TLRP's ten principles for effective pedagogy: rationale, development, evidence, argument and impact

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The ESRC Teaching and Learning Research Programme worked for ten years to improve outcomes for learners across the United Kingdom. Individual projects within the Programme focused on different research questions and utilised a range of methods and theoretical resources. Across-programme thematic seminar series and task groups enabled emerging findings to be analysed, synthesised and communicated to wider audiences. One outcome of this activity was the development of ten 'evidence-informed' principles, which engaged with diverse forms of evidence, whilst acknowledging that 'users' would need to judge how best to implement such principles in their particular contexts. Synopses of these principles were published in posters and booklets, from 2006, but the evidence and reasoning underpinning them has not been fully explained. This contribution attempts to fill this gap. It provides a justification for the production of the TLRP principles and describes the iterative process by which they were developed. It clusters the ten principles in four broad areas that reflect the multilayered nature of innovation in pedagogy: (1) educational values and purposes; (2) curriculum, pedagogy and assessment; (3) personal and social processes and relationships; (4) teachers and policies. It elaborates the argument and evidence for each principle, drawing not only on findings from projects but, crucially, the thematic initiatives that began the synthetic work. There is also an attempt, though by no means comprehensive, to relate TLRP insights

to research and scholarship beyond the Programme's school-focused work in order to ground them in a wider literature: to work in other sectors of education; and to the broader literature that has accumulated internationally and over time. Finally, the five years since the principles were first published provides some evidence of impact. Although direct impact on learner outcomes cannot be measured, it is possible to provide an account of take-up by mediating agencies and others. The piece has been prepared as a contribution to international dialogue on effective teaching and learning and to provide a focus for scholarly comment, sharing of expertise and knowledge accumulation.

Keywords: TLRP; educational values and principles; curriculum; knowledge; pedagogy; assessment; relationships; teacher learning; educational policy; educational research.

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Rationale

The bold aim of the Teaching and Learning Research Programme (TLRP) was to work to improve outcomes for learners of all ages in teaching and learning contexts across the United Kingdom. At the conclusion of TLRP's work,[1] it is appropriate to consider what it has contributed to the understanding and advancement of effective pedagogy.

What is meant by 'effective pedagogy'?

The effectiveness of educational provision needs to be evaluated by reference to the goals and values of the society it serves. Within contemporary Western democracies, three major strands of philosophical and political thinking on educational purposes are well established. The first concerns teaching and learning linked to *economic productivity* – and has taken various forms historically as labour market needs have evolved. The second concerns *social cohesion* and the inclusion (or control) of different groups within society – this remains important within our unequal and diverse communities today. The third concerns *personal development*, fulfilment and expression – with a contemporary manifestation perhaps in the term 'wellbeing'. The three are, of course, deeply interconnected. Indeed, the view taken here conceptualises 'effectiveness' as a mutually beneficial synergy among the three.

What then of 'pedagogy'? Many years ago, Brian Simon published a paper entitled: 'Why no pedagogy in England?' (1981). He compared the multi-disciplinary and

[1] TLRP's generic phase ran from 2000 to 2009. Some additional work on technology-enhanced learning (the TEL phase) completes in 2012.

scientific tradition of pedagogic thought and practice in Europe with the more instrumental approach to teaching that he found in England. Here, he argued, the development of teaching was dominated by a concern with the individual differences between learners and groups of learners, and how to respond to them. In contrast, as Simon put it:

> To develop effective pedagogy means starting from the opposite standpoint, from what children have in common as members of the human species; to establish the general principles of teaching and, in the light of these, to determine what modifications of practice are necessary to meet specific individual needs. (p. 131)

This argument can be chased through at two main levels. It has implications for forms of institutional provision – and Simon was a strong supporter of the comprehensive principle. It also has implications for teaching and learning practices and the way the highly contentious phrase, 'what works', is understood.

The TLRP, which has supported more than 100 projects, fellowships, thematic groups and capacity building initiatives, focused primarily on the second of these two levels: on teaching and learning in authentic settings inside and outside of schools and other institutions, through the life course. The specific findings of TLRP's projects are described in research briefings, articles, books, websites and other media. Its cross-programme thematic work is published in a series of commentaries on contemporary

policy issues, as well as in special issues of journals, research reviews for external bodies, and in briefing papers for direct communications with policy makers. [2]

A major ambition of the Programme, for both analytic and impact purposes, has been to try to produce an evidence-informed statement of 'general principles' of teaching and learning, just as Simon advocated. The basic view is that a great deal is actually known about pedagogy, both in the UK and internationally, but that the synthesis, communication and implementation of such knowledge are far weaker than they should be.

Why general 'principles' are an important outcome of TLRP?

The diverse nature of TLRP's projects, which focused on different research questions in different contexts, sometimes using different methods and theoretical perspectives, did not permit formal quantitative meta-analysis rendering aggregated effect sizes of interventions as indicators of 'what works'. However, each project engaged with existing research in its own particular field or sub-field and built on this to take knowledge forward cumulatively. Through the mechanisms for knowledge exchange set up by TLRP, and drawing on their own particular networks and resources, research teams also developed thinking in dialogue with other researchers and users. In this way new insights were located in intellectual and political context through social processes.[3]

[2] Details of these outputs can be found on the TLRP website at: http://www.tlrp.org/pub/index.html and via the British Education Index at https://bei.leeds.ac.uk/freesearch/TLRP/BEISearch.html (Accessed 17th May 2011)

[3] See James, 2006, for a detailed example drawing on the experience of one large project.

The expectation that the research would be carried out in authentic settings made it impossible to control all the variables operating at any one time. But it enabled researchers, working with practitioners, to grapple with the issues of implementation that so often confound best efforts to 'scale up' promising innovations. Furthermore, it enabled practitioners to use their knowledge, of the features of particular settings and characteristics of learners, to develop and refine generalisations from the original research.

For all these reasons, when TLRP was asked what it (as a Programme) had found out about effective teaching and learning, generally, it was not justifiable to make unequivocal claims about findings in terms of categorical knowledge or cause-effect relationships. However, it was possible, in our judgement, to offer 'evidence-informed principles', which could engage with diverse forms of evidence whilst calling for the necessary application of contextualised judgement by teachers, practitioners and/or policy-makers. Such principles, we believed, could enable the accumulation and organisation of knowledge in resilient, realistic and practically useful ways, and had the potential, progressively, to generate understanding and language for use within public debates.

How the ten principles were developed

The analytical and synthetic approach to reviewing the TLRP evidence involved an iterative process of working between the conceptual map that TLRP had developed to represent the scope of its interests with reference to teaching and learning (see Figure

1), and the outputs that were beginning to emerge from individual TLRP projects and cross-Programme thematic work. This model had a long gestation and can, in an early form, be found in a sociological analysis of classroom coping strategies (Pollard, 1982). However, it was simplified to its key elements to provide an analytic framework to structure cross-Programme discussion and analysis.

[Figure 1 near here]

The majority of projects that were funded in the early phases of TLRP commissioning were focused on the school sector and these were considered first.[4] However, many of the thematic initiatives went wider than the school sector. These were attempts to review findings across TLRP in relation to specific key ideas[5] and to relate these insights to research and scholarship beyond TLRP in order to ground them in a wider literature. This review has a similar ambition: to provide a synoptic overview of what TLRP's schools projects discovered about effective pedagogy but to relate this to TLRP's work in other sectors of education, and to the broader literature that has accumulated internationally and over time. This is a grand ambition and has necessitated selection and précis in order to produce a digest that is digestible.

The schools projects and the thematic work reviewed here are listed in the Appendix. The codes allocated to such projects (P1-P21) and to thematic work (T1-T17) are used as a referencing system, unless a particular output needs to be cited. Other publications are accessible by following the web links given in the Appendix. Other

[4] By the conclusion of the programme the balance had shifted and, by 2009, only approximately one third of projects had focused on schools. The majority researched further and higher education, workplace and adult learning.
[5] See http://www.tlrp.org/themes/index.html (Accessed 17th May 2011)

TLRP investments are sometimes also referred to using standard referencing conventions and are not listed in the appendix. All TLRP work is accessible via www.tlrp.org.

The way in which the TLRP Directors' Team tackled the analytical and synthetic task is best described as 'narrative review'. One piece of thematic work (T12), led by Torrance and Sebba, was explicitly directed towards promoting a better understanding of the nature and roles of reviews of research. A typology of reviews was developed, which distinguished between reviews for academic and scholarly purposes and those for practice and policy purposes The iterative review that the TLRP carried out was intended to serve both sets of purposes and attempts to address multiple audiences, albeit in rather different forms of presentation - an example of 'commitment to "multi-vocalism" in review processes' (Torrance and Sebba, 2007, p.3).

In terms of the classification developed by this thematic group, the present contribution cannot claim to be either a 'definitive' review of the 'state of knowledge' in the whole field, or a 'systematic' review intended to produce 'conclusive, generalisable, politically defensible knowledge for action'. Although the evidence base is extensive, and reaches beyond TLRP, teaching and learning has too many dimensions for a single review to be definitive. Furthermore, evaluative exclusion and inclusion criteria were not strictly applied as expected in systematic reviews. In some senses this was not felt to be necessary because almost all the projects in TLRP's portfolio, funded in the 'generic phase' to 2009, were evaluated as 'Good' or

'Outstanding' by independent peer and user referees appointed by the ESRC.[6] The single exception was not criticised for the quality of its design, methods or analysis but because its outputs were rather thin at the time when the end of award report was submitted. [7]

Preliminary work on this narrative review, the explicit aim of which was to add value to the TLRP by synthesising its most important findings, was accelerated by the need in 2005 to respond to an invitation from the education team at HM Treasury, under the then Chancellor of the Exchequer, Gordon Brown, to brief it about the progress of TLRP research. Aware of the current policy push for 'rapid reviews' or 'rapid evidence appraisal' (Boaz, Solesbury and Sullivan, 2004), and the limited time to present an oral account of TLRP's work, the notion of ten principles offered a purposive framework for an initial summary of findings from projects just completing, and some suitably tentative implications for policy in the light of the recently published 2005 Budget Report.

A model for 'principles', as a valued output from research review, was already in the public domain: the UK Assessment Reform Group had used this format as a way of summarising the evidence on effective 'assessment for learning' (formative assessment)(ARG, 2002). The ARG principles had been presented in a poster and disseminated widely by the Group and other organisations. Several years after publication these could still be found displayed in school classrooms and staffrooms,

[6] This did not apply to 'associate projects', funded from other sources. Neither were research training fellowships formally evaluated because their principal output was expected to be a PhD thesis which would be examined in the usual way.
[7] The summary evaluation grades are given in Appendix 1 and a digest of evaluation comments can be found as appendices in the End of Award Report for the Programme 2002-2009: see http://www.tlrp.org/manage/progrep.html (Accessed 17th May 2011)

and used in the documentation of other agencies, although not always with clear attribution (see, for example, DCSF, 2008, p.6).

The meeting at the Treasury convinced the TLRP Directors' Team of the need to publish something along similar lines for a general audience. So, in March 2006, it published *Improving teaching and learning in schools* as the second in its series of commentaries (James and Pollard, 2006). Initially written in response to the Schools White Paper, which later became the Education and Inspections Act 2006, this commentary argued that no amount of structural reform, such as the creation of different types of schools, would obviate the need for serious attention to the quality of relationships and pedagogic processes in classroom if standards of education were genuinely to improve. Included in the commentary was the first version of the TLRP's ten 'evidence-informed principles for effective teaching and learning', presented graphically on an ellipse to indicate that they represent no firm linear hierarchy. However, the sequence had a logic which helped with deciding an order when elaborated in text: beginning with pedagogical aims, and the way these are expressed in classroom practice, and extending to the conditions needed for effective pedagogy in the structures and cultures of schooling and the wider environment, including social and educational policy, locally and nationally. The relationship between elements was likened to the ripples when a pebble is thrown into a pond (James and Pollard, 2006, p. 5).

Educational innovation, even that which is primarily classroom-focused, almost always involves changes at several levels, which makes researching it similarly multilayered. However, by examining the evidence against the categories, and the

categories against the evidence, the themes of interest were eventually reduced to four main clusters (see James & Pollard, 2008):

1. Educational values and purposes
2. Curriculum, pedagogy and assessment
3. Personal and social processes and relationships
4. Teachers and policies

TLRP's ten principles were grouped under these headings (as they are in the Evidence section below). In most publications they are described as principles of effective teaching and learning. But here, as indicated in the title of this contribution, the term pedagogy is preferred for four main reasons. First, the audience for this contribution will be familiar with the term and not regard it as academic jargon. Second, the term is now more widely used by UK practitioners and policy makers, and it is used across most sectors of education and training, which was not the case when TLRP was set up. Third, and most importantly, 'pedagogy' expresses the *contingent relationship* between teaching and learning (see the quotation from Simon above) and does not treat teaching as something that can be considered separately from an understanding of how learners learn. Fourth, as TLRP researchers themselves pointed out, the work of the programme, certainly as it pertained to schools, focused more clearly on the implications for teaching of what we know about learning, than it did on developing new knowledge about learning *per se.*

In an article reflecting further on the question that Brian Simon posed in 1981, Robin Alexander (2004, p. 11) defines pedagogy as follows:

> Pedagogy is the act of teaching together with its attendant discourse. It is what one needs to know, and the skills one needs to command, in order to make and justify the many different kinds of decisions of which teaching is constituted.

This fits very well with the way TLRP came to understand pedagogy, and the present task of setting out the empirical and theoretical justification for the principles that we distilled from the work of the Programme.

As noted earlier, the ten principles were first generated with school teaching and learning in mind, drawing primarily on evidence from the schools projects. This focus is reflected in this contribution. However, there was interest in other sectors and the TLRP Directors' Team was committed to exploring whether they might apply elsewhere. At the annual meeting for TLRP researchers, in November 2006, a session[8] was devoted to critique of the principles as currently formulated and to questioning whether they had relevance in the post-compulsory settings that many later-funded projects were researching. This generated a lot of discussion, but the idea of having a similar set of principles for other sectors was generally endorsed. As a consequence, the wording of the ten principles was amended to be more generic. Later they were developed in two further Commentaries: one on effective teaching and learning in UK higher education and the other on higher skills development in the workplace. [9] They have also been built on in a handbook for practitioners (Pollard

[8] The presentation and handout related to the session, 'Making sense of TLRP' can be found at http://www.tlrp.org/conference/2006/programme.html (Accessed 17th May 2011).
[9] For more information see: http://www.tlrp.org/themes/themes/tenprinciples.html

2008) and in a further Commentary on professionalism and pedagogy (Pollard, 2010).[10]

In the discussion that follows, this later version of the ten principles is used. There are two reasons for this decision. First, although contexts for learning vary, the common features in how people learn across the life course makes the validity of a shared set of principles sufficient to be worthy of serious consideration. Second, the majority of school projects had findings related to the importance of the learning of teachers as a condition for effective support of the learning of their pupils. Teachers are adult learners in the workplace and therefore the principles needed to apply to their learning too.

From 2005 to the present, discussions between researchers, practitioners, policy makers and other 'user' groups, have been a principal means of developing, refining and validating both the synthesis of research and the principles that arise from it. If these principles are valued as a way to accumulate and organise knowledge, with potential for further progressive development and use within public debates, then such discussion and iterative development will need to continue. This development, by its very nature, continues.

[10] *Professionalism and Pedagogy: a contemporary opportunity*, published with the General Teaching Council for England, is available at: http://www.tlrp.org/pub/commentaries.html (Accessed 17th May 2011)

Argument and evidence

In this main section, the thinking underlying the articulation of particular principles is rehearsed and informing evidence from TLRP is outlined. The discussion is organised under the four headings given above. The aim is to identify the insights that TLRP researchers shared, and those on which they differed, and to tease out some of the underlying reasons for synergies or tensions. Some illustrative evidence from individual projects is included although projects or thematic initiatives, as entities, are more fully described elsewhere. Brief outlines are also available in audits of schools projects that have been written for other purposes (e.g. James and Pollard, 2009; Pollard, 2010).

Educational values and purposes (principle 1)

In the early days of the TLRP, a core objective was expressed as a need to investigate those teaching and learning practices that are most efficient and effective in enhancing the achievements of learners.[11] Given the policy context in the schools sector at the time, there was an assumption that projects would provide evidence of gains in pupil attainment. This created difficulties for some project teams. First, properly validated standard measures did not exist for some of the outcomes that projects had been funded to research e.g. learning how to learn capability. Second, causal relationships were difficult to establish in authentic settings where variables interact in uncontrollable ways. Third, most research projects depended on the co-

[11] The evidence for this can be found in the Annual and End of Award Reports of the first Programme Director, Charles Desforges (1999-2002). Accessible at: http://www.tlrp.org/manage/progrep.html (Accessed 17th May 2011)

operation of teachers and sometimes it was difficult to convince them that, say, the link between pupil engagement and better attainment is not self-evident.

