

Primary Review Research Survey: 2/4

Learning and teaching in primary schools: insights from TLRP

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Abstract

The Teaching and Learning Research Programme includes 19 projects and several cross-programme thematic initiatives which have evidence and commentary of potential interest to the Primary Review. The focus, findings and implications of the 19 projects are summarised and, in an across-project synthesis, ten principles for effective teaching and learning are distilled and critiqued. An indication of areas for consideration by policy maker, and for further research, conclude the survey.

Introduction

This survey has a very particular character. It provides an overview of the projects and thematic work of the UK's Teaching and Learning Research Programme (TLRP), insofar as this work relates to learning and teaching in the primary phase. In this sense the survey is delimited by the themes, questions and issues covered by the TLRP. In the main overview, the survey summarises the work of 19 projects, organised thematically. In the following synthesis, some general principles, distilled from these projects, are described and discussed.

Overview

Scope and coverage

The Teaching and Learning Research Programme is funded from a number of UK government sources and managed by the Economic and Social Research Council (ESRC). Costing about £40 million spread over 12 years (2000-2012), it is the biggest programme of coordinated research in teaching and learning that the UK has ever known. The total number of projects within the TLRP is likely to exceed 70, and these are complemented by almost 20 cross-Programme thematic analyses of various sorts. Projects cover issues ranging across the entire lifecourse, from early years to old age, and involve research teams from all parts of the UK.

22 projects and fellowships within the TLRP's portfolio were based in schools or pre-school settings: two of these focused on early years, six on primary education, and eleven across all school phases. These 19 (i.e. excluding the secondary only projects) will be the basis of this survey. The list below notes that three of these are 'associate projects'. These were funded from other sources but invited to become part of TLRP because of the significance of their work for teaching and learning. Many of these projects were established towards the beginning of the life of the Programme and most are now complete and publishing their individual results. This is an appropriate time to take stock of what has been learned as a result of this work, although it holds some challenges because TLRP projects were not set up to investigate topics according to some map of the theoretical and substantive territory. They were selected, by a Steering Committee, from a large number of bids¹, on the strength of their scientific quality and the extent to which they engaged with the core aims of TLRP:

- To work to achieve improvements in learning outcomes for identified groups of learners;

¹ The 'hit rate' was about one in ten.

- To work in authentic settings of teaching and learning;
- To bring multi-disciplinary or interdisciplinary approaches to research;
- To enhance the capacity for a research-based approach to education and training practices;
- To 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;
- To make research-based contributions to the fundamental understanding of teaching and learning.

Each of these expectations was itself a response to concerns about the quality and impact of educational research which had been articulated in recent years, in the UK and elsewhere (see Pollard, 2005, for more detail).

Thus, a diverse group of projects was funded: some dealing with learning in specific areas of the curriculum, some on learning across the curriculum, and others investigating environments for learning or school conditions for improvement. The projects that have involved primary schools, and are the particular focus of this survey, have been classified in the following way (see James and Pollard, 2006):

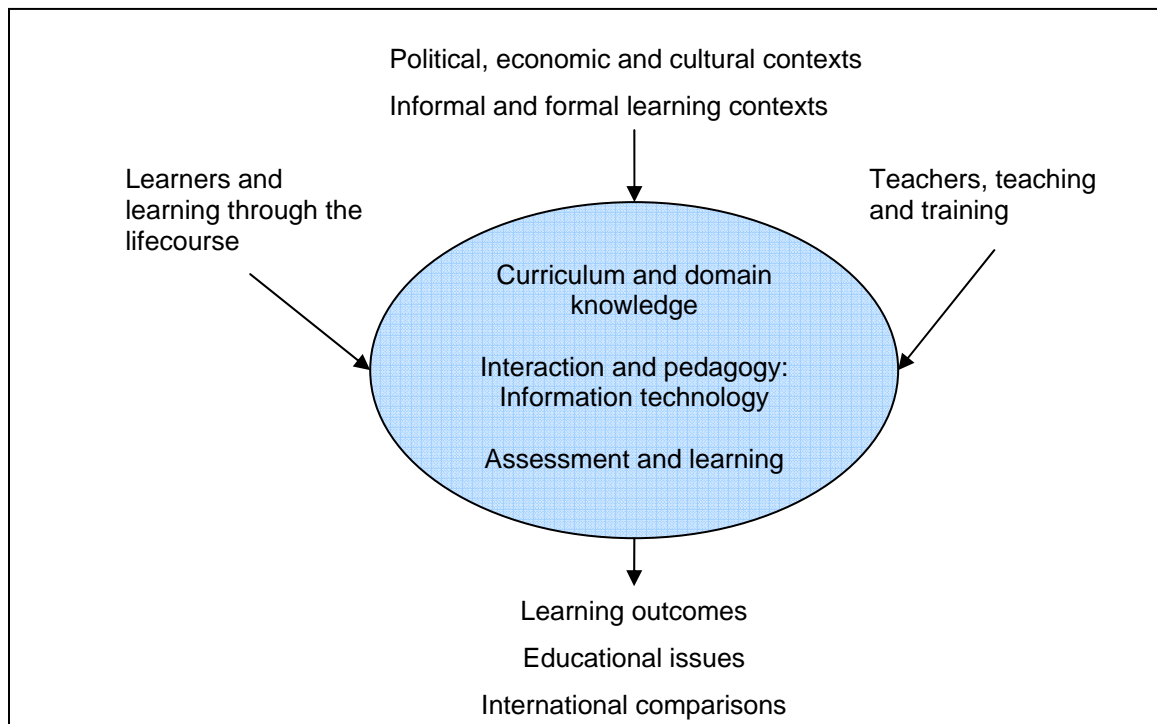
1. Learning in specific areas of the curriculum, notably English, mathematics and science.
 - a. The role of awareness in the teaching and learning of literacy and numeracy in Key Stage 2 (Director: Professor Terezinha Nunes, Oxford University)
 - b. 5-14 mathematics in Scotland: the relevance of intensive quantities (Director: Professor Christine Howe, University of Cambridge)
 - c. Learning scientific concepts in classrooms at Key Stage 1 (Research Training Fellow: Stephen Hodgkinson, University of Brighton)
2. Learning across the curriculum
 - a. ACTS II: Sustainable thinking classrooms (Director: Professor Carol McGuinness, Queen's University Belfast)
 - b. LH TL: Learning how to learn in classrooms, schools and networks (Director: Professor Mary James, Institute of Education London)
3. The use of ICT to enhance learning
 - a. INTERPLAY: play, learning and ICT in pre-school education (Professor Lydia Plowman, Stirling University)
 - b. InterActive Education: teaching and learning in the information age (Director: Professor Rosamund Sutherland, University of Bristol)
 - c. The use of ICT to improve learning and attainment through interactive teaching (Director: Dr Steve Kennewell, Swansea School of Education)
4. Environments for better learning
 - a. SPRinG: Social Pedagogic Research into Group work (Directors: Professor Peter Blatchford, Institute of Education London (for KS2) and Professor Peter Kutnick, King's College London (for KS1))
 - b. ScotSPRinG: Supporting group work in Scottish schools: age and the urban/rural divide (Director: Professor Donald Christie, University of Strathclyde)
 - c. HSKE: Home-school knowledge exchange in primary education (Director: Professor Martin Hughes, University of Bristol)
 - d. Provision for gifted and talented pupils at secondary transfer (Research Training Fellow: Jenny Brookes)
 - e. Identity and Learning (Associate project) (Director: Professor Andrew Pollard, Institute of Education London)
 - f. EPPE: Effectiveness of pre-school primary education (Associate project) (Director: Professor Iram Siraj-Blatchford, Institute of Education London)

