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Vygotsky's ideas on teaching and learning

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The best teaching and learning today builds upon knowledge and understanding of how children learn from research over time including the work of educational theorists.

Reading current educational research reports and publications about teaching and learning quickly leads to references about Vygotsky and the so-called 'zone of proximal development'. Reference to this idea can be found in research studies dealing with subjects from mathematics to PE, and from pre-school settings to key stage 3 classrooms. For references to, for example, Shayer and Adey (1994), Adhami, Johnson and Shayer and Adey (2002), Leat (1998), Higgins (2001), and McGuinness (1999) see the Further Reading section.

So who was Vygotsky and why is his work still so relevant and so highly regarded by teachers and researchers?

Lev Semyonovitch Vygotsky was born in 1896 near Minsk in Byelorussia. After studying law and philology he began his work in developmental psychology in 1917, following the Russian Revolution. Vygotsky became a leading figure in Soviet psychology but his work was tragically cut short by his early death from tuberculosis in 1934. Knowledge of Vygotsky's work did not reach the West until the 1960s, when the first translations of his work began to appear.

In this TLA research summary we've tried to draw out from Vygotsky's work some key ideas, which seem to be close to the current interests of classroom teachers. The source material we used is a book on Vygotsky edited by Michael Cole and co-workers (1978): *Mind in Society, The Development of Higher Psychological Processes* (Massachusetts/London: Harvard University Press). In making this choice we are aware that this book is an edited compilation of Vygotsky's ideas, not his original work. Nonetheless *Mind in Society* has been tremendously influential and most of the Vygotsky-related ideas in the West stem directly from this work. We have also included a number of case studies drawn from more recent educational practice in order to illustrate the

wide range of appeal and application of Vygotsky's ideas.

In our view Vygotsky's work offers teachers a powerful vehicle for framing pedagogical approaches that can be taken up at the individual pupil, the class, the department and the whole school level. Just as importantly, the adoption of Vygotskian approaches to teaching and learning, of necessity, involve the teachers in a process of developing their own thinking, of improving their own lesson planning skills and in encouraging discussion about classroom activities.

Overview

Why is the issue important?
The quality of learning is a key issue in schools and Lev Vygotsky's work offers teachers a pedagogic approach that builds on what students know already and supports them, through dialogue, in acquiring new learning. Vygotsky's ideas are more relevant than ever since the introduction of thinking skills as specific content in national strategies. What are the key messages?
Whilst Vygotsky's ideas were dynamic, connected and interdependent, it is possible to identify a number of key elements:

- language in children's learning - Vygotsky regarded speech as a tool which developed in a social context and which became the vehicle for thought
- children's play - Vygotsky believed that play not only fulfils children's emotional and physical needs, it provides a major stimulus to their cognitive development
- the concept with which Vygotsky is most closely and famously associated is that of the 'zone of potential (or proximal) development' - the 'zpd'. He believed children's learning could go beyond what the child showed in tests into their zpd, involving a higher stage of cognitive development which a learner could reach in collaboration with a more knowledgeable person, such as a teacher
- Vygotsky also explored the problematic topic of the transferability of thinking processes from one context to another and concluded that higher order skills - such as classification and logical thought - were transferable.

How did Vygotsky arrive at his ideas?
Vygotsky was a leading figure in Soviet psychology in the early 1900s. He conducted a number of experimental studies in clinical, special education and early year's settings, which included methods such as:

- introducing obstacles into tasks so as to disrupt routine methods of problem-solving
- observing how children did or did not make us of external aids to aid memory
- setting children tasks that exceeded their knowledge and abilities.

He regarded experiments as a means of making visible processes that are ordinarily hidden beneath the surface of normal behaviour patterns. Specifically, Vygotsky and his co-workers were interested not so much in what children achieved, but in how they went about it.

What are the implications?
Vygotsky's work suggests the importance of:

- starting from what children know already and providing them with guidance that moves their thinking forwards
- teachers using knowledge about how children learn to help them develop their own thinking about teaching and learning
- exploring how children learn as opposed to what they learn
- stimulating classroom discussion that helps children test and refine their own thinking in collaboration with each other.

What do the case studies illustrate?
The case studies show the contemporary relevance and importance of Vygotsky's ideas. They illustrate, for

example:

- a teacher and his students using the Vygotskian idea of co-operative learning in geography
- the role that play performs in the early learning of young children in relation to their thinking and learning in a social context
- a teacher and Year 1 pupils a undertaking a classroom activity that involved cognitive challenge and social construction
- a teacher helping secondary school students engage in thinking about thinking (metacognition)
- the potential for transferring students' thinking processes from one subject to another.