Many TLRP researchers also resisted taking for granted the idea that gains in pupil attainment on standard measures, such as national test or examination results, were necessarily 'a good thing'. They thought it important to examine the validity and reliability of these measures, to scrutinise the deeper purposes that such attainments were supposed to serve, and to investigate their effects on the behaviour of stakeholders. For example, were test results good indicators of enduring understanding and capability in important domains of learning? Did they lead to personal fulfilment and wellbeing? Did they contribute to the economic prosperity of the nation or to greater social justice and inclusion?

Some projects began to raise serious questions about the culture of performativity and/or the measures currently used (e.g. P7, P11, P13, P19, P21). In so doing, they rejected the notion that the responsibility of researchers is simply to report 'what works' in terms defined by others, especially groups who have strong vested interests. They pursued the idea that scholars and researchers have a legitimate role to play in democratic discussions about the aims, purposes and outcomes of education.

TLRP worked with the Philosophy of Education Society of Great Britain to examine the way in which the increasingly diverse intellectual resources of the educational research community might inform policy and, by extension, practice (T11). One paper from this thematic group (Bridges and Watts, 2008) argues that policy demands a much wider range of information than empirical research typically provides. One of

the gaps is the normative gap. The values that inform policy *can* be investigated empirically, but empirical investigation alone cannot tell us what we *ought* to do. However, other forms of disciplined enquiry can address these normative questions. As Bridges (2009, p.3) summarises:

> We should be more explicit about the educational and wider political values which frame policy and practice, and be more ready to subject these to careful scholarly, as well as democratic, scrutiny and criticism. The fact that ideology, normativity and educational values and principles are central to policy does not mean that scholarly endeavour has no work to do in these areas. The academy has enormous resources – in political science, social theory, ethics and philosophy – which can be brought to bear on this dimension of policy formation, and we should not be coy about using them.

Another thematic group (T2), which was convened earlier in the life of TLRP, examined how the first 30 projects to be funded (12 from the schools sector) used theoretical resources and empirical evidence to identify the learning outcomes of most interest in their specific context. Initial analysis of project documentation enabled seven categories of outcome to be identified:

1. Attainments – often school curriculum based (literacy, numeracy, science) or measures of basic competence in the workplace.
2. Understanding - of ideas, concepts, processes
3. Cognitive and creative – imaginative construction of meaning, arts or performance

4. Using – how to practice, manipulate, behave, engage in process or systems
5. Higher order learning – advanced thinking, reasoning, metacognition
6. Dispositions – attitudes, perceptions, motivations
7. Membership, inclusion, self-worth – affinity towards, and readiness to participate and contribute to, groups; building social and substantive identities.

(James & Brown, 2005, p.11)

BOX 1

Evidence from school projects

Many individual projects were interested in developing and researching achievements in several of these areas. For example, the Group Work projects (P6, P12) investigated motivation, attitudes, social-emotional relationships, and classroom behaviour as well as academic outcomes. The Thinking Skills project (P5) researched the broader learning goals of metacognition and self-regulation, and showed a positive relationship with academic attainment and effort, although the effect needed time to build and was not uniform across all learner groups (McGuinness et al, 2006). Similarly the Learning How to Learn project (P13) investigated learning practices and strategies, alongside more conventional academic outcomes defined by national test results (James, et al, 2007). In an early years project on learning and ICT (P1), enhanced learning dispositions and confidence were found to be crucial to building knowledge and skill (Stephen and Plowman, 2008). The development of dispositions was also prominent in the longitudinal projects on the formation of learning identities (P21). And, two projects (P10, P15) investigated the benefits of consulting pupils in

accordance with Article 12 of the United Nations Convention on the Rights of the Child, and in fulfilment of the aspirations for citizenship education through the practice of democratic values.

The evidence in Box 1 indicates that TLRP research and deliberation justified and embraced a wide definition of educational values, purposes and outcomes. Attainments as measured by national tests and qualifications were by no means ignored but there was interest in other 'outcomes', such as engagement, participation, learning skills, dispositions and strategies, and the development of learning identities and autonomy. This range offered possibilities for a mutually productive synergy among educational aims linked to economic productivity, to the promotion of social cohesion, and to personal flourishing. In a developed society all of these are important. This insight gave rise to the first of TLRP's ten principles, which, in common with the others, recognises the legitimacy of a normative dimension:

PRINCIPLE 1: Effective pedagogy equips 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 means adopting a broad conception of worthwhile learning outcomes and taking seriously issues of equity and social justice for all.

Is one thing to 'adopt a broad conception of worthwhile learning outcomes' for lifelong and life-wide learning; it is quite another to know whether ends are achieved. Dispositions and capabilities developed during the years of compulsory schooling can be enhanced or undermined by the opportunities and constraints experienced in later life.

In 2003 the Labour Government in England published its Every Child Matters agenda which highlighted the importance of five outcomes of the education system: being healthy; staying safe; enjoying and achieving; making a positive contribution; and achieving economic well-being. The UK Government also funded a Centre for Research on the Wider Benefits of Learning (WBL), which similarly viewed learning as a potential benefit to the individual, the family, the community and the nation. However, there is a tension between meeting these broad-ranging objectives, with which few disagree, and focusing on the basic skills and qualifications that have been the major thrust of contemporary policy. At the 2006 TLRP conference, where the ten principles were debated with researchers, a participant from the WBL Centre pointed out that although its longitudinal analysis of UK birth cohort studies provide much evidence of people's lives from birth to adulthood, 'these data sets do not have rich data on the experience of school. It would be useful to develop better integration between these approaches'. This must surely be a challenge for future researchers if we are to move from description of patterns in educational trajectories to better explanations of why they occur.

Curriculum, pedagogy and assessment (principles 2, 3, 4 and 5)

Conceptions of curriculum, pedagogy and assessment, and the interactions among them, lie at the heart of schooling. There has always been debate about what a whole curriculum should consist of, how it should be organised, what constitutes valued knowledge in a subject or field, how such knowledge can be represented and communicated to learners, and how learners' knowledge, understanding and skills can be detected and evaluated. These debates have involved curriculum developers, subject specialists, cognitive psychologists and assessment experts. However, in the 1970s, the intervention of a group of British sociologists (Young, 1971), of which Basil Bernstein was the foremost, introduced a powerful new element into the debate. They argued that knowledge, and hence curricula, are socially constructed and contested. This influenced a major shift in the way curricula were viewed. It appeared to undermine objectivity and led to some post-modernist claims that any knowledge, or form of curriculum organisation, is as valuable (or not) as any other, and the greatest need is to engage in rigorous critique of the political control they exercise. At its most extreme, this relativism seemed to undermine any Enlightenment notion that progress in education is possible because consensus on goals and means, undistorted by power relations, was thought to be unattainable.

TLRP's commitment to work 'to improve outcomes for learners' implied a belief that educational progress is possible. It never shared the extreme relativism of some post-modernists although it has tried to be inclusive of a wide range of theoretical perspectives within its activities. Pollard (2005, p.3) viewed the Programme as a potential vehicle for 'creative mediation' and drew explicitly on an appeal to the

Enlightenment commitment to the application of science and reason in the improvement of society. There is now wider evidence that researchers and scholars from a range of disciplines – epistemology, sociology, history, philosophy, cognitive science, curriculum theory, pedagogy and neuroscience – are 'bringing knowledge back' into play[12] to ask new kinds of questions and to ask some old questions in new ways. For example: Are pedagogies domain-specific? Do they need to vary between subjects and cultures? What is it to 'know' a subject and does this vary? How is knowledge constructed in different domains? What is the difference between a subject and a discipline, and is it ever possible for school pupils to develop an understanding of disciplines, given the fact that they study many subjects and are not immersed in a single discipline in the way that university students can be? Do students learn by acquiring knowledge or participating in practices? How can participation in communities of epistemic practice be validly and reliably assessed?

In this section, TLRP research and deliberation is brought to bear on these issues in justification of the following four principles that relate to the triad of curriculum, pedagogy and assessment.

PRINCIPLE 2: Effective pedagogy engages with valued forms of knowledge.

Pedagogy should engage learners with the big ideas, key processes, modes of discourse, ways of thinking and practising, attitudes and relationships, which are the most valued learning processes and outcomes in particular contexts. They need to understand what constitutes quality, standards and expertise in different settings.

[12] See, for example, Young (2008) who now takes a different (social realist) view from the one he promulgated thirty years earlier.

PRINCIPLE 3: Effective pedagogy recognises the importance of prior experience and learning. *Pedagogy should take account of what the learner knows already in order for them, and those who support their learning, 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.*

PRINCIPLE 4: Effective pedagogy requires learning to be scaffolded. *Teachers, trainers and all those, including peers, who support the learning of others, should provide activities and structures of intellectual, social and emotional support to help learners to move forward in their learning. When these supports are removed the learning needs to be secure.*

PRINCIPLE 5: Effective pedagogy needs 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.*

Learning presupposes that learners are learning something. This 'something' may be called 'knowledge' but what constitutes knowledge is often disputed. Gilbert Ryle's distinction between 'knowing that' and 'knowing how' has been important in expanding the conception beyond declarative knowledge to embrace procedural knowledge, although, in policy contexts, this is often reduced to a debate about learning facts versus learning skills.

In his keynote presentation, on the 'Complexity of Learning', to the 2005 TLRP Annual Conference, Michael Eraut delineated three types of knowledge: *codified knowledge,* judged by its source, truth claims and acceptability to 'gatekeepers'; *other cultural knowledge* as constructed and shared among communities and groups without undergoing codification; and *personal knowledge* defined as what people bring into new situations that enables them to think and act in those situations. This last type of knowledge comprises: codified knowledge ready for use; knowledge acquired during acculturation; knowledge constructed from experience, social interaction and reflection; skills; and episodes, impressions and images (case knowledge). Eraut made the important point that: 'A person's performance nearly always uses several of these kinds of knowledge in some *integrated form*, and is influenced by both *context* and *feelings*' [his emphases]. Eraut was drawing particularly on his research into workplace professional learning[13] but these ideas are transferable to school learning. They support the argument implied in Principle 2, above, that a wide definition of what counts as valid knowledge, sensitive to context, should be valued.

A small number of TLRP schools projects focused very specifically on the learning of codified knowledge in subject domains. The project on The Role of Awareness in the Teaching and Learning of Literacy and Numeracy in Key Stage 2 (P4) focused upon aspects of learning to spell and learning fractions. This project was extended in Scotland but the Scottish project researched aspects of mathematics (proportion and ratio, referred to as 'intensive quantities') across school phases (P14). The Evidence based Practice in Science Education (EPSE) network of projects (P7) worked mainly

[13] See http://www.tlrp.org/proj/phase11/phase2d.html (Accessed 17th May 2011)

in secondary schools to investigate how learning in science can be enhanced. In all these projects, the difficulties in teaching concepts and processes could only be tackled successfully by engaging with cultural and personal knowledge, with context as a crucial variable.

BOX 2

Evidence from school projects

The teaching of literacy in primary and infants schools is a 'hot topic' but little 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. The TLRP project on morphemes (P4) showed that literacy can be improved by increased awareness of how morphemes make words and are represented in spelling. It 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.

Fractions were the other focus of this project. It arose out of concern that rational numbers are not taught as well as natural numbers in primary school mathematics. A key finding was that knowledge of rational numbers is context specific and needs to be developed in different situations where transfer is difficult. As with the morphemes work, the project developed a teaching programme that 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 needs to build on pupils' intuitions and be aware of the situations in which logical relations are most easily understood.

The project conducted in Scotland (P14) 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. 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; but iii) a mere two or three hours of teaching can boost children's understanding and their use of fractions.

The EPSE (evidence based practice in science education) projects (P7) covered four distinct topics. One of these involved the design of short teaching sequences (4-6 lessons) to tackle important content that secondary pupils find difficult to learn: plant nutrition, modelling changes in matter in terms of particles, and the behaviour of simple electric circuits. When these teaching sequences were implemented, the researchers found that pupils' learning was measurably better, in terms of important aspects of conceptual understanding, than other pupils following the schools' normal approach to the same content, although they were no better than others at questions requiring factual recall. Testing regimes that focus heavily on factual recall may actually hide the need for such development because they can overestimate pupils' understanding of key ideas.

Another element of EPSE work focused on teaching pupils 'ideas about science' because much recent international debate has suggested that the primary aim of school science should be 'scientific literacy'. A Delphi study was used to explore the extent of agreement amongst a diverse group of expert stakeholders. The experts agreed on nine key epistemic themes: the nature of scientific knowledge (science and certainty; historical development of scientific knowledge), the methods of science (scientific methods and critical testing; analysis and interpretation of data; hypothesis and prediction; diversity of scientific thinking; creativity; science and questioning), and institutions and social practices in science (scientific work as communal and competitive activity). This led to an investigation of the nature of the challenge that teaching these ideas poses for teachers. The project concluded that these themes should be included in the school curriculum but this will require significant investment in the professional training of science teachers, particularly how to manage a more dialogic approach to teaching.

The findings of the ESPE projects fed directly into a TLRP Commentary on *Science education in schools* produced in collaboration with the Association for Science Education (T6) and also a suite of Twenty First Century Science GCSE courses, which has led to an increase in the number of youngsters choosing to study science at AS Level. [14]

Another TLRP project focused on teaching and learning thinking skills through an 'infusion approach' i.e. linking patterns of thinking to specific curricular topics. Previous research and scholarship has demonstrated that thinking skills are not separate psychological abilities but learnable practices that are used for learning different subject matter. Again, the context is important.

[14] See 'Inspiring more teenagers to study science', *Nuffield Foundation Newsletter,* Issue 14, Spring 2010, p.1. Downloadable from www.nuffieldfoundation.org (Accessed 17th May 2011)

The Thinking Skills project (P5) developed frameworks and classroom strategies with 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 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 just how powerful these background factors are. The study demonstrated that thinking skills and strategies are amenable to change but developing children's capacity to learn takes time and special attention needs to be paid to children with poorer cognitive and social resources.

The literacy, numeracy and thinking skills projects described in Box 2 were based in university departments of psychology. This raises an interesting question about

whether forms of knowledge should be regarded primarily or exclusively as individual acquisitions of a cognitive nature. Does this take sufficient account of knowledge as embodied in social activity in communities of practice? Post-Vygotsky, educational researchers are aware of, and often sympathetic to, sociocultural claims that knowledge can only be constructed and revealed in and through social practices, especially through the use of shared language. Accordingly, consciousness, hence knowledge, is constantly being reinterpreted in dynamic interaction between mind and the world. The theoretical challenge faced by TLRP was deciding whether it could be a broad church, embracing a range of perspectives, from the cognitivist to the sociocultural, even when these approaches appeared to contradict one another in rather fundamental ways.

The Learning Outcomes thematic group (T2), mentioned above, carried out an analysis of project documentation for evidence of Sfard's (1998) two metaphors of educational discourse: the acquisition metaphor (AM) and the participation metaphor (PM). This analysis showed that most TLRP projects stood on more than one 'metaphorical leg' (James and Brown, 2005), confirming Sfard's perception that there are difficulties in choosing just one. Whilst theoretical coherence might be served by adopting a purist stance, the practical consequences can limit the goals and outcomes conceived as desirable in the variety of contexts for learning.

Anne Edwards, in her keynote presentation to the 2005 TLRP Annual Conference, pointed out that individual learning is underplayed in versions of sociocultural theory that are most interested in change in systems (e.g. Engeström, 1999). However Engeström's transformative version of Activity Theory helps when working on new

problems where innovative solutions are called for. In these circumstances neither acquisition nor strict participation approaches[15] to understanding learning help because there is need to go beyond what is already known in codified knowledge or cultural practice. From her Vygotskian stance, Edwards proposed 'relational agency' as a way of putting individual cognition back into the equation (Edwards, 2005). She quoted Shotter (1993, p. 111): 'Vygotsky is concerned to study how people, through the use of their own social activities, by changing their own conditions of existence, can change themselves'. [16]

Most of the researchers involved in TLRP projects claimed to take a sociocultural, or social constructivist, theoretical position. Sometimes these two perspectives were clearly distinguished (e.g. P8); sometimes they were merged (e.g. P7).[17] The Programme, as a whole, has a commitment to interdisciplinary working, which implies a willingness to use the tools and constructs from diverse discourses. This has sometimes been difficult to achieve at project level, although:

> To capture the interacting layers of affordance and action, to acknowledge the power of history on practices and to reveal sense-making in language and tool use requires an educationally oriented team comprising sociologists, psychologists, socio-linguists, organisational experts and so on. (Edwards, 2005, p.13)

[15] Lave and Wenger, 1991, might be the best example.
[16] Both Sfard and Engeström contributed keynote addresses to the TLRP annual conference in 2004.
[17] In preparation for discussions at the 2003 TLRP annual conference, all projects commissioned at that time were asked to produce a paper on their 'Conceptions of teaching and learning'.