5. School conditions for the improvement of teaching and learning
 - a. Consulting Pupils about Teaching and Learning (Director: the late Professor Jean Rudduck, University of Cambridge)
 - b. CPAL: Consulting Pupils on the Assessment of their Learning (Director: Dr Ruth Leitch, Queen's University Belfast)
 - c. Understanding and developing inclusive practices in schools (Director: Professor Mel Ainscow, University of Manchester)
 - d. LHTL: Learning how to learn in classrooms, schools and networks (Director: Professor Mary James, Institute of Education London) (This project fell equally in two categories)
 - e. Lessons for learning: using research study lessons to innovate and transfer metapedagogy (Research Training Fellow: Pete Dudley, Capita)
 - f. VITAE: Variations in teachers' work and lives and their effects on pupils (Associate project) (Director: Professor Christopher Day, University of Nottingham)

The discussion of research findings, which follows, will be organised under these topics and, for brevity, the projects will be referred to mainly by the relevant director's surname or their acronym.

Each of these headings, and hence the foci of the projects, maps on to a simple conceptual framework that has been used to review the coverage of TLRP work (see below)

The coverage of projects is by no means comprehensive, and many of the relationships remain unexplored. This is not regarded as a fault; the field of education, even teaching and learning, is so broad and complex that no collection of projects could be expected to cover everything of potential interest. What projects promised to do was to investigate some important issues in some depth and with appropriate rigour.



In recognition that value could be added to project work by review and synthesis across projects, drawing in research and scholarship from beyond TLRP where relevant, the conceptual framework was also used as a device for identifying areas where useful cross-Programme thematic work might be done. Thus, over time, a series of thematic initiatives were commissioned and have produced, or are producing, research outputs in the form of commentaries, journal articles and special issues, annotated bibliographies etc. Some of these thematic initiatives are relevant to this survey and will also be drawn upon, especially in the final section of this survey which synthesises findings. Of particular relevance is TLRP thematic work on:

1. Neuroscience, human development and teaching (Director: Dr Paul Howard-Jones, University of Bristol)
2. Teacher learning (Director: Professor Mary James, Institute of Education London)
3. Changing teacher roles, identities and professionalism (Director: Professor Sharon Gewirtz, King's College London)
4. Curriculum and domain knowledge (Director: Professor Robert McCormick, Open University)
5. Identifying learning outcomes (Professor Mary James, Institute of Education London)
6. Assessment and indicators of learning outcomes (Director: Professor Richard Daugherty, University of Cardiff)
7. Social diversity and difference: researching inequalities in teaching and learning (Director: Professor Miriam David, Institute of Education London)

Methodological approaches

The methodological approaches adopted by projects were diverse: including classroom experiments evaluating 'interventions' through pre and post tests compared with control groups; large-scale quantitative surveys; in-depth qualitative case studies of individuals, groups or schools; and combined approaches. Most projects combined approaches in some way, either by having separate survey and case study strands, for example, or by attempting to integrate quantitative and qualitative elements more formally.

The majority of projects funded through TLRP could be described as 'development and research'. In other words, they set out to stimulate some activity, innovation and change and to research the consequences. In some instances an action research approach, working collaboratively with teachers as researchers, was specifically adopted. Some such approach was regarded as necessary if projects were to fulfil the TLRP aim to 'work to achieve improvements in learning outcomes for identified groups of learners', which implied a developmental dimension. However, the further aim to 'work in authentic settings of teaching and learning' made the attribution of measured change to specific interventions rather difficult, except in those studies that were closely focused on very specific innovations in controlled settings. Even here the constraints of working in schools with whole classes of children precluded the use of fully randomised experiments. For this reason, TLRP researchers are cautious about claiming to have found unequivocal evidence of cause and effect relationships although they all examine, in some detail, the various and complex associations between teaching, learning and context.

In project research briefings, as elsewhere, TLRP researchers have been expected to make explicit the 'warrant' for the knowledge claims they make (see James et al., 2005). In most cases they make reference to the way their research builds on previous work, its theoretical underpinnings and justification, the extent to which it has fulfilled the empirical standards of the social scientific approach adopted, and the ways in which the work has been received by the user community.

Some TLRP project teams are composed of researchers working with a single, coherent theoretical position or framework: there are examples of cognitive constructivist psychological perspectives, symbolic interactionist sociological perspectives, and cultural historical activity theory perspectives. However, many teams attempted, with varying degrees of success, to view the subjects of their study through multiple lenses in order to 'bring multi-disciplinary or interdisciplinary approaches to research'. (See James, 2006, for a discussion of the challenges of trying to meet TLRP's ambitious aims.)

The cross programme thematic work also adopted a range of approaches although none could be characterised as systematic research reviews, in the style of EPPI in the UK or the What Works Clearinghouse in the US. Much of this work was mostly carried out by a social, dialogic process involving a series of meetings or seminars, with contributions from researchers within and beyond TLRP, and subsequent deliberation and synthesis by a core team or task group.

Outputs from projects and thematic work have also taken various forms. In addition to books and journal articles, each project has produced (or will produce) a research briefing, for policymakers and practitioners, which summarises the research and findings. (These can be downloaded from the TLRP website at: <http://www.tlrp.org/pub/research.html>) These summaries explain the focus of the research, identify key findings and their implications for policy and practice, and provide brief accounts of how the research was conducted and why we should have confidence in the conclusions. These research briefings are the main basis of the accounts in the next section of this survey. (All publications from all projects can be located via the TLRP website.)

Cross-project thematic work has also produced a range of outputs, often in the form of journal special issues but, perhaps most importantly, in a series of TLRP commentaries (also downloadable from the website).

Selected studies

This section provides a very brief summary of the findings each of the TLRP projects that carried out research in primary schools or pre-school settings. They are grouped according to the classification outlined earlier.

Learning in specific areas of the curriculum.

Two TLRP projects and one research training fellowship have investigated specific areas of the curriculum in the primary phase. These involve the core areas of literacy, numeracy and science although, as mentioned earlier, this was what was funded, rather than deliberately planned. The project on 'The role of awareness in the teaching and learning of literacy and numeracy in Key Stage 2' (Nunes) focused upon aspects of learning to spell and learning fractions. The project directed by Howe was an extension of this, based in Scotland, but researching aspects of mathematics only. The project conducted by Hodgkinson, as the focus of his research training fellowship, was linked to the SPRinG project on group work, summarised below. However, it is included in this section because its focus on primary science was particularly strong.

The two different subject foci of Nunes' project are summarised separately here although they were unified by similar experimental approaches to their investigations.

The teaching of literacy in primary and infants schools is a 'hot topic' and much current attention has been given to the role of phonics. Much less attention has been given to the potential value to junior age children of learning about the role of morphemes in spelling. The English language, with roots in many other languages, uses units of meaning called morphemes to form words. An understanding that spelling represents morphemes can help.

