STAFFROOM POSTER INSIDE

Principles into practice

A teacher's guide to research evidence on teaching and learning

What is, and what might be?

T·L·R·P TEACHING & LEARNING RESEARCH PROGRAMME

E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Research into action

THIS is an exciting time to be a teacher. It may not always feel that way, on a Friday afternoon when another Government directive has landed on your desk, the students have been "lively", to put it politely, and you face a weekend of marking.

But the opportunities for creativity, reflection and making a difference to the life of every child who comes through your classroom have never been greater. Teachers today have the evidence and the tools at their disposal to help children become skilled and enthusiastic lifelong learners, and to grow and learn themselves throughout their own lives and careers.

Evidence from the 22 schools projects involved in the Teaching and Learning Research Programme led us to the 10 principles of effective teaching and learning which are set out in the enclosed poster and explicated on pages 13-16. Building on experience as well as evidence, these seem to apply across the board. Sadly however, a conundrum of early 21st century teaching revealed in our research is that practitioners sometimes feel they have to choose between their understanding and the type of practice expected of them to achieve the required "standards".

It doesn't have to be that way. Policy implementation only succeeds when it is supported by the expert judgement of skilled and knowledgeable professionals – and TLRP's contention is that such judgements are best informed by educational principles, rather than by de-contextualised prescription. Teachers are key mediators and must use judgements about circumstances, contexts, pupils, objectives and teaching approaches, bearing in mind their values, goals and educational principles.

Teachers need to be aware of the political process, and of its legitimate oversight of public educational services, but as professionals they should also be willing to contribute to it, challenging policy where they feel they must, in the light of their experience and other evidence.

However, just as TLRP aims to challenge governments so that policies are as consistent as possible with what we know about effective teaching and learning, so too it challenges fellow educationalists. Is our practice really evidence-informed?

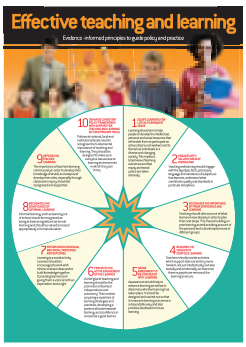
In this respect, it is exciting that Governments across the UK are encouraging reflective, evidence-informed teaching. For example, the Department for Education in Northern Ireland's Teacher Education Partnership Handbook says: "At the heart of becoming a teacher is, above all else, becoming a learner – a lifelong learner. To learn, one has to ask questions, of oneself and of others, and to know that this process is valued and shared across the school."

Action research and other forms of reflective practice are exciting ways for teachers to innovate, learn and refresh their thinking. Through them, teachers can monitor, observe and collect data on their own and learners' intentions, actions and feelings. Once evidence is analysed, shared and considered, it may lead the teacher to revise classroom policies, plans and provision. At its best, such work also draws on insights from other forms of social science research.

We hope this guide to a large and growing collection of research data gathered under the wing of the TLRP will help you make the most of the joys and challenges of teaching and think about undertaking systematic enquiries of your own.

Andrew Pollard Director TLRP

June 2007



Don't miss your 10 Principles poster, at the centre of this magazine

GETTY IMAGES

Every teacher matters

As a former assistant editor of *The Times Educational Supplement*, I was heavily influenced by something the educational researcher and former teacher Mary Jane Drummond once said to me. She said she'd like to read about teachers thinking. Not necessarily reaching solutions, but examining questions very hard, trying things out and sharing their reflections.

In recent years, some have argued that it is possible for research to determine "what works" in teaching – offering categoric answers to the knotty dilemmas of practice and policy.

The Teaching and Learning Research Programme and its many projects are more modest and realistic. In addition to the insights from particular projects, they propose evidence-informed principles to help with reflection and analysis, but rarely hard and fast answers. They recognise that one-size-fits-all solutions are much like one-size-fits-all garments – they don't actually fit anyone except that mythical average child.

What comes across clearly from every project, though, is the importance of fostering the whole school as a learning community, for teachers, parents and of course children. Findings from across the programme demonstrate that teacher learning is essential to children's learning. In order to help children to become reflective learners, teachers first have to develop this disposition for themselves.

There are even statistics to support this idea. Performance tables for 2002-4 comparing pupils from Learning How to Learn project schools with the progress of those in similar schools show that three of the four schools with the highest value added had high levels of engagement with the project and explicit strategies to support teachers' professional development and networking.

The researchers argue that teacher learning is both individual and collective. Teachers need to gain new knowledge and skills within a culture that supports new thinking and innovation. They need to learn how to evaluate evidence and to have "the confidence to challenge taken-for-granted assumptions, including their own".

In celebration of such personal exploration, let me quote some of Mary Jane Drummond's account of "Janice", an infant teacher, in the forthcoming LHTL book (see right):

"As she discusses the transition from the Foundation Stage to Key Stage 1, she expresses some of her doubts and uncertainties:

"Does it actually help them if they are sitting how you want them to sit?

"I don't know whether they are learning about learning or they're learning what I'm telling them.

"Looking at the children and thinking whatever we're doing isn't working and thinking this is not right for them… I think we feel in a rush… and there's not enough time to talk to the children or to think about how they are going to learn best; it's all been about what I'm going to teach them."

And later, the account goes on: "She continues to brood about the human, emotional dimension of her own learning, and the difficulty, even pain, of working outside the comfort zone: trying to do things differently. She is moving towards what she calls a more holistic approach to learning: 'Learning connects my mind, body and soul to understanding… as teachers we seek for wider understanding of the whole person'."

Diane Hofkins

Diane Hofkins is editor of this guide

TERI PENGILLEY

Light the fire within

Teachers can bring their beliefs and pratice into harmony

Teachers need to appear calm and confident in the classroom, but inside, many are engaged in a tug-of-war within their own hearts and minds. Their principles are pulling them in one direction, but they believe the demands of league tables and performance targets are dragging them in another.

How can there be time for open enquiry, for pupils to set their own goals or for experimentation? You've got to do well in national tests, so how can you squeeze in other types of assessment as well, even if you think they are important?

The work of Learning How to Learn and other TLRP projects shows that teachers do not have to choose between teaching well and getting good results.

They found that the more reflective teachers came to be, the easier it was for them to align their beliefs with their teaching.

This was true of whole schools as well. "Those schools that refused to be passive but worked – reflectively, strategically, intentionally and collaboratively – on the contradictions, to resolve them, showed signs of learning how to learn in much the way that we conceptualised LHTL by pupils and teachers" say TLRP deputy director Mary James and the project team in their forthcoming book, *Improving Learning How to Learn in Classrooms, Schools and Networks* (Routledge).

The central aim of this research and development project was to help children become self-motivated, autonomous learners who enjoyed the process of learning and understood what they needed to do to meet new challenges.

Assessment for learning was a powerful way into learning how to learn, say the researchers, who worked with 40 primary and

secondary schools. But it is difficult to shift from reliance on specific techniques to practices based on deep principles.

As with any shift in practice, a surface interpretation (for example a teacher using "traffic lights" so children can show whether or not they have understood, without really coming to terms with the philosophy behind them) may only bring about surface changes. Teachers need the intellectual resources to "know what to do when they don't know what to do".

Children, teachers and the school community all need time to absorb and use new ways of working.

The innovations introduced into classrooms through the LHTL studies incorporated some combination of:

- *Developing classroom talk and questioning.* Teachers need to spend time planning good diagnostic questions, possibly with colleagues. Pupils can learn to ask questions too, and reflect on answers. They will need more thinking time in order to come up with more profound ideas.
- *Giving appropriate feedback.* Careful commenting has been shown to work better than marks or even marks with comments.
- *Sharing criteria with learners.* This includes expectations, objectives, goals, targets and success criteria.
- *Peer- and self-assessment.* Research has shown the greatest gains for children previously assessed as having weak basic skills. This may suggest children didn't understand what was expected, rather than that they lacked ability.
- *Thoughtful and active learners.* Children need to understand the desired outcomes and the processes of learning.

Website www.learntolearn.ac.uk

See also "Getting to the heart of children" p 17, "A treasure chest of ideas" p 18

ASSESSING AFL

Assessment for learning is effective when pupils:

- Show changes in their attitudes to learning and in their motivation, self-esteem, independence, initiative and confidence
- Show changes in their responses to questions, in contributions to plenary sessions and in explanations and descriptions
- Improve their attainment
- Ask relevant questions
- Are actively involved in setting targets, in peer or self-assessment, and in recognising progress in their written work, skills, knowledge and understanding.

CASE STUDY: PERFORMANCE ARTS

Secondary English teacher Angela asked her Year 8s to consider a dramatic rendition of a 19th century poem, seeking to engage them in the question of what makes for quality in a piece of work. She began the lesson by asking the pupils to draw up a list of criteria for performing a poem. Suggestions all came from the pupils while she probed, challenged and polished their contributions. For example:

Pupil You could speed it up and slow it down.

Angela Yes – pace, that's very important in reading.

Angela and the classroom assistant then performed the poem and invited pupils to critique their performance based on the criteria. A similar form of probing took place.

Pupil It was boring.

Angela What do you mean "boring"?

Pupil There wasn't enough expression in your face when the poem was being read or in the reading.

Angela So what could I have done to make it better?

Pupil You could have looked and sounded more alarmed.

The three tasks in Angela's lesson – the creation of the criteria, the performance of the poem and the application of the criteria to the performances – governed both the pupils' thinking about what was needed when they acted out the poem themselves and the peer assessment of those performances.

In interviews with researchers, Angela always described assessment tasks as opportunities for the pupils to improve their performance.

In this way the activities had an open, fluid feel which corresponded with the notion of promoting pupil autonomy. It reinforced a sense of limitless progress whereby assessment is always seen as a tool for changing future performance rather than for judging what has been done already.

From *Improving Learning How to Learn in Classrooms, Schools and Networks* (out this year)

Children should be seen and heard

Finding out what they've got to say for themselves

GETTY IMAGES

The UN Convention on the Rights of the Child (1989) includes the right to be heard as one of its four basic principles. This right is also enshrined in the Every Child Matters legislation, under the guarantee that young people should be able to make a positive contribution to their community and society.

Since the TLRP's Consulting Pupils about Teaching and Learning project began in 2000, the idea of Pupil Voice has taken hold across the UK and has even been formalised in the Children Act 2004. This has dangers as well as benefits, warn the researchers. When schools only follow the letter of the law and consult pupils in a tokenistic way, asking them only about unimportant issues, or worse, failing to carry through on their ideas, this "can lead to cynicism and disengagement."

Rules from on high can unintentionally limit innovation and improvement. As the researchers say, "Policy-makers know something about consultation, about when it is genuine and when simply symbolic."

On the other hand, "Being consulted genuinely can help pupils feel that they are respected as individuals and as a body within the school and that they can make a real contribution."

One ambitious scheme is Bedfordshire's Students as Learning Partners, built on the project's work, in which discussion between staff and children is continual. One aspect involves particular students observing lessons and giving constructive and tactful feedback to the teachers.

The Consulting Pupils research team brought six projects together into a network of 43 schools, coordinated by the respected Cambridge Faculty of Education Professor Jean Rudduck, who died this year.

The team found that:

- If pupils feel they matter and are respected in school, they are more likely to commit themselves to learning
- Pupils' accounts of what helps them to learn and what gets in the way of their learning can provide a practical agenda
- Examples of practice and pupil testimony can feed powerfully into whole school policy and planning.

As can be seen in many TLRP findings spotlighted in this publication, finding out from children what helps them or stops them from learning builds relationships and provides teachers with crucial information.

Consulting Pupils project researchers say that teachers gain a deeper insight into young people's capabilities, the capacity to see the familiar from a different angle, a practical agenda for improvement and, perhaps most important, a renewed sense of excitement in teaching. The process helps schools develop a more partnership oriented relationship between staff and students.

Schools consult pupils in a variety of contexts. These include:

- Spotlighting issues of concern for particular groups, such as girls or the disengaged
- Clarifying generalised issues, for example a referendum on a key school matter
- Monitoring and evaluating new strategies
- Supporting individual learners
- As part of self-review

PUPIL CONSULTATION: SOME CAUTIONS

Consultation can sometimes fail to make a real difference because pupils are not truly "heard". It's important to be alive to the following issues:

- Hearing the quiet voice in the acoustic of the school
- Avoiding the creation of a "pupil voice élite"
- Maintaining authenticity. Consultation needs to be on important matters and must have a result.
- Sharing data and offering feedback to pupils
- Trust and openness. Pupils need to feel their ideas are welcome and not simply "accommodated" so as not to disturb existing orthodoxies.

- Establishing a more democratic school system or putting citizenship education into action.

The project's work has been extended by a Northern Ireland study, Consulting Pupils on the Assessment of their Learning (CPAL) which is looking at how to engage children in assessment for learning and at the potential of an annual pupil profile.

The Consulting Pupils team has produced a wealth of books and materials including *Consulting Pupils: A Toolkit for Teachers*, MacBeath, Demetriou, Rudduck and Myers and *Students as Researchers: Making a Difference*, Fielding and Bragg (Pearson). Visit www.consultingpupils.co.uk and www.cpal.qub.ac.uk

Building thinking skills for thinking classrooms

Get those brains into gear

When they grow up, today's children are going to have to be extremely skilled thinkers in order to tackle the global problems facing them. Traditional approaches to learning will not be enough.

