investigate LHTL on three levels but the project team took these three levels to be strongly interlinked. Thus the underlying research model acknowledged the possibility of a 'logic model' linking variables at different levels. The research sought to investigate these links.

Quantitative measures of *antecedent* and *outcome* variables were therefore developed by creating new or adapting existing, research instruments. The results of standard performance measures (national curriculum tests and GCSE results) were also used as indicators of pupils' academic achievement. The intention was to analyse the relationship between such measures at baseline and as a measure of change over time. Qualitative data were collected to investigate the nature of links between variables. These indicators of *mediating or contextual variables* included narrative accounts of policies, initiatives, processes and events derived from observations, interviews and document analysis. These enabled researchers to examine the plausibility of relevant alternative explanations for associations. The concept of a 'theorised audit trail', which traced the impact of specific innovations in LHTL practice, was an element of project design although the complexity of the social phenomena under investigation meant that evaluations of the effectiveness of different innovations could only, realistically, be carried out in the context of case comparisons. The decision not to use controls was deliberate because the team was less interested in evaluating project 'interventions', which would require efforts to ensure fidelity, than to investigate how project ideas 'landed' in schools, how teachers adapted and implemented innovations, and what conditions promoted effective practice and enhanced outcomes.

The project has plans for cross-level analyses and case studies. Some of this work has yet to be completed although most of the preparatory analytical work at each level has been done, and produced significant findings. Much of the rest of this paper focuses on the methods and results at the different levels.

Level 1 – classrooms

We drew on three main data sets: video recordings of lessons; interviews with focal teachers; and questionnaires to 'target' pupils and teachers. The choice of video data alone, as opposed to general field notes or observation schedules, needs some explanation.

While full field notes on all lessons observed were taken, only half (29) were videoed. We piloted two different types of observation schedules but it was deemed preferable to concentrate our analysis on those lessons that had been videoed. This decision was taken partly because we were attempting to explore new territory but also because we felt that the schedules over simplified complex classroom activity. The video recordings enabled multiple and group viewings and intensive analysis.

The analysis of the data drew heavily on Eisner's notion of connoisseurship, critical enquiry and educational criticism (1991). This novel approach, rather than one more traditional in the social sciences, was taken because it fitted the medium of the data better and was better fitted for purpose. Moreover, the lead member of the classroom-level research team has expertise in arts and media studies. Our theoretical position was underpinned by the work of Dewey and Vygotsky, who regard task creation, talk and teacher-guided activity as crucial to progression in learners' understanding and moves to independence.

Teacher interviews were used as a way of gaining further insight into what can only be a 'snapshot' of their practice captured on video. Interviews with focal teachers were analysed more conventionally by being transcribed and coded using Atlas.ti. A

grounded approach to coding and theorizing was adopted, in the main, although analysis at this level was also informed by the conceptual framework and the factors that emerged from analysis of section A of the staff questionnaire - concerning classroom assessment practices and values (see level 2 below).

The other main source of data at level 1 was questionnaires: one set for pupils to explore their beliefs and attitudes to learning, the other for teachers covering beliefs and practices. The procedure for teachers and teaching assistants was similar. The data from responses were subjected to item and factor analysis, and means and standard deviations were calculated. In those schools where the questionnaires had been administered on two occasions, correlations between responses on the two occasions were also calculated. The post-pre difference in means was tested by the cumulative frequency difference test (Kolmogorov-Smirnov); school effects were explored using an ANOVA test.

At the beginning of the project, we attempted to develop a task to assess learning to learn 'ability' or capacity. However, we abandoned this after considerable development and piloting because of problems with validity and manageability. This activity was useful however in helping us to clarify the meaning of 'learning how to learn' as a concept.