For example, the correct spellings of ‘magician’ and ‘infection’ are not predictable from the way they sound. The ending of both sound the same. However, knowing that the suffix ‘ian’ is added to a noun denoting a person, but the suffix ‘ion’ is added to a noun denoting a concept, can help children make sense of the spelling of these kinds of words. Nunes’ project on morphemes showed that literacy can be improved by increased awareness of how morphemes make words and are represented in spelling. Specifically they found that: i) primary school children of all ages have difficulties with spelling words when the spelling cannot be predicted from the way the word sounds; ii) children’s difficulties with spelling of many words can be reduced by making them aware of the morphemes that compose words; iii) making children aware of morphemes has a positive effect on their vocabulary growth. The implications of this study are that teachers should be made aware of the role of morphemes in spelling and that systematic teaching about morphemes school be introduced into primary schools.

Fractions were the other focus of Nunes’ project. In this she and her team tackled the problem of teaching rational numbers. Quantities represented by natural numbers are easily understood: we can count and say how many oranges are in a bag. However, fractions cause difficulty to most people because they involve relations between quantities. For example, if two girls spend half of their pocket money on snacks, they may not each spend the same amount of money. As with the morphemes work, the project developed a teaching programme which boosted pupils’ understanding of the relative nature of fractions. The team found that: i) most pupils in Years 4 and 5 have not grasped the relative nature of fractions as numbers, and their difficulty is primarily conceptual; ii) pupils have some intuitive understanding of the relative nature of fractions from their experiences with division; iii) teaching programmes that start from pupils’ intuitions about sharing, and which establish connections to fractions as numbers, can have a positive impact on pupils’ learning. The implications are that teaching pupils about fractions should include a focus on logical relations, but this should build on pupils’ intuitions. Teacher education needs to help teachers become aware of pupils’ intuitive understanding of the logic of fractions and the situations in which they are most easily understood.

The project conducted by Howe in Scotland, in collaboration with Nunes and her team, again studied the relations between quantities in mathematics. On this occasion the project was built on the observation that most mathematics teaching in the UK focuses on ‘extensive quantities’ involving one variable, such as distance or time, whilst ‘intensive quantities’ involving relationships between more than one variable (e.g. speed which involves distance in relation to time) tend to be ignored or treated in piecemeal fashion. A survey of primary school children showed that this neglect leads to enduring difficulties and undermines children’s mastery of fractions. A teaching programme was developed to remedy this and was found to boost understanding of intensive quantities as well as fraction usage. Moreover, the approach was compatible with current curricular demands and extended them in valuable ways. Specifically the project found that: i) primary school children of all ages have difficulties with intensive quantities, showing that mastery does not develop without teaching; ii) these difficulties are primarily conceptual; iii) primary school children of all ages have difficulties using fractions to name intensive quantities, but iv) a mere two or three hours of teaching can boost children’s understanding and their use of fractions in these contexts. The implications are that intensive quantities, and the use of fractions to name them should be explicitly taught in primary schools because children cannot be expected to generalise their knowledge from extensive contexts to intensive ones. However, this does not require major changes in the school curriculum because short teaching programmes have been found to be effective.

The studies summarised above were conducted in school contexts by researchers with backgrounds in psychology, using quantitative survey and experimental research designs and adopting cognitive constructivist theoretical perspectives. The study undertaken by

Hodgkinson, as a fellowship towards a PhD, was of a very different kind. It adopted an ethnographic approach to the investigation of how young children come to understand the world as they interact in groups whilst undertaking science tasks. (This project is linked to the Key Stage 1 SPRinG project on group work which is summarised below.) The results of this project are yet to be evaluated or published, however the narratives developed from contrasting ethnographic studies of classroom practice in England and Germany indicate two forms of classroom ritual – hegemonic and identity rituals – which shape the way children find meaning in classroom activities, or are excluded from doing so.

Learning across the curriculum

The two TLRP projects which we have classified under this heading focus on the development of skills and practices associated with analytical, critical and creative thinking, assessment for learning and learning how to learn. In both projects the approach to development was based on providing teachers with practical strategies that could be ‘infused’ across the curriculum. The project teams took the view that skills learned in separate lessons or courses would not easily transfer to different subject contexts without explicit attempts to integrate them across the curriculum. Previous research and scholarship had demonstrated that thinking skills and learning to learn are not separate psychological abilities but learnable practices that are used for learning different subject matter. Thus thinking skills and thinking something are inextricable, as are learning how to learn and learning something.

In the ACTS II project, McGuinness developed frameworks and classroom strategies with teachers, involving a curriculum topic and specific pattern of thinking being taught together. These methods were evaluated in a three-year study with Key Stage 2 pupils in Northern Ireland schools. A particular focus was on the development and analysis of classroom talk that helped children to think about their thinking (metacognition). The findings indicated that: i) teachers were able to design and teach lessons using the ‘infusion’ approach; ii) children’s thinking strategies were helped by such things as modelling thinking and using visual tools; iii) 94 teachers involved in the CPD programme reported changes in their classroom practices, in their perceptions of children’s thinking and in their images of themselves as teachers; iv) on self-rating measures, children participating in ACTS reported positive changes in their learning, particularly their use of metacognitive strategies, which were related to effort. However these changes took time to build: those children who had participated for three years benefited most; and gains were not even across all learners. The 80 per cent of children with moderate to high developed abilities, as measured by verbal and non-verbal reasoning tests, benefited most. When the bottom 20 per cent were given problems to solve they showed positive changes in their strategies compared to control children, but these specific achievements did not translate into how the children rated themselves more generally. Children’s self-evaluations were positively correlated with measures of attainment in reading and mathematics but effects were small compared to the impact of background factors such as social-economic circumstances, gender, prior attainment and age in class. This shows how powerful these background factors are. Nevertheless, the study showed that thinking skills and strategies are amenable to change and they can be a lever for improvement. As with the Nunes and Howe studies (above) the key seems to be to help children become aware of these strategies and how to use them. The implications are that developing children’s capacity to learn takes time and special attention needs to be paid to children with poorer cognitive and social resources. This in turn requires teachers to develop both their practices and their beliefs about learners.

Making learning practices explicit was also a key theme in the Learning How to Learn project led by James. This project built on existing research which has demonstrated that assessment for learning (formative assessment) practices can lead to improved learning and achievement. This project was primarily concerned with the conditions in schools and networks that would allow such practices to become embedded and spread within and between schools. For this reason it is also included in the relevant section below. The strand of the project that focused

on classrooms showed that assessment for learning helps teachers promote learning how to learn by providing ideas for practical strategies that enable pupils to become more autonomous learners. This enables classroom practice to be better aligned with the dominant values that 600+ teachers expressed in a questionnaire, and less driven by the culture of performativity. However, analysis of video evidence showed how difficult it is to shift from reliance on specific techniques e.g. writing learning objectives on the board (the letter of AfL) to practices based on deep principles integrated into the flow of lessons (the spirit of AfL). Again, this project demonstrated that although advice on techniques is useful and important to teachers, longer term development and sustainability depends on professional development that encourages teachers to re-evaluate their fundamental beliefs about learning, the way they structure tasks, the nature of their classroom roles and their relationships with pupils.

The use of ICT to enhance learning

The use of ICT in teaching and learning warrants a separate heading because three projects (one in secondary schools only) had this as a central focus, and a whole new set of projects on technology-enhanced learning (TEL) is being established within TLRP at the time of writing. TEL work is likely to continue until 2012.