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Study

Which of Vygotsky's ideas have been shown to be useful to teachers?

By using methods (see section below on methods), which included close observation of the way children tackled tasks in a social context, Vygotsky and his colleagues developed ideas which contribute to our understanding of how children learn and how teaching can be made more effective.

Whilst Vygotsky's ideas were dynamic, connected and interdependent, it is possible to tease out and cluster them into a number of areas including:

- language in children's learning - Vygotsky believed strongly in the importance of the social and cultural features of children's learning. He regarded speech as a tool that developed in a social context and which became the vehicle for thought
- children's play - from his analysis of pre-school children's play Vygotsky concluded that not only does play fulfil children's emotional and physical needs, it provides a major stimulus to their cognitive development
- the part played by schools and teachers - Vygotsky viewed school instruction as a key factor in children's development, which was crucial to the development of specific forms of thinking
- the significance of the zone of proximal development for teaching and learning - the concept with which Vygotsky is most closely and famously associated is that of the 'zone of potential (or proximal) development' - the 'zpd'. He described the zpd as the difference between the level of actual development as measured by tests, particularly IQ tests which were becoming common in Vygotsky's day, and the level of potential development that a learner could reach in collaboration with an adult
- learning with others - Vygotsky's work strongly emphasised social learning, so much so that the idea of learning outside a social context was alien to him
- the unity of higher order skills - Vygotsky also explored the problematic topic of the transferability of thinking processes from one context to another and concluded that higher order skills - such as classification and logical thought - were transferable. (This is a contested notion partly because we do not know enough about the structures and processes that support transfer.)

Each of these features of Vygotsky's work is described in separate sections below.

What evidence is there that Vygotsky's principles have helped to improve children's thinking?

There are a number of current initiatives gaining momentum both through their inherent practical appeal and, more recently, because they have been built into national strategies that build on Vygotsky's principles. These include 'thinking skills', one example of which is the Cognitive Acceleration through Science Education (CASE) project described in our earlier RfT Improving learning through cognitive intervention and 'assessment for learning', which we summarised in the RfT Raising standards through classroom assessment.

The (CASE) project team has collected performance data about pupils who had been taught by their methods, which explicitly aimed to improve children's thinking in science. This approach incorporated the significant Vygotskian elements of pupils working together to solve problems and teachers' 'scaffolding' of children's learning. Scaffolding is a creative, dynamic process in which the adult supports children's learning by, for

example, asking leading questions or encouraging children to work through a related but more familiar example first. There is more information about scaffolding later in this RfT.

In 'The long-term effects of Cognitive Acceleration on pupils' school achievement, November 1996' (Michael Shayer, Centre for the Advancement of Thinking) the CASE team presented evidence showing overall increases in the numbers of children achieving grade C or better in the science GCSE examination equivalent to increases in the national average from 43 to 57% in 1995 and from 44 to 63% in 1996.

The evidence from the CASE project is significant because of the numbers of pupils involved, which was about 4,500 from 17 intervention schools and a similar number of control schools, in the example just given.

Recently the CASE team have published findings from their work in primary schools. A digest of the research 'Key Stage 1 intervention' is presented on the DfES 'Research informed Practice' website. Again the results demonstrate evidence of improved performance from children involved in the project.

In addition to CASE there are a number of other thinking skills or cognitive acceleration approaches such as Cognitive Acceleration through Mathematics Education (CAME), Thinking Through Geography, Thinking Through History, Activating Children's Thinking Skills (ACTS) and the Art, Reasoning and Thinking Skills Project (ARTS). CAME reports gains in pupils' attainment in mathematics tests; and comments from teachers involved in the other initiatives indicate that pupils show improvements in their ability to ask questions, offer explanations, reflect on their learning and explain their reasoning.

A recent study from Slovakia explored the effects of children's play on the development of thinking in pre-school children. In particular they aimed to compare the relative effects of teacher-directed play with child-directed play. The researchers found a significant increase in instances of behaviour related to thinking among the second group. The authors concluded that with reference to children's learning in the context of play:

'Children think more, learn more, remember more, spend more time on task, and are more productive in well-implemented co-operative groups...'

What might teachers find useful in Vygotsky's ideas about language and learning?