The ACTS (Activating Children's Thinking Skills) research team in Northern Ireland worked in junior classrooms to develop and analyse the sort of classroom talk that would help children "to think about their thinking". A central aim was for lessons to blend subject content with thinking skills, an approach the researchers, led by Carol McGuinness and Noel Sheehy, call "infusion".

The principle of making thinking explicit is valuable for both children and teachers. ACTS used "thinking diagrams" to clarify the steps in a thinking process. For example, a diagram for decision-making invites the students to first consider and write down all the options. Each is taken in turn, pros and cons are listed and then weighed up before an action is decided upon. Students can evaluate both their own decisions and those of literary or historical figures in this way. Using diagrams also slows down the thinking process, giving students time to grasp what is involved.

ACTS builds on the idea that good thinking may have as much to do with creating a disposition to be a good thinker as it has to do with acquiring specific skills and strategies.

Researchers developed a framework setting out different kinds of thinking which can be applied to different situations or topics. For example, "sequencing" is among the "Searching for meaning" skills, and can be applied readily to science or history. The other categories are critical thinking, decision-making, problem solving and creative thinking.

The researchers found that teachers needed support:

- to recognise the need to be explicit about the process of thinking as well as the content
- to sharpen their own understanding of a range of thinking skills
- to readily identify contexts or topics within the curriculum which can be matched with particular thinking skills
- to develop lesson plans and teach lessons which meet both high quality thinking skills and curricular content objectives
- to develop a vocabulary for talking about thinking which is suitable for the age and ability levels of their pupils.

Teachers who took part in a CPD programme reported that their images of themselves as teachers changed. Their own thinking sharpened, their planning improved, their expectations of children were raised and they developed better questioning strategies. Time was the main constraint.

Researchers found that teachers using these approaches need to pay special attention to lower ability children. Although these children's strategies improved, their self-image appeared not to be enhanced.

By and large, though, children became more self-motivated and active as learners. Teachers said their pupils gained better reasoning powers and greater creativity. They were more able to clarify and structure thinking and to see links between curriculum areas. Their confidence increased and they expected to be "pushed".

In lessons, children were engaged in cognitively demanding tasks.Teachers used visual tools such as diagrams and wall charts to help thinking and reflection.

The programme has also been trialled in Wales, England and Scotland, and used successfully at key stage 3.

A Teachers' Handbook will join the TLRP's Improving Practice Series. www.sustainablethinkingclassrooms.qub.ac.uk

THE LONG AND SHORT OF IT

Eight and nine-year-olds had been comparing and contrasting two pieces of classical music. At the end of the lesson, the teacher invited them to make connections between the pattern of thinking (comparing and contrasting) that they had been engaged in and new contexts.

T Can anybody think of a situation in their own lives where it might be useful to compare and contrast two things? The real life situation that I told you about at the beginning of the lesson was comparing two pupils who might be class captain. (short silence)

P1 If you were looking for a job, so let's say you have

T Two job offers...

P1 ...and you don't know which one to choose, and by looking at the similarities and differences it might help you understand which job is right for you.

P2 Buying a house

T Explain...

P2 You're looking at two houses, and there is one that is cheap but it isn't so good, it hasn't a garden and things like that...

T So it would help you weigh up two things like choosing a house...

P3 (from the back of the room) If you got accepted by two universities you could see which one was better and it would help you decide which one to go to...

T That's a good example....

P4 (hesitantly but gaining in confidence) I got invited to two birthday parties and they were on the same day – and I had to decide which one to go to...

T Very good...

The social world of school

In a series of books, Pollard and Filer have told the engaging and revealing stories of individual children as they negotiate their way through the academic and social challenges of their school years. The Social World of Secondary Education (Continuum, forthcoming) includes comparison of the careers of two girls from the same middle-class primary who went on to comprehensives with more working-class environments.

SALLY

Sally had been a star in primary school – popular with teachers and children, good at sports and drama and a top student. She enjoyed being the caretaker's daughter, *au fait* with all aspects of the school.

Within days of starting at St Margaret's Comprehensive, she went home ill and miserable, and things did not improve for a long time. "From being the high status, popular pupil of her primary school years, Sally had become a pupil with no real friends. Moreover, it transpired that she was being bullied... However, through that difficult and distressing time, Sally maintained astonishing levels of academic success."

Socially, she had lost the "specialness" she had at primary, but she retained her image as an "ideal pupil" for teachers – making her peers even more resentful. It was devastating because, as her father said, "Sally likes to be liked". She was actually quite vulnerable, needing approval.

Eventually, she did make friends – working-class girls who accepted her, rather than the middle-class ones who made her life a misery. She became much happier, broadened her accent, and began to do less well in school, dropping from straight As to a mix of As, Bs and Cs by Year 11, although she retained good relationships with teachers.

The researchers conclude: "Whilst she was socially adept in the context of her primary school, she had few strategic resources for adapting to different peer expectations or shaping a different identity... When she finally relinquished her former peer identity and conformed to the peer culture, so also she relinquished her high-achieving academic identity." Teachers could consider what might have helped her to respond differently.

Six years after GCSEs, Sally is training as a transport company junior manager.

HAZEL

Hazel also suffered from peer hostility and bullying when she got to Southwater Comprehensive, but she had the resources to manage the situation, and "she did so by strengthening and elaborating, rather than compromising, her distinct identity".

Her (middle-class) parents had sought out a secondary school with a pastoral and social ethos "likely to be sensitive to the emotional vulnerability and social marginality that Hazel had shown through her primary years", and which would also support her artistic talents, which had been less well-appreciated at primary.

At Greenside she'd believed art was her only talent, but "Then when I went to Southwater, I found I was good at lots of different things, and art," she said in Year 9. Teachers valued her individuality and her out-of-school interests were known and recognised.

Her Y9 art teacher said of her, "An exceptional artist, real talent. An eccentric – we need people like that, though I can see it causes problems with her peers."

Hazel was someone who knew who she was, and wasn't interested in conforming to the norm, quite happily dismissing popular music or TV as "a load of rubbish". However, she sought out the unusual, artistic people, and brought them together in a friendship group.

"Of course, this may have been largely due to her own temperament and to parental support and endorsement for her individuality," say Pollard and Filer. "However, Hazel's accounts certainly suggest that the school and its curriculum also supported the development of her identity and for academic and social growth in areas that were of great importance to her."

Hazel has now graduated from art college and has held her first solo exhibition.

GETTY IMAGES

Children build their own identities as learners. How can teachers and schools make a difference?

Personalised learning. What does that phrase make you think of? A new and confusing demand from the Government? An exciting opportunity? Children studying in their own little bubbles? Or do you just go blank?

According to the Identity and Learning Programme, children are creating their own personalised learning every day, as they actively negotiate their way through schooling. And it is not always what they really want or what is best for them.

Children create their own school and learning identities in response to the way they are treated by teachers and other students, and the successive experiences they have as they move through education. Researchers Andrew Pollard, now TLRP director, and Ann Filer, followed small cohorts of working class and middle class children in an English city through their "pupil careers" from ages four to 16. "The most fundamental form of education, the process of becoming a person, requires careful consideration as well as the

acquisition of knowledge and skills," they conclude.

However, if a child's own background, personality and strengths fit in well with the ethos and curriculum of their school, they are more likely to succeed. Pollard and Filer found that middle class children attending independent or selective schools had a more consistent identity whether they were at home, at school or out with friends. But children in comprehensives "often experienced disparities in the discourse, values and expectations of significant others in their homes, schools and peer groups." This meant they developed more "fragmented identities", which could make it harder for them to learn and succeed in school.

One of the lessons is that children need to be seen more in the round, difficult though this may be in a world which "presses remorselessly for short-term performance". The researchers insist that: "Maximising the potential of children and young people calls for a more appropriate understanding of them as social actors within their cultures and communities, and of how education fits into, and contributes to, their lives as a whole".

Identity and Learning Programme
Books associated with the programme include:
The Social World of Children's Learning, Pollard and Filer (Cassell)
The Social World of Pupil Career, Pollard and Filer (Continuum)
The Social World of Pupil Assessment in Primary School, Filer and Pollard (Continuum)
Reflective Teaching, Pollard (Continuum)

Towards schools where everyone belongs

Teachers often think about inclusion in terms of children with special educational needs, but researchers on the Understanding and Developing Inclusive Practices in Schools project sought to broaden the definition. They worked over three years with a network of 25 schools to help groups of staff engage with evidence about pupils' experience of school and about their own practice.

Staff in the participating schools came to recognise that barriers to pupil-learning often stem from teachers' misplaced assumptions about what their pupils can do and how best to teach them. What's needed is not just new ways of working, but new ways of thinking – and this takes time.

Researchers found that it can be more useful for a school enquiry to focus on a specific issue of concern rather than whole school change. For example, one primary school was concerned because children's language skills were holding them back. They devised a questionnaire after consulting the children. Answers to "What don't you like about writing?" included "It hurts my hand" and "It takes me a long time to think what I'm going to write". What children did like about writing centred on the chance to use their imaginations.

A teacher commented: "It made me try to analyse things… because we could look at the children's answers and so started to think, well if they're thinking this way… how do we have to think to get them to change their minds about what they're doing?"

Teachers saw that teaching the curriculum harder and longer wouldn't improve many pupils' learning outcomes. Rather, they needed to think about factors that underpin learning, such as pupils' self-esteem, enjoyment and their view of themselves as learners. The researchers concluded: "Addressing both under-achievement and inclusion requires that the national focus on highly measurable outcomes of school be broadened to include these underlying factors."

Project contact mel.ainscow@man.ac.uk
Further reading: *Improving Scools, Developing Inclusion*, Ainscow, Booth and Dyson (Routledge)

CREATING INCLUSIVE CULTURES

The **Index for Inclusion** was used to inform the action research This is an example of the indicators it uses:

Building community
- Everyone is made to feel welcome.
- Students help each other.
- Staff collaborate with each other.
- Staff and students treat one another with respect.
- There is a partnership between staff and parents/carers.
- Staff and governors work well together.
- All local communities are involved in the school.

Establishing inclusive values
- There are high expectations for all students.
- Staff, governors, students and parents/carers share a philosophy of inclusion.
- Students are equally valued.
- Staff and students treat one another as human beings as well as occupants of a 'role'.
- Staff seek to remove barriers to learning and participation in all aspects of the school.

From the Centre for Studies on Inclusive Education (CSIE) inclusion.uwe.ac.uk/csie/indexlaunch.htm

When group think is a good thing

Individual success is highly valued, and competition encouraged, so why is it important to get children to work effectively together in groups?

HERE ARE A FEW REASONS

1 **Behaviour improves**
2 **Attainment goes up**
3 **Teachers have more time to think**

When groups of children are working productively, with real engagement, genuinely listening to each other and developing ideas together, it transforms the teacher's job. "As pupils demonstrated group-working skills, teachers reported that they had been 'freed' from many of their ordinary procedural duties and they were now able to reflect on their teaching and think strategically about it," say researchers from the TLRP's SPRinG project.

But getting the class to that point is not easy. In classrooms across the UK children are seated in groups, but working as individuals. This seating arrangement can distract children from their learning rather than help with it as children go off-task to chat to their neighbours. Groups in classrooms are often formed without a strategic view of their purpose.

The SPRinG researchers argue that children can't just be placed in groups and expected to work effectively together; they have to be trained. "It is well-known that children need to have the skills to communicate effectively through listening, explaining and sharing ideas. But pupils also have to learn to trust and respect each other, and they need skills in how to plan, organise and evaluate their group work.

The project stresses supportive relationships between pupils and between teachers and pupils. A key aim is the development of pupil independence and the need to address difficulties between pupils."

Teachers, too, need to learn to work differently, operating more as "the guide on the side" than as "the sage on the stage".

The project's directors, Peter Blatchford (Institute of Education, London) Maurice Galton (Cambridge) and Peter Kutnick (formerly at Brighton and now at Kings College London), say the SPRinG research shows that we need to rethink current teaching theories, which appear to favour teacher-led situations and individual work. It also has implications for school discipline policies, which are usually designed to control rather than eliminate the problem.

They say wider use of their findings could transform the environment of classrooms across the country. Groupwork "deserves to be given a much more central role in educational policy and school practice."

Improving the Effectiveness of Pupil Groupwork in Classrooms: www.spring-project.org.uk
Contact p.blachford@ioe.ac.uk
Also www.groupworkscotland.org

RESULTS

Although teachers involved were initially worried that group work might hinder curriculum coverage, SPRinG (Social Pedagogic Research into Group work) is the first study in the UK to show that when it is well-planned and understood by pupils and teachers, this approach to classroom organisation leads to higher gains in individual attainment than other types of teaching and learning. At key stage 1, benefits were seen in reading and maths. At KS2, all types of science knowledge benefited, but particularly conceptual understanding and inferential thinking. Meanwhile, in KS3, success depended on the type of topic, but appeared to benefit higher order thinking.

GETTY IMAGES

TOGE

While many schools pay little more than lip-service to collaborative learning, it has been an essential feature of life at one Suffolk comprehensive for almost two decades. Yet to understand how pupils at Kesgrave High, on the outskirts of Ipswich, are able to work successfully in groups for large parts of every lesson, it is necessary to understand key aspects of the school's organisation.