The group Edwards omitted to mention were neuroscientists. Yet increasingly, in the 21st century, interest has grown in brain research. In 2007, a TLRP thematic seminar series on neuroscience and education (T4) published a commentary (Howard-Jones, 2007) to improve dialogue and collaboration between neuroscience and other educational, psychological and social science communities.[18] The significance of this publication lies in its 'cautious optimism'. Although brain imaging techniques, and other experiments, are giving fascinating results, the authors are sceptical of current 'brain-based applications' that have not, themselves, been properly evaluated. However there is a belief that neuroscience does have relevance to education, which needs to be explored. As Howard-Jones (2007, p.23) expressed it: '…collaborative research projects may need to extend the cognitive neuroscience model of brain>mind>behaviour to incorporate processes of social construction pertinent to learning'. If sociocultural views are seriously embraced then a model of behaviour>mind>brain would need to be considered, or, more appropriately, brain<>mind<>behaviour, which would capture the interactions between individual cognition and the material and social world. No TLRP projects investigated this directly but TLRP can claim that it established its importance for future research. The challenges however are considerable because this would require researchers, eminent in their own fields, to commit to working with others whose discourses and methods are unfamiliar.

The significance of domain knowledge (often referred to as content or subject knowledge) for effective pedagogy was also investigated by TLRP in another thematic seminar series (T8). In their position papers, developed to initiate and to

[18] In the first month of publication 38,000 copies were downloaded from the TLRP website, and within two years downloads numbered 213,170.

summarise debate in two conferences, Moon and McCormick[19] formulated distinctions between knowledge, school knowledge and pedagogy. They based this on three clusters of ideas: the curriculum-orientated work of Shulman (1986), the cognitive approach of Gardner (1983; 1991) and the interrelated traditions of didactics and pedagogy in continental Europe (Verret, 1975; Chevallard, 1991).

Shulman's distinction between subject content knowledge and pedagogical content knowledge has spawned a plethora of subject-specific research projects. However, Moon and McCormick criticise its objectivist epistemology, which implies that knowledge is a contained, fixed and external body of information. They also question his view of pedagogy as skills and knowledge that the teacher possesses, rather than as interaction in the process of learning.

In contrast, Gardner draws extensively on the transactional psychology of Dewey (and Bruner) to argue that while subjects or disciplines are important, it is necessary to move beyond them:

> ..organised subject matter represents the ripe fruitage of experiences… it does not represent perfection or infallible vision; but it is the best at command to further new experiences which may, in some respects at least, surpass the achievements embodied in existing knowledge or works of art (Gardner, 1992, p. 198)

[19] The text of these can be accessed at http://www.tlrp.org/themes/seminar/moon/papers.html (Accessed 17th May 2011)

According to Moon and McCormick this key insight still fails to address fully the issues thrown up by rapid and radical changes in domain knowledge. They therefore turn to Francophone literature, which explores the concept of 'didactic transposition' whereby subject knowledge is transformed into school knowledge. The work of Verret and, later, Chevallard emphasises that subject matter must undergo change, alteration and restructuring if it is to become teachable to novices or children. School knowledge becomes codified, partial and formalised in a syllabus, text or curriculum, which implies that learning has an initial state and an end state. This transformation of non-linear knowledge into programmable contents to be taught - termed didactics in the European tradition - is carefully distinguished from pedagogy, which is more about how to plan for, and respond to, problems and opportunities encountered in the flow of teaching and learning interactions.

Taking all these ideas together, Moon and McCormick present a model of the ways in which subject knowledge, school knowledge, pedagogic knowledge and personal constructs are related.[20] They illustrate this with an example from the perspective of a teacher of English (taken from Leach and Moon, 1999, see Figure 2). Their discussion of codified knowledge, knowledge transformed through sociocultural processess, and personal knowledge, share much with Eraut's typology, outlined above. [21] Both accounts reflect an epistemological position that is neither purely objectivist nor

[20] The participants who were involved in this thematic seminar series engaged with this model, critiqued it and built on it. The resulting papers were published in a special issue (vol.18, no. 4) of *The Curriculum Journal* in 2007. Some authors were from TLRP projects, for example the Evidence-based Practice in Science Education (EPSE) projects, but other contributions are from Germany and Denmark. These provide an important European perspective on these issues, which is less familiar in the UK than the work carried out in other Anglophone countries.

[21] However, their discussion is more focused on the contextual demands of teacher learning, which will be revisited in relation to TLRP Principle 9.

entirely relativist. There is indeed 'stuff' to be learned – ideas, facts, processes, stories, skills, language and dispositions – but it is equally important to learn that valued knowledge is produced, contested and changed in dialogic processes within and between communities of practice. This is the perspective that underpins TLRP's Principle 2 quoted above.

[Figure 2 near here]

TLRP Principles 3 and 4, flow from the above discussion but focus more specifically on the ways in which knowledge is used in pedagogical processes to advance learning. These two principles are strongly linked and have theoretical and empirical foundations in the work of Dewey, Piaget, Vygotsky and Bruner.

The importance of taking account of prior learning, in cognitive terms, has been shown to be important in teaching and learning subjects such as mathematics and science where misconceptions established at an earlier stage create serious barriers to new learning and need to be tackled. TLRP projects in these subjects made this a particular focus. It was a feature of the EPSE project (P7), described in Box 2, which developed and evaluated sequences for teaching science concepts. It was also the focus of another EPSE project, which developed banks of diagnostic questions based on research about common misconceptions. The researchers found that carefully designed probes can provide quality information on pupils' understanding of key concepts, and inform action. However, they also found that the level of pupils' understanding of many fundamental science ideas is low, and increases only slowly with age. In other words they cautioned that the level of challenge should not be

underestimated. We should not be surprised by this conclusion. Support for the need to make associations with previous knowledge has largely been drawn from the psychological literature on meaning-making, but further evidence is emerging from neuroscience, which has linked this ability to activities in the inferior frontal lobes. The work of cognitive scientists, using fMRI scans, is beginning to show just how difficult it is to suppress naïve concepts of the physics taught in school curricula (see Dunbar et al, 2007).

Mathematics and science are often described as cumulative subjects in which failure to understand basic concepts and principles leads to obvious difficulties in later learning. Other subjects have a less hierarchical or linear nature and the issues may seem less acute. However the need to take account of prior learning still applies in different ways. What may be more important in these contexts – and is important in mathematics and science also – is to take account of understandings, skills and attitudes derived from the other worlds that pupils inhabit: from their homes, communities, media and peer groups. For example, a number of TLRP projects, especially those working with young children and/or investigating computer use, found benefits in teachers making more deliberate and positive use of the informal knowledge and understanding that children and young people acquire in their homes and local communities. This crucial aspect of effective pedagogy will be dealt with more fully in the section on personal and social processes and relationships, below. It has great significance for the equity dimensions of teaching and learning, as processes and in building identities. Another TLRP thematic seminar series (T10), on social diversity and difference, explored this further.

TLRP projects also had much to say about the 'scaffolding' of learning – an idea that was implicit in Vygotsky's work but named as such by Bruner (Wood, Bruner and Ross, 1976). Vygotsky's conception of learning as object-oriented, tool-mediated activity emphasises the importance of choice and use of tools, especially language tools, in learning activity. The role of the 'more expert other' in helping the novice to make progress in the zone of proximal development (ZPD) is equally crucial. When these two elements are brought together, the pertinence of the concept of scaffolding becomes evident. Within schools, it is often assumed that the responsibility for scaffolding lies primarily with the class teacher. However, TLRP projects in post-school settings remind us that often there is no 'teacher' in these contexts and effective scaffolding can be provided by peers or by computer programmes.[22] The key consideration, and the determinant of effectiveness, is whether tools - textbooks, computer programmes, other artefacts, signs, symbols and grading systems etc. – are chosen and used appropriately. For example, tools such as interactive whiteboards are not intrinsically valuable; their worth depends on how they are used. As TLRP projects found, the usefulness of new technologies is associated with the ways in which they are incorporated into learning activity and classroom dialogue.

[22] The TLRP professional learning project on 'Vicarious Learning and Teaching of Clinical Reasoning Skills' developed multi-media resources to help scaffold learning. More detail available at: http://www.tlrp.org/proj/phase111/cox.htm (Accessed 17th May 2011)

BOX 3

Evidence from school projects

The INTERPLAY project (P1) investigated how practitioners can create opportunities for learning with ICTs in play settings involving very young children. Practitioners and researchers worked together using the concept of 'guided interaction'. They found that: i) children's encounters with ICTs are enhanced when practitioners use guided interaction (questioning, modelling, praising, supporting) and balanced 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 InterActive Education project (P8) 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 explicitly sociocultural. The project found that: i) 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, e.g. pupils are unlikely to develop knowledge of science from game-like simulation software without help; ii) there is a two-way exchange of knowledge between home and school use of ICT and this impacts on school learning; iii) the teacher can promote successful use of ICT by helping pupils build on out-of-school learning to construct 'common' knowledge which has currency in communities beyond the classroom.

A linked project on the use of ICT to improve learning and attainment through interactive teaching (P16) focused particularly on the use of interactive whiteboards. The proliferation of interactive whiteboard (IWB) technology in classrooms suggests that teachers and educational policymakers see this as a very powerful teaching tool. The project found that although IWBs have the potential to support new forms of interactivity in teaching, and more participatory pedagogy, they are still tools that need to be used well, which has implications for teachers' professional learning, especially the development of their pedagogical reasoning.

Robin Bevan, a TLRP Research Training Fellow, carried out a PhD project[23] in which he investigated on-screen learning in secondary schools using a concept mapping software program developed in the United States. Bevan's study showed how effectiveness of on-screen activity depends significantly on the strategy adopted by the teacher. He found that: i) pupils who used the on-screen concept-mapping tool alone, with no collaboration with other students, achieved no significant sustained learning gains; ii) when the class collaborated in developing their concept maps, pupils demonstrated sustained and improved learning in a subsequent essay task; but iii) providing automated scoring for the concept maps demotivated the weakest pupils and did not lead to any additional learning gains. He concluded that despite the promise of new technologies, an unmediated switch to on-screen learning is unlikely to lead to improvements in learning. Teachers looking for improved learning with on-screen activities need to explore the powerful potential of peer collaboration. Indeed the adoption of new classroom strategies involving such collaboration can be more significant than the impact of the software itself.

[23] See http://www.tlrp.org/proj/rtfbevan.html (Accessed 17th May 2011) Robin Bevan's PhD thesis, *From black boxes to glass boxes: the application of computerised concept mapping in schools,* is available in the University of Cambridge Faculty of Education Library.

The conclusions from the examples given in Box 3 are corroborated by other TLRP projects. The numeracy and literacy projects (P4 and P14) were centrally concerned with creating explicit scaffolds for teachers to use. And the thinking framework developed by the Thinking Skills project (P5) was itself a scaffold. Like the InterPlay project (P1), the very large-scale EPPE 3-11 Project (P2) also provided evidence of the importance of both adult-initiated and child-initiated activity, including direct teaching and sustained shared thinking.

What emerges from all this evidence is the primacy of dialogue. But dialogue needs to be understood, not simply as oral interactions in classrooms, but as more varied communications between minds. Alexander (2006, p. 13) gives credit to Bakhtin (1981) for providing a vocabulary for exploring the nature and possibilities of dialogue. Bakhtin was interested in the relationship between the individual and society, present and past, between the developing mind and the thinking embodied in the wider culture, between our inner and outer worlds. While face-to-face interactions are important, a dialogue can be set up between authors and their readers so that readers have access to the author's thinking and can use it to interrogate their own. The breadth of these ideas is reflected in 'enacting dialogue', one of twelve aims for primary education distilled from the Cambridge Primary Review, which describes advancing pedagogy through dialogue 'between self and others, between personal and collective knowledge, between past and present, between different ways of making sense' (Alexander, 2010, p. 199).

The dialogic approach that Alexander has been developing through his international research (Alexander, 2001, 2006) comprises a three-part repertoire informed by five

dialogic principles. The repertoire consists of *learning talk* (narrating, explaining, questioning, answering, analysing, speculating, imagining, exploring, evaluating, discussing, arguing, justifying and negotiating), *teaching talk* (rote, recitation, exposition, discussion, dialogue) and *interactive strategies* (whole class teaching, teacher-led group work, pupil-led group work, one-to-one pupil discussion, one-to-one discussion between pupil and teacher). The principles that inform this repertoire are that genuine dialogue is *collective, reciprocal, supportive, cumulative and purposeful*. According to Alexander, the most vital of these is cumulation: that teachers and pupils build on their own and each other's ideas and chain them into coherent lines of thinking and enquiry. 'If an answer does not give rise to a new question from itself, it falls out of the dialogue' (Bakhtin, 1986, p. 168). However, this principle is also the most difficult to achieve, which has major implications for 'assessment for learning' (AfL), the pedagogical strategy that has been promoted extensively, by researchers and policy makers, in the UK and internationally.

BOX 4

Evidence from school projects

The TLRP Learning How to Learn project (LHTL) (P13) built on existing research which demonstrated that assessment for learning (formative assessment) practices can lead to improved learning and achievement (Black & Wiliam, 1998; Black et al, 2003). Four clusters of practices have been identified, all of which are based on dialogue: developing classroom talk and questioning to elicit understanding; giving appropriate feedback; sharing criteria of

quality; and peer-and self-assessment which incorporate elements of all three previous clusters of practices. The strand of the LHTL project that focused on classrooms showed that assessment for learning helps teachers promote learning how to learn activity, which enables pupils to become more autonomous learners. Thereby, classroom practice becomes better aligned with the educational values expressed by teachers, and less driven by a culture of performativity. However, analysis of video evidence from classrooms showed how difficult it is to shift from reliance on specific techniques, 'dropped into' conventional lessons e.g. writing learning objectives on the board (the 'letter' of AfL). Such techniques swiftly become mechanistic, ritualised and distorted in their purposes. For example, the use of 'traffic lights' as a means for pupils to indicate their confidence in their learning as a lesson progresses, easily becomes just another way of scoring products (James et al, 2006, pp. 99-100). What is needed is a more holistic transformation based on deeper principles - such as thinking about the questions posed by an answer to a previous question - integrated into the flow of pedagogical interactions (the 'spirit' of AfL). Marshall and Drummond (2006), drawing on Dewey's conception of progressive education, described this as requiring 'high organisation based upon ideas'. The LHTL project demonstrated that, although advice on specific techniques is useful in the short term, longer-term development and sustainability depends on re-evaluating beliefs about learning, reviewing the way learning activities are structured, and rethinking classroom roles and relationships.

The aims of the Learning How to Learn project (P13) - to develop, embed and spread assessment for learning practice in ways that promote autonomous learning by pupils - was in line with TLRP's Principle 5 that, 'Effective pedagogy needs assessment to be congruent with learning', and especially that, 'It should help to advance learning as well as determine whether learning has occurred'. This project focused very

specifically on the relationship between assessment and learning and how a beneficial synergy might be established.

A related element of Principle 5: 'Assessment should be designed and implemented with the goal of achieving maximum validity both in terms of learning outcomes and learning processes' was specifically addressed by other projects, and by two thematic initiatives (T9, T13). Traditionally, the quality of assessments is judged by their reliability and their validity, which together indicate whether the inferences drawn from assessment results are dependable. Often more attention is paid to reliability for two reasons. First, there are clear technical procedures for enhancing reliability; second, the publication of unreliable results can have immediate and far-reaching political and personal consequences. [24] However, there is a sense in which even reliable assessment results have no worth if they are not valid – if they have no meaning. Kane (2001) traces the development of validity theory over a century, from limited criterion-related models, through sophisticated construct models, to an argument-based approach. The current view is that validation requires an extended analysis of evidence, based on explicit statements of proposed interpretations, and consideration of competing interpretations.

> Validity is concerned with the clarification and justification of the intended interpretations and uses of observed scores (sic). It is notoriously difficult to pin down the interpretation (meaning) of an observation (hence the popularity of detective novels). (Kane, 2001, p. 339)

[24] Poor marking quality of Key Stage 3 national tests in England in the summer of 2008, contributed to the decision by Government to get rid of them.

What Kane makes clear is that validity cannot be achieved by the manipulation of statistical models; it requires qualitative analysis and judgement and is therefore open to contestation. In high stakes environments this is not easy to accept and the most powerful people in a system are inclined to limit potential damage by limiting the scope for dispute. In so doing they often also limit the validity of assessments.