The INTERPLAY project, led by Plowman in Scotland, investigated the challenges of introducing ICTs into play settings involving very young children, and how practitioners can respond to changes to create opportunities for learning with ICT. Practitioners and researchers worked together to address these questions using the concept of 'guided interaction' to initiate small projects using different approaches. They found that: i) children's encounters with ICT are enhanced when practitioners use guided interaction (questioning, modelling, praising, supporting) and balance child-initiated and adult-led activities; ii) encounters with ICT accompanied by guided interaction can enhance dispositions to learn, knowledge of the world and operational skills, as well as hand-eye coordination; iii) providing a broad range of ICTs, including digital still and video cameras, mobile phones and electronic keyboards and toys, as well as computers, promotes more opportunities for learning. The implications are that professional development of practitioners is needed to develop a responsive, reflective pedagogy, and nurseries should broaden their focus beyond computers to other forms of ICT and be aware that children develop competence with ICTs at home.

The InterActive Education project (Sutherland) worked in partnership with primary and secondary school teachers to investigate ways in which ICT can be used to enhance learning in subject domains, particularly its value in helping children to enter new knowledge worlds. The approach was holistic and socio-cultural. The project found that: i) schools have interpreted enthusiasm for ICT in education as being largely about the acquisition of equipment; ii) effective teaching and learning with ICT involves building bridges between 'idiosyncratic' learning, arising from extended periods of individual engagement, and 'intended' learning that often needs to be supported by the teacher; for example, pupils are unlikely to develop knowledge of science from game-like simulation software; iii) there is a two-way exchange of knowledge between home and school use of ICT and this impacts on school learning; iv) the teacher remains key to the successful use of ICT for learning. The implications are that professional development is crucial so that teachers can put ICTs to good pedagogical use in the classroom, encouraging pupils to build on their out-of-school learning but helping them to construct 'common' knowledge which has currency in wider communities, as well as in the classroom.

The project led by Kennewell, in Wales, on the use of ICT to improve learning and attainment through interactive teaching is an extension of the InterActive Education project. Kennewell's project has focused particularly on the use of interactive whiteboards. The recent proliferation of interactive whiteboard (IWB) technology in classrooms, particularly in the UK, suggests that teachers and educational policymakers see this as a very powerful teaching tool. Although the project will not complete until the summer of 2007, the indications are that

Kennewell's results will be much like Sutherland's. The features of IWBs have the potential to support new forms of interactivity in teaching and to support a more participatory pedagogy. However, they are still tools that need to be well used. If IWB's are to achieve the claims made for them, there may need to be a new wave of professional development which takes account of the particular affordances of IWBs and the need to embed them in teachers' pedagogical reasoning.

Environments for better learning

A group of TLRP projects investigated features of classroom settings and the wider environment that promotes or inhibits learning. Two linked projects researched the effects of pupils working in groups in classrooms, and another three projects studied the interactions between learning in home and school. A further major 'associate' project has compared the learning benefits of different structures for provision in the early years.

The SPRinG (Social Pedagogic Research into Group work) project sought to develop a new approach to increasing engagement and learning in everyday classroom settings at Key Stage 1 (led by Kutnick), Key Stage 2 (led by Blatchford) and Key Stage 3 (led by Galton). The project team was aware of a wide gap between the potential of group work to enhance learning and their previous evidence of only limited use in schools. The problems that they identified were a lack of a strategic view of the purpose of groups and practical problems of formation and process. In response, the team embarked on a project to work with teachers to develop a programme of group work that could be successfully integrated into school life (the development stage) followed by a year-long intervention study to evaluate the success of the programme in terms of attainment, motivation and within-group interactions, compared to control groups (the evaluation stage). An applications stage was designed to apply group work to contexts known to be particularly problematic. The project found that: i) in contrast to views that group work may interfere with learning in mainstream curriculum areas, teachers successfully implemented effective group work in both primary and secondary and across the curriculum; ii) this had a positive effect on pupil's academic progress and higher conceptual learning (at KS1 effect sizes from 0.22 to 0.62 were recorded in reading and mathematics; at KS2, where science was a special focus of the project; effect sizes from 0.21 to 0.58 were recorded for conceptual understanding and inferential thinking); iii) there were positive effects on pupil behaviour, through increased on-task interactions, more equal participation, sustained interactions and higher level discussions; iv) there were improvements in personal relations between teachers and pupils and among pupils, provided that teachers took the time to train pupils in the skills of group working. The implications were that group work can be made to work with benefits to attainment, motivation and behaviour. However, this requires preparation and support. Group work skills need to be approached developmentally: social skills first, then communication skills, then problem-solving. Providing teachers with practical 'relational' strategies, based on principles, provides a successful approach to raising standards and improving behaviour.

The linked 'extension' project in Scotland (ScotSPRinG), led by Christie, had similar results. This project worked only in primary schools but investigated, especially, the effects of class composition in urban and rural school contexts where classes may be single age or a mix of year groups. As with the KS2 work in England, the team worked with upper primary school age pupils and focused upon the development of conceptual understanding in science, although a range of cognitive, affective and social measures were used to assess impact of innovations. Project findings showed: i) significant gains across a number of measures, attributable to the group work intervention; ii) cognitive gains were related to the quality of collaborative dialogue during group work; iii) there were no consistent differences between single age or mixed age classes, nor between urban and rural schools; iv) group work yielded significant gains in social relations with collaborative engagement with tasks contributing most, however, socio-emotional gains were independent of the cognitive gains. The practical 'relational' strategies offered to teachers were highly valued and reported to benefit both

teachers' professional practice and pupils' learning which implies that the SPRinG approach is effective and sustainable.

The Home-school knowledge exchange (HSKE) project, led by Hughes, investigated how the home and school environments for learning might complement each other. Focusing upon literacy and numeracy in these two worlds, the team helped teachers, parents and children to find new ways of exchanging knowledge between home and primary school, using videos, photographs, shoeboxes of artefacts etc. They then investigated how this process of knowledge exchange could enhance learning and ease the transition to secondary school. The project found that: i) there are substantial 'funds of knowledge', embedded in national, ethnic and popular cultures of homes and communities, that can be used to support learning in schools; ii) simple knowledge-exchange activities can make teachers more knowledgeable about children's out of school lives, and parents more knowledgeable about what happens in school; iii) HSKE can have a positive impact on teachers, parents and children and on attainment although gains were not statistically significant in mathematics, and not uniform across the project in literacy (they were significantly better in Cardiff schools but not in Bristol). However, the implications are that policy-makers and school leaders should pay more attention to HSKE as a means of improving relationships and raising standards.

A research training fellowship, held by Brookes, is linked to the HSKE project but focuses particularly on provision for gifted and talented pupils at secondary transfer. Findings from this ethnographic study tracking 15 Year 5 children into Year 8 are yet to be evaluated and published. However, there are indications that school selection by parents, and the process of transfer, are experienced as multi-faceted, iterative, stressful and prolonged. Evidence from the HSKE project, and this linked fellowship, focusing particularly on the social and emotional dimension of secondary transfer, has been the focus of an innovative dramatic representation of research findings which is now available on a DVD (see http://www.tlrp-archive.org/cgi-bin/tlrp/news/news_log.pl?display=1181220375 for details).