Level 2 – schools

As a strategy for understanding the organizational conditions conducive to the classroom promotion of LHTL, we carried out a survey using a Staff Questionnaire. This was designed with a dual scale format in order to elicit, at the start and end of the project, the values and perceptions of practice of teaching assistants, teachers, middle and senior managers with regard to classroom assessment (30 items in section A), teachers' professional learning (28 items in section B) and school management (26 items in section C). In a fourth section, respondents were also asked to provide background details such as gender, teaching experience, subject, and principal area of responsibility. A version of this questionnaire, split into three parts, is provided for schools to use in the 'Self-evaluation resources' section on the project website. (NOTE: All project instruments are now deposited in this area for others to use.)

In 2002, 1,977 teaching staff at 32 schools were included in the questionnaire sample. (VEAZ schools completed a different questionnaire.) We obtained 1212 completed questionnaire returns representing a return rate of 63%. In 2004, 1258 staff at 23 schools remained in this questionnaire study. From the second administration we obtained 698 completed questionnaires representing a return rate of over 55%. The data were entered into SPSS and subjected to item, factor, cluster and regression analyses in order to identify patterns within and across schools and over time. For the purpose of providing answers to our research questions, statistical associations between responses to the three sections of the questionnaire were particularly important.

Reports of results, at baseline, for individual schools compared with results for the whole sample, were fed back to school staff to stimulate reflection. In this sense, the use of the instrument was also an 'intervention' and the effects of this needed to be taken into account in our conclusions.

In order to explore how practices and approaches for promoting LHTL, and their associated values and beliefs, were embedded at participating schools, and the related challenges to leadership, detailed semi-structured interviews with headteachers (n=40), at the beginning of the project, and school coordinators, at the beginning (n=32) and end of the project (n=30), were conducted. Interviews were transcribed and entered into Atlas ti which assisted the process of coding and extraction of evidence around themes.

Level 3 – networks

The Level 3 sub-sample was made up of schools either in a VEAZ or in a specific NCSL Networked Learning Community. The nature of the networks was investigated in two ways. First, a section was added to the Level 2 Staff questionnaire to obtain information on the use of technology for professional purposes. Second, a mapping exercise asked head teachers and school, LEA and VEAZ co-ordinators to draw a map and provide a commentary on those with whom they communicated, and how this was done. This was followed by an interview. A version of the mapping exercise, for use by schools, is on the website. This map was updated a year later along with a follow-up exercise.

Two NLCs were investigated through case studies. This involved attending meetings of the NLC managing group, collecting documents, and interviewing head teachers or co-ordinators of the project schools in the network.

Questionnaire analysis, from a sample of 13 schools (9 primary and 4 secondary), was carried out in SPSS. This is reported in Carmichael & Procter (2005). The analysis of the mapping exercise data was at two levels. The first was descriptive using low-level inference categories for the nodes (e.g. organisation, role, named people, groups) and the mode of communication of the links (e.g. face to face, telephone, e-mail). This was carried out across all 48 respondents in all (reported in Fox *et al*, 2005) and also for each individual school (and fed back to each school as part of the follow-up interview). The second level of analysis was based upon the effective elements of networks, drawn from theory (reported in James, McCormick & Pedder 2003). In this instance, 35 maps/commentaries were coded. From this analysis 12 groups of codes were created.

Results

Work on cross-level statistical analysis, and detailed case studies, has yet to be completed. These elements will be reported in the project's book in the TLRP Improving Learning series. We plan to have this ready by summer 2006. Here we report the results of our empirical work at the separate levels. First, however, we comment on evidence of pupils' academic performance in project schools.

As a TLRP project, working to enhance outcomes for learners, we were interested in the results of project schools on standard performance measures (national curriculum tests and GCSE results) as indicators of pupils' academic achievement. These will be incorporated into our across-level analysis and our case studies. The self-evaluation reports for individual schools, produced by the Fischer Family Trust from the national data base, provided us with data on value-added performance for the cohorts we were particularly interested in i.e. those reaching the end of a key stage in 2004. The pattern of these results is very mixed and we will not be able to interpret them fully until we have done further work. However, four schools in our main sample, where value-added in 2004 was significantly higher than expected for similar schools, will be strong candidates for case studies. We have good data on all of these and, in the case of two, we have the most complete data across all three levels because they were highly engaged with the project. Indeed, the head teacher of one school said, in a public forum:

‘AfL has been a joy. It is intellectually profound, yet eminently practical and accessible. The LHTL project has enhanced the learning of us all. I have no doubt that our children are now better taught than ever before. It has been the best educational development of my career.’