"There were two things I wanted to change when I came here in 1986," says George Thomas, the head, "and they were both to do with climate, culture and the capacity to learn."

At that time, pupils were divided into three ability bands along crude lines that tied them to their alloted band right across the curriculum. A conversation with the deputy head girl in which the 16-year-old said that she felt she was "still in the B band really" despite having been moved up to the A band convinced him that the school should go down the mixed-ability road.

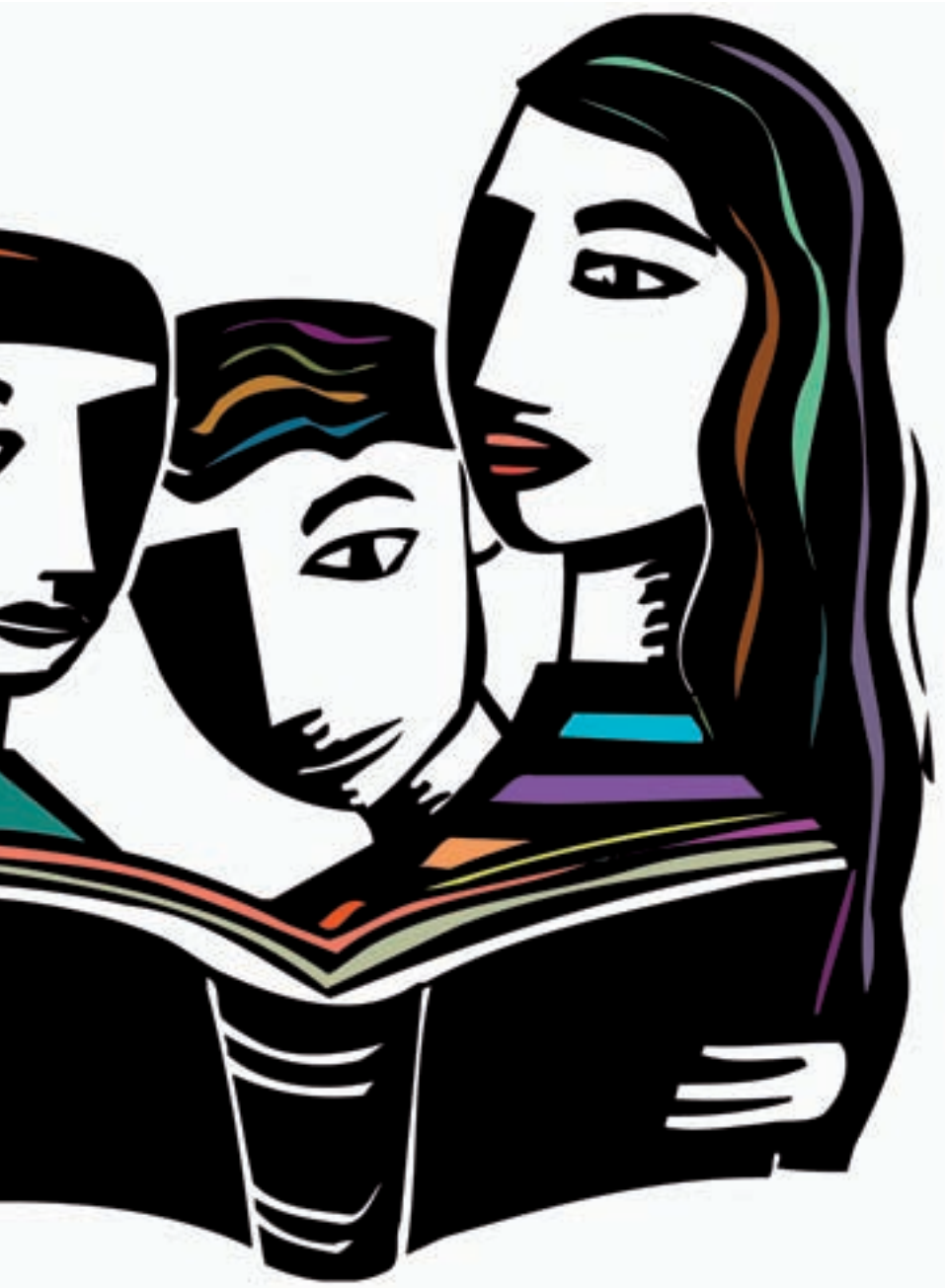
Having abolished banding, Mr Thomas then turned his attention to the timetable, which he felt was "all about chopping up the curriculum into bits and then having to have lots of periods to sort it out". He set about replacing the seven-period day with a much simpler system, comprising two long periods before lunch and a single lesson in the afternoon. And soon, the benefits became apparent.

"A bi-product has been that the school is calm," he explains. "You don't have lateness to lessons, and people get on task within a minute of the bell. But the real essence of the 95-minute slot was that it enables real learning to take place, rather than 'chalk and talk', or the kind of passive learning which is easy to do if you've got 40-minute lessons.

"It's very easy in a short lesson to use a passive structure to get your behaviour sorted. Kids are less threatening if they're sat down, writing notes or doing work off the blackboard.

"But the essence of a long session is that the teacher is challenged automatically to look at what you're doing in that lesson — to look at variety, pace and the involvement of pupils in the learning. Getting kids to talk about things is crucial. You need kids to be embedding their learning, and it's this internalising that they get from group work and talking, not from doing endless examples."

In most lessons, pupils at Kesgrave will spend some time working either in pairs, or in larger groups, depending on the nature of the task. Staff will occasionally intervene in



THER WE STAND

Group-work is central to Kesgrave High School's philosophy. David Newnham talks to headteacher **George Thomas** about making sure students are engaged, empowered and enjoying school

the formation of each group, but pupils themselves say that they quickly learn from experience how to form groups and operate within them - a process which they say increases their confidence both in themselves as individuals, and also in their own ability to learn.

"We have lots of children who go to university and come back and say: 'We were surrounded by people who didn't know how to learn independently,'" says Mr Thomas. "They'd been spoon-fed, and when told to go off and research something, they didn't know what to do. But our kids do. They have that culture right from Day One."

What sixth formers at Kesgrave High say about group learning

"You probably work better when you're happier, so if you're working in a group, having a kind of friendship thing going on with other people in the group means your work will be better."

"It's less stressful doing a particular piece of work in a group. If you don't understand something, you can ask other people for advice. And you can usually come up with a better product because it's everyone's ideas rather than just your own."

"The teachers here are quite open, so you can pull them to one side and say, 'Look, this person here won't shut up, can you do something about it?'"

"You learn who's good at what, and where your speciality lies."

"I find that in some theory-based subjects like English or philosophy, when you're working with people you don't normally work with, you see different points of view that maybe you haven't seen before. By working with people like that, you can add their view to your own and have a wider diversity in your outlook. I'm conscious of doing that."

"You learn it first, then in a group you get together and bounce ideas around and put what you've learned into practice."

"If we hadn't worked in groups since Year 7, I don't think I'd find it easy to talk in front of other people. I've learned to talk to people or listen to people or react to what they're saying. And I've been able to use that in different circumstances outside school — even just when you're talking to your family. You can react to it because you're doing it at school all day."

"You come in, you sit down, they talk to us, you work in groups and talk about it again. You do your thing on your own, then you get to talk about it with other people. And in a way, they re-teach it to you. And if you don't understand just a little bit of it, they can explain it to you in terms you understand because they're on your level and they've just learned it and they're also your friend."

"I like working in a group — it's easier and more interesting, although I tend to not write things down as much as when I'm being taught. I'm a bit prone to that."

"It helps me remember the things we've done in class. When I'm doing revision, I think: 'Oh, that's the thing we did in that group,' and I remember that more than something I've done on my own because I've enjoyed it."

"The not-so-bright people would deliberately tag along with people that they thought would do all the work. I got the impression it was an easy way out for them. But they do learn from it as well."

"I was always the person who didn't really do much and let everyone else get on with it. But I think I've learned from that and now I find that I'm doing more work than the rest of them. And it's definitely a lot more fun working in a group."

How to make groups work

SPRinG has developed six key points to guide the planning of group-work

1 The classroom and groups should be constructed strategically and flexibly.

The classroom should be arranged to allow group-work as well as individual and whole class work.

THE NUMBER OF GROUPS

These should maximise effective interaction between pupils as well as with the teacher. Balance between the size and the number of the groups is important – but challenging! Lots of small groups or pairs may work well over short time periods with a deadline (e.g. around 5 minutes). A few large groups lead to higher potential for pupil distraction and disruption. Flexibility is needed.

GROUP SIZE

It is important to make the size of groups relevant to the task at hand and the age and ability of pupils.

Pairs

They can be good for collaborative high level thinking tasks (i.e. decision making, problem solving) and for peer tutoring.

Small groups

Units of 4-6 pupils are good for many group-work activities and for reducing group domination by one child but there is greater opportunity for some members to do less and quiet children may be less willing to contribute. The larger the group the harder it is to plan and organise work, roles, and interaction and engage in conversation.

Large groups

Groups of 7-10 pupils may be useful where the aim is to bring many viewpoints to a debate on issues, but they are problematic.

GROUP COMPOSITION

This should be strategic. A random allocation allows problems to run free but also lets children work with people they might not normally work with. A shared teacher-pupil decision is often a good solution.

Same or mixed ability?

In same ability groups (high or middle only) pupils can push each other and come up with ideas that individuals would not think of alone. But it is well known that low ability groups are unlikely to be successful. The best form of mixing is probably putting high and middle ability pupils and low and middle ability pupils together.

Friendship groups

It may be best to balance friends with non-friends in a group.

Personality and working style

We all know that some pupils have conflicting personalities or may not work well together. But these situations may be used to encourage children to learn how to deal with different people.

Integrating children with special needs, eals, isolates etc

This may be problematic, for example. the child may contribute little to group-work or disrupt. Careful consideration is required.

2 Group-work should be designed to maximise interactions that are linked to effective group-work outcomes.

3 Pupils should have the social, communication and problem solving skills that support effective group-work and encourage them to take an active role in their own learning.

Group-work is effective when it encourages pupils to think and talk about their understanding, to question ideas and get ideas from others. Social skills, communication and problem solving skills need to be developed. They should be approached developmentally, i.e., social skills first, then communication skills, then problem solving.

SOCIAL SKILLS

Children need skills which help build up an understanding of what is involved in being a member of a group, and increase levels of mutual tolerance and trust, mutual respect, and sensitivity to others. Activities encourage pupils to see situations from other people's perspectives.

COMMUNICATION SKILLS

The most beneficial aspects of group talking are:

- Taking turns at talk
- Active listening
- Asking and asking for questions
- Making and asking for suggestions
- Expressing and requesting ideas and opinions
- Brainstorming suggestions, ideas and opinions
- Giving and asking for help
- Giving and asking for explanations
- Explaining and evaluating ideas
- Making group decisions and coming to consensus
- Summarising conversations
- Persuasive talk.

PROBLEM-SOLVING STRATEGIES

These allow the group to plan and organise effectively so that they are not reliant on adults. Some such strategies are:

- How to organise/plan the group-work
- Working out the time scale
- Brainstorming
- Deciding whether some individual activity or thinking prior to group-working is needed
- Whether to create roles (e.g. leader, scribe, reporter, observer etc.) within the group or allocate aspects of the task to different members
- Whether achieving consensus is a necessary part of the task .

These activities should be supported by pre- and de-briefing.

4 Adults should act in a way that supports effective group-working and positive outcomes.

Class teaching and/or briefing should include discussion about what is to be achieved and learnt and how whole class instruction is connected to the group-work. Briefing should also remind pupils about the skills, strategies and rules that they should be using.

Adult intervention should be to the point, and should model suitable communication skills. More support is likely to be needed in the early stages. At the end of a session pupils should be encouraged to reflect.

5 Tasks and activities should be constructed strategically to encourage/ warrant effective group-working and be used to develop high level learning, thinking and understanding.

6 Group work can be used in all curriculum areas.

Tasks which encourage group-work include: problem solving, project work, group discussion of issues, decision making tasks, tasks that involve sharing information, researching an issue, collecting data/information/ views.

Tasks can vary in terms of how open-ended they are. They are most effective when the path to the solution/ decision is not obvious.

STRUCTURING GROUP WORK

Group-work can be structured in terms of sub-activities or ways of interacting, by giving particular pupils roles (e.g. scribe, chair, leader, decision maker/s, discussers) or broken down into sub-tasks. Putting an expert with a novice is the main way to set up peer tutoring.

Group-work tasks can be structured into phases, e.g. brainstorming, followed by justifying/explaining and evaluation/ reducing ideas down. Tasks can be structured by sequencing the size of groups, e.g., moving from individual work to dyads, then groups.

Briefing and de-briefing help pupils know why they are doing the task.

Group work tasks can be applied to *all curriculum areas*. It is important not to marginalise it.

GETTY IMAGES

AND THEN THERE WERE...

Can you boil down the principles of effective teaching and learning into a short and lucid list? **Mary James** explains how it was done

Learning is more than acquiring new knowledge and skills. It is also about making sense of the world and creating new knowledge. It involves testing new experience against previously learned ways of thinking and doing things, and changing habits of mind. And it involves using the ideas of other people expressed through what they say, write or make. New knowledge is always, in this sense, a joint production.