BOX 5

Evidence from school projects

The problem of limited validity in standard assessments was illustrated in the EPSE projects (P7), which showed that, although learning about the nature of science is valued, current assessment regimes privilege recall of science 'facts' over epistemic understanding. Furthermore, emphasis on factual recall (as in KS3 science tests before 2008) over-estimates conceptual understanding because a single short-answer question is often taken as evidence of understanding of a more complex construct. In these circumstances more than one question is usually needed to ensure that the inferences drawn from the results are valid.

The need to avoid over- or under-estimating children's capabilities was also raised as an issue by the INTERPLAY project (P1), which explored the possibilities of recording what children were actually doing with ICTs by using these tools for capturing evidence. This has the virtue of authenticity and the benefit of monitoring progress in real time. However, it depends on teachers and other adults accepting a role for which they may feel ill equipped without additional training.

As the LHTL project discovered (P13), the constraints of an accountability system, which encourages teaching to the test through the publication of league tables, does little to promote

the openness and honestly needed for a system based principally on on-going teacher assessments. Yet openness would be the prime condition needed to fulfil the requirements for validity that Kane outlines.

Two other groups of TLRP projects, not mentioned before but referred to more fully in the next section, noted other limitations of existing assessment measures. The Understanding and Developing Inclusive Practices in Schools network of projects (P11) and the linked Facilitating Teacher Engagement in more Inclusive Practice project (P9) highlighted the need for assessments of a broader range of outcomes than those evaluated in conventional tests and examinations, including pupil participation and development of learner identities.

The Group work projects (P6, P12) used a multiplicity of measures in their research to evaluate pupil development in cognitive, social and affective domains. These covered a wide range of processes and outcomes relevant to all kinds of outcomes. However, they noted that group work itself tends not to be directly assessed, in summative terms, despite the value attached by employers to both group products and teamwork skills. This is not to say that it cannot be done. Galton (2010) reviews possible ways of assessing both group productivity and individual contributions and argues that fair, reliable and valid assessment of both these elements is possible. However, it is undoubtedly difficult, and it demands that teachers and pupils understand the criteria for judgement.

The essence of the general problem, illustrated in Box 5, was identified by the Learning Outcomes thematic group:

> If projects within TLRP are attempting to conceptualise learning outcomes in a much broader way than previously, taking account of surface and deep, process

> and product, individual and social, intended and emergent learning, how can these 'outcomes' be detected in a way that does them justice? (James & Brown, 2005, p. 18)

No TLRP schools projects were established with a prime intention to develop new assessment instruments. Many had assumed that they would be able to use existing measures to detect the outcomes in which they were interested. National tests and examinations (SATs and GCSE) were widely used as proxy measures of attainment, together with cognitive abilities tests (e.g. PIPS in P3, P6, P12), self-report inventories of meta-cognition, motivation or attitudes towards learning (e.g. ELLI in P3; ALCPs in P5). [25] However, the choice was motivated as much by the need to have some measure of change over time, across cases or in comparison with control groups, as by the need for construct validity. The desire to reconceptualise learning outcomes and the need to investigate change were fundamentally in tension. On the one hand, investigating change usually requires some baseline assessment, which encourages the use of existing measures; on the other hand, new conceptions of learning outcomes require new measures and these demand extensive development and trialling. This situation, created mainly by the conditions of TLRP commissioning, was unsatisfactory. Little could be done to change the situation for currently funded projects but a thematic group was set up to explore the issues further.

[25] SATs - the popular term for national key stage tests in England; GCSE - General Certificate of Secondary Education examinations; PIPS –Performance Indicators in Primary Schools System, see: http://www.cemcentre.org/RenderPage.asp?LinkID=22210000 (Accessed 17th May 2011); ELLI – Effective Lifelong Learning Inventory, see: http://www.ellionline.co.uk/ (Accessed 17th May 2011); ALCPS – Assessment of Learner Centered Practices, see (McCombs & Miller, 2007).

The Assessment of Significant Learning Outcomes (ASLO) theme group (T9), which drew on the expertise of the UK Assessment Reform Group[26], set out to examine the relationships between assessment and pedagogy and between assessment and curriculum, and, specifically, issues of alignment or congruence. Five case studies were chosen to investigate how the assessment of learning outcomes was understood in different contexts: school mathematics in England; Learning to Learn in countries of the European Union; workplace learning in the UK; higher education in UK; and vocational education in England. Three initial questions were used to frame the enquiry:

1. What are the significant learning outcomes that are not being assessed in a system that relies wholly on test-based assessment procedures?
2. What are the indicators of student performance, which have been, or could be, developed in relation to such learning outcomes?
3. What assessment procedures do not rely on testing but do, or might, give dependable measures of student performance?

'Curriculum' and 'assessment' were seen in fundamentally different ways in each context, and, in only two of the five settings, was the term 'learning outcomes' in widespread use. However, four common themes emerged across the five case studies: construct definition; progression; the impact of assessment procedures; system-level accountability as a driver of alignment. The familiar problem of construct definition – how, and by whom, the constructs involved are defined and made real – was exemplified by school mathematics.

[26] See http://www.assessment-reform-group.org (Accessed 17th May 2011)

> Current views about what school mathematics should be are often quite different. One view is that mathematics is the performance of routine algorithms; another sees mathematics as a tool to tackle "everyday" or "real world" problems. The former leads to assessment of achievement with well-defined exercises, which have a single right answer, with learners inclined to think of achievement as arriving at that answer. The latter looks for evidence of a capacity to tackle the rather messy contexts which are characteristic of every-day problems: problems for which there is no right answer, and where explanation of the way the problem has been defined, and of the approach adopted, is as important as the "answer" itself. Such work is much more demanding to guide, and harder to assess. […]
>
> The testing system is of course of crucial importance here. With time-limited tests to cover a very full curriculum, any activity that involves much more time, than that in which a single examination answer can be given, is not possible. Therefore realistic problems are ruled out. This results in an invalidity block, which could in principle be cleared by strengthening the use of teachers' own assessments in national tests and public examinations. (Mansell, James & the Assessment Reform Group, 2009, p. 14)

The conclusion from this aspect of the ASLO enquiry was that the constructs underpinning programmes of study are often inadequately articulated.

Enabling progression is at the heart of pedagogy and therefore central to formative assessment (assessment for learning), however, the ASLO case studies showed that summative assessment requirements, driven by pressure for uniformity and accountability, often constrain teachers from using their own judgement to nurture progression. Equally, the impact of assessment procedures on the alignment between intended and actual learning outcomes is considerable. Misalignment in this respect can represent a threat to the integrity of learning itself. The examples studied highlighted numerous ways in which assessment procedures disrupted desirable learning or encouraged undesirable learning. Case studies - such as the project to develop a European indicator for learning to learn capability[27] - also revealed just how influential the political imperatives for system-level accountability can be. 'They drive the role of assessment in defining the relevant constructs and, perhaps more crucially, shape how teachers and students then interpret and enact those constructs.' (Daugherty, 2009, p. 3).

The evidence of the ASLO thematic work suggests that the relationship between assessment and curriculum is more multi-dimensional and multi-level than the terms 'alignment' or 'congruence' imply. The group concluded that it might be better understood as a complex, non-linear, interacting system with the ultimate goal being a synergy of curriculum, pedagogy and assessment. This takes us back to the proposition at the very beginning of this section.

Ideas and evidence from the ASLO seminar were incorporated into a TLRP Commentary on *Assessment in Schools. Fit for Purpose?* (T13). This was also

[27] The TLRP Learning How to Learn project team (P13) was consulted about this.

prepared with the help of the Assessment Reform Group (ARG) (Mansell, James and the Assessment Reform Group, 2009). Its purpose was to present policy makers – in the run-up to the 2010 general election – with four key challenges drawn from the collective research intelligence of TLRP and ARG. In light of the evidence that assessment systems in the UK, and elsewhere, are expected to serve an enormous range of purposes – many of them quite remote from their original intentions to evaluate what a pupil knows, understands and can do – education professionals, policy makers and the public should be aware of the unintended consequences of assessment policy decisions and initiatives. At the heart of the matter are concerns about fitness for purpose, which are also about the quality of assessments. The commentary identified different criteria for judging such quality depending on whether the purpose was formative, summative or evaluative. It contested the common view that a single set of assessments could serve several purposes without distorting one purpose or another. The four challenges were therefore: to extend, embed and spread good in-class assessment practice through the professional development of teachers; to enhancing confidence in tests and examinations by improving their reliability and validity; to justify the costs of the assessment system, which in England was calculated as £750k per annum; and to avoid micro-management by politicians and managers who are ill-equipped to make technical judgements of quality. Above all, assessment systems must be congruent with the overarching purpose of education systems to advance learning.

One of the outputs (Filer & Pollard, 2000), from the TLRP Associate projects on Identity and Learning (P21), shed light on assessment from a different angle by focusing specifically on pupil perspectives, strategies, relationships and identities

developed in assessment encounters. As in other contexts of schooling, children develop their identities through successive experiences as they move through schooling. Experiences of assessment are shown to be among the most powerful. As in the TLRP project on Consulting Pupils on the Assessment of their Learning (P15), which also focused on pupil perspectives, assessment is revealed as a social process. Performance is inseparable from context and results take meaning from social and cultural interpretation. The case for strengthening the validity of the inferences drawn from assessments is therefore overwhelming if learners' sense of agency and identity is to be promoted and not destroyed.

Personal and social processes and relationships (principles 6, 7 and 8)

This cluster of principles also reflects contemporary awareness of the influence of social, as well as psychological, factors on learning. As noted above, TLRP funded psychologists such as Peter Bryant and Terezinha Nunes (P4) and Christine Howe (P14), and neuroscientists such as Paul Howard-Jones (T4), although the major disciplinary framework from which it drew was that of education itself. In this respect, the Programme reflected the contemporary UK field with an eclectic mix of projects, many informed by sociological and sociocultural theory. For example, several projects shared an interest in Bourdieu and another group identified with activity theory. Some, particularly those concerned with identity, were influenced by the symbolic interactionist roots of British qualitative sociology of education.

Most TLRP projects started from specific educational issues but explicitly maintained a theoretically-informed awareness of agency, culture and context in education. The outcomes of such work are reflected in the three principles below.

PRINCIPLE 6: Effective pedagogy promotes 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.*

PRINCIPLE 7: Effective pedagogy fosters 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.*

PRNCIPLE 8: Effective pedagogy recognises the significance of informal learning. *Informal learning, such as learning out of school or away from the workplace, should be recognised as at least as significant as formal learning and should therefore be valued and appropriately utilised in formal processes.*

In relation to Principle 6, almost all TLRP schools projects affirmed the importance of developing active engagement, positive learning dispositions, self-confidence and

learning awareness. Indeed, in an era that saw a steady growth, within much of the UK, of central control over curriculum, pedagogy and assessment, the engagement of learners has become an increasingly pressing contemporary issue.

Traditionally, in psychological terms, such issues have been framed in terms of motivation with emphasis being placed on ways of engaging individual learners in particular tasks. The work of Carol Dweck (1999) for instance, on 'mastery' and 'learned helplessness' as orientations to new learning challenges, has been very influential in the UK. In parallel, though, has been a practical humanistic tradition in British education drawing on the practitioner enquiry movement initiated by Lawrence Stenhouse (1975). TLRP's network on Consulting Pupils about Teaching and Learning (P10) was a manifestation of this commitment to practical theorising and improvement. Led by the late Jean Ruddock, the Consulting Pupils network directly engaged teachers, children and young people in 46 schools in reflection on their classroom practices and school experiences (Rudduck and McIntyre, 2007). Indirectly, it connected with thousands more in building from the UN Convention on the Rights of the Child (1989) to affirming the quality and constructive nature of feedback about teaching and learning that pupils were able to offer. Outcomes (see evidence Box 6 below) included enhanced commitment to learning and improved teacher-pupil relationships. The work was widely influential and contributed, for example, to provision for pupil opinions in the framework though which all schools in England were externally inspected.

The UK tradition of qualitative sociology has also developed to offer a complementary understanding of how learners perceive and make sense of their

school experiences. For example, the Identity and Learning Programme, a TLRP associate investment (P21), was a longitudinal series of ethnographic projects by Pollard and Filer tracking two cohorts of children from age 4 to 16 (e.g. Pollard and Filer, 1999). It started in the mid 1980s and demonstrated how pupils progressively develop strategies to cope with the challenges of schooling over time, and how secure forms of learning become embedded in meaningful personal narratives and identities. Where school curricula fail to make meaningful connections with the learner, then it is argued that pupil performance and capability are likely to be shallow and transitory. Similar ideas were reflected in other TLRP projects. A developed example is provided by a study of further education experiences – Transforming Learning Cultures (James and Biesta, 2007) – which recognised the way in which institutional conditions enable or constrain opportunities for independent learning. Another is that of Crozier and colleagues (2009) who analysed disjunctions in the experiences of working class students entering higher education. However, the analysis was developed most thoroughly by the Learning Lives project (Biesta et al, 2011) which studied learners across the lifecourse using a combination of evidence from a large-scale cohort study and case study interviews reviewing learning careers over time.[28] This study was important for its lifelong reach and demonstration of the durability of attitudes deriving from early school experiences. In particular, it reported how narratives about learning and educational experiences are used as frameworks of interpretation in the development of identity, self-confidence and agency.

A seminar series on Transitions through the Lifecourse was established to explore such ideas across TLRP projects (T17). Through this work, transitions between

[28] The survey sample of 5500 adults was drawn from the British Household Paned Survey, and this was combined with data from 120 interviews.

sectors at different phases of life were reviewed – home to school, school to college, college and university, between workplaces – and analyses of social class, gender, disability and age patterns were also undertaken (Ecclestone, Biesta and Hughes, 2010). The emerging analysis was initially seen as a possible way of constructing a meta-narrative for the TLRP programme as a whole, since the work of many projects could be plotted across dimensions of the lifecourse. As it developed, the interest in transitions deepened because of the discontinuities and disruption to progression in learning that was often observed. The social dimension remained prominent in the thinking of TLRP teams. As John Field suggested in his introduction to an edited collection on this work, it is necessary to recognise the 'diversity of individual experience' but we 'should not neglect the collective dimensions to transition'. He went on: 'we need to examine systematically the sites in which learning occurs and the nature of locally experienced structures of opportunity' (Field, 2010, p. xxiii).

Here then we can clearly see the emphasis on the social of a significant cluster of TLRP projects, and their concern for the construction of meaning in relation to circumstances. The promotion of learner independence and autonomy, in this sense, is not just about the effectiveness of learning. It also concerns the realisation of rights, formation as a person, manifestation of citizenship and contribution of individuals to history.

BOX 6

Evidence from school projects

Consulting Pupils about Teaching and Learning (P10), a network of six projects, built on growing recognition that young people have a right to be heard and have something worthwhile to say about their school experiences. 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, 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 often 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 was extended by subsequent work carried in Northern Ireland with a particular focus on children's rights to be consulted on the assessment of their learning. This had particular relevance in Northern Ireland as policy makers introduced a Pupil Profile to record pupils' development and encourage the adoption of Assessment for Learning in classroom practice. The CPAL project (P15) comprised 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 pupils 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.

Pollard and Filer's longitudinal ethnography, Identity and Learning (P21), focused on the interaction between pupils' experiences of schools, homes and communities in the formation of learner identities. Two cohorts of children (ten in each of two primary schools contrasted by different social class settings) were tracked through multiple secondary schools to public examinations at age 16. 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.

Principle 7 focuses on how teaching and learning foster both individual and social processes and outcomes. Practitioners consistently assert the importance of 'good relationships' in classrooms or, to put it another way, the necessity for teacher-pupil respect as the foundation of discipline, order and learning. Indeed, the longitudinal work of TLRP's associated Identity and Learning project (P21) claimed that 'meaning and opportunity in classrooms build from everyday relationships' (Pollard and Filer, 2007) – thus encapsulating the interrelationship of individual perspectives and social interaction. Some projects used the concept of social capital (Putnam, 1993) in discussion of broad social opportunities whilst noting the formative role that school and classroom processes and peer-relations can play in such accumulation.

More specifically, several TLRP projects investigated the particular educational uses to which such relationships and processes can be put. For example, reference has been made earlier to the projects on thinking skills, learning how to learn and pupil consultation.

The TLRP group work projects (P12 and P6) particularly demonstrate the benefits of efforts to improve student's mastery of cooperation and collaboration. Pupils involved in such developments made significant academic gains, which were stable across schools in different social contexts. The implications are that group work can produce significant benefits to attainment, motivation and behaviour. However, this requires explicit 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 – and thus moves

beyond the general affirmation of relationships. A TLRP Research Training Fellowship study (Bevan et al, 2007) of on-screen learning using concept-mapping software also found that significant sustained learning gains were only associated with structured opportunities for collaborative peer discussion. These projects confirm the vital importance of classroom dialogue when it is put to use in building explicit awareness of learning processes.