In 2004 this school achieved 84% A*-C GCSEs, VA percentile rank of 3 (KS2 -> KS3), VA percentile rank of 14 (capped point score KS3-> KS4), with 57% boys, 22% FSM, 66% ethnic minorities and 15% SEN. However, we have been careful not to jump to conclusions because one other secondary school with high value added hardly had any engagement with the project at all, although the school was engaged with other initiatives.

Level 1 – classrooms

Observations

Our central finding, from the classroom is that implementing the ‘spirit’ of AfL is hard to achieve – roughly 20% of the lessons we observed possessed this quality. Such a spirit has the promotion of learning autonomy at its heart. This proportion coincides with the quantitative analysis from level 2, which indicated that only 20% of teachers practised what they believed to be important in promoting pupils’ autonomous learning. Black & Wiliam’s review (1998a) and the subsequent KMOFAP (Black et al, 2003) indicated a fine balance between the need for teachers to internalise the principles, or ‘spirit’, of AfL, which this project hypothesised might lead to LHTL, and the need to give teachers clear practical techniques or strategies to hang onto - the ‘letter’. Evidence from classrooms suggests that the balance has tipped too far in the direction of useable procedures at the expense of the underlying principles.

The sample of lessons videoed was very small, and difficult to generalise from, however, lessons agreed as capturing the ‘spirit’ of AfL tend to conform to a broad pattern, irrespective of the subject being taught. There is a clear sequence to the task order: each builds on and develops the previous activity. In this sense, the sequence of activities exemplify ‘making the learning explicit’ in that they follow a logical order, each level deepening the understanding of the element that comes before it. A typical pattern involves the pupils framing their own notions of quality, negotiating and refining these within the group, applying these principles to a piece of work of a peer and then using this understanding to re-assess their own work in the light of the judgments about quality. The exchanges between pupils, and between teacher and pupil, are all understood in terms of refinements of the central aim – understanding what constitutes quality or a good answer. When pupils re-consider their own work they do so in the light of the collective wisdom of the class.

Focal teacher interviews

Full analysis of the interviews is yet to be undertaken but what is already evident, from a small sample, is that teachers’ beliefs about learning have a role in the way they operationalise AfL in the classroom. Two features characterise teachers who adopt the spirit of AfL: (i) a strongly held conviction that the promotion of pupil autonomy is integral to their beliefs about learning, and (ii) their own sense of agency in promoting this in the classroom. When asked about impediments to learning, these teachers tended to proffer, as the first or second explanation, their own responsibility in motivating or helping students learn.

The picture, for the rest of the teachers videoed, is much more complex and patchy. Their interviews reveal a variety of constraints: from the nature of the examination system and the demands of curriculum coverage to ability groupings and the general passivity of the pupils. Several also exhibit tension between what they would like to achieve and what they feel is practically possible.

Questionnaires

Results from level 1 questionnaires indicate the following. For pupils, the responses to the same questions, by both primary and secondary pupils, and by the same pupils on two occasions 12 months apart, exhibit a complex pattern. In general their responses are positive about learning, but with no overall enhancement between years 5/6 and years 8/9. Individuals' responses are however inconsistent, both between their earlier and later attempts at the same questions, and between different questions addressing apparently similar issues. Thus their beliefs seem to be tentative and labile rather than firmly held. At school level there are significant differences between pupils in different schools. Two groups of responses, one concerned with beliefs about learning in general, the other about learning within school, reveal, for primary pupils, contrasting patterns of difference between schools and over time, whereas for secondary pupils there is much closer alignment between the two

The teacher questionnaires also show generally positive responses, but again with different patterns between different groups. Primary teachers are more positive about classroom practices, and their ideas about principles of feedback and interaction seem to correlate with this, but not so strongly with beliefs about learning in general. Secondary teachers show stronger links between beliefs about general principles, and those about classroom practices, but weaker links with ideas about feedback and interaction. They also show less positive opinions overall about classroom practices that would promote better learning. Teaching assistants show less positive views overall compared with the teachers they help. For secondary subject specialists, teachers of English have the most positive responses overall, whilst some of the least positive responses are shown by teachers of PE and humanities. Further analysis of these data, and of ways results relate to the pupils' responses, and to the results at level 2, are still being explored.