Vygotsky regarded language as a cultural tool that involves dialogue with others. He argued that children free themselves through speech from the immediate constraints of their environment. In the earliest stages of children's growth (below three years of age) he asserted that speech is entirely communicative and not related to thinking. However, from the age of three onwards he thought that new functions of speech emerge alongside the communicative function. Vygotsky identified three elements:

- during the ages of three to seven years children think out loud, talk to themselves when doing tasks and manipulate numbers out loud
- over the same period most children increasingly use speech to plan and control their behaviour and that of others. Their speech develops in relation to their own actions and purposes
- from about seven years onwards children's speech, as related to thinking and planning, usually becomes internalised, the processes they described out loud in an early phase have now become internal means of organising the mental processes used to manipulate numbers, to make comparisons, to apply ratio and proportion, to make causal links, and so on.

The following example illustrates how nursery age children use language to organise play. Here child S uses language effectively to shift the direction of play from a focus on routine activity in a restaurant to the more dramatic action of 'Doggy's dead':

M: Pretend you're the doggy
S: Pretend I'm called Hannah and she's called Becky
S: Pretend the doggy was dead, yeah. (3 times for emphasis)
G: Only you.

M: Only you dead.
S: Only you, me and somebody killed me.
A: (Calls in a sing-song voice) Chips and chicken nuggets.
M: A burglar because we've left you in the shop.
S: Pretend the doggy was me.
S: Pretend the doggy was going to be dead and somebody will kill me.
(S goes out of the door alone. Soon others follow. S is lying 'dead' on a cushion in the book corner. ... F tries to wake her and she looks up.)
S: You have to tell the kids, the kids of the restaurant that I'm dead and say to them, 'The doggy's dead'.

(Adapted from research into how children use socio-dramatic play to construct meaning. For more details about this work see case study 2 and Further Reading.)

How teachers can use appropriate language to extend children's thinking

An important implication of Vygotsky's ideas about language is that by encouraging children to use the appropriate language teachers can reinforce and extend their thinking as this example from a primary science classroom shows:

T: Who can tell me what a gas is like? This group ought to be able to tell me. What can you do to a gas?
P: You can push it.
T: I'd say there's a better word than that isn't there?
P: Squash it.
T: Squash it, you can compress it.
P: You can squeeze it to a certain amount.
T: Yes you can compress it. Can you compress a solid?
P: No

This example is taken from Watts, D.(2002): see Further Reading.

Why did Vygotsky believe play was so important in pre-school children's cognitive development?

According to Vygotsky, imaginative play:

- creates a world within which they create their own meanings
- provides a zone of proximal development for the pre-school child
- incorporates a number of key developmental actions, which provide a foundation for development at school
- provides a natural setting for the introduction of literacy skills.

Vygotsky suggested that imaginative play arises in children over the age of three as a result of changing needs that parents can no longer fulfil immediately. To resolve the tension this produces the pre-school child creates an imaginary world of play in which the unrealisable desires can be fulfilled.

He proposed that from about the age of three onwards children are able to act in ways based on the meanings and ideas they create about the objects they incorporate into their play. In play, Vygotsky suggested children consciously act out roles that they witness or perform in everyday life without thinking. This conscious action creates rules which define the action. In this example a child is explaining both his own action (shaking the waist of a child lying prone) and what he expects from the other child:

'When somebody's dead the police do like that and they don't wake up so when I go like that you don't wake up.'

(Adapted from research into how children use sociodramatic play to construct meaning. For more details about this work see case study 2.)

Play creates a zone of proximal development of the child. According to Vygotsky:

'In play a child always behaves beyond his average age, above his daily behaviour; in play it is as if he is a head taller than himself. As in the focus of a magnifying glass, play contains all developmental tendencies in a condensed form and is itself a major source of development.'

Vygotsky believed that play, like teaching at school, offered children the background material on which their thinking processes can develop and operate. During play, Vygotsky suggested children became conscious of what they are doing and why they are doing it, and learned to plan. He believed that these elements made imaginative play the highest level of pre-school development, and provided a preparation for the development of abstract thought.

Vygotsky suggested that play presented a natural environment for the introduction of reading and writing. He also maintained that reading and writing should always have a purpose. This point is well recognised by modern early years teachers and researchers. One researcher illustrates activities that give writing in play a purpose in the context of a nursery project about flight:

'At the back of the room an aeroplane, made up from rows of chairs, is ready for take off. The children take the passports they have made to the airline desk, where forms are filled in and tickets issued. As a visitor, I am offered a menu card so that I can choose my in flight meal...'

From Miller (1996): see Further Reading.