BOX 7

Evidence from school projects

The SPRinG (Social Pedagogic Research into Group work) project (P12) 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 previous evidence of its 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 school classrooms 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.

A linked project in Scotland (ScotSPRinG) (P6) had similar results. This project worked in primary schools and investigated 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 Key Stage 2 study 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.

Principle 8 asserts the significance of informal learning and urges its utilisation in more formal educational settings. This principle can thus be expressed simply, but has profound implications and challenges. Recognition of the social and cultural

dimensions of learning in many TLRP projects produced a heightened awareness of learners, relationships and contexts. In successive annual Programme conferences, researchers struggled with how to study, analyse and represent the learning that took place beyond formal educational settings. Two seminar series were established to wrestle with these issues.

The first seminar series was entitled, Contexts, Communities and Networks: Mobilising Learners' Resources and Relationships in Different Domains (T16, see Edwards, Biesta and Thorpe, 2009). Meeting over a two-year period, representatives of projects and others explored the nature of learning in different settings and the validity, or otherwise, of contrastive descriptions of these processes. Sociocultural theory provided a major driver here. So, for example, a study of literacy practices in further education (Ivanic et al, 2009) demonstrated how learners' every-day, vernacular experience yielded significant educational value when ways were found to draw on this knowledge in college settings. This approach echoed Dewey's emphasis on the validity of many different kinds of experience. The implications for pedagogy are profound. As Thorpe and Mayes (2009, p. 160) put it in their review of the work of the seminar series:

> Pedagogy needs to build connections across different areas of experience, between the classroom, the workplace, the home and social life, where these connections can provide points of engagement for learners and ways of enabling them to draw on the resources of their own experience.

A second TLRP investment was led by Leon Feinstein and drew, beyond the Programme, on the work of the Centre for the Wider Benefits of Learning (WBL) at the University of London, Institute of Education (T15, see Schuller et al, 2004; Feinstein, Budge, Vorhaus and Duckworth, 2008). This Centre specialises in analysis of social, economic, medical and environmental factors influencing learning across the lifecourse and draws on both qualitative research and large-scale statistical analysis of cohort, economic and social data. TLRP's portfolio of projects, though rather different in nature, echoed the Centre's range of concerns and an association was therefore developed. In particular, whilst WBL worked on patterns in life trajectories, TLRP focused on pedagogic and learning processes. This work came together in a Foresight publication for the UK Government Office for Science entitled *Learning through life: Future challenges* (Feinstein, Vorhaus and Sabates, 2008). Citing TLRP's Ten Principles, this report argued that only quality education and learning can enhance skill and capability.

In England the New Labour government did indeed demonstrate greater awareness of the significance of social context in relation to children and young people. For example, as noted earlier, the Every Child Matters agenda and integration of national health, social and educational provision into Children's Services across the whole country were clear evidence of holistic analysis and of attempts to promote inclusion through the coordination of services.

TLRP's own work in these areas was at rather different levels, whether in workplace, university or school education. Two areas of research stand out regarding school education – home school relations and the influence of new technologies.

The Home-School Knowledge Exchange (HSKE) project (P3, see Hughes, 2006), 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.

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

BOX 8

Evidence from school projects

The Home School Knowledge Exchange project (P3) collected baseline data in 'action' and 'comparison' schools in Bristol and Cardiff prior to instigating a range of home-school exchange activities. Measures were repeated and qualitative pupil/family case studies were also developed to assist in the interpretation of the patterns found. The project concluded that: i) there are substantial 'funds of knowledge', embedded in national, ethnic and popular cultures of homes and communities, which 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) home school knowledge exchange 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 than in Bristol).

A research training fellowship, held by Brookes[29], was linked to the HSKE project and focused particularly on provision for gifted and talented pupils at secondary transfer. Findings from this ethnographic study tracking 15 Year 5 children into Year 8 show how school selection by parents, and the process of transfer, are experienced as multi-faceted, iterative, stressful and prolonged. [30]

Another of TLRP's associated projects is of relevance here. EPPE (Effectiveness of Pre-school Primary Education)(P2) is 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) (see Sylva et al, 2010). The findings from the pre-school study (3000 children and 141 pre-school settings) were 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.

[29] See website at: http://www.tlrp.org/proj/rtfbrookes.html (Accessed 17th May 2011)
[30] Evidence from the HSKE project, and its linked fellowship, focusing particularly on the social and emotional dimension of secondary transfer, was 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).

In TLRP's discussions, the juxtaposition of formal and informal learning came to signify debates about the influence of social context. This was sometimes represented in terms of bounded environments, often with the classroom or child at the core and with multiple contextual layers circling beyond. Another usage, adoption of which grew over time, saw context more in terms of ever-present interpolating factors that crossed boundaries rather than being constrained by them. In this respect, Cole's (1996) distinction was helpful between general uses of the term 'context' to denote 'that which surrounds us' and 'that which weaves us together'.[31] The latter usage was particularly illuminative in relation to the influence of new technology on learning.

TLRP's work on technology began modestly with a single project on the integration of ICT into everyday classroom practices. The InterActive Education project (P8) worked with primary and secondary school teachers to study how subject-knowledge could be enhanced through the use of new technologies. The use of mobile and other forms of technology is now so pervasive and so embedded within the cultures of children and young people that it provides a very strong illustration of the knowledge and experiential resources that exist beyond formal educational settings. Such knowledge is, however, somewhat idiosyncratic and uneven, making it a difficult resource to harness in schools. The project found that technology could be particularly effective at enhancing subject knowledge when teachers were able to bridge between the idiosyncratic and the intended curricular learning using tailored software. The software was seen, in sociocultural terms, as a mediating tool in support of the teaching-learning process. A similar conclusion was reached in a supplementary early years technology project in Scotland – InterPlay (P1). In this

[31] See Thorpe and Mayes (2010) for a discussion of these representations.

work, the ‘guided interaction’ of teachers and young children was seen as crucial in supporting dispositions to learn though the use of new technologies – including electronic toys and devices of many sorts, as well as technologies designed for more conventional educational processes. (See Box 3, above, for more detail of these projects.)

In 2007, TLRP was able to launch a completely new phase of investigation on Technology Enhanced Learning with the joint backing of two UK Research Councils and an additional £12 million in funding. Known as TLRP-TEL and under the leadership of Richard Noss, this phase of work has developed its own momentum and will run to the end of 2012. Following a development phase, eight major projects were selected for investment. Thematic analysis on flexibility, inclusion, personalisation, productivity and capacity building was built in from the start (see www.tlrp.org/tel - accessed 17th May 2011). This thematic work is conclusively demonstrating the experiential power of new technology and its influence on learning, and also the fact that such phenomena are fast moving with high potential for penetrating conventional forms of educational provision. The new world of technological learning and experience is thus both a fantastic resource and a considerable threat to schooling practices as they have been understood in the past.

The InterActive Education projects synoptic book (Sutherland, Robertson and John, 2009) reflects on this in terms of its implications for school contexts. Robertson and Dale write that there is a ‘tendency to view schools as islands, loosely connected to society. ... What young people learn in other places and spaces has little currency in the classroom.... and ... schools are represented as enduring features of the landscape,

immune to change' (p.155). They suggest that schools reflect an 'assemblage' of social relations, assumptions and organisational arrangements with significant effects on pupils, teachers, parents and others. Change, they suggest, is inevitable, as the impact of new technology and of learning beyond school accumulates. The book concludes: 'Maybe it is time to consider young people's out-of-school knowledge and cultures not as 'distractions' from the main business of schooling, but as rich, complex, diverse and powerful sources for learning and as an important place to start in designing education for the twenty-first century' (p. 176).

Teachers and policies (principles 9 and 10)

A distinctive characteristic of TLRP schools projects was their aim to generate new knowledge about effective teaching and learning in authentic settings i.e. in classrooms led by teachers. In almost all cases this encouraged them to work directly with teachers, or other education professionals in classrooms, to *develop* innovations.[32] This contrasts with much existing research on 'what works', especially from the United States, which tends to rely on university-based researchers to develop and test interventions in quasi-experimental settings. Under this system, those programmes, projects and products that achieve respectable effect sizes are disseminated through, for example, the What Works Clearinghouse.[33] However, the transformation of evidence-based knowledge into sustainable and effective practice cannot be taken for granted. Promising innovations often fail simply because they are

[32] The exception might be the literacy and numeracy projects (P4; P14) although the project on spelling using morphology carried out research on how the interventions developed by researchers could be transformed into teacher practice (Hurry, et al, 2005).
[33] See http://ies.ed.gov/ncee/wwc/aboutus/ (Accessed 17th May 2011)

not implemented; and implementation depends on those who work on a daily basis with pupils taking ownership of new ideas and practices. This requires teacher learning.[34]

The premise from which TLRP started made investigation of teacher learning an integral part of the work of most projects. Therefore, almost all projects contributed some evidence to underpin TLRP Principle 9:

> ***PRINCIPLE 9: Effective pedagogy depends on the learning of all those who support the learning of others.*** *The need for lecturers, teachers, trainers and co-workers to learn continuously in order to develop their knowledge and skill, and adapt and develop their roles, especially through practice-based inquiry, should be recognised and supported.*

Much debate has centred on the issue of whether teachers need to learn new techniques or whether the ideas underpinning them are more important. Some argue (e.g. Webb et al, 2004) that changing practices can lead to changes in beliefs; others (e.g. Ajzen and Fishbein, 1980) take the view that changing behaviour depends on changing beliefs because they provide the necessary reasons to act. The general conclusion, to be drawn from the diverse studies in TLRP, is that changes in behaviour and beliefs are both are necessary and should be developed together, progressively. Furthermore, effective pedagogy depends not only on behavioural change and the acquisition of new knowledge but on the development of values and dispositions, and reappraisal of roles and relationships in and beyond the classroom.

[34] In order to avoid cumbersome expression, 'teacher learning' is used in this article to encompass the learning of all adults who provide support for learning.

Such learning by teachers takes place in the workplace, through participation in collaborative activities with other 'insiders', although the involvement of outsiders, such as researchers, and the provision of well-researched materials can be highly valued.

These conclusions began to emerge early in the life of TLRP. During a mini-conference held in 2002, which brought together the first projects to conclude their work, researchers with very different interests (P4, P7, P10, P11 and P19) discovered that they all had findings regarding teacher learning. These were initially fleshed out in a BERA conference symposium and then published in a special issue of the journal, *Research Papers in Education* (volume 20, Number 2, June 2005*).* The editorial to this issue summarised the common themes:

1. Learning is both individual and collective and involves both the acquisition of knowledge and skills and participation in social processes. Thus the development of supportive professional cultures within which teachers can learn is vitally important. Within schools, especially secondary schools, the focus is often the department or team. However, the very cohesion of these groups can create insularity and inhibit change. Dynamic and expansive learning environments need to provide opportunities for boundary crossings, which encourage teachers to learn from others in different networks or communities of practice.
2. Teachers are most ready to accept ideas for change if they resonate with their existing or previous beliefs and experience. However this does not make then right or appropriate. Teachers need to develop the knowledge

and skills to evaluate evidence and the confidence to challenge taken-for-granted assumptions, including their own. This is difficult and it is often helpful to involve outsiders, perhaps researchers from universities or visiting teachers from other schools, in helping teachers to see things differently. Teachers need to be assured that it is acceptable and often fruitful to take risks. Trust is therefore of the essence.

3. Evidence from research about effective practice is not always sufficiently accessible for teachers to use as a basis for action. Findings often need to be transformed into practical and concrete strategies that they can try out. This may involve the production of concise and user-friendly materials written in natural language although ideas are often mediated best by talk and personal contacts with other teachers who have had some success in using them. Researchers have a responsibility to communicate their work in accessible ways but other education professionals can also have an effective role in mediation of this kind. (James, 2005, pp. 107-108)

BOX 9

Evidence from school projects

One study in the network of projects, Improving Incentives in the Workplace (P19), investigated secondary school teachers' learning as a special case of workplace learning. Drawing on a wide literature, including analysis of metaphors of learning and sociocultural theory, Hodkinson and Hodkinson (2005) draw attention to the way teachers learn through individual activity, collective activity and planned activity. They argue that the current policy

context in England restricts teachers' capacity to learn and that genuine improvements are only likely to come if more expansive learning environments are created in which teachers can learn through participation in a supportive learning culture.

Similar concerns with structural and dispositional barriers and affordances are raised in the article by Howes et al (2005), who report work of the TLRP network of projects, Understanding and Developing Inclusive Practices in Schools (P11). Inclusive practices are defined as those that help to overcome barriers to participation and learning. The project was committed to institutional change, at the cultural level. Nevertheless, teacher learning was seen as central to this and, as a social process, has to proceed in a research-like way with the construction of alternative perspectives that can pose questions and disturb taken-for-granted assumptions. The researchers call these *interruptions* to thinking and practice. Outsiders, including researchers or teachers visiting from other schools, are an important resource because they can help to 'make the familiar strange' and encourage 'boundary crossing'. However, it requires determined leadership to maintain risky learning dialogues that can bring about change.

The importance of learning dialogues, particularly around what pupils can tell teachers about teaching and learning, was the central theme of the network of projects, Consulting Pupils about Teaching and Learning (P10). In this study the researchers were interested in whether teachers learned from pupils in a way that led to sustained changes in their practices. McIntyre et al (2005) produced evidence of both comfortable and uncomfortable learnings for teachers. They conclude that in order for teachers to change their practice a number of conditions are necessary: teachers need to believe that pupil perspectives are important; teachers need to help pupils to learn to take on the new roles demanded by consultation; teachers need to be confident that they can combine responding to the needs of government and to the views of pupils; teachers need support from school managers to develop regular ways of consulting pupils.

One of four studies within the network of projects, Towards Evidence-based Practice in Science Education (EPSE) (P7) explored factors that promote and inhibit the impact of educational research on teachers' practice. Ratcliffe et al (2005) found that use of research evidence in the classroom depends on two factors: i) the 'translation' or 'transformation' of research findings into tangible outputs such as teaching materials; ii) the existence of a professional culture in the school that encourages teachers to explore ways to use research in practice. Teachers engaged more readily with research generated by others once they had some experience of doing research themselves. However, when judging whether a piece of educational research might cause them to change their practice, it was not the quality of the research, but the extent to which it accorded with their own existing practices and beliefs, that influenced them. This sometimes caused them to dismiss research findings that challenged their assumptions.

Teachers were also more inclined to pay attention to research disseminated through oral communication and personal contacts than written reports. The influence of research on practice was often indirect or mediated. This study concluded that if research findings are to make an impact on classroom practice they need to: produce *convincing* findings, which *resonate* with teachers' professional experience, and *translate* into practical strategies that are widely disseminated through *professional networks*.

An attempt at this kind of translation, or 'transformation', of research evidence into teacher practice was attempted in the project, The Role of Awareness in the Teaching and Learning of Literacy and Numeracy in Key Stage 2 (P4). Hurry et al (2005) were particularly interested in: the relationship between teachers' knowledge and understanding of morphology; whether this awareness was reflected in their practice; and whether this was associated with gains in their pupils' spelling. The study concluded that research can be transformed into teacher

practice but there are difficulties in sustaining professional development. Again, the policy context was seen to be crucial and provision of documentation alone is insufficient to ensure implementation.

All the studies described in Box 9 above, emphasise the importance of interactions among teacher factors (e.g. knowledge, attitudes and behaviour), cultural factors (e.g. professional networks or communities) and structural factors (e.g. policy contexts).

As further TLRP projects reported their findings, these insights were elaborated, refined and expanded. Teacher-research, action research, practice-based enquiry or lesson study were regarded as key professional learning activities and many projects incorporated these in their design.

BOX 10

Evidence from school projects

Understanding and Developing Inclusive Practices in Schools (P11), which is described in the previous box (Box 9), was a collaborative action-research project in three local authorities. It 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. This project gave rise to an 'extension' project in Wales, Prosiect Dysgu Cydradd (or Facilitating Teacher Engagement in more Inclusive Practice) (P9). This project was built on evidence that many teachers remain unconvinced of the principle of inclusion. Through action research, it set out to draw more secondary teachers into the challenge of engaging all of their pupils in learning. A major

innovation was the involvement of educational psychologists acting as facilitators to support and challenge. The project team found that: i) many secondary school teachers are unfamiliar with action research and, unless they develop a sense of ownership, they see this approach to development as just another imposition; ii) however, energy and creativity are released when teachers allow or invite their assumptions about pupils and learning to be challenged; iii) both school leaders and external facilitators (such as educational psychologists) have a role in providing support and challenge. One strong conclusion was that the process of reflection and action needs to be protected from external agenda.