Developing the 10 principles of teaching and learning was an act of learning itself and had these characteristics. As Deputy Director of TLRP, with responsibility for 22 schools projects, one of my tasks was to try to come to some overview of their findings so that we might be able to answer the question: What has TLRP found out about effective teaching and learning in schools? There is still a long way to go with this but I started by reading the reports and publications that projects had produced to date and began to get a sense of the points of similarity and difference. But then I needed some structure to organise these thoughts. I wanted especially to find some way to communicate these to busy teachers.

Andrew Pollard, the Programme Director, had developed a simple way of arranging ideas: moving out from those at the heart of classroom processes (aims, curriculum, teaching, assessment and relationships) to those that support these processes, such as teacher learning and policy structures."Ten" had a nice resonance so we stuck with that. In their simplest form, we chose to present the principles in the round to show that, although there is a logic, there is no necessary hierarchy.

Mary James
Deputy Director
TLRP

> "It's through communication that we find out what we think"

We completed this initial work rather hurriedly because we wanted to issue the principles in a Commentary from the TLRP at the time when the Schools White Paper, proposing more specialist schools and academies (now the Education and Inspections Act 2006), was being discussed. We especially wanted to emphasise that improvement comes from teaching and learning rather than simply changing school structures.

The principles didn't hit us in sudden "Eureka" bursts; rather, we watched themes and overlapping findings emerge. Often they chimed with what we knew from prior research. For instance, the SPRinG project on what makes effective groupwork was built on the Oracle project of the 1970s, and their findings support the old cliché that two (or even more) heads are better than one. The value of thinking with other people is demonstrated throughout TLRP's work, from the high quality talk which characterises the best early years practice, as shown by the Effective Pre-school and Primary Education project, to the benefits of peer review found by Towards Evidence-Based Science Education. It's through communication that we find out what we think.

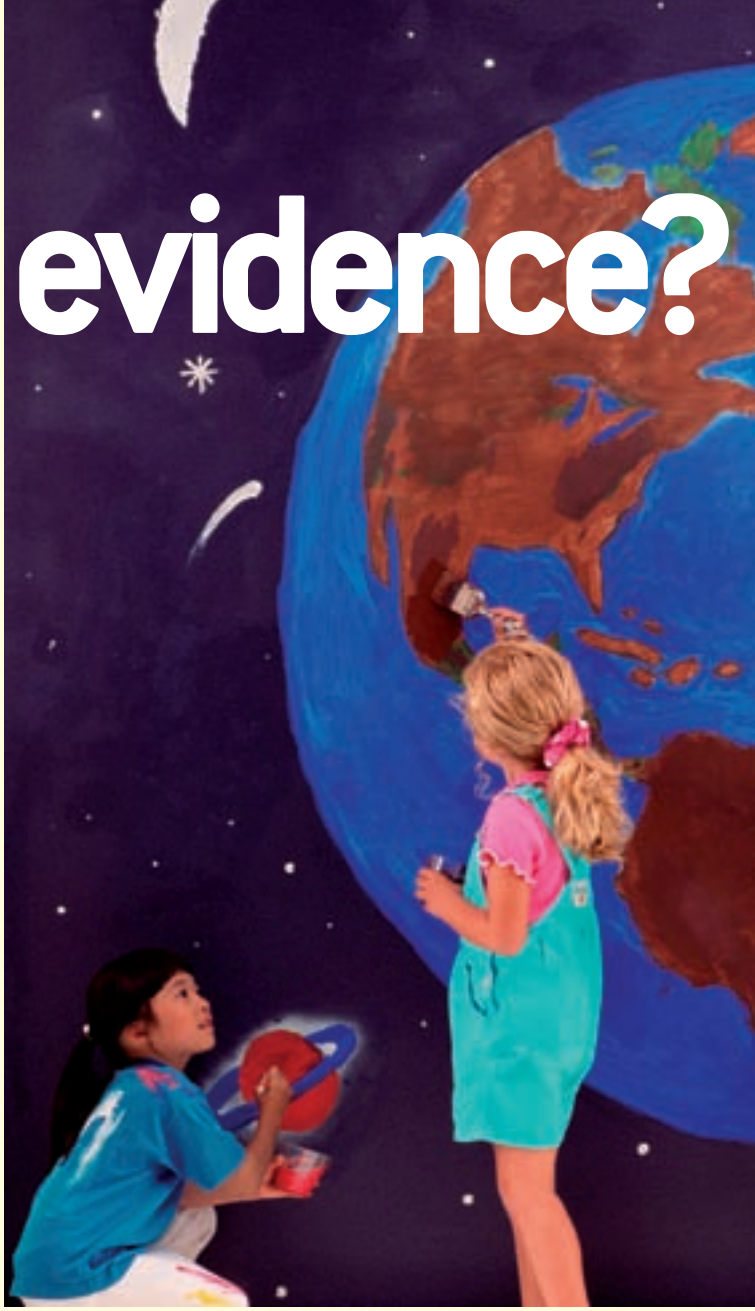
Evidence from numerous projects also confirmed the need for consistent policy frameworks. Repeatedly, researchers have found that teachers' willingness to experiment and their progress in bringing in forms of assessment which help children learn have been inhibited by a climate of testing and league tables. While Ministers on the one hand encourage assessment for learning, on the other, they continue to put pressure on schools to raise their results in high-stakes summative tests. This can militate against the use of other, voluntary types of assessment, even when they are shown not only to boost children's learning skills and autonomy, but also to raise their scores in national exams.

So how do we know that the principles we have pinpointed are universal? The short answer is that we can never be sure. As the best scientists will say, knowledge is always provisional. However, the principles are drawn from a large number of recent, highly-regarded research projects. People seem to find them interesting and helpful. The first 8,000 copies of the Commentary flew off the shelves in a matter of weeks and, and 45,000 copies were downloaded from the TLRP website in six months.

We have asked our project teams to critique the principles so that we can refine them. Some of the researchers have problems with the word "should" in each principle, as represented on the poster, finding it too prescriptive, but they understand that teachers seek advice and guidance. So, for now, "should" remains. ▶

What's the evidence?

The 10 principles grew out of an extensive and ever-expanding body of research findings about what really makes a difference in the classroom. **Diane Hofkins** looks at the data and the philosophy behind the ideas on the pull-out poster



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Effective teaching and learning

EQUIPS LEARNERS FOR LIFE IN ITS BROADEST SENSE

1 School is about more than passing exams and "delivering the curriculum". What happens in school needs to connect with the outside world, both by relating what children are learning to events at home and abroad and by helping them develop the skills, strategies and courage they will need in an uncertain future.

Collaboration will become increasingly important. 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 and as workers able to adapt.

Flexibility of mind – the ability to transfer skills and to think methodically but creatively – will be an increasingly hot intellectual property.

The TLRP's SPRinG and ScotSPRinG projects helped schools develop effective groupwork in which children didn't just sit together, they *thought* together. Activities were specifically designed to encourage children to explain things to each other and to promote joint reasoning. Other activities developed social skills by encouraging pupils to see situations from other people's points of view.

The "A for attitude" culture has been sneered at; it implies that the recipient really wasn't very good at the subject, but tried. In fact, evidence from across the TLRP shows that that attitude is crucial. Starting with the early years, the massive EPPE (Effective Pre-school and Primary Education) study shows that toddlers need to develop a "disposition" to learn.

Other projects, such as ACTS II Sustainable Thinking Classrooms from Northern Ireland, demonstrated how learning and thinking skills help boost confidence, autonomy and attainment. More broadly, the 12-year Identity and Learning Programme showed how children and young people develop a "learning identity" from the social influence of parents, teachers and peers as they progress through their school careers. Attitudes to lifelong learning are founded on each pupil's experiences of schooling and on the strategic biographies which make sense of these.

ENGAGES WITH VALUED FORMS OF KNOWLEDGE

2 In the justifiable swing toward emphasising the processes of learning and away from the pressure to pack in content and facts, it is important to remember that every subject has at its heart elements that make it unique. Teaching and learning should engage with the big ideas, key processes, modes of discourse and narratives of subjects so that they understand what constitutes quality and standards in particular domains. This precept is well-supported by the EPSE (Evidence-based Practice in Science Education) studies. Leading scientific thinkers were able to agree broadly on what constitutes the nature of scientific knowledge (such as what has been established beyond reasonable doubt and what is still open to debate) and the key elements of scientific method. The best way for students to understand these concepts is through classroom discourse. This means a change in teachers' role from transmitter of information to facilitator of opportunities for children to understand the various dimensions of science.

Skills cannot be taught in a vacuum; the Learning How to Learn research shows that learning practices are best developed when children are learning about something significant and specific. The process is part of subject teaching, not a course of its own.

This theme also chimes with Government guidance. For instance the proposed Key Stage 3 framework says children should become successful learners who know about big ideas and events that shape our world and understand how they learn and learn from mistakes.

"Scaffolding is about teachers recognising when they should inter

RECOGNISES THE IMPORTANCE OF PRIOR EXPERIENCE AND LEARNING

3 Few people these days think that children arrive at school as "empty vessels" to be filled with knowledge. The principle of starting where children "are" and helping them to move on is widely recognised. Never-the-less, with a class of 25 or 30, it can be difficult to determine each one's starting point. The EPSE project has found that carefully designed tools, underpinned by solid research, can quickly "diagnose" children's understanding of key science ideas and inform what the teacher does next.

Pressure to cover an overloaded curriculum makes it harder for teachers to find the time to diagnose individual chidren's needs, and a number of TLRP projects challenged teachers' assumptions about some groups of children. Teachers involved in the Developing Inclusive Practices in Schools project in England and Wales began to see that they could help change pupils' attitudes, self-esteem and engagement with learning; these were not fixed.

National policy is beginning to recognise that local culture and enthusiasms can be built into the curriculum. *Excellence and Enjoyment*, the 2003 Primary Strategy document, encouraged this, as does the revised KS3 programme. TLRP's Home-School Knowledge Exchange aimed to tap and recognise the fund of knowledge that children can draw on in their homes, communities and ethnic cultures. Meanwhile the Scottish study, learning with ICT in Pre-School Settings found that the so-called "digital divide" between well-off and poorer families is not as significant as is sometimes assumed.

REQUIRES THE TEACHER TO SCAFFOLD LEARNING

4 Scaffolding in teaching is like scaffolding in building work; it supports the construction until the house (or the child's learning) is secure enough to stand on its own. This scaffold is built of teachers' knowledge of how children learn.

Scaffolding is about teachers recognising when they should intervene to help the child move on to a higher level of understanding. The TLRP 's Learning with ICT in Pre-school Settings study found that young children's encounters with computers and other technology were enhanced when practitioners stepped in to guide them. Teachers in turn learned more effective ways to scaffold children's learning through CPD.

The InterActive Education study also concluded that ICT in the classroom will not help learning on its own. "Without the support of a teacher, students are unlikely to develop their knowledge of mathematical proof from their everyday reasoning, knowledge of the Italian Renaissance from knowledge of popular culture… or knowledge of science from game-like simulation software," the researchers say.

They found that students working on computers on their own for an extended period of time may come up with odd information, or misapply rules. For instance some secondary pupils using the internet to research the Renaissance were reading about somewhere called Florence in the USA.

NEEDS ASSESSMENT TO BE CONGRUENT WITH LEARNING

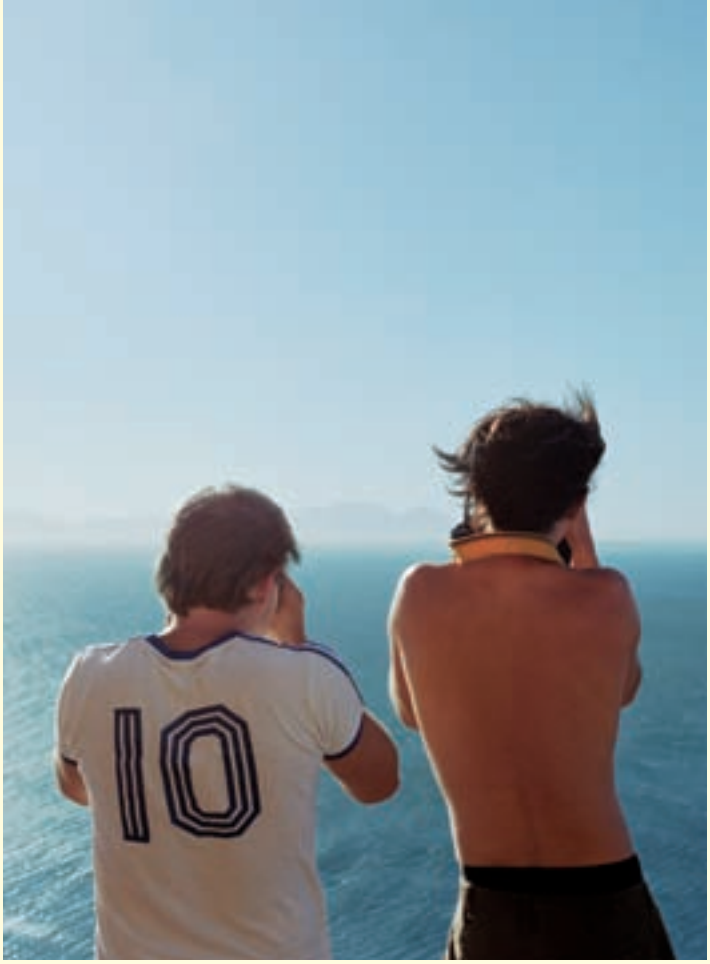
5 Assessment should help advance learning as well as determine whether learning has taken place. This may sound obvious, but many teachers involved in TLRP projects have complained that the assessment system in England militates against good learning. When staff end up "teaching to the test" rather than teaching to the principles they believe in (and the government says it endorses), something is not right.