What did Vygotsky regard as the unique contribution of schools and teachers?

Vygotsky emphasised the specific role schools and teachers played in the cognitive development of children. In contrast to everyday experience in which children become familiar with the people and objects around them in an unstructured way, Vygotsky explained that school instruction focused children's minds on structured thinking processes. He referred to this process as the acquisition of 'scientific' concepts. (Vygotsky included under this heading historical concepts and those related to social science, politics and language in addition to science and mathematics. It is probably better to regard 'scientific' concepts simply as 'taught' concepts.)

Vygotsky suggested that when children constructed meaning they learnt to relate causes and effects. Because their experiences in everyday life are not subject to this construction process children think about these experiences in a different way. Vygotsky suggested that the thinking processes which developed in the child at school were instrumental in enabling the child to make more sense of their experiences in life outside school.

Unlike Piaget, who sought to explore children's abilities to form concepts entirely as a result of their own thinking, i.e. in the absence of social interaction ('spontaneous concept' formation), Vygotsky was interested in concepts which developed in the child as a result of teaching at school or from the influence of adults ('nonspontaneous' concepts). Piaget believed that concepts learned from teaching at school reflected the adult thinking the child had learned rather than the child's own thinking, whereas Vygotsky believed that the child not only imitated but reworked the concepts s/he received in order to understand and learn them.

How can Vygotsky's work help teachers think about and plan their teaching - the ZPD?

From evidence drawn from clinical studies Vygotsky advanced a number of propositions about children's learning. Although many of his ideas were based on interactions between an adult and a single child, Vygotsky nonetheless regarded each child as a member of a social environment. His suggestions included the following:

- children's achievement, when assisted by an adult, tells us more about their capacity to learn than IQ tests

- learning of a concept, word or phrase, etc, is followed by a longer process of the child's development of thinking that includes learning when and how it can be used, recognising when it is being used by somebody else, using and learning how to use it in conjunction with reasoning processes (to make deductions, to interpret, to relate causes and effects, etc)
- effective teaching is that which not only builds on what a child understands already, but that is a stimulus to a new series of thinking processes in the child. In this context assessment for learning is highly significant in that it enables teachers to identify and use what pupils know already to plan their teaching. (For more information about this important topic see our RfT about assessment for learning, Raising standards through classroom assessment.

Unlike other educationalists of his day, Vygotsky was convinced that what children can achieve assisted by an adult tells us more about their capacity to learn in the future than tests they tackle in isolation. Vygotsky presented children with tests with and without support. The results, according to Vygotsky, gave widely different indications of what the children's later development might be like, with results from tests administered without support leading to much more conservative expectations of children's educational development.

Vygotsky was impressed by the sometimes dramatic acceleration some children showed in their ability to solve problems in collaboration with an adult. These observations convinced Vygotsky that in the ZPD the child already possessed partly formed skills and schemes. In other words the child already had some capacity for solving more advanced problems that had not yet been used. Vygotsky likened these functions to the 'buds' of development rather than the 'fruits' of development. In the mediation process - a key creative activity - which occurs during the dialogue between child and adult, the child completes these partially complete skills and concepts and is so able to tackle problems she could not deal with prior to the adult intervention. Further teaching raises the level of present development and creates new potentials.

Vygotsky referred to evidence that teaching based solely on concrete reasoning to the exclusion of abstract thinking not only failed to help children with learning disabilities overcome their problems, but also reinforced those problems by accustomising the children only to concrete thinking. (Concrete reasoning occurs for example when children sort objects by shape, colour or some other observable feature.)

What is scaffolding?

To aid mediation many teachers have developed techniques, which they describe as scaffolding, a creative interactive process aimed at moving children through their ZPD in order to complete the partly-formed ideas that lie there. David Leat and his colleagues described scaffolding in these terms:

- using explanations, demonstrations, stories and analogies to make sure that they have an initial purchase on the relevant concepts, skill and language that they need
- building confidence, and valuing and reinforcing what the teacher sees as important in their continued learning (such as listening)
- encouraging mutual support among pupils.

(from 'Thinking Through Geography', see Further Reading)

For an illustration of scaffolding see case study 4.

How do children construct meaning through social learning?

Vygotsky believed that social interaction was essential if children's thinking was to develop:

'We propose that an essential feature of learning is that it creates a zone of proximal development, that is learning awakes a variety of internal development processes that are able to operate only when the child is interacting with people in his environment and in co-operation with his peers. Once these processes are internalised, they become part of the child's independent developmental achievement.'