Both of the home-school projects outlined above drew to some extent on the methodological (longitudinal ethnography) and theoretical (symbolic interactionist) antecedents of work by Pollard. The interactions between pupils' experiences of schools, homes and communities in the formation of learner identities has been a focus of his longitudinal ethnography of two cohorts of children (ten in each of two primary schools contrasted by different social class settings). They were studied from 4 to 16 and tracked into secondary school. Although not funded by TLRP, this series of studies has been drawn into TLRP as an associate project, partly because Pollard's thinking, derived from this work, has informed the way the scope of the Programme has been conceptualised (see the framework above). Comparison and analysis of detailed case studies from this project revealed that: i) relationships between teachers and pupils remain the basis of the moral order of the classroom and underpin discipline and behaviour; ii) children develop their identities as learners through successive experiences as they move through schooling; iii) pupils actively negotiate their way through schooling, which, over time, can be conceptualised as a 'pupil career'; iv) the extent to which school provision matches learners' identities, social relationships and cultural resources strongly influences the outcomes of education. The implications are that attention needs to be given to the creation of positive classroom climates characterised by respect, trust and mutual exchange of dignity; the most fundamental form of education – the process of becoming a person – requires as much careful consideration as the acquisition of knowledge and skills; and, personalised provision in schools, should build on an understanding of the development of these strategic biographies, and respond to the social, cultural and material experiences of different groups of learners, which is challenging when inequalities between schools remain.

Another 'associate' project, funded by the DfES, is EPPE (Effectiveness of pre-school primary education), the most significant European study to date on the impact of pre-school and the contribution of family background to children's development (3-11 years old). The

findings from the pre-school study (3000 children and 141 pre-school settings) are that: i) high quality pre-school experience benefits children and these benefits remain evident at age 10; ii) children made more gains in settings combining education and care and in nursery schools where there were more highly qualified staff; iii) good early years staff provided direct teaching, instructive learning environments and ‘sustained shared thinking’ to extend children’s learning; iv) a high quality early years home environment is associated with gains for children but what parents do is more important than who they are. The implications of this project have already had a substantial impact on national early years policy including establishing free entitlement to pre-school for all children; pilot projects on an early (2-3yrs) start for disadvantaged children with a greater emphasis on quality; expansion of Children’s Centres under Sure Start and a funding framework to enhance staff qualifications; greater emphasis on adult/child interactions in the English Primary National Strategy and the Foundation Stage; initiatives to increase parental involvement through joined up services, especially to disadvantaged families.

School conditions for the improvement of teaching and learning

A final cluster of TLRP projects focuses upon the conditions within schools, and across networks of schools, that support improvements in teaching and learning.

Consulting Pupils about Teaching and Learning, a network of six projects coordinated by the late Professor Jean Rudduck, built on growing recognition that young people have a right to be heard and have something worthwhile to say about their school experiences. The UN Convention on the Rights of the Child (1989) included children’s right to be heard as one of its four basic principles. Pupil consultation is also regarded as integral to the citizenship curriculum and lifelong learning. However, listening to and learning from pupils is a challenge to teachers and schools. The findings of the projects, drawn primarily from the testimony of pupils and teachers in 48 schools, provided evidence of benefits for: i) pupils, by enhancing engagement with learning, sense of agency and of self as learner; ii) teachers, by deepening insights into children’s abilities and learning preferences, leading to more responsive teaching and willingness to give pupils more responsibility; iii) schools, by strengthening school policy in substantive rather than marginal or tokenistic ways; and iv) national policy, by providing new insights and practical tools for school self-evaluation and development planning. Importantly, however, given the increasing status of ‘pupil voice’ as a ‘movement’, this research also cautioned that ingrained habits can prevent pupils being heard. Conditions for new ways of listening include: hearing the quiet voice in the acoustic of the school; avoiding the creation of a pupil voice elite; maintaining authenticity; sharing data and/or offering feedback to pupils; trust and openness as a pre-condition of dialogue and action.

This project has been extended by a subsequent project carried in Northern Ireland with a particular focus on children’s rights to be consulted on the assessment of their learning. This has particular relevance in Northern Ireland as policy makers introduce a Pupil Profile to record pupils’ development and encourage the adoption of Assessment for Learning in classroom practice. Led by Leitch, the CPAL project comprises three independent but interrelated studies in primary and post-primary schools. One of these asked (through focus groups, creative approaches and e-consultation) 80 Key Stage 2 pupils what they thought of the concept of the Pupil Profile, and another study investigated teachers’ and parents’ awareness of children’s rights and their responses to key aspects of AfL pedagogy. Findings were that: i) KS2 pupils viewed Pupil Profiles as personal documents, useful for helping them improve their learning and helping them with decision-making about future schooling; ii) to fulfil these expectations, children thought that Profiles should provide feedback from teachers on how to improve, be attractive and readable, include a section contributed by pupils, have input from parents/carers, be inclusive of wider abilities and achievements, and enhance a pupils’ views of themselves; iii) teachers advocated children’s rights, expressed by Article 12 of UNCRC and embodied in AfL practices, but viewed time, class size, curriculum coverage,

need for control and school culture as constraining implementation. CPAL demonstrates that children can be consulted directly on significant matters of educational policy, and that where principles of AfL are embedded in practice, pupils can experience high levels of participation. However there is a need to promote greater consistency among teachers of what consultation means from a rights-based perspective.

The issue of children's rights was also implicit in the work of the project on inclusion, led by Ainscow. This collaborative action-research project in three local authorities addressed the question of how schools can include all children from the communities they serve and enable them both to participate fully and achieve highly. The findings were that: i) many barriers to participation and learning stem from teachers' misplaced assumptions about what pupils can do and how best to teach them; ii) 'interruptions' to established understandings and practices can be fostered when groups of staff engage with evidence about pupils' experience of school and their own practice; iii) it is not possible to improve outcomes for pupils simply by teaching the curriculum harder and longer; teachers have to strengthen pupils' pleasure in learning and their self-esteem. The implications are that teachers need to question their accepted ways of working; focusing on a specific issue for school enquiry is more productive than imposing whole school change; and, the national focus on highly measurable outcomes needs to be broadened in addressing underachievement and inclusion.

The Learning how to learn in classrooms, schools and networks (LHTL) project has already been mentioned, above. Its findings are also relevant to this section because it was principally concerned with the conditions in schools and networks that would enable the positive effects of assessment for learning to be scaled up and sustained without intensive and expensive support. Combining both quantitative and qualitative methods, this project worked with 40 infants, primary and secondary schools to investigate a 'logic model for a causal argument' that linked classroom practice to teachers' own learning practices and school management practices. It found that: i) classroom-focused inquiry by teachers is a key condition of promoting autonomous learning by pupils and that schools that embed AfL and LHTL make support for professional learning a priority; ii) educational networks are much talked about but little understood, and electronic tools for professional development purposes are not well used, however, the intellectual capital of schools can be built on the social capital developed through teachers' personal networking practices. The implications are that school leaders need to create the structures and cultures that support collaborative classroom enquiry and the sharing of innovations in classroom practice, within and beyond the school, because a key aspect of teacher learning is 'knowledge creation' (i.e. a third metaphor to add to the more familiar 'learning as acquisition of knowledge and skill' or 'learning as participation in communities of practice').

Linked to this project is another TLRP research training fellowship, awarded to Dudley to undertake an investigation of ways in which Japanese 'Lesson Study' might be adapted and used in UK schools. This provides a formal approach to collaborative classroom enquiry that emerged as a crucial factor in the LHTL project. Teachers work in groups to formulate hypotheses about adjustments to lessons to improve learning. These are tested in Research Lessons which colleagues observe and discuss subsequently. New hypotheses and adjustments are tested in further iterations until the teachers feel ready to perform a public research lesson. This fellowship project has yet to be evaluated although there are early indications that: i) Research Lesson Study engages teachers at all levels of experience and sustains their interest over time; ii) it involves pupils directly in the analysis of teaching; and iii) leads to innovation in lesson design and improvements in pupil achievements. Partly because of the unique position of this researcher, who is also a policy maker (Director of the Primary National Strategy at the time of writing), he has been able to facilitate the dissemination of findings of this project, the LHTL project, and the TLRP more generally, through guidance materials produced by the National College for School Leadership and the Primary National Strategy.