Level 2 - classrooms

Staff questionnaire

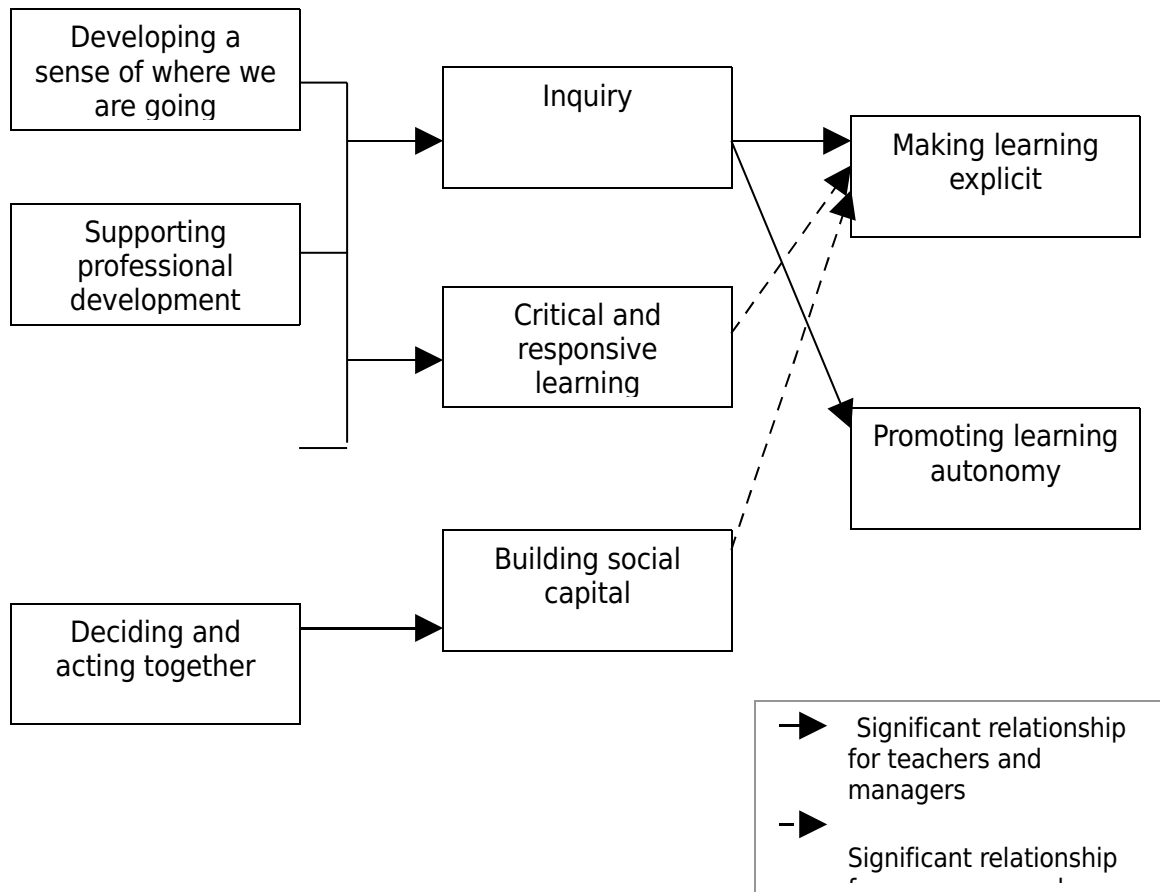
A model of factors and associations. On the basis of analysis of responses in 2002 (first administration) three underlying dimensions of assessment practice were identified: 'making learning explicit', 'promoting learning autonomy' and 'performance orientation'. There were sizeable values-practice gaps on two dimensions that appear to be in tension ('promoting learning autonomy' and 'performance orientation'). Most teachers were unable to sustain practices across all dimensions in line with their values.