This CASE example about optimal conditions for the fermentation of sugar using yeast shows how the teacher guides pupils as they construct meaning together:

T: What do you know about yeast?
P1: It's a fungus.
P2: In beer and wine.
P3: In water it bubbles.
(The teacher now selects the third of these random contributions in order to make the discussion more structured, and to develop it more scientifically.)
T: Air bubbles?
P4: Carbon dioxide.....
T: What does yeast need to make gas?
Ps: Water, yeast, sugar.......
P: You need heat as well.
(The teacher now aims to help the pupils construct a reasoning pattern, in this case, control of variables)
T: What are the variables?
P: Water, sugar, heat.
T: Explain.
P: Because if you change them you get more or less gas.

From *Really Raising Standards* by Shayer and Adey (see Further Reading).

Social construction also occurs among pupils in the absence of the teacher as this discussion, in a primary classroom, about dividing a 30cm strip of paper into six equal pieces shows:

Pupil 1: I'm going to fold it.
Pupil 2: I've got an easy way, fold it into three pieces.
Pupil 1: (Starts to fold strip, then stops looking unsure. Watches others in group.)
Pupil 2: It's easy with this ruler. It's split into tens.(Marks off strips at 10 and 30 cm, then in between at 5,15 and 25 cm.) One, two, three, four, five, six, yes!!!
Pupil 1: (Begins to measure in 5 cm intervals.)

(from Raiker, A. (2002), see Further Reading)

For a more detailed example of a social construction activity see case study 1.

Can the same thinking processes be used by pupils in different contexts?

Vygotsky proposed that the development of abstract thinking and other higher order skills forms a unified process, which runs through all subject areas. In common with other developmental psychologists of his day Vygotsky recognised that in the earlier stages of thinking, ie at concrete levels, pupils grasp specific skills, but do not generalise them. Vygotsky believed that because such activities depend entirely on the specific material with which they operate, they cannot be generalised.

This has even been shown to be the case when the applications are quite closely related. For example, Nunes described how street children in Brazil who were used to selling fruit on the streets were presented with three types of problem:

- some were typical of the buying/selling transactions they were used to
- some were similar problems but involved different types of goods
- some were without the problem solving context e.g. 85 + 63 in the abstract.

Success rates declined markedly from 98% to 74% to only 37% across the three sets of questions. Discussing this issue J Freeman (see Further Reading) commented that the children had not understood any fundamental

law of mathematics but were only mastering some techniques that made use of numbers. There was no reflection or insight involved so the children were unable to transfer their techniques to different contexts.

For teachers bridging of thinking from one context to another is a key aim and one that is an explicit feature of all thinking skills approaches. Because the approaches are based in individual subjects such as mathematics, science, and history, however, the intended transfer is within specific subjects areas.

Vygotsky went further than making the suggestion that the same thinking processes could be used by children in different contexts within the same subject. He believed that where teaching and learning involve higher mental functions, such as classifying or using ratios and proportions, it can influence related mental processes in other subject areas. He suggests that children's abstract thinking develops in all lessons, not in separate channels corresponding to different school subjects:

'Because of the foundation which is common to all the higher mental functions, the development of voluntary attention and logical memory, of abstract thinking and scientific imagination occurs as a complex unified process.'

Analysis of gains in attainment in maths and English, as well as science, in which subject the intervention took place, led the CASE project team to suggest that their approach led to transfer of thinking processes not only between contexts but between subjects too.

Where are we now - how can teachers turn Vygotsky's ideas to practical use?

What have we learned from Vygotsky?

Vygotsky's emphasis on the social dimension in pupils' construction of knowledge has led many teachers to pay as much attention to how pupils learn as to what they are learning. Over the past 30 years or so, teachers have tried to draw on Vygotsky's insights in order to arrive at more effective strategies for teaching and learning in schools. The following key points have emerged from the interpretation of Vygotsky's work by educationalists in the West:

- by engaging in discussion children create a 'dialogue' with themselves in which they check and refine their own thinking
- teachers can assist children to move further into their zpd by scaffolding their learning
- teachers can help pupils use appropriate language in order to make their thinking explicit, and thereby make it easier to use the learning strategies in other contexts
- collaboration with their peers and sharing their thinking also helps children reach new knowledge and understanding.

What are the essential features of strategies aimed at improving children's thinking?