Finally, the importance of teacher learning emerges again in the VITAE ‘associate’ project. This study of 300 teachers provides a new perspective on teachers’ quality, retention and effectiveness over the whole of their careers. The findings are that: i) pupils of teachers who are committed and resilient are likely to attain more than pupils whose teachers are not; ii) teachers’ sense of positive professional identity is associated with well-being and job satisfaction and this is a key factor in their effectiveness; iii) the commitment and resilience of teachers in schools serving more disadvantaged communities are more persistently challenged than others ; iv) teachers do not necessarily become more effective over time – a minority risk becoming less effective in later years; v) sustaining and enhancing commitment and resilience is a key quality and retention issue. The implications are that head teachers, national associations and policy makers need to consider the connections between commitment, resilience and effectiveness and develop strategies for meeting the needs of teachers in different phases in their professional lives, and in different communities.

Main areas of divergence, disagreement and consensus

TLRP projects all share a concern with teaching and learning but they do not completely overlap in terms of focus, context, scale, methods or perspective. Therefore they cannot be compared directly and any ostensible areas of divergence, disagreement or consensus can be contested. As the synthesis below indicates, we have attempted to elicit some common themes and distilled these into principles for practice. However, they are at a very general level and some might say that they are self-evident truths. Even if this were true, TLRP evidence suggests that many are still some way from being operationalised, implemented and sustained in policy and practice. So they are worth reiterating.

At the level of detail some differences do emerge, for example, projects that focus on cognitive dimensions of learning (e.g. Nunes) might seem to contrast with those that emphasise emotional engagement, dispositions and motivation (e.g. Hughes and Pollard), or those that investigate learning as socio-cultural activity (e.g. Sutherland). However, surface differences usually disappear on further scrutiny because different projects ask different research questions. They do not necessarily refute the value of other questions or perspectives. All might be considered important and complementary in investigating the holistic experience of learning by children, in and out of school.

If there is one notable area of agreement in general, but divergence in detail, it concerns teacher learning. Most projects produced strong evidence that a key to improved learning and achievement by pupils is the learning of teachers. However, there are some differences implied by the evidence about how this learning is best achieved. Some projects (e.g. Nunes and Howe) argued strongly that research findings need to be translated into practical strategies and materials that teachers can use directly in classrooms, whilst others were more inclined to support classroom based enquiry in which teachers have a greater say in identifying problems to work upon. However, even here, the differences are more of degree than substance. Those projects, such as Ainscow’s, which adopted an action research approach still saw an important role for evidence from research in challenging the taken-for-granted assumptions that stand in the way of improvement in learning. As John Elliott pointed out in his contribution to the C-TRIP thematic seminar series (see <http://www.tlrp.org/themes/seminar/gewirtz/papers/seminar8/paper-elliott.pdf>), Lawrence Stenhouse, who is often regarded as the father of teacher research in the UK, saw the transformation of schools as most likely to arise from a productive relationship between university researchers and classroom practitioners, who each have different but complementary roles in generating and testing new knowledge for practice.

Synthesis of key findings and insights

In 2006, the TLRP directors' team began work on looking across project findings to see whether any overarching messages were emerging. The TLRP Commentary, *Improving teaching and learning in schools* (James and Pollard, 2006), was the first statement of our tentative conclusions, including the ten principles for effective teaching and learning. We subsequently 'tested' their validity in discussion with various audiences. One such 'audience' was researchers working on TLRP post-school projects, who were interested in the extent to which such principles might generalise to their work. Discussions with them alerted us to some particular emphases and gaps in the school based work. For example, although the schools projects were interested in learning outcomes, and were underpinned by coherent conceptions of learning, they probably contributed more 'new' knowledge to our understanding of effective teaching, than learning per se. This is perhaps understandable given the nature of schools, which contrasts with post-compulsory settings where 'teachers', as such, do not always exist. Furthermore, whereas psychological, social-psychological or sociological approaches were drawn upon, biological (neuroscientific) aspects of learning were not investigated in TLRP schools projects. As one respondent expressed it, 'Where is the brain in TLRP's model of learning?' TLRP has sought to redress this imbalance by funding a seminar series which has published a commentary on *Neuroscience in Education* (Howard-Jones, 2007). In the first month after publication this commentary was downloaded 38,000 times. The object of this publication was to engender a formal dialogue between neuroscience and education because almost all teachers believe that knowledge of the brain is important in the design of educational programmes. Many programmes that claim to be 'brain-based' have been flourishing in the UK but, as this commentary makes clear, 'these programmes have usually been produced without the involvement of neuroscientific expertise, are rarely evaluated in their effectiveness and are often unscientific in their approach' (p. 4).

Other criticisms of our attempt to synthesise our findings from school-based projects highlighted limited attention to issues of equity and transitions, including a need for greater clarity about the relationship of informal to formal learning because informal learning can occur within schools, as formal learning can occur in non-school settings. It is not the case that schools projects have nothing to say on these issues, as the summaries above make clear, but some of their data on these issues have yet to be fully analysed or written up. For this reason a further thematic group, led by Miriam David, is working on mining evidence across TLRP on *Social diversity and Difference*.

Despite these reservations, our attempt to synthesise findings from school-based projects in the form of principles, has been welcomed. For example, they are to be included in new CPD material from the Primary National Strategy in England. In autumn 2007, we will publish them again as a poster inside a magazine called, *Principles into Practice: a teacher's guide*. This will be sent out, with a DVD, to every school in the UK.

Each of the ten principles is first expressed as a simple statement beginning with the stem: 'Effective teaching and learning....' It is then expanded in a description of the practices that are seen as important. In the original version (in James and Pollard, 2006) each principle was also mapped against the evidence that supported it. Such evidence comes from across school sectors. We have not reiterated all that evidence here because we have summarised project findings in the section above. However, we have added critical commentary with respect to some of these principles.

Principle 1. Effective teaching and learning equip learners for life in its broadest sense

Learning should aim to help individuals and groups to develop the intellectual, personal and social resources that will enable them to participate as active citizens, contribute to economic

development and flourish as individuals in a diverse and changing society. This may mean expanding conceptions of worthwhile learning outcomes and taking seriously issues of equity and social justice for all.

As the first and most important aim of TLRP, all projects were expected to work to improve outcomes for learners. In the early days it was mostly assumed that this meant increasing attainment on tests and examinations. As the work progressed, researchers sought to broaden the concept of outcomes beyond those defined by the current standards agenda. The need to do this was emphasised by the work of the Inclusion projects, which saw engagement with learning as crucial. The projects on group work (SPRinG and ScotSPRinG), researched the affective dimension as an outcome of learning as well as a precondition for academic success. ACTS II found a positive relationship between attainment, effort and the development of metacognitive strategies and the Learning How to Learn (LHTL) project concluded that a capacity for autonomous learning is possibly the most important outcome for students who will live and work in the fast moving world of the 21st century. The longitudinal studies carried out by Pollard emphasised the importance of the development of learner identities for personal fulfilment.

It is possible to argue that attempts to broaden the ‘standards’ debate, were driven by a desire to promote educational values beyond those that focus narrowly on benefits to the economy. Education is driven by moral purposes (Pollard, 2002) and educational research reflects this. Such values are contested and the way in which this principle is worded possibly understates the extent of the debate about the aims of education.