In relation to teachers' professional learning, we identified 4 dimensions of teachers' professional learning: two related to in-class learning ('inquiry' and 'critical and responsive learning') and two related to out-of-class learning ('building social capital' and 'valuing learning'). Levels of practice for classroom-based learning tended to be lower than for out-of-class learning.

With regard to school management practices and systems, four factors were generated: 'deciding and acting together', 'developing a sense of where we are going', 'supporting professional development', and 'auditing expertise and supporting networking'. Practices were markedly behind values for all four dimensions at the outset of the project.

The model of associations between school management practices and systems, teachers' professional learning, and classroom assessment practice, which we drew from baseline responses to the Staff Questionnaire, are represented in Figure 1. This forms the basis of our understanding of the conditions that characterise schools where teachers successfully learn how to develop pupils' skills in learning and in learning how to learn.

Figure 1: The organizational conditions that foster successful classroom promotion of learning how to learn



On the basis of our analysis of questionnaire data and the relationships we identified among key variables, we propose, that schools that best support teachers in promoting LHTL develop a clear sense of direction, support teacher development and actively manage the knowledge resources of staff and pupils through auditing expertise and supporting networking. The positive influence of these strategies on the classroom promotion of LHTL are mediated by teachers' in-class learning. In addition, school conditions that have an indirect positive effect on the classroom promotion of LHTL include the involvement of staff and pupils in decision making - 'deciding and acting together' - and by 'building social capital'.

Change over time. Mean values and practice scores for each factor in 2002 were compared with mean factor scores recorded in 2004.

In the light of our initial analysis of strength and significance of relationship among the dimensions in our model, we make a number of observations:

1. There was a clear shift in classroom practice over the course of the two years of the project. Teachers reported increasing levels of ‘promotion of learning autonomy’ and decreasing levels of ‘performance orientation’ while maintaining the high levels of practice for ‘making learning explicit’ they had reported in 2002.
2. With regard to teachers’ professional learning, there was a striking increase in levels of practice reported for the ‘inquiry’ factor. Practice scores in 2002 for this set of practices were the lowest of all the teacher learning factors. This set of practices play a vital role in supporting the classroom promotion of LHTL through ‘making learning explicit’ and ‘promoting learning autonomy’. There were more modest increases for ‘building social capital’, ‘critical and responsive learning’ and ‘valuing learning’.
3. The largest increases in mean practice scores for school management were reported for ‘auditing expertise and supporting networking’, ‘supporting professional development’ and ‘deciding and acting together’. Levels of practice for ‘developing a sense of where we are going’ remained stable.

School coordinator and head teacher interviews

Qualitative interview data from school coordinator interviews suggest that structural and cultural aspects of embedding are closely interrelated, although schools place differing emphases on one or the other. The challenges for leadership associated with embedding LHTL practice include resolving the tension between ‘bottom-up’ growth and ‘top-down’ mandated change. Seven conditions of embedding, to which leadership needs to attend, are identified:

1. Knowledge factors: Teachers’ relevant knowledge, experience, disposition to challenge inert ideas and commitment to LHTL principles.
2. Curriculum factors: Perceptions of latitude, balancing a need for ‘coverage’ with a focus on the process of LHTL.
3. Professional development factors: Issues of transfer and enactment of practice from sources both external and internal school, with support for embedding new ways of doing things in the classroom.
4. Peer factors: The balance of influence, power and persuasion within a staff and openness to collaborative learning.
5. Economic and political factors: Response to external pressures and resourcing issues which allow investment in LHTL as a practical priority.
6. Sociological factors: The extent to which there is parental and community support for certain kinds of structural and cultural change.
7. Epidemiological factors: The congeniality of the climate in which ideas and practices are able to spread and ‘catch’.