Whilst different programmes involve some distinctive features, they have a number of features in common including:

- preparation, in which pupils are made familiar with the task, relevant aspects of previous learning are highlighted and essential vocabulary is emphasised
- setting pupils a cognitive challenge which is within their zpd
- social construction in which children work together to solve the challenge, prompted by the teacher
- metacognition, in which pupils are helped to become aware of their own thinking
- bridging, in which pupils bring the thinking they have acquired to bear on a problem in a new context.

The third and fourth steps are not sequential but interact together, such that metacognition arises from construction and in turn influences it, leading to more developed construction and so on.

During 'social construction' children work together to construct a new understanding of their task and its solution. (An example of how teachers can manage social construction in the classroom is presented in case

study 3). While children are engaged in this task it is important for the teacher to prompt discussion in which all pupils are involved. During this stage the teacher prompts children to say what they are thinking and why they are thinking it, leading to metacognition, or awareness of their own thinking.

Another feature of teacher mediation is to make the pupils' thinking more explicit and to raise their thinking to more abstract levels. This might include, for example, using words like cause, effect, ratio, proportion, compare. In addition, by introducing appropriate vocabulary the teacher can help pupils to generalise and remember their reasoning patterns for later use (bridging and transfer).

An example of bridging occurs when pupils who have been introduced to the idea of variables in the context of the fermentation of sugar successfully apply the idea of variables to photosynthesis in plants. One might conceive of pupils gradually acquiring the ability to apply the variables concept in more and more contexts including those far from science, such as economics, history or literature, thereby achieving transfer. At a higher level of abstraction transferable thinking patterns might include those related to the analysis or synthesis of information or the identification of common features in different situations.

The problem of children's different levels of development

One problem for teachers which was implicit in Vygotsky's thinking and working with small groups but only became explicit in large mixed ability classrooms is that the children may be at very different levels of development. Vygotsky cautioned that:

'We said that in collaboration the child can always do more than he can do independently. We must add the stipulation that he cannot do infinitely more...Our research demonstrates that the child does not solve all unresolved problems with the help of imitation. He advances only up to a certain limit, a limit which differs for different children.'

He went on to advise that whilst teaching at too low a level might result in mental stagnation, if the level was too high it could lead to a repetition of concepts without understanding.

This sets different starting points for the intervention and different upper limits for their ZPDs, which the teacher may have to address by setting different challenges within the same activity. For this reason, it is important that the teacher has some knowledge of pupils' prior development.

What methods did Vygotsky use to collect evidence?

Vygotsky began his work in 1917, in a post-revolutionary Russia beset by a range of social and educational problems left by the upheavals of war and revolution. His approach to developmental psychology was rooted in Marxist principles, particularly the idea that historical changes in society and material life produce changes in human consciousness and behaviour. Vygotsky believed all phenomena were processes in motion and change and had to be studied as such.

Vygotsky provided few methodological details in his work and his findings were often presented as generalisations rather than as empirical data. His main focus was on drawing out from research - 'investigations' is perhaps a better word - material examples with which to illustrate and support his principles. In his view the experiment must provide the maximum opportunity for the learner to engage in a variety of activities that can be observed, not just rigorously controlled, in order to provide information about 'the course of development of process' of higher order thinking in the subject.

The types of thinking activities in which Vygotsky was particularly interested included the ability to classify, make causal links, make logical deductions, etc. Vygotsky regarded experiments as a means of making visible processes that are ordinarily hidden beneath the surface of normal behaviour patterns. Following Vygotsky's early death from tuberculosis, his work was continued by colleagues including A. N. Leontiev and A. R. Luria.

Vygotsky's experimental data are drawn from clinical, special education and early year's settings. His methods for observing changes in the intellectual development of young children, aged three to five, were characterised by a number of features including:

- the introduction of obstacles into the tasks set for subjects so as to disrupt routine methods of problem-solving;
- providing alternative routes to solving a particular problem, including the provision of external aids, for example, to aid memory; and
- setting children tasks that exceeded their knowledge and abilities.

In some experiments Vygotsky provided children of different ages and under different degrees of task difficulty with external aids which they could use to help them solve the problems. By observing the children closely to see what use, if any, they made of the aids, Vygotsky sought to recreate the sequence of changes in intellectual operations associated with children's cognitive development.

In exploring the intellectual development of school age children, Vygotsky believed that dialogue between the educator and child offered the educator the best opportunity to achieve a deep understanding of the process. Of particular value, according to Vygotsky, was the dialogue which occurred when an educator assisted a child to solve problems in their zone of proximal development.