The Learning How to Learn in Classrooms, Schools and Networks project (LHTL) (P13) was principally concerned with the conditions in schools and networks that would enable the positive effects of assessment for learning (AfL) to be scaled up and sustained without intensive and expensive support. This project investigated 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 enquiry by teachers is a key condition of promoting autonomous learning by pupils and that schools that embed AfL 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. Therefore 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'.

Linked to this project was a TLRP Research Training Fellowship, awarded to Pete Dudley, to undertake an investigation of ways in which Japanese Lesson Study might be adapted and

used in UK schools.[35] 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 that 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. The findings, which will be reported in a PhD thesis, are 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.

Underlying the examples given in Box 10 are some deeper questions about the purpose and value of action research and collaborative enquiry. These relate to earlier discussion about learning in general - about whether learning is an individual or a social process, and what and whose ends it serves. Such issues were also explored in, Changing Teacher Roles, Identities and Professionalism (C-TRIP) (T5), one of TLRP's most successful thematic seminar series. These seminars invited presentation of new empirical and theoretical work and brought together two important traditions of enquiry about teachers' lives and practices: research that investigates *the social and policy contexts of teachers' lives* and research that focuses on the *enhancement of professional practice*.[36]

[35] See http://www.tlrp.org/proj/phase111/rtfdudley.htm (accessed 17th May 2011)for details and publications.

[36] In addition to a collection of seminar papers, it produced an annotated bibliography of 100 texts produced since January 2000, plus an appendix reviewing the literature prior to 2000. These can be downloaded from http://www.tlrp.org/themes/seminar/gewirtz/ (Accessed 17th May 2011)

In his C-TRIP seminar paper, Elliott (2006) traces the concept of 'research-based teaching' in the UK to the work of Lawrence Stenhouse and his Humanities Curriculum Project in the late 1960s and early 1970s. He claims that Stenhouse had emancipatory intent:

> Research-based teaching was viewed by Stenhouse as a form of research that focuses on over-coming the difficulties of achieving high quality discussion in classrooms, given the norms that have traditionally shaped practice in them. For him, the transformation of the culture of teaching and learning that prevailed in the field of humanities education, and which he believed to be the primary source of students disaffection, depends upon the capacity of teachers to adopt a research stance towards their practice. He did not view this capacity in purely individualistic terms. Cultural transformation depends on teachers collaborating together across classrooms and schools to identify and diagnose common problems they experience in attempting to realise the standards implied by the pedagogical aim of developing understanding - given that their practice tends to be shaped by shared norms - and to devise experimental strategies for resolving them. Research-based teaching depends on the willingness of individual teachers to open up their practice to scrutiny by others. It therefore presupposes the possibility of discerning shared problems and solutions in common across a wide range of classroom contexts. (Elliott, 2006, pp. 3-4)

However, Elliott also perceives that the 'teachers as researchers' movement has been re-shaped by the 'standards agenda'.

> What is now known as 'practitioner research' tends to be understood as an inquiry that may be carried out by individual teachers into how to drive up standards in their classroom. […]'Practitioner Research' of this kind is shaped by an objectivist and instrumentalist rationality as opposed to the deliberative and democratic rationality embedded in the idea of research-based teaching to improve the ethical quality of teacher's interactions with students in the teaching-learning process. (Elliott, 2006, p. 12)

Data from many TLRP projects indicated structural constraints on teachers' capacity for professional learning that were not simply practical but 'an assault on values' (Woods et al, 1997, p. 84). For example, approximately 80 per cent of 1,200 teachers surveyed in the Learning How to Learn project (P13) reported marked gaps between what they valued and what they practised. Most teachers believed more strongly in promoting learning autonomy in their pupils than claimed to practise it; and they practised 'performance orientation' more than they believed in its value (James et al, 2007, p. 56). In-depth interviews with 37 teachers revealed that they felt constrained by the press for rapid 'curriculum coverage', 'teaching to the test' and a 'tick box culture'. Although values-practice gaps reduced significantly during the course of the project, some remained. This poses a question about whether professionals who are able articulate educational values should be expected to tolerate such levels of tension and dilemma in their professional lives. An optimistic message from this project was that the 20 per cent of teachers, who had most success in promoting AfL in their classrooms, were those who demonstrated a capacity for strategic and reflective thinking and took responsibility for what happened in their classrooms. They were not inclined to blame external circumstances or pupil characteristics but concentrated on

the ways in which they could improve the learning experiences for pupils (James et al, 2007, p. 215).

The character of teachers' professional lives was, as mentioned above, the other strand of interest in the C-TRIP thematic seminar series (T5). It was also the particular focus of a TLRP associate project, Variations in Teachers' Work, Lives, and their Effects on Pupils (VITAE) (P17). This longitudinal study of 300 teachers provided a new perspective on teachers' quality, retention and effectiveness over the whole of their careers. The project found 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 project concluded that strategies are needed for meeting the needs of teachers in different phases in their professional lives, and in different communities. Furthermore, CPD may not be as influential as the work context in creating commitment, resilience and wellbeing in teachers. These factors are important in that they are correlated with pupil outcomes. This finding resonates with other TLRP research that looked beyond continuous professional development (CPD), as the main

opportunity for teacher learning, to issues around recruitment, retention, initial teacher education (ITE) and induction.[37]

In England, the influential EPPE project (P2) found that the recruitment of highly qualified staff is the key factor in effective pre-school education. In Northern Ireland, Innovations for a Values-based Approach to Teacher Education project (P18), questioned the value of professional development activities. Focusing on the role of values in recruitment, ITE and induction, the project discovered that beginning teachers in Northern Ireland lacked diversity; few shared background with pupils, which made connection and communication difficult. This difficulty was compounded by the appointment of new teachers to temporary positions, which led to inconsistent induction. In Scotland, the Competence-based Learning in the Early Professional Development of Teachers project (P20) investigated informal identity formation in beginning teachers. As in the projects on pupil group work (see above), the emotional and relational aspects were found to be important in the early stages with role aspects, including cognitive learning, featuring later. Patterns of social interaction correlated with job satisfaction. The director of this project noted at the 2006 TLRP annual conference:

> Pupil engagement in learning and their sense of worth depend also on the personal qualities of new teachers and the gradual growth of relationships that are imbued with mutual trust and confidence. This reciprocity is important for the further development of teaching and learning.

[37] A substantial bibliography of 446 recent research publications on teacher education was compiled by the Teacher Education Group for the research resources section of the TLRP website. This can be found at: http://www.tlrp.org/capacity/rm/wt/teg/ (Accessed 17th May 2011)

Comparing teacher education across the four countries of the United Kingdom, a TLRP thematic group on Teaching and Learning Policy in Post-devolution UK Contexts (T7) found aspects of both convergence and divergence in grade structures, services, standards and structures.

All these studies suggest that the two strands of the C-TRIP seminar series are closely interrelated: the enhancement of professional practice is influenced by the social and policy context of teacher's lives. C-TRIP accumulated a very considerable body of evidence on the material significance of policy - connected with history, regional or national specificity and education phase or sector – which contributes to the case for TLRP's tenth principle:

> ***PRINCIPLE 10: Effective pedagogy demands consistent policy frameworks with support for learning as their primary focus.*** *Organisational and system level policies need to recognise the fundamental importance of continual learning – for individual, team, organisational and system success - and be designed to create effective learning environments for all learners.*

Most TLRP projects raised questions and produced evidence about the impact of policy at three levels - school, local authority and the nation - and the interactions among these levels.

At school level many researchers observed that when senior management support innovation it becomes sustainable. However, head teachers revealed their concerns

about leading learning in their schools within the context of prescriptive government policy. For example, within the Learning How to Learn project (P13), Swaffield and MacBeath (2006) found that challenges for leadership include resolving tension between 'bottom-up' growth and 'top-down' mandated change. Yet it was those school management systems that prioritised developing a sense of purpose, supporting professional development, auditing expertise and supporting networking, that were significantly more effective in fostering learning how to learn in classrooms (James et al, 2007). Similarly, the Pupil Consultation project (P10) found that support and commitment of school leaders was vital to ensure that consultation led to transformation in pedagogic practice. The InterActive Education and the Interactive Teaching projects (P8, P16) also found that support for professional development, to help teachers develop expertise in using ICT in dialogic teaching, was as important as providing equipment and technical training in its use.

Amongst TLRP project teams there was sometimes a perception that progress was being made despite government policy rather than because of it. However, there were exceptions. Some projects worked directly with policy makers to influence the policy agenda. The EPPE associate project, directly funded by the Department for Children, Schools and Families (formerly the Department for Education and Skills; now, since the 2010 election, the Department for Education), has been highly effective in influencing policy for pre-school. The Thinking Skills project (P5) worked with policy makers in Northern Ireland, in Wales and in some local authorities in England; larger scale development projects have been rolled out as a result. The project on Intensive Quantities (P14) has had an impact on the Scottish curriculum for mathematics, as a result of direct contact. And the EPSE project (P7) has influenced

the creation of the 21st Century Science GCSE, and the demise of the Key Stage 3 national tests in science, which over-emphasised factual recall and under-emphasised conceptual learning and scientific literacy. However, anomalies and tensions remain and there is still much work to do to make policy better informed by research evidence. Building the social capital, to support meaningful activities and to ameliorate policy constraints on developing effective pedagogy, may be slightly easier in the smaller and more cohesive countries of the UK. But values are always contested in a democracy and challenges are likely to remain. What is important is that all those with an interest in effective pedagogy – pupils, parents, teachers, researchers, policy makers and the public at large – strive together to find and establish socially just policy frameworks that truly support learning for diverse learners.

At the beginning of this review, it was noted that the first version of TLRP's ten principles was presented graphically on an ellipse to indicate that they represent no firm linear hierarchy. However, the sequence reproduced here claims to possess a logic. Two later versions, adapted for higher education (David, 2009) and workplace learning (Brown, 2009), reverse the order. Thus, the TLRP principle related to policy frameworks comes first in these versions. This decision was partly influenced by a post-school project, Policy, Learning and Inclusion in the Learning and Skills Sector [38], that investigated the impact of key national policy levers, such as funding, targets and inspection, on teaching, learning and assessment in the Learning and Skills System (LSS). After the 2006 TLRP annual meeting, when these principles were debated, this project team held a 'long discussion' and submitted a detailed

[38] See http://www.tlrp.org/proj/phase111/coffield.htm (Accessed 17th May 2011)

commentary on the tenth principle, questioning its ordering. Among the points they made are two which have relevance beyond the LSS:

- Centralised control appears to be having the paradoxical effect of increasing the agency of tutors, precisely because a punitive audit culture and an excess of policy have forced them to consider their basic values and their professional stance.
- We agree with the conclusion of Seymour Sarason that teachers cannot create the conditions for students to become creative lifelong learners, if those conditions do not exist for the teachers.

The project team concluded (Coffield, 2008, p. 25) that the skills sector would benefit from a 'social partnership' between government and other stakeholders with more local and collaborative decision-making. 'This would allow for more professional participation and feedback, making change more gradual and reflective.' This conclusion might equally apply to the schools sector.

The impact of TLRP's analysis of ten principles for effective pedagogy

There is enormous contemporary interest in forming judgements of the degree of impact, and thus value for money, of research investments in social science. TLRP reflected these concerns from its inception and was developed explicitly to make a difference. In academic terms this was justified through the Enlightenment tradition

'seeking improvement through the application of reason' (Pollard, 2005) and the Programme has contributed significantly to thinking about evidence informed policy and practice within the UK (see Pollard and Oancea, 2010).

In considering the actual impact of TLRP's 'ten principles', it is helpful to review the UK context at the time and also the strategies adopted for user engagement, knowledge transformation and distribution (T14). The ten principles, as framed in relation to teaching and learning in schools before the 2010 change of UK government, responded to a growing concern with pedagogy in schools. For example, an agenda known as *Every Child Matters* was introduced and backed by *National Strategies* for teaching and learning in England; a new *Curriculum for Excellence* was implemented in Scotland; teaching and learning was prioritised by *The Learning Country* and *Aiming for Excellence* in Wales; and Northern Ireland's *Curriculum Review* built on new understandings of how children learn, giving more freedom to teachers to respond to pupils' needs. The UK context was thus one in which there was growing awareness of the significance of the quality of teaching in enhancing learner outcomes – reinforced by reports both from OECD and McKinsey (OECD, 2005; Barber and Mourshed, 2007) and by PISA's international comparisons (eg: OECD, 2007).

TLRP was established with, and sustained, an ambition to contribute to policy and practice. For this reason, all project investments were required to prioritise 'user engagement' at two levels. Teachers or other practitioners in specific research sites were involved in project research activity. In some cases, they simply advised but in others they participated as co-researchers – sometimes working towards higher

degrees in the process. At the national level, projects were encouraged to enlist the support of organisations with the reputation, resources or role to offer 'high leverage' for the dissemination of findings. Thus government departments and agencies, charities, local authorities, pressure groups, etc, were informed and engaged throughout the research process. In these ways, practical credibility was enhanced and the potential for large-scale impact was established. These alliances between researchers and users were reinforced through project advisory groups and by inviting key users to attend project and cross-Programme events. Good relationships with major national user organisations in key sectors were also nurtured by the TLRP Directors' Team, working from its London base.[39]

TLRP project researchers distilled their findings through a small set of standard Programme outputs – including posters, research briefings and books in the TLRP series.[40] These were intended to provide accessible accounts of the research – thus delivering on the Programme ambition to combine relevance and quality. Such work was complemented by more academic work, often published in journal, conference or working papers.

As we have seen, by building on these project resources, the Programme team sought to synthesise, distil and transform this knowledge further through the device of the 'ten principles'. This was initially achieved through the TLRP Commentary *Improving Teaching and Learning* (James and Pollard, 2006).

[39] For more information on such strategies, see http://www.tlrp.org/users/ (accessed 17th May 2011) or Pollard (2011).
[40] See http://www.tlrp.org/manage/admin/outputnew.html (accessed 17th May 2011) for a full description of these and http://www.tlrp.org/pub (accessed 17th May 2011) for the published outcomes.

In 2007, with the encouragement of government departments and professional organisations, the representation of the principles was refined to become a pullout poster for use in school staff rooms. This was included in a magazine written primarily for teachers. 40,000 copies were distributed, including to all UK schools, together with a DVD of case studies and interviews, filmed in project schools, to illustrate the principles in practice (TLRP, 2007).

This latter version was reproduced, in content if not in form, in several other papers and publications by the Programme Team, for example: in a 2007 paper for the Prime Minister's Strategy Team at the Cabinet Office; in an audit paper for a 2007 workshop with the Department of Children, Schools and Families' National Strategies Team; as Research Survey 2/4 for the Cambridge Primary Review in 2008; as an article entitled 'What have we learned from TLRP?' for a special issue of the National Union of Teachers' journal, *Education Review*, (volume 21, number 1, Summer 2008, pp. 90-100); in a response to the European Commission's Public Consultation on Schools for the 21st Century. Members of the TLRP Directors' Team also spoke about the ten principles at a wide range of professional and academic events. The analysis was incorporated into one of the UK's established textbooks for teachers, *Reflective Teaching* (Pollard, 2008) and rolled out in tailored versions in TLRP Commentaries for Further Education (Brown, 2009) and Higher Education (David, 2009) with the support of related sectoral organisations.

The analysis has been taken up independently by other bodies. For example, it was distributed as a bilingual poster issued in the Welsh Assembly Government's *Curriculum and Assessment Update*, Spring 2008. It was the focus of a series of

articles in *Termtalk*, the newsletter of the General Teaching Council for Northern Ireland and in *Teaching Scotland,* the newsletter of the General Teaching Council for Scotland. The argument foregrounding the role of evidence-informed professional judgement was taken up by the General Teaching Council for England and led to co-publication of a TLRP Commentary on *Professionalism and Pedagogy* in which the principles underpinned proposals for a conceptual framework demarcating teacher expertise (Pollard, 2010).

The analysis of ten principles was used for synoptic, summarising purposes in both the final Report of the Cambridge Primary Review (Alexander, 2010, pp. 302-303) and the UK Government's 2008 Foresight Programme Report on mental capital and wellbeing (Feinstein et al 2008). It was promoted for teachers by the University Council for Teacher Education, at its 2008 conference, and by the Teacher Development Agency though its Teacher Training Resource Bank. Teacher training courses in many parts of the UK began to use the analysis (for an example, see Barber, 2009).