However, TLRP findings have begun to influence policy. The new 21st Century Science GCSE course launched in September 2006, is based on EPSE research, and melds content and assessment in a coherent way.

The project on pupil consultation, in England, has shown that being able to talk about their own learning helps students become better able to manage it, more confident and positive about education and able to contribute to the development of the school. This pupil engagement gives teachers a deeper insight into their pupils' capabilities. A related project, on assessment in Northern Ireland, makes the point that such consultation is an obligation under the UN Convention on the Rights of the Child.

The Learning How to Learn study concluded that the ultimate goal of assessment for learning is to promote learning autonomy so that pupils can reflect on where they are and where they need to go, and then act in such a way as to get there. ▶

vene to help the child move on to a higher level of understanding"



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PROMOTES THE ACTIVE ENGAGEMENT OF THE LEARNER

6 If a key goal of education is to promote students' autonomy and encourage them to have positive attitudes to learning, it needs to start at the youngest age. The EPPE research shows the importance of encouraging child-initiated activities as well as ones set in train by adults.

The Learning How to Learn project showed – perhaps ironically – that teachers who took responsibility for their pupils' self-motivation (and did not blame home circumstances or adolescence) had the most engaged groups of students. The most effective teachers organised open, fluid activities. The pupil consultation studies found that children develop a stronger sense of self-worth when they are able to talk about their learning. Classroom tasks allowed students to enter the subject community, to behave as a scientist, an historian or an artist.

In addition, pupils are more likely to be engaged with schooling when they are consulted and their views treated with respect.

FOSTERS BOTH INDIVIDUAL AND SOCIAL PROCESSES AND OUTCOMES

7 Learning is a social activity. It demands interaction with other minds. TLRP studies on groupwork, teacher learning and inclusion, among others, show that when schools function as genuine learning communities, students and teachers thrive both collectively and as individuals. Pupils who worked effectively in groups also did measurably better on individual exams than those who had other forms of teaching and learning. The SPRinG and ScotSPRinG projects found that in key stages 2 and 3, children who worked effectively together made gains in their inferential thinking and their higher cognitive understanding. Groupwork also improved social relationships among pupils and between pupils and teachers. In From Black Boxes to Glass Boxes, experiments carried out with older students, using concept-mapping software, also showed that opportunities for students to discuss their maps with others was the significant factor in raising attainment.

The dramatic impact of teachers learning together is also being recognised throughout the world of education.

RECOGNISES THE SIGNIFCANCE OF INFORMAL LEARNING

8 Everyone now recognises that parents are children's first educators, but it can still be difficult to connect home learning with school learning. In the Home-School Knowledge Exchange primary pupils took photos to show the maths and literacy activities they were doing at home. Maths activities included cooking, shopping, playing board games, setting timers and consulting timetables.

Children were also asked to compile a shoebox of artefacts from home called All about Me, which enabled teachers and other pupils to find out about their interests and abilities.

The EPPE research has shown that when parents engage with young children in learning activities at home, children do better later on. In fact, parents' educational and economic backgrounds are less important than whether or not they provide enriching learning environments at home for children. Tellingly, boys tend to receive less home learning than girls, and this could be one reason why they do less well when they get to school.

Children's lives outside school have a huge impact on who they are as learners. The Identity and Learning Programme, which studied small numbers of children from middle- and working-class backgrounds over time makes clear how family relationships at home and peer friendships in the community affect the self-confidence and belief in themselves as learners which children and young people bring to the challenges of school.

DEPENDS ON TEACHER LEARNING

9 This was a consistent theme throughout TLRP findings. The need for teachers to develop their knowledge and skills and initiate their own classroom-based research should be recognised and supported both by government and within schools.

Improving outcomes for pupils, however they are defined, often requires teachers to change their classroom practice, sometimes radically. But these innovations can only occur if teachers themselves have learned. It's also important for them to be willing to examine their own practice. The Learning How to Learn project found collaborative classroom-based inquiry to be crucial and the project on Using Research Study Lessons shows a specific way of doing this.

Researchers also found that teachers valued materials and courses which would help them implement new ways of learning or new content. For instance, many of those involved in the project on why morphemes are useful in primary school literacy had to learn about morphemes (units of meaning in words) themselves. They also learned new teaching methods.

The Development of Inclusive Practices in Schools study concluded that "at the heart of this process of change were groups of staff involved in generating and engaging with evidence about practice, and about outcomes for pupils."

The government has been told this before. A much-publicised longitudinal study it commissioned from the University of Ontario on the implementation of the National Literacy Strategy said deep learning was necessary if teachers' grasp of the new policy was to be more than superficial. However, as the VITAE (Variations in Teachers' Work and Lives and their Effects on Pupils) project emphasises, teachers' levels of commitment and resilience are a vital condition for change.

DEMANDS CONSISTENT POLICY FRAMEWORKS WITH SUPPORT FOR TEACHING AND LEARNING AS THEIR PRIMARY FOCUS

10 Government policy should not chop and change every year or two, and ministers should act on the understanding that good pedagogy and pupil engagement will do more to raise standards than league tables and catch-up classes.

If effective teaching and learning are the core functions of schools (and what else could be?) they should be the focus of policy at school and national level. This would give coherence to other policies.

Teachers in a number of TLRP studies believed progress was being made despite government policy rather than because of it. The Learning How to Learn studies, for example, found that "The current performance-orientated climate in schools in England seems to make it difficult for teachers to practice what they value." And the Inclusion study concluded that school leaders should be selected and developed not only on the basis of their managerial skills, but on their values. It said national policy should support teachers who are working collaboratively to use a range of evidence about their teaching (including pupils' attitudes and engagement) "which goes beyond a relatively narrow range of performance indicators".

Getting to the heart of children

Headteacher **Janet English** tells Diane Hofkins about building a learning community

TERI PENGILLEY

Year 2 teacher Chris Starkl's class has been asked: "What will make me happy to learn?" The resulting mind-map shows answers such as: When my teacher helps me, When I try myself, Interesting books, It's OK to make mistakes, Fun activities, Drawing, When my teacher is happy – and my friends – and myself.

At Malvern Way Infant and Nursery near Watford in Hertfordshire, everyone, down to the youngest child, is thinking about learning. It's a school that embodies the TLRP's 10 principles of effective teaching and learning, both indoors and out. For instance, to reinforce pupil autonomy, child-size sheds were put up in the playground to allow youngsters to get their own equipment.

Teachers and children work together to discover how they learn best, and children's ideas are incorporated into the planning of topics. In the Don't Stop Moving topic, Y1 children wanted to learn about: bubbles in bottles, dinosaurs under attack, water moving, how we move, how animals move, how does the world turn, wind and clouds, how we make things move, and making moving models.

"It all fits in exactly with national curriculum planning," says headteacher Janet English. "We also have an unplanned area in our planning, which we never had before." Its purpose is wider and deeper than simply allowing time for children to take advantage of a snowfall or newly-hatched chicks. "We don't want to just make it a token input for children," she explains. "It will be a genuine response to the children's learning."

When Mrs English became head of the 300-pupil school in 2004, her "burning desire" was to bring the principles of assessment for learning into practice. "We started from the research from the TLRP's Learning how to Learn project, and used their CPD" (see "A treasure chest", page19).

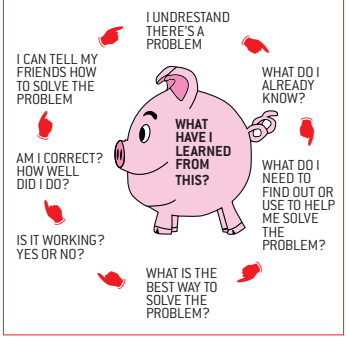
What chimed with the teachers? "The difference it makes to children." Teachers said that what altered their practice the most was a change in climate, so that it was OK to take a risk. She encouraged staff to look at the research evidence, develop an idea for themselves and then share it with other people.

"AFL makes everything cohesive and really gets to the heart of children," she says. "That's what teachers like; it's giving them permission to really focus on the children."

In the summer term of 2007 Malvern Way staff were looking at the difference between a learning objective and its context. "What we have got really good at is all the skills-based objectives," says Mrs English. In literacy, for example, these include using interesting adjectives or putting full stops at the end of a sentence. "They have got to be there, but what we really want to look at is the quality underlying all that – imagination, the way they describe a context for a story. We need to delve a bit deeper ▶

"We encourage them to go to their peers, share their successes"

PROBLEM PIG



This chart is designed to help infants think about how to solve problems and make sure they have understood. Teachers at Malvern Way are still refining "Problem Pig", asking themselves questions such as: is it the right sequence? or should it be a mind-map?

for what it is that makes quality in writing."

Or when it comes to problem-solving, "Not just, can they count in twos, but when they're faced with a new situation, can they apply that in a problem?"

There are learning posters in every classroom, asking children to think about what they know already, and then find out something new. Everyone is responsible not just for their own learning but for helping others, too. "We encourage children to go to their peers, share their successes and the things they need to develop, and to recognise that everybody has specific strengths that may be different to their own," says Mrs English.

At weekly Celebration of Learning assemblies, children talk about something they're particularly pleased about having learned at home or school.

Teachers have a responsibility to help children reach for new accomplishments. "We ask, 'Where do you think you can get to?'"

And they assess children's learning all the time, trying to discern who has understood and who needs more support. "What we have found is that children who are doing well tend to get more feedback," says Mrs English. "Those who aren't get less because teachers don't want to hurt their feelings. But we are saying, they need to have just as much specific feedback, but perhaps based on smaller steps."

National policy-makers often underestimate teachers' professionalism, she feels. "I do not think some of them give teachers the credit they deserve for their knowledge and understanding."

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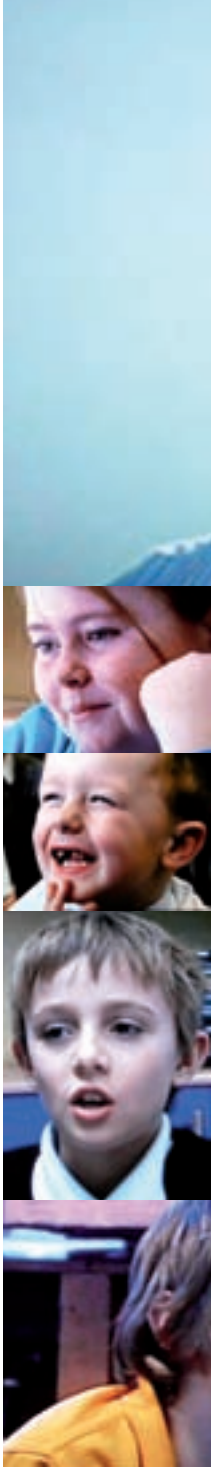
Brain hurt? Take six of these



Worried about OFSTED? What someone in Whitehall might think? That the schools police will arrest you unless you triple-mount those displays? You need a support group. And the down-to-earth teachers on the TLRP's Teaching and Learning DVD (enclosed with this magazine) might be the place to start.

Belfast primary headteacher Helen Farrimond has got a pep talk for you. "Teachers need to be brave and confident," she says, "and risk-taking." It's OK to have your learning outcomes pinned up haphazardly around the classroom, rather than having beautiful displays which may be no more than decoration, she argues. And when the inspector comes, you don't have to have all your evidence on paper. If you know the children have learned, tell the inspector to ask them about it.

She appears in one of six episodes filmed in different parts of the UK illustrating some of the TLRP's 10 evidence-based principles of effective teaching and learning. Longer interviews with some of the participants, who have all been involved in TLRP development and research projects, are also included. The DVD can be shown in full, or its components used individually in CPD sessions.

The lessons and interviews shown are not intended as examples of how to teach; they're meant to raise questions and encourage reflection. Similarly, a booklet to go with the DVD poses open-ended questions to complement each segment.

In the section illustrating "Learning should involve and engage the learner", Bolton headteacher Tony Purcell tells us that without pupil consultation, the school would miss out on 2,000 people's ideas. And a student adds, "Pupil voice is important. Otherwise it's the teachers' school, not the children's school."

To add to this, the booklet offers questions such as: "How can the quiet or disaffected be heard? And how can the creation of a 'pupil élite' be avoided?"

A treasure chest of ideas

Enter through the magic portal **www.tlrp.org** and prepare to be amazed by the riches that await you. You can find authoritative evidence about aspects of teaching and learning ranging from subjects such as maths and science to social issues such as inclusion and pupil voice.

There is a wealth of practical ideas, too, through many of the projects' own websites (a full list of schools projects is on page 27) and the large collection of Practitioner Applications (see far right).

Click on Projects, on the left of the screen, and you can find your way to gems such as the Consulting Pupils about Teaching and Learning website, with its hoard of ideas you can use in your school (http://www.tlrp.org/proj/phase1/phase1dsept.html).