The most highly significant feature of Vygotsky's approach was that at all times he and his co-workers were interested not so much in what children achieved but in how they went about tackling problems.

Implications for practice

Teachers may wish to consider the following implications of the findings of this research:

- Vygotsky emphasised that play helped children experiment with new roles and ideas and stimulated cognitive development. This is well recognised in Early Years contexts - to what extent can teachers of older pupils use role-play or an element of 'fun' to motivate pupils and help their learning?
- Vygotsky believed that effective teaching built on what children already knew or believed. How well do your assessment processes identify your pupils' current skills and prior knowledge (or misconceptions)? How do you seek out pupils' own comments on their work to help you identify the next steps?
- Vygotsky and his colleagues often set children challenging tasks or introduced obstacles for them to overcome and then provided them with support to scaffold their learning. How extensive are the opportunities you provide for pupils to solve problems collaboratively? Would it be helpful to discuss with colleagues how teachers scaffolded the complex pupil tasks in case studies 1 and 4?
- Vygotsky believed that the use of stories and analogy, classifying activities and making cause and effect explicit could develop useful vocabulary and higher order thinking skills that then helped learners transfer their knowledge from one context to another. To what extent do you and your colleagues use these and other strategies to link learning from one context to another?

Head teachers and senior staff may wish to consider the following:

- Vygotsky believed that learning happened best in social contexts and that discussion helped to develop, check and refine thinking. Would it be helpful to explore your own and your colleagues' beliefs about the benefits of pupils working together or individually and to look at evidence from your own school of pupil learning in different contexts?
- Adults, as well as children, find it helpful to learn socially through discussion and problem solving. How can you increase opportunities for teachers in your school to meet to learn collaboratively and actively? To what extent are the principles of effective learning that you use with pupils also applied to adults in the school community?

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Case studies

The case studies have been selected to demonstrate the wide-ranging scope of Vygotsky's ideas

and the creative and practical use teachers are making of them.

Thinking through geography - the Kobe earthquake

This case study illustrates the use of the Vygotskian idea of co-operative learning. The activity - Mind Movies - is a particular form of activity devised by the proponents of the Thinking Skills approach to raising children's cognitive levels. The activity was carried out with several Year 9 classes covering a range of abilities in a north east England secondary school. The activity took place three-quarters of the way through a unit of geography based on Japan. During previous lessons the pupils had studied housing structures in large cities like Tokyo, the physical geography of Japan and they had studied the causes of earthquakes and volcanoes in Year 8.

The initial activity

In the first stages of the lesson the teacher set the scene by preparing the pupils for listening in complete silence to a description of an earthquake in Japan. The teacher explained that the narrative was incomplete and the pupils' task was to work together to construct the remainder of what the teacher described as an eye-witness account. The effectiveness of this part of the lesson depended on the teacher establishing the necessary degree of calm and attentiveness on the part of the pupils. The teacher then directed the pupils to close their eyes and to try to imagine the scene described in the real life account. At this point the teacher read the account and after doing so told the pupils to continue to keep quiet and to imagine the scene in much the same way as letting a film continue to run in their minds for a minute. The teacher reported that the top set remained quiet for well over a minute while the lowest achieving group just reached a minute.

Working together

The co-operative learning phase came next. The teacher placed the pupils in pairs. Each child was allowed two minutes to describe what they had 'seen' to their partner, who took notes. The roles were then reversed. The two pupils then had to discuss their accounts and list:

- a similarity
- a difference
- something they found surprising about their partner's account.

The teacher then worked with the whole class and asked for feedback on the three points. By skilfully managing the discussion, for example, by prompting pupils to comment on or question remarks by other pupils without criticising each other, the teacher helped pupils to construct a co-operative learning environment. The teacher listed comments that met with general agreement among the pupils on the board.

The pupils now worked individually to complete the story in their own way. A pleasing feature of this activity reported by the teacher was the length and quality of the writing, particularly from the lower achieving pupils.

What did pupils think about the activity?

During the debriefing (or discussion) activity that followed the teacher observed that the pupils:

- used previous knowledge to help them understand and complete the activity
- regarded the strategy of 'Mind Movies' as useful for other subjects, especially when they were learning history where they recognised the need to look at things through other peoples' eyes
- believed that the strategy had helped them think imaginatively
- enjoyed the activity and wanted to do a similar activity again.

The teacher made two other observations which seem strange in the context of the exercise and would suggest

the need for further exploration: the pupils did not believe they were doing 'work' and did not consider the strategy useful for revision for exams. It is worth commenting that the pupils' awareness that the activity could be transferred into another context is an example of transfer.