By May 2009, when the generic phase of TLRP formally ended, the pdf of the 2006 *Improving Teaching and Learning in Schools* commentary, in which the first version of the principles was published, had been downloaded 225, 399 times. The later version in the *Principles into Practice* magazine had been downloaded 85,352 times. In terms of print, the 35,000 distribution of the 2006 Commentary was matched by that of the 2010 Commentary. In addition, the principles have featured in the newsletters of all UK General Teaching Councils, thus reaching some 500,000 teachers.

From the evidence cited above, we feel able to claim that TLRP's attempt to distil and synthesise diverse project findings into a coherent and accessible representation was successful at the level of engaging many of the key organisations that mediate between researcher, practitioner and policy-maker communities. We see such engagement as being, in normal circumstances, a necessary condition for real impact on the ground.

However, we acknowledge the lack of hard evidence on the extent to which actual practice or actual policy has altered as a result of this work. We do, of course, have examples of such direct impact, but in most circumstances the role of research will be to provide evidence to be considered alongside many other factors. Influence is thus not likely to be direct or immediate.

More realistically, we prefer to see TLRP's work on ten principles in the sweep of history and as part of an international movement to accumulate knowledge about effective teaching, learning and educational provision. Progressively and incrementally, we would argue, more is being understood and evidenced about pedagogic effectiveness. Meta-analysis by scholars, such as Hattie (2009), is being complemented by programmatic enquiries in many countries – such as those of the commentators on this contribution.

Conclusion

In this contribution we have reviewed the origins and characteristics of TLRP's ten principles of effective teaching and learning and have provided illustrations of their evidential foundations. We have acknowledged the presentation of 'ten principles' as a summarising device to distil complexity and to contribute towards the quality of judgements by practitioners, policy-makers and others.

The presentation of ten principles is TLRP's attempt to answer the question which was posed at the start of its funding: 'How can outcomes be improved for learners in all educational contexts and sectors across the UK?'. Such a question can only be answered in general terms and this we have tried to do. However, we are aware that other research groups, across the world, are wrestling with similar attempts to construct synoptic representations of their understanding.

International knowledge builds through exchange but must, in education, be applied with reference to the particular cultural, social, economic and political contexts of each country. Particular issues will thus be fore-grounded in relation to specific contexts, and different interpretations may be placed on some findings. Given contextual variations and the nature of education in relation to national futures and the distribution of opportunities, this is inevitable. However, a major responsibility for academics, we believe, is to look for commonalities. In this, we both join with Brian Simon in regretting the weakness of pedagogic awareness in England and align with international scholars in working towards global understanding.

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References

Ajzen, I. and M. Fishbein, M. 1980. *Understanding attitudes and predicting social behaviour.* Englewood Cliffs, NJ: Prentice Hall.

Alexander, R. 2001. *Culture and Pedagogy: international comparisons in primary education.* Oxford: Blackwell.

Alexander, R. 2004. Still no pedagogy? Principle, pragmatism and compliance in primary education. *Cambridge Journal of Education* 34, no.1: 7-34.

Alexander, R. (2006) *Education as Dialogue. Moral and pedagogical choices for a runaway world* (Hong Kong, HKIED in conjunction with Dialogos UK).

Alexander, R. ed. 2010. *Children, their World, their Education: Final report and recommendations of the Cambridge Primary Review.* Abingdon: Routledge.

Assessment Reform Group (ARG) 2002. *Assessment for Learning: 10 Principles.* Cambridge: University of Cambridge School of Education. Available for download in English, Welsh and Japanese at: http://www.assessment-reform-group.org/publications.html

Bakhtin, M. 1981. Ed. M. Holquist. *The Dialogic Imagination.* Austin: University of Texas Press.

Bakhtin, M. 1986. Ed. C. Emerson and M. Holquist. *Speech Genres and other Late Essays.* Austin: University of Texas Press.

Barber, M. and M. Mourshed. 2007. *How the World's Best Performing Schools Systems Come Out on Top.* London: McKinsey and Company.

Barber, P. 2009. Putting principles at the core in teacher education. *TLRP Research Briefing no. 70.* London: TLRP, Institute of Education, University of London.

Bevan, R., D. Pedder, M. James, and P. Carmichael, P. 2007. From black boxes to glass boxes: On-screen learning in schools with concept maps. *TLRP Research Briefing no. 21.* London: TLRP, Institute of Education, University of London.

Biesta, G., J. Field, P. Hodkinson, F.J. Macleod, and I.F. Goodson. 2011. *Improving Learning through the Lifecourse.* London: Routledge.

Black, P. and D. Wiliam. 1998. Assessment and classroom learning. *Assessment in Education 5*, no.1: 5–75.

Black, P., C. Harrison, C. Lee, B. Marshall and D. Wiliam. 2003. *Assessment for Learning: Putting it into Practice.* Maidenhead: Open University Press.

Boaz, A., W. Solesbury and F. Sullivan. 2004. *The Practice of Research Reviewing 1: an assessment of 28 review reports.* London: ESRC UK Centre for Evidence-based Policy and Practice, Queen Mary College, London.

Bridges, D. 2009. Evidence based policy. What evidence? What basis? Whose policy? *TLRP Research Briefing no. 74.* London: TLRP, Institute of Education, University of London.

Bridges, D. and M. Watts. 2008. Educational research and policy: epistemological considerations. *Journal of Philosophy of Education* (Special Issue, Supplement 1) 42: 41-62.

Brown, A. 2009. *Higher skills development at work. A Commentary by the Teaching and Learning Research Programme.* London: TLRP, Institute of Education, University of London.

Chevallard, Y. 1991. *La Transposition Didactique: du savoir savant au savoir enseignk.* Paris : La Pensee Sauvage.

Coffield, F. 2008. FE needs more partnership and collaboration in decision making. In *Challenge and change in further education. A Commentary by the Teaching and Learning Research Programme,* ed. I. Nash, S. Jones, K. Ecclestone and A. Brown, 24-25. London: TLRP, Institute of Education, University of London.

Cole, M. 1996. *Cultural Psychology: A Once and Future Discipline.* Cambridge, MA: Belknap.

Crozier, G., D. Reay, and J. Clayton. 2009. The Socio-Cultural and Learning Experiences of Working Class Students in Higher Education. In *Widening Participation in Higher Education*, ed. M. David, 16-17. London: Routledge.

Daugherty, R. 2009. Assessment of significant learning outcomes. *TLRP Research Briefing no. 75.* London: TLRP, Institute of Education, University of London.

David, M. 2009. *Effective learning and teaching in higher education. A Commentary by the Teaching and Learning Research Programme.* London: TLRP, Institute of Education, University of London.

Department for Children, Schools and Families (DCSF). 2008. *The Assessment for Learning Strategy.* Nottingham: DCSF Publications.

Dunbar, K., J. Fugelsang and C. Stein. 2007. Do naïve theories ever go away? In *Thinking with Data: 33rd Carnegie Symposium on Cognition,* eds. M. Lovett and P. Shah. Mahwah, NJ: Erlbaum.

Dweck, C. 1999. *Self-Theories: Their Role in Motivation, Personality and Development.* Philadelphia: Psychology Press.

Ecclestone, K., G. Biesta and M. Hughes, eds. 2010. *Transitions and Learning through the Lifecourse.* London: Routledge.

Edwards, A. 2005. *Cultural Historical Activity Theory and Learning: a relational turn.* TLRP Annual Conference Keynote Address, November, in University of Warwick, England.

Edwards, R., G. Biesta and M. Thorpe, eds. 2009. *Rethinking Contexts for Learning and Teaching.* London: Routledge.

Elliott, J. 2006. Research-based teaching. Paper given at TLRP C-Trip seminar *The Impact of Research on Professional Practice and Identity*. April, in King's College London, England.

Engeström, Y. 1999. Activity theory and individual and social transformation. In *Perspectives on Activity Theory*, eds. Y. Engeström, R. Miettinen and R-L Punamaki, 19-38. Cambridge: Cambridge University Press.

Feinstein, L., D. Budge, J. Vorhaus and K. Duckworth. 2008. *The Social and Personal Benefits of Learning: A summary of key research findings.* London: Institute of Education, University of London.

Feinstein, L., J. Vorhaus and R. Sabates. 2008. *Foresight Mental Capital and Wellbeing Project. Learning through life: Future challenges.* London: The Government Office for Science, London.

Field, J. 2010. Foreword. In *Transitions and Learning Through the Lifecourse*, eds, K. Ecclestone, G. Biesta and M. Hughes. London: Routledge.

Filer, A. and A. Pollard. 2000. *The Social World of Pupil Assessment in Primary School.* London: Continuum.

Gardner, H. 1983. *Frames of Mind: The Theory of Multiple Intelligences.* New York: Basic Books.

Gardner, H. 1991. *The Unschooled Mind.* New York: Basic Books.

Gardner, H. 1992. A Response. *Teachers' College Record* 94, no. 2: 407-413.

Galton, M. 2010. Assessing Group Work. *International Encyclopedia of Education, Third Edition vol.3.* Oxford: Elsevier.

Hattie, J. 2009. *Visible Learning: a synthesis of over 800 meta-analyses relating to achievement.* London: Routledge.

Hodkinson, H. and P. Hodkinson. 2005. Improving schoolteachers' workplace learning. *Research Papers in Education* 20, no. 2: 109-131.

Howard-Jones, P. 2007. *Neuroscience and Education: issues and opportunities.* London: TLRP, Institute of Education, University of London.

Howes, A., T. Booth, A. Dyson and J. Frankham. 2005. Teacher learning and the development of inclusive practices and policies: framing and context. *Research Papers in Education* 20, no. 2: 133-148.

Hughes, M. 2006. Home-school knowledge exchange. *Educational Review* 58, no. 4: 385-487.

Hurry, J., T. Nunes, P. Bryant, U. Pretzlik, M. Parker, T. Curno and L. Midgley. 2005. Transforming research on morphology into teacher practice. *Research Papers in Education* 20, no. 2: 187-206.

Ivanic, R., R. Edwards, D. Barton, M. Martin-Jones, M. Fowler, B. Hughes, G. Mannion, K. Miller, C. Satchwell, and J. Smith. 2009. *Improving Learning in College: Rethinking literacies across the curriculum.* London: Routledge.

James, D. and G. Biesta. 2007. *Improving Learning Cultures in Further Education.* London: Routledge.

James, M. 2005. Introduction: Insights on teacher learning from the Teaching and Learning Research Programme (TLRP). *Research Papers in Education* 20, no. 2: 105-108.

James, M. 2006. Balancing rigour and responsiveness in a shifting context: meeting the challenges of educational research. *Research Papers in Education* 21, no. 4: 365-380.

James, M., P. Black, P. Carmichael, C. Conner, P. Dudley, A. Fox, D. Frost, L. Honour, J. MacBeath, R. McCormick, B. Marshall, D. Pedder, R. Procter, S. Swaffield, and D. Wiliam. 2006. *Learning How to Learn: tools for schools.* Abingdon: Routledge.

James, M. and S. Brown. 2005. Grasping the TLRP nettle: preliminary analysis and some enduring issues surrounding the improvement of learning outcomes. *The Curriculum Journal* 16, no. 1: 7-30.

James, M., R. McCormick, P. Black, P. Carmichael, M-J. Drummond, A. Fox, J. MacBeath, B. Marshall, D. Pedder, R. Procter, S. Swaffield, J. Swann, and D. Wiliam. 2007. *Improving Learning How to Learn: Classrooms, Schools and Networks.* Abingdon: Routledge.

James, M. and A. Pollard. 2006. *Improving teaching and learning in schools.* London: TLRP, Institute of Education, University of London.

James, M. and A. Pollard. 2008. What have we learned from TLRP? *Education Review* 21, no. 1: 90-100.

James, M. and A. Pollard. 2009. Learning and Teaching in Primary Schools: insights from TLRP. In *The Cambridge Primary Review Research Surveys*, eds. R. Alexander, C. Doddington, J. Gray, L. Hargreaves and R. Kershner. Abingdon: Routledge.

Kane, M. 2001. Concerns in validity theory. *Journal of Educational Measurement* 38, no. 4: 319-342.

Leach, J. and R. Moon. 1999. *Learners and Pedagogy.* London: Paul Chapman Publishing.

Mansell, W., M. James, and the Assessment Reform Group. 2009. *Assessment in Schools. Fit for purpose? A Commentary by the Teaching and Learning Research Programme.* London: TLRP, Institute of Education, University of London.

Marshall, B. and M-J. Drummond. 2006. How teachers engage with Assessment for Learning: lessons from the classroom *Research Papers in Education* 21, no. 2: 133-149.

McCombs, B. and L. Miller. 2007. *Learner-centred Classroom Practices and Assessment: maximizing student motivation, learning and achievement.* Thousand Oaks, CA: Corwin Press.

McGuinness, C., N. Sheehy, C. Curry, A. Eakin, C. Evans and P. Forbes. 2006. Building thinking skills in thinking classrooms. ACTS (Activating Children's Thinking Skills) in Northern Ireland. *TLRP Research Briefing no. 18*. London; TLRP, Institute of Education, University of London.

McIntyre, D., D. Pedder and J. Rudduck. 2005. Pupil voice: comfortable and uncomfortable learning's for teachers. *Research Papers in Education* 20, no. 2: 149-168.

OECD. 2005. *Teachers Matter: attracting, developing and retaining effective teachers.* Paris: OECD.

OECD. 2007. *PISA 2006 Science Competencies for Tomorrow's World.* Paris: OECD.

Pollard, A. 1982. A model of classroom coping strategies. *British Journal of Sociology of Education* 3, no. 1: 19-37.

Pollard, A. 2005. Taking the Initiative? TLRP and Educational Research. *Educational Review* Guest Lecture, October 12, School of Education, University of Birmingham, England. Downloadable from http://www.tlrp.org/dspace/handle/123456789/380 (Accessed 17th May 2011)

Pollard, A. 2008. *Reflective Teaching, 3rd edition.* London: Continuum.

Pollard, A. ed. 2010. *Professionalism and Pedagogy: a contemporary opportunity. A TLRP Commentary.* London: GTCE/TLRP.

Pollard, A. 2011. Exploring strategies for impact: riding the wave with the TLRP. In *Knowledge Mobilization and Educational Research: politics, languages and*

responsibilities, eds. L. Farrell and T. Fenwick. London: Routledge.

Pollard, A. and A. Filer. 1999. *The Social World of Pupil Career.* London: Continuum.

Pollard, A. and A. Filer. 2007. Education, Schooling and Learning for Life. *TLRP Research Briefing no. 23.* London: TLRP, Institute of Education, University of London.

Pollard, A. and A. Oancea. 2010. *Unlocking Learning? Towards Evidence-informed Policy and Practice in Education. Final Report of the UK Strategic Forum for Research in Education.* London: British Educational Research Association (BERA).

Putnam, R. 1993. Prosperous Community: Social Capital and Public Life. *The American Prospect* 3, no. 13: 11-18.

Ratcliffe, M., H. Bartholomew, V. Hames, A. Hind, J. Leach, R. Millar, and J. Osborne. 2005. Evidence-based practice in science education: the researcher-user interface. *Research Papers in Education* 20, no. 2: 169-186.

Rudduck, J. and D. McIntyre. 2007. *Improving Learning by Consulting Pupils.* London: Routledge.

Schuller, T., J. Preston, C. Hammond, A. Brassett-Grundy and J. Bynner. 2004. *The benefits of learning: The impact of education on health, family life and social capital*. London: Routledge.

Sfard, A. 1998. On the two metaphors of learning and the dangers of choosing just one. *Educational Researcher* 27, no. 2: 4-13.

Shotter, J. 1993. *The Cultural Politics of Everyday Life.* Buckingham: Open University Press.

Shulman, L.S. 1986. Those who understand: knowledge growth in teaching. *Educational Research Review* 57, no. 1: 4-14.

Simon, B. 1981. Why no pedagogy in England? In *Education in the Eighties: the central issues,* eds. B. Simon and W. Taylor. London: Batsford.

Stenhouse, L. 1975. *An Introduction to Curriculum Research and Development.* London: Heinemann.

Stephen, C. and L. Plowman. 2008. Enhancing learning with ICT in pre-school. *Early Child Development and Care* 178, no. 6: 637-654.

Swaffield, S. and J. MacBeath. 2006. Embedding Learning How to Learn in school policy: the challenge for leadership. *Research Papers in Education* 21, no. 2: 201-215.

Sutherland, R., S. Robertson and P. John. 2009. *Improving Classroom Learning with ICT.* London: Routledge.

Sylva, K., E. Melhuish, P. Sammons and I. Siraj-Blatchford. 2010. *Early Childhood Matters.* London: Routledge.

Thorpe, M. and T. Mayes. 2009. The implications of learning contexts for pedagogical practice. In *Rethinking Contexts for Learning and Teaching*, eds. R. Edwards, G. Biesta and M. Thorpe. London: Routledge.