A related book in the TLRP's Improving Learning series is soon to be published by Routledge. It will look at the role of consultation in a more partnership-oriented relationship between teachers and pupils. It will cover the problems of finding time to consult and of coping with the uncertainty that the change in power relationships brings.

Books in the Improving Learning series are explicitly designed to

> "Books in the Improving Learning series support evidence-informed decisions"

and inspiration

support "evidence-informed" decisions in educational practice and policymaking. *Improving Schools, Developing Inclusion*, by Mel Ainscow, Tony Booth and Alan Dyson takes the view that marginalisation, exclusion and underachievement take many forms and affect many different kinds of child.

Another jewel in the treasure chest is the Learning How to Learn project, which has published a book of *Tools for Schools* (Routledge). It provides ideas and materials for teacher workshops and other in-service activities developed with teachers by some of the best-known names in educational research. And there is much more besides at http://www.tlrp.org/proj/phase11/phase2f.html.

The TLRP website will also lead you to printable posters for many of the projects and a set of research briefings summarising their main findings and recommendations.

There are many ways to search, including by themes such as Curriculum or Learning Processes. These will take you to briefings, articles and other publications across different projects. Among them are Commentaries from TLRP on Personalised Learning, Effective Teaching and 14-19 Reforms.

Food for thought

Among the many resources you can find at **www.tlrp.org/search/pa/**is a large collection of activities to help teachers reflect. These "practitioner applications" have been created by CUREE (Centre for the Use of Research and Evidence in Education) for the TLRP for areas ranging from assessment and behaviour to relationships and social inclusion.Here are two of them.

What do pupils understand about the criteria for good work?

Research taster

Many pupils have little or even no understanding of what precisely makes work "good". Pupils often think that "working harder" involves superficial issues perpetuated by teachers' responses in lesson time, along the lines of talking less, completing work on time and presenting it neatly.

Your evidence

To help students understand the criteria for good work it is first important to make clear to them how they can analyse their own work. You might want to find a way to do this informally, e.g., when a story is brought for marking a student can be asked for his or her opinion on it. Or you may wish to be more formal, perhaps by asking pupils to fill in a comment form at the completion of a project to indicate what they had liked best/least about it, what they had found easy/difficult about it, what they had learned from it (content and skills), what they think they need to practise more or try harder at etc. Alternatively, if the children can write freely, you could ask them to keep a journal in which they can review their achievements on a regular basis. You can then use comment forms or journals to help you identify misunderstandings or areas where more clarification is needed.

Moving forward

This is perhaps one of the most important aspects of pupil voice as a topic. If pupils can be properly informed about the criteria for good work there can be a serious effect on most of their school life. You might want to find ways of looking into pupils' ideas about assessment criteria to help them in re-examining different aspects of their work. How can you do this in such a way that they are still working out for themselves how to improve their work?

Find out more

The project is Consulting Pupils about Teaching and Learning. Its website is at: www.consultingpupils.co.uk TLRP Research Brief on pupil voice is at: www.tlrp.org/pub/research/no5.pdf

What role do teachers play in directing learning with ICT?

Research taster

Although ICT changes the ways in which teachers direct learning, it doesn't replace them. Developing an understanding of how to support students who are completing learning activities using ICT, in order to ensure that they are being challenged and their learning tested, is clearly an important ingredient in the development of teachers' roles.

Your evidence

Would it be helpful for you to explore your understanding of your role in supporting ICT in the classroom? Could you identify an ICT activity you use regularly and feel confident with, then ask a colleague to observe a lesson in which you use this activity to give you a more detailed picture of the different roles you take than ordinary recall provides? You might like to ask them to consider:

- the instructions you gave to your students;
- the support that you offered to your students during this activity.

Moving forward

Do you need to do some diagnostic work to establish which ICT skills get in the way of learning about core objectives in your lessons? Could you plan, for example, an intensive activity to ensure that all students know how to store data and generate a graph automatically, or use all the available formatting tools to improve presentation?

Find out more

The full project is InterActive Education: teaching and learning in the information age. The project website is at: www.interactive education.ac.uk You might like to read a review of 42 studies about the use of ICT: Scrimshaw, P. (2004) Enabling teachers to make successful use of ICT. Becta. This article is available online at: www.becta.org.uk/page_documents/research/enablers.pdf

Victoria Neumark explores ways that teachers can get their students thinking about science

GETTY IMAGES

What's the big id

What science do children need to learn at school? And how best should it be taught? Terms like "scientific literacy", "ideas about science" and "more discursive" teaching are frequently invoked by curriculum planners. Internationally, experts worry over how wide and how deep scientific understanding needs to penetrate for modern societies to function. In the UK, universities and employers worry over a large and continuing drop in students wishing to study science at advanced levels. It all adds up to pressure on the science classroom. The tests press: teach to the tests!

What can teachers do? And how? Research shows that over-testing of factual recall likely overestimates understanding of key concepts: it does not improve it. Crudely, if students memorise facts for tests, they will not necessarily be able to use the concepts behind the facts in other contexts: the teacher may have transmitted information but not true knowledge.

Yet taking more time to establish pupil understanding, through open discussion and focused questioning can, paradoxically, pay off in more efficient learning. Particularly when teaching "ideas about science", teachers need to expand beyond their own expertise on the nature of science and learn how to manage students' progress in handling ideas. It's a big challenge for adults who have grown up mastering a body of subject knowledge.

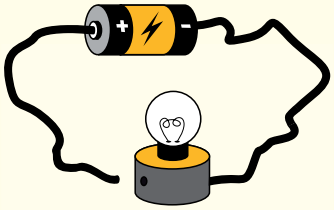
The new GCSE specifications are built around a dual demand: that all pupils should be "scientifically literate" whilst those who need to be are equipped with a sound basis in subject knowledge for advanced study. How should the content be divided up?

So-called "science wars" have hotly debated what science needs to be known by whom. Research from

THE BIG CIRCUIT

When the second wire from the battery is connected up to the bulb, what will happen?

Pupils may assume that there is a delay, following a "source-consumer" model. Yet the bulb lights up instantaneously. If the teacher sets the circuit up with a wire stretching around the whole classroom, the lively discussion which ensues when the bulb lights up enables the teacher to challenge their conception and makes pupils try to devise a new model to explain the phenomenon.



ea?

EPSE (Evidence-based Practice in Science Education) has synthesised nine themes (see box) abstracted from international experts and tested with practising teachers, with which everyone, be they future scientists or future non-scientist citizens, ought to be familiar.

To teach these themes, say EPSE researchers, teachers had to have the confidence to be able to develop their pupils' reasoning skill as well as impart facts. Pupils needed space to ask their own real questions, rather than shooting for the "right" answer. If they really felt that their own enquiries were valid, they became far more engaged.

The down side is that such teaching is challenging, particularly for those who are highly competent in "proper" scientific skills and understanding. Schools urgently need to invest in CPD to help teachers lead open discussion in which students reflect on their own emergent understandings: neither a free-for-all nor rote-learning.

What kind of materials could help such CPD? EPSE researchers worked with teachers at key stages 2, 3, and 4, devising diagnostic questions and research-informed activities. They scored significantly better than traditional teaching sequences in establishing pupils' understanding of key concepts.

Special "probe" questions aimed to establish correct understanding and misconceptions in specific areas: electrical circuits, life processes and forces and motion. The questions were in two stages: one to predict and one to ask for an explanation. For instance, key stage 3 pupils were asked to predict what the reading on an electrical circuit would be at given points, and then to choose an explanation for their prediction. Some pupils were followed up to probe understanding further.

Depressingly, then, less than half of the sample at age 14 knew that electric current is the same everywhere on a circuit; disturbingly, the proportion at age 16 was well nigh the same. Ideas built on this, such as the relationship between voltage, current and resistance, were grasped by fewer than 20 per cent of 16-year olds.

Such findings are not new: they are almost exactly the same as those pre-dating the national curriculum. But they do indicate that decades of innovative science teaching have done little for general understanding – and that current measures of student performance do not highlight this gap.

Teachers in the study found the probes useful, be they as "good questions: we're so short of useful questions" or as end-of-topic tests. Most interestingly, the probes could be used to open up discussion and bring misconceptions to light. "I got an entire unplanned lesson," said one. Their clear structure enabled teachers to begin dialogues without fearing classroom anarchy. Multiple-choice answers prompted more discussion than open-response ones as they made students consider other viewpoints: "they made real progress with their thinking".

Even non-specialists found that their teaching was enhanced by the use of the probes, which enabled them quickly to assess the understanding of the whole class, rather than a few individuals who might answer open-response questions. Practically, the banks of questions produced required detailed analysis of content to extract learning objectives. These could be broken down into differentiated learning tasks, to sift out who understood each point.

This process tested traditional sequences of ideas, particularly in the area of mechanics, where some key ideas (like the fact that all forces arrive from interactions and so always come in pairs) are unduly delayed and some other critical aspects (like the need clearly to identify which object each force acts on) are insufficiently emphasised for pupils to grasp.

Teachers found that "going back to basics" in this way, so far from boring pupils, actually led to their being more deeply engaged. Activities based on an analysis of the structure of scientific concepts can also help teachers be more versatile. Researchers who developed lesson activities for teachers built in a range of types of communication: teacher-led demonstration, open discussion, small group work with teacher support. There is the information – for instance, the formation of starch granules when a photosynthesising organism is kept in the dark – and there is the need to use scientific concepts to formulate an explanation. Different parts of the lesson call for different methods.

Generally, teachers tend to feel that external tests rely excessively on factual recall to test pupils' understanding. But the good news is that more innovative approaches, using questions based on research into how pupils learn, is as good or, mostly, better than traditional approaches even in questions based on factual recall. Perhaps this is because it is easier to remember facts if you know why they are true. Revolutionary: but it might catch on!

Website www.tlrp.org/proj/phase1bsept.html

NINE THEMES EVERYONE SHOULD GRASP

THE NATURE OF SCENTIFIC KNOWLEDGE

1 Science and certainty
How far some scientific knowledge, particularly that in school science, is beyond all reasonable doubt and how far other ideas are open to question. This includes: The nature of theory: that new evidence can always affect interpretation.

2 Historical development
Students should be aware of some of the historical background.

METHODS OF SCIENCE

3 Scientific methods and critical testing
The experimental method, the use of controls and how a single experiment is rarely conclusive.

4 Analysis and interpretation of data
Scientific analysis is more than sheer data; it requires sophisticated theory building. Disagreements are entirely legitimate.

5 Hypothesis and prediction
This process is essential to developing new knowlege about natural phenomena.

6 Diversity of scientific thinking
There is no single scientific method or approach.

7 Creativity
As much as any other activity, science involves imagination, inspiration and passion.

8 Science and questioning
Science is a process of continual and cyclical questioning, out of which new theories and techniques emerge to be tested in their turn.

INSTITUTIONS AND SOCIAL PRACTICES IN SCIENCE

9 Cooperation and collaboration in the development of scientific knowledge
Scientists work both communally and competitively, often in multi-disciplinary groups. New knowledge claims are shared and, if they are to be accepted by the scientific community, have to survive peer review.

Wording is adapted from the EPSE research reports

EPSE has also produced:
- Large banks of research-informed diagnostic questions, which have influenced and been incorporated into several national initiatives.
- Research-informed lesson sequences and teaching materials for several key science ideas.
- Research-informed lessons on 'ideas-about-science'.
- *Improving Subject Teaching* by Millar, Leach, Osborne and Ratcliffe, part of TLRP's Improving Learning series.

Morphemes' magic spell

Unlocking the mysteries of language for juniors

Once you see the power of morphemes to help children build spelling strategies and vocabulary, you will find it un-forget(t)-able. Morphology breaks words into units of meaning, rather than just letter combinations. When children understand that "magician" is made of two morphemes, "magic" + "ian", its spelling becomes more logical. When they play games which ask them to construct a variety of different words using this principle, the result is… magic.

It's magic because children learn not only to spell, but to make connections and analogies and to think laterally. In their book *Improving Literacy by Teaching Morphemes* (Routledge), Terezinha Nunes and Peter Bryant say, "Our approach to *how* to teach in order to develop children's awareness of morphemes was to engage the children in a variety of problem-solving activities that required different operations of thought. We did not design tasks that required the same response over and over, produced by the application of one and the same rule. We already know from our own research that the same amount of experience has different results depending on whether the children applied the same rule over and over or whether they had to make decisions about the different spelling possibilities."

Learning about morphemes unlocks some of the mysteries of spelling. Children discover that adding "ian" to nouns such as magic, music or electric produces a "person word", while adding "ion" to verbs such as protect or infect results in an abstract noun. Phonics – the strategy emphasised by the government – wouldn't help here, because both endings sound the same. Learners start figuring out the connections between uniform and unicycle, unicycle and and bicycle, and bicycle and binoculars. "The key to generalisation is variation," the researchers emphasise.