Within TLRP, this debate was acknowledged in the work of the cross-phase Learning Outcomes Thematic Group. Using the distinction made by Sfard (1998) concerning two metaphors of learning – learning as acquisition (of knowledge, skills and understanding) and learning as participation (in communities of practice) – and speculating on the need for a third ‘knowledge creation’ metaphor (Paavola, et al., 2002), it became clear that there was a difference between the outcomes that were promoted in post-compulsory settings and those that are most obviously pursued in schools. As James and Brown (2005, p.17) observed:

- The acquisition metaphor was used, and attainment/understanding/concepts and other cognitive outcomes were pursued, in all sectors of education, but especially in schools and HE.
- The participation metaphor was more characteristic of post-compulsory education (FE, HE, workplace learning, CPD, and lifelong learning) with strong emphasis on outcomes associated with social practice, dispositions, membership, access and inclusion.
- Only early years (pre-school and early primary) and HE appeared in the creative category to suggest a possible need for a ‘knowledge creation’ metaphor.

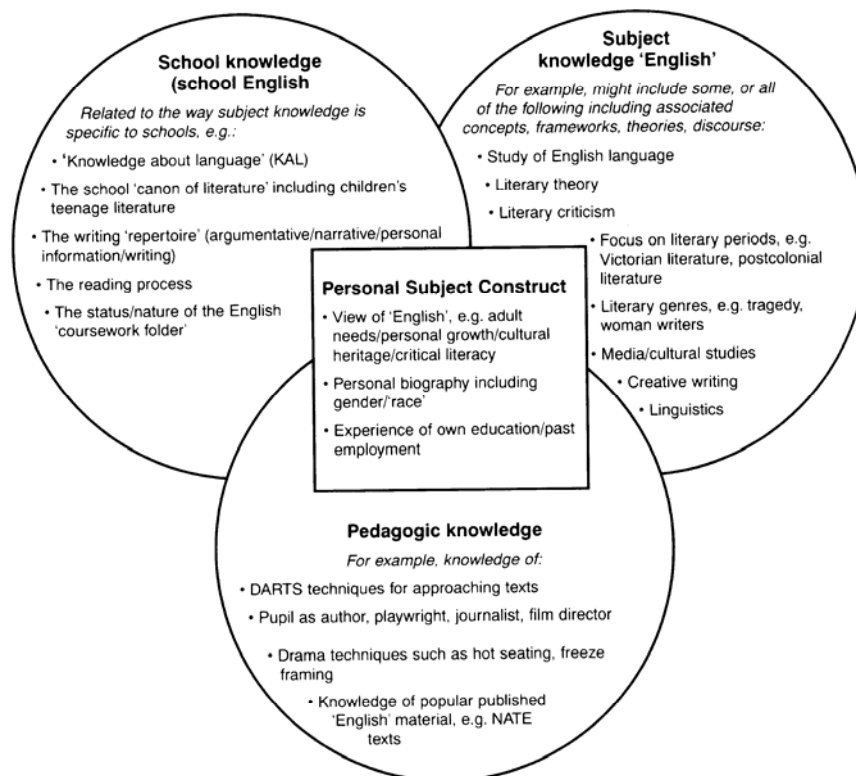
One implication of this analysis of the first 30 TLRP projects was that more focused attention needs to be given to the nature of the outcomes that are valued, promoted and assessed at every phase, and the degree of consistency and coherence that may, or may not, be needed in education across the lifecourse and across diverse groups of learners.

Principle 2. Effective teaching and learning engage with valued forms of knowledge

Teaching and learning should engage learners with the big ideas, key processes, modes of discourse and narratives of subjects so that they understand what constitutes quality and standards in particular domains.

TLRP projects that focused on particular subjects showed that teachers need to possess both a good understanding of the subjects they teach and of the best ways to teach them. The literacy and numeracy projects carried out by Nunes and Howe emphasised the role of ‘awareness’ of this kind by teachers. They also showed that insights from research were readily used by teachers when they were transformed into worked examples.

Further cross-programme thematic work on curriculum, domain knowledge and pedagogy, led by Professors McCormick and Moon, is currently underway and will report in a special issue of *The Curriculum Journal* at the end of 2007. This group is exploring a heuristic model (see <http://www.tlrp.org/themes/seminar/moon/papers.html>) which examines the relationships between four perspectives: the subject knowledge perspective; the curriculum perspective; the learner perspective; and the pedagogical perspective. Leach and Moon (1999) illustrate this with respect to secondary English teaching.



Principle 3. Effective teaching and learning recognise the importance of prior experience and learning

Teaching and learning should take account of what the learner knows already in order to plan their next steps. This includes building on prior learning but also taking account of the personal and cultural experiences of different groups of learners.

Pressures for ‘delivery’ and ‘coverage’ can work against the promotion of deep and secure learning, and enhanced motivation. Teachers need time to diagnose learning difficulties and help pupils to improve. This was a foundation principle of the LHTL project, which built on assessment for learning practice. The Inclusion project, the HSKE project and the EPPE project also encouraged teachers to challenge their taken-for-granted assumptions about the prior knowledge and experience of certain groups of children.

Principle 4. Effective teaching and learning require the teacher to scaffold learning

Teachers should provide activities and structures of intellectual, social and emotional support to help learners to move forward in their learning so that when these supports are removed the learning is secure.

The way teachers plan and structure activities in the classroom, and the role of classroom dialogue in scaffolding, was a theme in a number of projects. The InterActive project found scaffolding learning, by teachers, to be crucial across ages and across the whole range of school subjects because it promoted sustained, mindful engagement. It was also found to be crucial in early years learning with ICT (Plowman's INTERPLAY project).

Principle 5. Effective teaching and learning need assessment to be congruent with learning

Assessment should be designed and implemented with the goal of achieving maximum validity both in terms of learning outcomes and learning processes. It should help to advance learning as well as determine whether learning has occurred.

Complex learning behaviours and outcomes (see Principle 1 above) need subtle measures which often require observation, by teachers, over time and across different contexts. However, the way in which the initial TLRP projects were commissioned did not easily permit new measures of wider learning outcomes to be developed and tested prior to the introduction of pedagogical innovations (see James and Brown, 2005, for a discussion of this). In other words, most projects were 'development and research' rather than 'research and development', and assessments of outcome tended to be based on existing measures, such as national tests, rather than novel instruments. The problems raised were recognised as individual project teams sought to find adequate ways to assess the outcomes they wanted to promote, i.e. beyond conventional academic attainment.

These issues, identified by the Learning Outcomes Thematic Group (James and Brown, 2005), have subsequently been revisited by another TLRP thematic seminar series, led by Daugherty, with support from the Assessment Reform Group. This 'Assessment of Significant Learning Outcomes' (ASLO) thematic series is exploring the ways in which the relationships between assessment and curriculum are conceptualised. It has become evident that the problems inherent in specifying a curriculum and in designing valid assessments have been compounded, even within one country (UK), by the use of different terminology in different sectors. The ASLO team has been investigating examples of work undertaken on maximising the extent of congruence of assessment practices with the full range of learning outcomes as specified in five contexts: national curriculum mathematics; the 'Learning to Learn Indicators Project' in Europe; workplace learning; higher education; vocational education.