TLRP. 2007. *Principles into practice: a teacher's guide to research evidence on teaching and learning.* London: TLRP, Institute of Education, University of London.

Torrance, H. and J. Sebba. 2007. Reviewing Reviews: Towards a better understanding of the role of research reviews. *TLRP Research Briefing no. 30.* London: TLRP, Institute of Education, University of London.

United Nations. 1989. *Convention on the Rights of the Child.* New York: United Nations.

Verret, M. 1975. *Le temps des Crudes*. Paris: Librarie Honor6 Champion.

Webb, R., G. Vulliamy, S. Hämäläinen, A. Sarja, E. Kimonen and R. Nevalainen. 2004. A comparative analysis of primary teacher professionalism in England and Finland. *Comparative Education* 40, no. 1: 83-107.

Wood, D., J. Bruner and G. Ross. 1976. The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry* 17: 89-100.

Woods, P., B. Jeffrey, G. Troman and M. Boyle. 1997. *Restructuring Schools, Restructuring Teachers: Responding to Changes in Primary Schools.* Buckingham: Open University Press.

Young, M.F.D. ed. 1971. *Knowledge and Control: New Directions for the Sociology of Education.* London: Collier-Macmillan.

Young, M.F.D. 2008. *Bringing Knowledge Back In: from social constructivism to social realism in the sociology of education.* Abingdon: Routledge.

Appendix: Projects and thematic work reviewed for this contribution

Projects

Early years projects

P1: INTERPLAY: PLAY, LEARNING AND ICT IN PRE-SCHOOL SETTINGS

Award: ESRC RES-139-25-0006, 2003-2006, £87k

PI: Lydia Plowman, University of Stirling

Website: http://www.tlrp.org/proj/phase111/Scot_extc.html

Evaluation Grade: Good

P2: EPPE 3-11: THE EFFECTIVE PRE-SCHOOL AND PRIMARY EDUCATION (EPPE 3-11)

(A TLRP Associated Project)

Award: DFES and DCSF, 2003-2013

PI: Brenda Taggart, Institute of Education, University of London

Websites: http://eppe.ioe.ac.uk/ http://www.tlrp.org/proj/phase111/AssocEPPE.htm

Primary education projects

P3: HOME-SCHOOL KNOWLEDGE EXCHANGE IN PRIMARY EDUCATION

Award: ESRC L139 25 1078, 2001-2005, £965k

PI: Martin Hughes, Graduate School of Education, University of Bristol

Websites: www.home-school-learning.org.uk

http://www.tlrp.org/proj/phase11/phase2e.html

Evaluation Grade: Outstanding

P4: THE ROLE OF AWARENESS IN TEACHING AND LEARNING LITERACY AND NUMERACY IN KEY STAGE 2

Award: ESRC L139251015, 2001-2004, £788k

PI: Terezinha Nunes, Oxford University

Website: http://www.tlrp.org/proj/phase11/phase2h.html

Evaluation Grade: Good

P5: SUSTAINABLE THINKING CLASSROOMS

Award: ESRC L139 25 1042, 2001-2004, £233k

PI: Carol McGuinness, Queens University Belfast

Website: http://www.tlrp.org/proj/phase11/phase2g.html

Evaluation Grade: Problematic

P6: SUPPORTING GROUPWORK IN SCOTTISH SCHOOLS: AGE AND THE URBAN/RURAL DIVIDE

Award: ESRC RES-139-25-0004, 2003-2004, £74k

PI: Donald Christie, University of Strathclyde

Websites: http://www.groupworkscotland.org/

http://www.tlrp.org/proj/phase111/Scot_extb.html

Evaluation Grade: Good

Secondary education projects

P7: TOWARDS EVIDENCE-BASED PRACTICE IN SCIENCE EDUCATION (A network of projects)

Award: ESRC L139251003, 2000-2003, £449k

PI: Robin Millar, University of York

Website: http://www.tlrp.org/proj/phase1/phase1bsept.html

Evaluation Grade: Good

P8: INTERACTIVE EDUCATION: TEACHING AND LEARNING IN THE INFORMATION AGE

Award: ESRC RES-139-25-1060, 2001-2004, £934k

PI: Ros Sutherland, Graduate School of Education, University of Bristol

Websites: http://www.interactiveeducation.ac.uk/

http://www.tlrp.org/proj/phase11/phase2i.html

Evaluation Grade: Good

P9: FACILITATING TEACHER ENGAGEMENT IN MORE INCLUSIVE PRACTICE

Award: ESRC RES-139-25-0160, 2005-2007, £122k including co-funding

PI: Sue Davies, Trinity College Carmarthen

Website: http://www.tlrp.org/proj/smbdavies.html

Evaluation Grade: Good

Across school phases projects

P10: CONSULTING PUPILS ABOUT TEACHING AND LEARNING

(A network of projects)

Award: ESRC L13925 1006, 2000-2003, £425k

PI: Jean Rudduck, University of Cambridge

Websites: *http://www.consultingpupils.co.uk/*

http://www.tlrp.org/proj/phase1/phase1dsept.html

Evaluation Grade: Outstanding

P11: UNDERSTANDING AND DEVELOPING INCLUSIVE PRACTICES IN SCHOOLS

(A network of projects)

Award: ESRC L13925 1001, 2000-2003, £444k

PI: Mel Ainscow, University of Manchester

Website: http://www.tlrp.org/proj/phase1/phase1asept.html

Evaluation Grade: Good

P12: IMPROVING THE EFFECTIVENESS OF PUPIL GROUPS IN CLASSROOMS

Award: ESRC L139 25 1046, 2001-2005, £1,006k

PI: Peter Blatchford, Institute of Education London

Websites: http://www.spring-project.org.uk/

http://www.tlrp.org/proj/phase11/phase2a.html

Evaluation Grade: Good

P13: LEARNING HOW TO LEARN: IN CLASSROOMS, SCHOOLS AND NETWORKS

Award: ESRC L139 25 1020, 2001-2005, £926k

PI: Mary James, University of Cambridge and Institute of Education London

Websites: www.learntolearn.ac.uk

http://www.tlrp.org/proj/phase11/phase2f.html

Evaluation Grade: Outstanding

P14: 5-14 MATHEMATICS IN SCOTLAND: THE RELEVANCE OF INTENSIVE QUANTITIES

Award: ESRC RES-139-25-0009, 2003-2005, £60k

PI: Christine Howe, Strathclyde University

Website: http://www.tlrp.org/proj/phase111/Scot_extd.html

Evaluation Grade: Good

P15: CONSULTING PUPILS ON THE ASSESSMENT OF THEIR LEARNING (CPAL)

Award: ESRC RES-139-25-0163, 2005-2007, £87k

PI: Ruth Leitch, Queen's University Belfast

Websites: http://www.cpal.qub.ac.uk/

http://www.tlrp.org/proj/leitch.html

Evaluation Grade: Outstanding

P16: THE USE OF ICT TO IMPROVE LEARNING AND ATTAINMENT THROUGH INTERACTIVE TEACHING

Award: ESRC RES-139-25-0167, 2005-2007, £115k

PI: Steve Kennewell, Swansea Metropolitan University

Websites: http://www.interactive-teaching.org.uk/

http://www.tlrp.org/proj/kennewell.html

Evaluation Grade: Good

P17: VARIATIONS IN TEACHERS' WORK, LIVES, AND THEIR EFFECTS ON PUPILS (VITAE) (A TLRP Associated Project)

Award: DFES, 2001-2006

PI: Christopher Day, School of Education, University of Nottingham

Website: http://www.tlrp.org/proj/cday.html

Evaluation Grade: N/A

Higher education projects

P18: INNOVATIONS FOR A VALUES-BASED APPROACH TO TEACHER EDUCATION

Award: ESRC RES-139-25-0152, 2005-2007, £126k

PI: Alan Smith, University of Ulster

*Website***:** http://www.tlrp.org/proj/asmith.html

Evaluation Grade: Good

Workplace learning projects

P19: IMPROVING INCENTIVES TO LEARNING IN THE WORKPLACE (A network of projects)

Award: ESRC L139251005, 2000-2003, £473k

PI: Phil Hodkinson, University of Leeds (for the project relevant to the school sector) *Website:*

http://www.tlrp.org/proj/phase1/phase1csept.html

Evaluation Grade: Outstanding

P20: COMPETENCE-BASED LEARNING IN THE EARLY PROFESSIONAL DEVELOPMENT OF TEACHERS

Award: ESRC RES-139-25-0122, 2004-2008, £732k

PI: Jim McNally, University of Stirling

Websites: http://www.ioe.stir.ac.uk/research/projects/epl/index.php

http://www.tlrp.org/proj/phase111/mcnally.htm

Evaluation Grade: Good

Lifelong learning project

P21: IDENTITY AND LEARNING (A TLRP Associated Project)

Award: ESRC general large grants, 1998-2004

PI: Andrew Pollard, Institute of Education, University of London

Website: http://www.tlrp.org/proj/phase111/ILP.html

Evaluation Grade: Outstanding

Thematic work

T1: TEACHER LEARNING (2002-2004)

Convenor: Mary James, University of Cambridge

T2: IDENTIFYING LEARNING OUTCOMES (2003-2004)

Convenor: Mary James, University of Cambridge

T3: PERSONALISED LEARNING (2004)

Convenors: Andrew Pollard and Mary James, University of Cambridge

T4: NEUROSCIENCE, HUMAN DEVELOPMENT AND TEACHING (2005-2006)

Convenor: Paul Howard-Jones, University of Bristol

T5: CHANGING TEACHER ROLES, IDENTITIES AND PROFESSIONALISM (2005-2006)

Convenor: Sharon Gewirtz, King's College London

T6: SCIENCE EDUCATION IN SCHOOLS (2006)

Convenor: John Gilbert, University of Reading

T7: TEACHING AND LEARNING POLICY IN POST-DEVOLUTION UK CONTEXTS (2006-2007)

Convenor: Ian Menter, Glasgow University

T8: CURRICULUM AND DOMAIN KNOWLEDGE (2006-2007)

Convenors: Robert McCormick and Robert Moon, Open University

T9: ASSESSMENT OF SIGNIFICANT LEARNING OUTCOMES (2006-2007)

Convenor: Richard Daugherty, University of Cardiff

T10: SOCIAL DIVERSITY AND DIFFERENCE: RESEARCHING INEQUALITIES IN TEACHING AND LEARNING (2006-2007)

Convenor: Miriam David, Institute of Education London

T11: EPISTEMOLOGICAL BASIS OF EDUCATIONAL RESEARCH FINDINGS (2006-2007)

Convenor: David Bridges, University of Cambridge

T12: REVIEWING REVIEWS (2006-2007)

Convenor: Harry Torrance, Manchester Metropolitan University

T13: ASSESSMENT IN SCHOOLS (2008-2009)

Convenor: Mary James, University of Cambridge

T14: COMMUNICATION, IMPACT AND KNOWLEDGE TRANSFER (2004-2007)

Convenor: Andrew Pollard, Institute of Education London

T15: IMPACT OF SOCIAL, ECONOMIC, MEDICAL AND ENVIRONMENTAL FACTORS AND INTERVENTIONS ACROSS THE LIFECOURSE (2006-2007)

Convenor: Leon Feinstein, Institute of Education London

T16: CONTEXTS, COMMUNITIES AND NETWORKS (2005-2006)

Convenor: Richard Edwards, University of Stirling

T17: TRANSITIONS THROUGH THE LIFECOURSE: ANALYSING THE EFFECTS OF IDENTITY, AGENCY AND STRUCTURE (2006-2006)

Convenor: Kathryn Ecclestone, Oxford Brookes University.

Figures

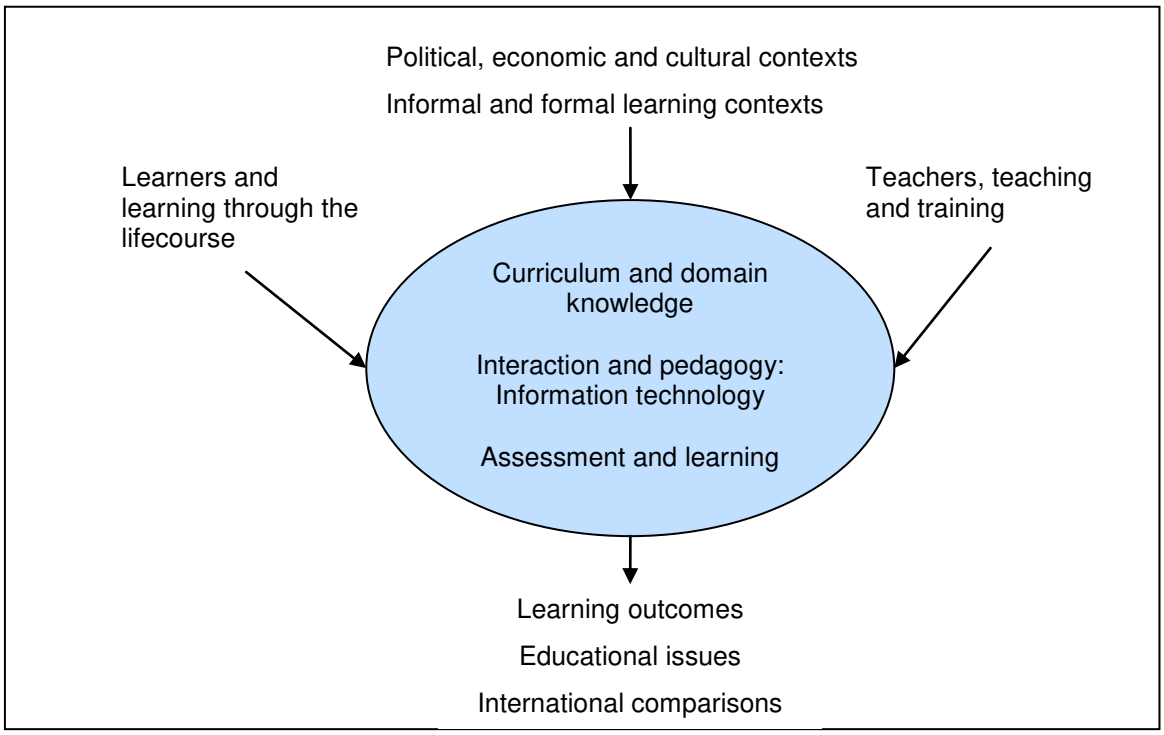

Figure 1: The conceptual scope of TLRP's interests relevant to pedagogy

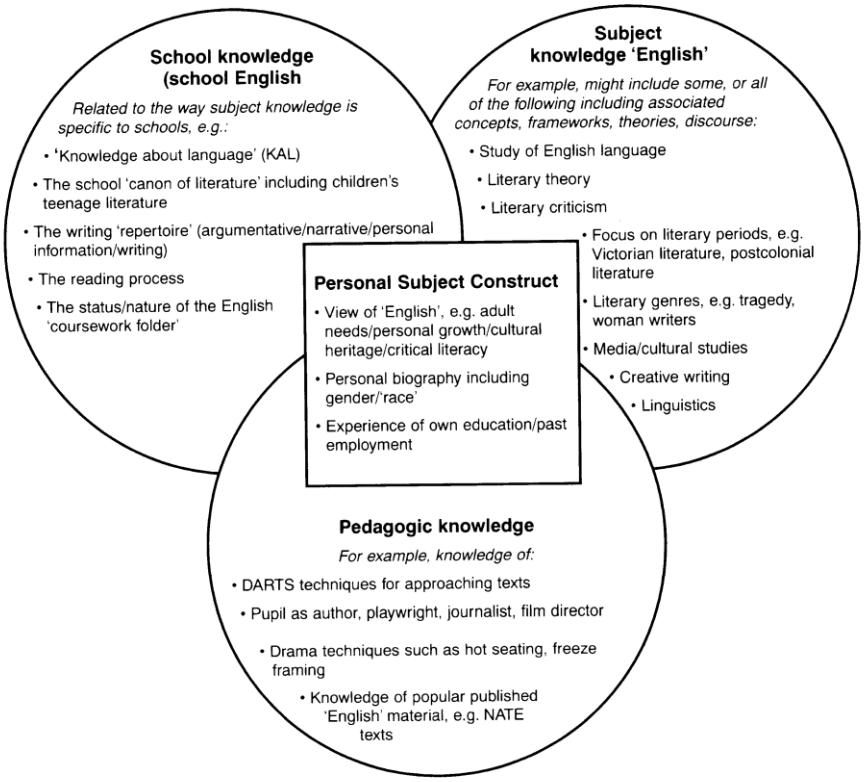

Figure 2: Leach and Moon's (1999) model of professional knowledge as illustrated by teachers of English