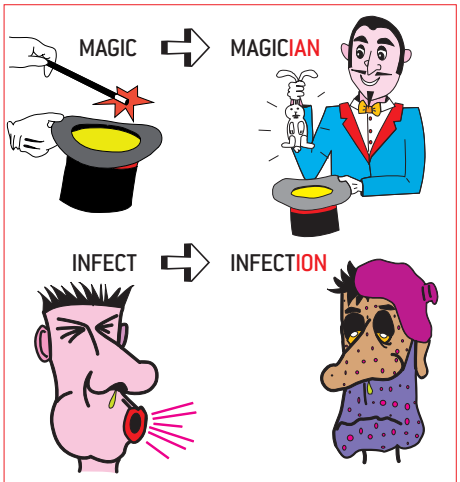
They say there should be systematic teaching about morphemes and their role in spelling in the junior years of primary school. It means that teachers have to learn about the role of grammar and meaning in spelling, too, and teachers involved in the TLRP project took part in a special literacy course. "The ingredients for change in pupils' performance appear to be teacher knowledge and dedicated teacher time with the appropriate set of materials," conclude the researchers.

Their findings are posted on the Department for Education and Skills website, but little of this knowledge has been incorporated into the National Literacy Strategy.

"It is a shame the newly-revised NLS has not made more use of these findings," says Professor Andrew Pollard, director of the TLRP, "This is important new knowledge, and phonics alone is likely to disappoint."

Knowledge about morphemes also helps in learning a second language, because it provides strategies for deciphering unfamiliar words. It also helps to tackle complex words in English, since short, familiar words may be hidden within a long one.

The researchers taught through games, working mainly with nine-year-olds. These included pseudowords blended with common prefixes and suffixes, to test children's ability to fragment any word into components.



Example of an analogy game that helped with the distinction between 'ion' and 'ian'

The researchers found that primary school children of all ages have difficulties with spelling words when the spelling cannot be predicted from the way the word sounds. They conclude that:

- These difficulties can be reduced for many words by making children aware of the morphemes that compose the words.
- Teachers should be made aware of the role that morphemes play in these spelling difficulties and how they can be addressed.
- Teaching about morphemes is a good strategy to promote spelling and languge development.

Nunes, Bryant and their team found that classroom instruction about morphemes and spelling does not have to be boring, and can be effective for pupils of all abilities. The interventions they devised provide a framework which teachers can use.

website www.tlrp.org/proj/phase11/phase2h.html
terezinha.nunes@edstud.ox.ac.uk

"Children learn to spell and make connections thinking laterally"

GETTY IMAGES / CARTOONS CHLOE WILSON

A meeting of minds

Bridging of home and school

Children live in two very different worlds – home and school. The Home School Knowledge Exchange project set out to bring them closer together, leading to better relationships with parents and children and improvements in children's learning.

One of the aims was to make sure the flow of information went both ways, not just from school to home. Videos were a particularly effective means of communication.

Action researchers worked with two schools each in Bristol and Cardiff on literacy at key stage 1, four more schools from the same cities on numeracy at key stage 2, and another four plus their main receiving secondaries on improving children's experience of transfer at 11.

To help with transfer, videos of Y7s, their parents and teachers talking about life in secondary school were shown to Y6s, their parents and teachers. Y6s made "passports" of the skills they might need in secondary school. This required them to reflect on themselves as individuals, to imagine themselves in the new setting and to offer themselves "advice". There was also an informal parents' evening.

Once they started at secondary, children brought in photos of their out-of-school lives. Parents were invited to an informal evening with teachers, and one secondary held an event to help recognise the funds of knowledge in its Somali community and to discover how they might be used in school.

The result was that children who attended a HSKE school made significantly greater progress in literacy from Y6 to Y7 compared to other students. Those from HSKE primaries appeared to adjust more quickly to secondary as well and to have better attitudes towards learning.

When it came to the literacy and numeracy exchanges, parents were very interested in the process of teaching reading. One noted the difference between the quality of expression when a child read something aloud for the first time compared with reading a familiar story. "I learnt a lot from that," she said, "because I never used to read a story first, I'd just open the book and start to read it."

In one of the maths schools, children made a video about multiplication methods, with one pupil taking the role of "teacher", asking questions of the others, who explained how they had arrived at their answers.

To help make the exchange two-way, children were given disposable cameras and asked to take pictures of "everyday" maths at home, such as cooking, shopping and playing board and card games. Once teachers and researchers saw how much home-based maths took place in game-playing, this activity was given a higher priority in school.

In a particularly popular literacy-strand activity, children were asked to fill a shoe box with artefacts from home. As one teacher put it, "The children were desperate, absolutely desperate to show you what was in their boxes." In class, they constructed word webs based on their boxes and then did an extended piece of writing.

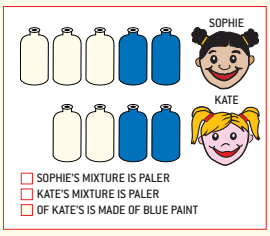
The shoe box collections showed teachers more about the lives of their pupils and about their abilities. For example, one quiet boy knew a great deal about birds and became the class expert. The activity also helped communication at home, as parents discussed with their children what to include in the box.

website www.tlrp.org/proj/phase11/phase2e.html

Maths in the fast lane – why intensive quantities are of primary importance

If children don't learn about mathematical concepts such as speed, density and value for money in primary school, they are likely to have difficulties with them for the rest of their lives. These "intensive quantities" need to be taught explicitly, say researchers from Scotland, who studied and worked with 10 and 11-year-olds in seven primary schools.

Teaching in the UK tends to focus only on extensive quantities such as distance, volume or price, which involve only one variable. The result is that children can be confused about fundamental concepts in science and maths. "For instance, a common response to 'What happens if you mix a tub of hot water with another tub of hot water?' is that the water will become even hotter, a response which suggests that



temperature, an intensive quantity, is thought of as extensive," say the researchers.

Intensive quantitites, which have two variables, need to be represented in fraction or ratio form, so they would provide good contexts for learning about fractions. In pre-tests, children often tried to use addition or subtraction to solve problems which required multiplication or division. This led, for instance, to the belief that if you need eight spoons of flour and 12 spoons of milk to make eight pancakes, you will need six spoons of flour and 10 spoons of milk to make six. Systematic teaching of concepts such as inverse proportion made a difference to pupils' understanding. The teaching in the intervention study took two to three hours of class time.

5-14 Mathematics in Scotland
http://www.strath.ac.uk/Departments/Psychology/DevEd/maths/mathsscotland.htm

How do we begin?

Giving children the right start makes a big difference

The EPPE project has robustly demonstrated the importance of high-quality pre-school in children's intellectual and social development. It has pinpointed what makes good pre-school teaching, what makes a good centre and what difference parents can make.

Its findings have been instrumental in formulating the Sure Start programme as well as government guidance for early years curricula.

EPPE found that children who don't receive pre-school provision suffer in their development. Children who attended the higher-quality centres showed less anti-social and worried behaviour and more independence when they started school.

The biggest impact comes from having qualified teachers working with young children, and the four key curriculum areas which need to be included are maths, literacy, science and the environment and diversity.

Importantly, it concludes that "what parents do matters more than who they are." Engaging in learning activities at home is more important than having a university degree.

The research shows that the actions of children's parents and carers, such as reading with a child, visiting the library or teaching letters and numbers are associated with educational and social attainment.

The study has found that the gains for children from good pre-schools last well into the primary years.

Teaching: good practice

Most important for early-years teachers is that, through careful study of settings which were measurably successful, EPPE found that there were seven characteristics of effective provision. They are:

SUSTAINED SHARED THINKING
High-quality interaction between adult and child or between two children requires one-to-one work between two individuals, or highly focussed group work. Both or all participants must join in, working together to solve a problem, extend a story or carry out some other intellectual activity. Allied to this is open-ended questioning from staff to children.

INITIATION OF ACTIVITIES
In good provision, children and adults each suggest about half of the activities. In addition, child-initiated activities were often extended in ambition by adult suggestion. These findings suggest that the best way for children to learn in a pre-school setting is for them to initiate an activity to which an adult then suggests extensions, although teacher-initiated group work also has a role. There appears to be a correlation between successful cognitive development and the amount and quality of planned and focussed group work undertaken.

CURRICULUM KNOWLEDGE
Workers in pre-school settings need a good knowledge of the curriculum.

PEDAGOGIC KNOWLEDGE
The same staff need to be aware of how children learn. This is a complex field and their knowledge may be dated or incomplete. It should be enhanced by continuous professional development. There has been a long-running debate over whether pre-school children should be in a setting that is more or less formal, a distinction often summarised as whether it is based on "play." However, EPPE has shown that children can learn from activities they have chosen provided they have the right adult intervention.

ADULT SKILLS
The best adult staff provide more activities concerned with curriculum learning, such as maths and literacy, and encourage more purposeful interaction. More highly-qualified staff perform more and better interventions. In the presence of trained teachers, less qualified staff also become more active and effective.

PARENTAL INVOLVEMENT
Staff seek out information from them about the children, and involve them in decisions. More significant still is the provider's willingness to engage parents in its educational and other aims. This allows parents to add to the pre-school centre's provision with appropriate activities and materials at home.

DISCIPLINE AND BEHAVIOUR
The most effective pre-school centres apply substantial human resources to these issues, especially by helping children to discuss and rationalise their behaviour. Less well-considered approaches involve simply silencing or distracting the child.

WHAT IS EPPE 3-11?

The Effective Pre-School and Primary Education Project is the most significant European study to date on the impact of pre-school and the contribution of family background on children's development between three and 11. The study is funded by England's Department for Education and Skills and is an associate project of the TLRP. Researchers collected longitudinal data on more than 3,000 children and their parents, home environments, pre-school settings and achievement once they entered school. They examined 141 pre-school settings in rural, metropolitan, shire county and inner city settings, providing both social and economic diversity in the sample. EPPE has produced 12 Technical Papers (available from the EPPE office 0207 612 6219) as well as a Final Report and a number of research briefs (all downloadable from the DfES Research Website or ordered from DfES Publications, PO Box 5050, Sherwood Park, Annesley Nottingham, NG15 0DJ. email dfes@prolog.uk.com Tel: 0845 602 2260) More information is available on the EPPE website: www.ioe.ac.uk/schools/ecpe/eppe

GETTY IMAGES

What does shared thinking look like?

These vignettes are from Researching Effective Pedagogy in the Early Years by Iram Siraj-Blatchford, Kathy Sylva, Stella Muttock, Rose Gilden and Danny Bell

FROM TINY ACORNS
Boy We found a coconut Miss!
Teacher Well done! Oh it's an acorn, if we planted it what do you think would grow?
Girl A flower
Teacher Not quite, if it came off that tree what would grow?
Child Don't know!
Teacher Ok, lets get a pot, some stones and soil and plant it to see. (goes with 5 children) Which way up do you think? I think on its side it will have the most

chance. What do you think it will grow into? (Using opportunity presented by children to model growth/wonder and to investigate. Children now have an investment in it.)
Child A tree.
Teacher Mmmm, I wonder what kind?

IN THE BEGINNING
This interaction shows what may be achieved when children are supported and encouraged:
Boy How did God make himself?
Teacher Well in most of the books about God, it says God just is.
Boy Well how did God make us?
Teacher I don't know. What do you think?
Boy I don't know.
Teacher Well how would you make yourself?
Girl I would make myself happy.
Boy I think when God made us, we made God.
Girl He putted (sic) our bones in first and then he putted our blood on the bones and then he putted our skin on.
Boy No – he opened up our bones and put the blood in us.
Girl No – if he put it in our bones, the blood wouldn't come out.
Girl (drawing) He's got long arms to let him make his dinner. 'Cos my mum's got long arms like me. (pauses and thinks) ... If the blood was inside your bones...
Boy (interrupting) I know your blood is out of your bones...
Girl (ignoring Boy's comment and pointing to a blood vessel in her finger) Look! So Why are you telling me blood's in the bones?...
I know God's got blood.
Boy No he hasn't.
Girl Yes he has. Why do you think we have blood and everybody has blood and he doesn't?... (Showing her picture to Zoe) Look I done (sic) God.
[The following week the teacher brings in a dog's skull and the following week a skeleton - the discussion about bones and blood continues in detail and in an equally dramatic fashion!]

Groovy moves for mini-geeks

The use of ICT may at first seem contrary to the sort of play-based active learning associated with the best early-years education – but it doesn't have to be.

Extending the defiinition of ICT to include digital still and video cameras, mobile phones, electronic keyboards and toys that simulate technologies such as laptops and barcode readers can enhance early learning in all sorts of ways. They also tend to be better for collaborative use, easier to integrate into play and more fun than desktop computers at this age.

This expanded definition of ICT has implications for providing resources in nurseries. Practitioners were able to look again at technology such as the listening centre or toy telephones and think about using them in different ways. They also bought new equipment, such as a computer microscope, a karaoke machine, disposable cameras, walkie talkies, a dance mat and an electronic music keyboard.

ICT can help develop children's dispositions to learn by increasing self-esteem and confidence or by supporting independence and persistence in the face of initial difficulties. Practitioners can help guide children's learning through questioning, modelling and support. It's also important for staff to recognise children's competence with ICT at home, and not to make assumptions about class and experience with technology.

Teachers make this sort of learning real for children when they deploy it themselves, for instance by using digital photography and video to document pupils' development.

Researchers found that young children were developing technical competence – the ability to switch items off and on, and conduct other operations – and cultural competence – an understanding of ICT's social roles and an ability to use it for communication, self-expression or entertainment. They found that ICT was being used at home to support early literacy and numeracy, communication and musical skills, and also had a role to play in helping children learn how to learn.