Through the course of the seminar series the thematic group has been developing a conceptual framework with a view to developing a more constructive critique of the extent of congruence in existing curriculum and assessment systems. It is hoped that the framework will eventually support the design of systems in which the alignment of assessment to curriculum is closer than is often found in current systems. A draft conceptual framework will be presented for discussion at the annual BERA conference in 2007.

Principle 6. Effective teaching and learning promote the active engagement of the learner.

A chief goal of teaching and learning should be the promotion of learners' independence and autonomy. This involves acquiring a repertoire of learning strategies and practices, developing positive learning dispositions, and having the will and confidence to become agents in their own learning.

Most TLRP schools projects emphasised the importance of developing learning awareness, explicit learning practices, positive learning dispositions, and learning autonomy. However, the LHTL Project found that, whilst teachers want to promote learning autonomy in their pupils, they find it difficult. Those who were most successful were those who took responsibility for what happened in their classrooms, and reflected on what they could do to improve matters, rather than blame external pressures or pupil characteristics.

Principle 7. Effective teaching and learning foster both individual and social processes and outcomes.

Learners should be encouraged and helped to build relationships and communication with others for learning purposes, in order to assist the mutual construction of knowledge and enhance the achievements of individuals and groups. Consulting learners about their learning and giving them a voice is both an expectation and a right.

The TLRP group work projects demonstrated the benefits of efforts to improve the quality of group work and student's mastery of cooperation and collaboration. Pupils involved in these developments made significant academic gains, which were stable across schools in different social contexts. This confirms the importance of dialogue. Other projects examined the benefits of making space for teachers to consult students about their learning. The Consulting Pupils Project found that taking students' views seriously enhances self esteem and agency and improves learning opportunities. However, these researchers also found that in the 'acoustic of the classroom' some pupils have more communicative competence, and are 'heard', more than others. Teachers need to be alert to social class and gender differences. The CPAL Project, which extended these themes, used the concepts of space, voice, audience and influence, from the UN Convention on the Rights of the Child (Article 12), as a framework for understanding the possibilities and challenges of encouraging student participation and consultation.

Principle 8. Effective teaching and learning recognise the significance of informal learning

Informal learning, such as learning out of school, should be recognised as at least as significant as formal learning and should therefore be valued and appropriately utilised in formal processes.

At classroom level, teachers can be encouraged and helped to value and build on informal learning. For example, projects investigating ICT in schools found that schools sometimes underestimate the extent of computer expertise derived out of school.

Explicit home-school knowledge exchange activities produced impact on outcomes but this was mediated by social class, gender and attainment factors, which underlines the importance of handling informal learning with sensitivity in order to avoid negative consequences for particular groups of pupils.

Principle 9. Effective teaching and learning depend on teacher learning

The need for teachers to learn continuously in order to develop their knowledge and skill, and adapt and develop their roles, especially through classroom inquiry, should be recognised and supported.

TLRP has produced very substantial evidence on the needs and character of teachers' professional development and learning, both through individual projects and through two cross-Programme thematic initiatives (see <http://www.tlrp.org/themes/seminar/gewirtz/> and a special issue of *Research Papers in Education* 20(2), 2005). That pupils' learning depends

substantially on teachers' learning is perhaps the overriding finding from TLRP schools projects. In subject areas, as in relation to more generic approaches to learning, teachers were found to need opportunities to develop their own knowledge, beliefs and values, as well as their practical skills. Teachers need to possess frameworks of concepts and principles to guide the decisions they make in the unpredictable situations they often encounter in classrooms. Without this there is a danger of practice becoming ritualised and mechanistic. TLRP evidence suggests that this development is best achieved through teachers' critical inquiry, with colleagues, in classrooms contexts. The Research Lesson Study Project (Dudley) researched a model for CPD that is school-based, longer term, collaborative and inquiry-based. The Inclusive Project, noted that visits from teachers in other schools was valued for questioning assumptions. Schools with cultures of participation and inquiry, and professional networks, are in a good position to support this but they benefit from help from local and national providers.

Specific, targeted professional development materials and courses were also valued. All TLRP development and research projects found that offering teachers practical strategies, based on principles and evidence, provided much needed support for setting up, managing and improving the effectiveness of innovations in everyday classroom settings.

Principle 10. Effective teaching and learning demand consistent policy frameworks with support for teaching and learning as their primary focus

Institutional and system level policies need to recognise the fundamental importance of teaching and learning and be designed to create effective learning environments for all learners.

A number of TLRP projects investigated the impact of policy on teaching and learning. Most noted that when senior management support innovation it becomes sustainable. However, LHTL Project head teachers revealed their concerns about leading learning in their schools within the context of prescriptive government policy. The greater the external pressure, the greater was the desire for flexibility, diversification and agency.

Implications for the Primary Review theme and for national policy, national agencies, LAs, schools, others

Applying evidence-informed principles for teaching and learning

In 1997 the New Labour government promoted 'standards not structures' as a new vision for the direction of education policy. After years of attempts to engineer improvements by changing the way the school system was structured and managed, this seemed at last to be recognition that, despite structural 'reforms', standards will only rise if core processes of teaching and learning are given priority. Although structures are necessary they are never sufficient to secure improvements in teaching and learning, and thereby higher standards. Structures should support these fundamental processes, including, and crucially, provision for professional development of teachers and leadership for learning.

UK governments have invested enormous amounts of financial and political capital in education in recent years. Many of the resulting initiatives are broadly consistent with the principles for teaching and learning which we have identified – certainly at a rhetorical level.

In England, the recent emphasis on 'personalised learning' in schools affirms the centrality of teaching and learning processes, and the DfES ostensibly seeks to maintain this priority through the National Strategies and initiatives such as the Gifted and Talented programme. Taken as a whole, changes in curriculum, assessment and other elements of the *Five Year Strategy for Children and Learners* are being designed to reduce prescription and increase

flexibility, as is the increased integration of children's services and the *Every Child Matters* agenda. A similar emphasis is to be found in the new standards for teachers being created by the Training and Development Agency for Schools. However, the benefits from such initiatives take time to be realised and political pressures sometimes press for more rapid outcomes. Indeed, some have suggested that the Education and Inspections Act, 2006, indicated that the government has reverted to structural change as a lever for raising standards.

Policies have ultimately to be turned into practices which bring about improvements in learning and achievement for individuals and groups – the output for the input. The key challenge is to ensure that the various elements and contributions, at each level of the system and from each stakeholder, are as consistent as possible with what we know about effective teaching and learning. This is not always achieved, as practising teachers are often only too aware.

We hope that the ten principles which we have identified will be helpful in evaluating such policy proposals. They could be applied to the policies of any government department or agency, to a school, or to a classroom. We hope that they will generate debate. But they are offered with due humility. They are the result of an analysis of key findings across TLRP's projects, some of which were still active whilst the overall review was being conducted. Conclusions in this complex field will always be conditional. The learning of pupils, teachers, schools, communities, researchers and governments are bound up together. In various ways, all need to learn better if children are to succeed.

Further research needed

Researchers will always say that further research is needed. There is justification in this in that knowledge is always provisional and needs to be constantly tested in new circumstances. However, as the preceding discussion has indicated, there are a number of areas in urgent need of further development:

- Further work on the contribution of neuroscience, on the one hand, and socio-cultural approaches, on the other, to our understanding of learning and the formation of learning identities;
- Further work on valid assessments of valued learning outcomes, following renewed public debate on the latter;
- Further work on how successful small scale innovations in teaching and learning can be effectively scaled up and rolled out across schools and across the system.

Note on authors including contributions to the field surveyed.

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