Level 3 - networks

General issues. As noted above, our data indicate that the role of technology is low in educational networks. Although our focus was on networks external to schools, it became apparent that large schools, particularly secondary schools, were themselves complex networks that make it equally difficult to share knowledge within as between schools.

A school does not exist in, or have, a single network but is part of multiple, overlapping and intersecting networks. This means that, not only is it impossible to investigate 'complete networks', but that there is no such thing as *the* network. This is true even in the case of NLCs - formal organisations established to create 'a' network.

Network concepts. 12 groups of codes have been used to analyse particular school networks. Although we give some indication of the comparative frequency of various features of school networks, these are only indicative.

Traffic. Few of the material resources flowing in school networks capture practice. More often it is transactions of ideas through activities. In Wenger's terms (1998), teachers prefer participation rather than reification to negotiate meaning. This limits sharing to the immediate locality.

Characteristics of nodes. The literature recognises four effective nodes in networks: experts, brokers, communities and knotworks. Schools seek experts that closely resemble their teachers. While this acknowledges practitioners, expertise is local and likely to offer a restricted field of advice. Brokers work between two communities and, secondly, as bridges that link schools to a wider network. Communities do not resemble those described by Wenger, and there are few subject communities that schools draw on. Instead schools rely on knotworks, where a group comes together for a specific short-term task, and through this knowledge is shared.

Informality of nodes. Informality characterises respondents' personal networking activities. However, such networks can be proactively and deliberately managed. We found examples of strong yet informal interactions of heads and advisers working across organisations in groups drawn from those in similar roles.

Strong and weak links. Links can be categorised according to strength and value. High value and extended, bi-directional relationships (or strong, 'strong' links) included the activities of research groups within schools and interactions between teachers in active NLCs. In contrast, weak, 'weak' links included rarely used, uni-directional links largely unvalued by the recipient (e.g. unsolicited but statutory links). Significantly, there were also infrequently used, or 'weak', links, which were highly valued; e.g. inspiration from external speakers.

Effectiveness. The nature of the networks depicted above will be used to explore particular schools that, for example, score highly on networking in the Level 2 Questionnaire (B 'inquiry' & C 'auditing expertise and networking' factors). We have already analysed a particular school using these concepts and we intend to relate features of networks from the above to the factor scores and measures of pupil outcome for particular schools.

Notes

1. This paper is a version of the research report to the ESRC submitted in October 2005. More details of the findings described here will be found in a Special Issue of Research Paper in Education to be published in 2006. A project book in the TLRP Improving Learning series will also report these and some of the cross-level analyses and case studies, which are yet to be completed. We hope also to write a book of case studies. Articles on particular aspects of the work are also being published or in preparation. A book of INSET materials for schools has been submitted to Routledge and will be published in the Improving Practice series. A version of these INSET materials is also available on the project website.
2. This paper is based on the work of 'Learning How to Learn- in classrooms, schools and networks'. This was a four year development and research project funded from January 2001 to July 2005 by the UK Economic and Social Research Council as part of Phase II of the Teaching and Learning Research Programme (see <http://www.tlrp.org>). The Project (ref: L139 25 1020) was directed by Mary James (University of Cambridge until December 2004, then at the Institute of Education, University of London) and co-directed, from 2002, by Robert McCormick (Open University). Other members of the research team were Patrick Carmichael, Mary-Jane Drummond, John MacBeath, David Pedder, Richard Procter and Sue Swaffield (University of Cambridge), Paul Black and Bethan Marshall (King's College London), Leslie Honour (University of Reading) and Alison Fox (Open University). Past members of the team were Geoff Southworth, University of Reading (until March 2002), Colin Conner and David Frost, University of Cambridge (until April 2003 and April 2004 respectively) and Dylan Wiliam and Joanna Swann, King's College London (until August 2003 and January 2005 respectively). Carmel Casey-Morley and Nichola Daily were project administrators. Further details are available at <http://www.learntolearn.ac.uk> .

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