Interplay: Play, learning and ICT in pre-school education is at www.tlrp.org/proj/phase111/Scot_extc.html

Under the influence

How are policy-makers using TLRP findings? **Diane Hofkins** investigates

There would be no point in spending millions on educational research if the findings did no more than appear in learned journals written in language only understood by academics.

Fortunately, a foundation principle of TLRP has been to engage with practitioners and policy-makers throughout the research process. The payoff is that the work of the TLRP is now having an influence across the UK and even abroad, through the schools it has worked with, their local authorities and national agencies and governments.

In England, much, though not all, government policy has come into alignment with the principles underlying TLRP projects. For instance, "pupil voice" is now a requirement in every school under the Every Child Matters agenda, and the pupil consultation projects help to indicate ways to make it genuine. The Primary and Secondary National Strategies, the Qualifications and Curriculum Authority, the National College for School Leadership and the Gilbert Review, *2020 Vision*, have all made use of the findings.

Pete Dudley, a research trainee fellow with the TLRP, is director of the Primary National Strategy. "One of the areas of development in the coming year will be maths and assessment for learning," he says. The programme's primary maths projects will be influencing that work, and they will be studying the Learning How to Learn findings "to understand the kind of teacher learning that makes a difference in classrooms". The strategies are also looking at TLRP findings on groupwork, and the new Primary Framework, published in 2006, incorporates information on assessment for learning from the LHTL work.

Meanwhile, his own research study, using "research lessons" to help improve teaching, is being taken on board by the NCSL. Teachers work together to identify a point for improvement in teaching, pinpoint a multiple of three children in the class of differing abilities and plan the lesson around the anticipated responses of those children. One then teaches while another observes the selected pupils, after which the teachers compare the actual responses with what they expected.

> "We were directly testing research findings right into the development of policy"

In Northern Ireland, "we had a superb direct link between research and policy", says Carmel Gallagher, development manager for curriculum assessment at the Council for Curriculum, Examinations and Assessment (soon to become the Education and Skills Authority). "Professor Carol McGuinness (director of ACTS II, Sustainable Thinking Classrooms) had thirty per cent of her time seconded to our curriculum development team for three years, so we were directly testing the research findings right into the development of policy." She worked directly with CCEA on embedding thinking skills from ages four to 16. In addition, LHTL findings have helped form Northern Ireland's forward-looking assessment for learning policies.

TLRP researchers in Scotland have been invited by the Scottish Executive Education Department and Her Majesty's Inspectorate for Education's Learning and Teaching Forum to provide briefings on peer learning and collaborative group work.

"There is no doubt that the ideas expressed in the documentation surrounding the curriculum review 3-18 taking place in Scotland at present, 'A Curriculum for Excellence' are consistent with TLRP research messages", says Professor Donald Christie of Strathclyde University. "The emphasis is clearly shifting from content of the curriculum towards processes of learning and teaching, with elements such as pupil voice, inclusion and leaning to learn figuring strongly in the declared intentions of ACfE, which are to help all Scottish children become 'successful learners, confident individuals, effective contributors and responsible citizens'."

In Wales a curriculum and assessment officer at the Department for Education, Lifelong Learning and Skills, says the TLRP's evidence-informed principles of effective teaching and learning have fed into the development of the new curriculum.

"Our programme on developing thinking and assessment for learning has drawn heavily on the TLRP projects Learning How to Learn and Sustainable Thinking Classrooms. Professors Mary James and Carol McGuinness are members of our steering group and have made important contributions to the work."

Other projects are also contributing to new thinking, for instance, on science education, spelling in key stage 2, how teachers can best use new technology and on home-school liaison at primary-secondary transfer.

FIND OUT MORE
More information can be found about each of these projects via the TLRP website, **www.tlrp.org.** Look under Projects; each has a hyperlink to its gateway page. Many have websites, downloadable posters and other material, which can be reached through links on the left-hand side of the webpage.

Early Years

INTERPLAY: Play, Learning and ICT in Pre-School Education
2003–2006
Contact
Dr Lydia Plowman
lydia.plowman@stir.ac.uk
01786 467619
Interplay identified ways of enhancing young children's experiences with ICT through guided interaction with practitioners, peers and parents.

EPPE: Effective Pre-School and Primary Education
2003–2008
Contact
Prof. Iram Siraj-Blatchford,
i.siraj-blatchford@ioe.ac.uk
020 7612 6218
Following 3000 randomly selected children in 141 pre-school settings, EPPE has shown the contribution to children's development of different types of provision and length of time at pre-school, and of different pedagogical strategies and levels of staff qualification.

Primary Education

Home-School Knowledge Exchange in Primary Education
2001–2004
Contact
Prof. Martin Hughes
martin.hughes@bristol.ac.uk
0117 928 7007
The project developed ways to raise standards and enhance pupil attitudes through new forms of school-home collaboration.

Learning Scientific Concepts in Classroom Groups at Key Stage 1
2001–2005
Contact
Mr Stephen Hodgkinson
s.hodgkinson@brighton.ac.uk
01273 643517
The project developed an exemplar programme of group work in science and disseminated skills, methods and resources identified in the research to practising teachers.

The Role of Awareness in the Teaching and Learning of Literacy and Numeracy in Key Stage 2
2001–2004
Contact
Prof. Terezinha Nunes
terezinha.nunes@edstud.ox.ac.uk
01865 274023
This project aimed to improve learning through understanding how implicit and explicit knowledge is used by pupils and teachers.

ACTS II: Sustainable Thinking Classrooms
2001–2004
Contact
Prof. Carol McGuinness
c.mcguinness @qub.ac.uk
028 9097 4373
The research examined the role of metacognition (knowledge about thinking) in teaching thinking skills at Key Stage 2. It focused on assessing and promoting effective classroom dialogue and models of teacher support which can sustain innovation.

Supporting Group Work in Scottish Schools: Age and the Urban/Rural Divide
2003–2004
Contact
Prof. Donald Christie
d.f.m.christie@strath.ac.uk
0141 950 3360
Building on the SPRinG group work project in England, this study supported science teaching to 10 to 12-year-olds in mixed-age groups. It produced teaching materials with sponsorship from BP and had an impact on "A Curriculum for Education" in Scotland.

Provision for Gifted and Talented Pupils at Secondary Transfer
2002–2007
Contact
Miss Jenny Brookes
jenny.e.brookes@btinternet.com,
tel. via Stephanie Burke
0117 928 7094
This study is exploring how the needs of pupils are accommodated when they transfer from primary to secondary school.

Secondary Education

Towards Evidence-Based Practice in Science Education
2000–2003
Contact
Prof. Robin Millar
rhm1@york.ac.uk
01904 433469
The EPSE network explored how research findings could be used to enhance pupils' learning in science, sought to pinpoint key ideas about science and developed teaching and diagnostic assessment materials. Its work led to the 21st Century Science GCSE option.

InterActive Education: Teaching and Learning in the Information Age
2000–2004
Contact
Prof. Ros Sutherland
ros.sutherland@bristol.ac.uk
0117 928 7108
The project found that the role of teachers remains crucial in designing and supporting learning with ICT across the curriculum, but new technologies' potential was not being fully realised. Researchers, research students and teachers worked together to explore ways in which ICT could be used in seven curriculum areas.

From Black Boxes to Glass Boxes: Computerised Concept Mapping in Schools
2002–2006
Contact
Robin Bevan
rbevan@kegs.org.uk
01245 353510
The project is investigating how computerised concept mapping can be developed in a manner informed by a sound theory of learning.

Prosiect Dysgu Cydradd/ Facilitating Teacher Engagement in More Inclusive Practice
2005–2007
Contact
Dr Sue Davies,
s.davies@trinity-cm.ac.uk
01267 676622
Researchers are developing a toolkit to help educational psychologists support teachers in becoming more reflective.

Across School Phases

Consulting Pupils about Teaching and Learning
2000–2003
Contact
Prof. Donald McIntyre
dim20@cam.ac.uk
01223 767513
The network sought to open up, with teachers, new dimensions of classroom practice where they think pupil perspectives can make a difference, and to disseminate good practice. A network membership of interested teachers and researchers is being built up.

Understanding and Developing Inclusive Practices in Schools
2000–2003
Contact
Prof. Mel Ainscow
Mel.Ainscow@man.ac.uk
0161 275 3503
This network used action research methods to help promote practices in school which would increase the participation and achievement of those learners who are often marginalised.

Improving the Effectiveness of Pupil Groups in Classrooms
2001–2004
Contact
Prof. Peter Blatchford
p.blatchford@ioe.ac.uk
020 7612 6268
The SPRinG project showed that group work where there is genuine collaborative learning in key stages 1-3 can more positively influence academic progress than other forms of teaching and learning.

Learning How to Learn: In Classrooms, Schools and Networks
2001–2005
Contact
Prof. Mary James
m.james@ioe.ac.uk
020 7911 5580
Building on the principles of assessment for learning, the project Investigated what teachers, schools and networks can do to help pupils become autonomous learners.

Lessons for Learning: Using Research Study Lessons to Innovate and Transfer Metapedagogy
2003–2007
Contact
Mr Pete Dudley, pete.dudley@capita.co.uk
07785380646
This project's independent research training fellow is now director of the Primary National Strategy. The project is investigating the development of Research Study Lessons as tools for constructing professional knowledge about classroom teaching.

5-14 Mathematics in Scotland: The Relevance of Intensive Quantities
2003–2005
Contact
Prof. Christine Howe
cjh82@cam.ac.uk
01223 767724
The project investigated Scottish primary pupils' mastery of intensive quantities such as speed and density.

Consulting Pupils on the Assessment of their Learning (CPAL)
2005–2006
Contact
Dr Ruth Leitch
r.leitch@qub.ac.uk
028 9097 5949
This Northern Ireland extension of Consulting Pupils about Teaching and Learning has a distinctive focus on the pupil voice in the assessment of their learning, particularly in key stage 2.

The use of ICT to Improve Learning and Attainment through Interactive Teaching
2005–2007
Contact
Dr Steve Kennewell
s.e.kennewell@swansea.ac.uk
01792 482012
The research is comparing the effect on learning and attainment of effective teaching methods with and without the use of ICT by teachers and pupils.

Variations in Teachers' Work and Lives and their Effects on Pupils (VITAE) 2001–2006
Contact
Prof. Christopher Day
christopher.day@nottingham.ac.uk
0115 951 4423
The key aim of this longitudinal study was to identify factors which may contribute to variations in teachers' professional and personal lives, and to examine why teachers do, or do not, become more effective over time.

Lifelong Learning

Identity and Learning
2004-2007
Contact
Prof. Andrew Pollard
a.pollard@ioe.ac.uk
020 7911 5581
This is a 12-year, longitudinal ethnographic study in which social influences on the learning of two cohorts of children were traced as they moved through their entire compulsory schooling in a city in southern England.

New opportunities, new challenges

THE present trend of education policy, taken as a whole, is away from central prescription and towards a more trusting approach to the teaching profession.

ENGLAND In England, the recent emphasis on 'personalised learning' in schools affirms the centrality of teaching and learning processes, and the Department for Education and Skills seeks to maintain this priority through the National Strategies and initiatives such as Every Child Matters. A recent review of teaching and learning in the future, *2020 Vision*, has affirmed the importance of pupil consultation, learning how to learn and assessment for learning.

SCOTLAND In Scotland, the new *Curriculum for Excellence* is intended to produce a de-cluttered 3-18 curriculum with more space for responsive teaching and learning. Consistent with Scotland's National Priorities, the provision is intended to be both more challenging and more enjoyable for pupils.

WALES In Wales, teaching and learning issues were prioritised by *The Learning Country* and are being developed through *Aiming for Excellence*, a programme of guidance and support for schools, as well as through other initiatives. Assessment reform to ensure that it directly supports learning is well advanced and a National Pedagogy initiative has been launched to affirm and spread good practice.

NORTHERN IRELAND Northern Ireland's *Curriculum Review* again proposes to reduce statutory prescription, building on new understandings of how children learn, and is intended to make it easier for teachers to respond to specific pupil needs.

However, both policy and practice are now expected to be informed by the best available research evidence on how to improve teaching and learning. This is where TLRP's findings should help to inform key judgements.

The Teaching and Learning Research Programme is the largest educational research programme ever mounted in the UK. Starting in 2000, 22 school-focused development and research projects have been funded. The findings now emerging from these projects have helped TLRP to identify 10 general, evidence-informed educational principles which we believe to be of particular significance in achieving high quality teaching and learning. These principles, which feature in this guide, also have implications for national and local policy and for the many agencies who mediate between policymakers, researchers and teachers.

We hope that this Teacher's Guide to TLRP's findings, *Principles into Practice*, together with the associated DVD and all the supplementary web-resources and publications of the Programme, will be helpful to you in rising to these challenges both today and in the future.

More information on TLRP projects

Research Briefings Summaries of each of the major projects' findings: http://www.tlrp.org/pub/research.html

Books *Improving Learning and Improving Practice* series. These provide accessible overviews of the work of each project: www.routledge.com

Websites Each project: http://www.tlrp.org/proj/expand.html

Practitioner Applications These offer classroom activities based on TLRP project findings: http://www.tlrp.org/search/pa/

Commentaries These relate to contemporary issues. Download from: http://www.tlrp.org/pub/commentaries.html

TLRP's website Offers sophisticated search facilities leading to more advanced academic materials: http://www.tlrp.org/search/

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