David Leat, Thinking Through Geography.

How young children construct meaning from their sociodramatic play

This case study provides an example of the role that play performs in the early learning of young children, and brings to life some of the essential features of Vygotsky's analysis of play. This study aimed to:

- observe what happened when young children play in the role-play area of a nursery
- provide some insight into how young children construct meaning from their socio-dramatic play.

How did the researcher carry out her work?

The researcher observed children while they were engaged in what she terms 'sociodramatic play' in the role play area of a nursery. To make it possible to conduct a detailed study of not only the children's spoken words, but also their body language in the form of physical movements and hand gestures, the researcher made extensive use of video. She found that it was possible to film the children without disrupting the flow of their play, so deeply were they immersed in their activities. About two days after the play activity the researcher and the children watched the video together, and the researcher interviewed them to find out what the children had to say about their play.

What features of children's sociodramatic play did the research highlight?

From a careful and detailed study of the children's play, the researcher provided evidence for a number of findings, which lend support to Vygotsky's ideas, including:

- children learned from each other and their learning evolved during the course of the play. This learning often lead to greater social competence children abided by rules during their play, communicating the rules implicitly or explicitly to their partners. (The researcher termed this activity 'metaplay')
- involvement in play and the recall of play afterwards conjured up intense emotions in the children. Through the play children became involved in serious issues like death, destruction and despair
- children moved between different layers of reality and imagination during their play, sometimes imitating everyday life while at other times acting out intense personal anxieties in imaginative situations, such as the fear of death or of the dark
- in role play children were observed to exert great self-control in order to facilitate the smooth running of the play scenario
- children incorporate different forms of communication in meaning-making - speech, physical movement and hand gestures.

The researcher concludes that the sociodramatic play increases children's ability to persevere, enhances social skills, raises self-esteem and promotes self-regulation. As Vygotsky and others have done she noted the potential of play to develop in children a 'flexible repertoire of learning skills', which is the foundation for the future growth of higher order thinking. In conclusion, she argues strongly for placing role play high upon the agenda of early years' education, allowing children space and time to fully engage and extend their play in order to maximise the development of both social and cognitive skills.

In reflecting on her experiences during the project, the researcher paints a picture which is distinctly Vygotskian in character:

'The appeal of socio-dramatic play also seems to lie in the dichotomies that can be explored...children reach

beyond the known, expanding their horizons....children can push boundaries, engineer risks, feel the thrill but then retreat during socio-dramatic play. The juxtaposition of being safe or threatened, big or little is present in my study... For young children the potential is vast.'

Karen James, MEd thesis

How can teachers stimulate and manage social construction in the classroom?

The following example drawn from a classroom activity involving Year 1 pupils illustrates the process:

- The activity involved classification and followed other activities which dealt with classifying by colour. The children were given some models of extinct animals consisting of mammoths and dinosaurs. All the dinosaurs were coloured green, as was one of the mammoths.
- The teacher asked the children to separate the animals into two hoops - all the green animals in one and all the mammoths in the other. The six children worked as a group and put all the green animals in one hoop and all the mammoths in the other. Among the green animals they had included the green mammoth despite the fact that it was a mammoth!

T: Do you all agree that is what you have done? (Referring to original instructions.)
P(A): I want that one in the mammoth group. (Points to the green mammoth)
T: Is it all right for the mammoth to be in the green group?

The pupils were divided in their opinions, pupil (B) thought it was all right where it was, pupil (C) agreed adding 'Because it's the same colour.'

The teacher asked pupil (D) to explain why they were stuck. Pupil (D) explained:

P(D): All the mammoths have to go here, and all the green dinosaurs have to go here.
P(E): (Suggested putting a second green mammoth into the mammoth group). So that each group would have a green mammoth.
T: We haven't got another one so what can we do? How can we solve the problem? How can it be part of this and part of this.
After some more discussion.
P(B): It could go in the middle. (Pupils placed green mammoth between the two hoops.)
The teacher asked if it was actually in the hoops, the pupils answered 'No.'
P(B): Put it in both of them!
After more discussion the pupils came up with the idea of overlapping the two hoops.
The teacher asked individual pupils what they thought when they solved the problem.
P(F): I was thinking if I get them together it will be in both of them.
P(A): I was thinking that's in the small groups and the others are in the big groups (indicating the green mammoth in the small intersection of the hoops).

(This example is adapted from one given in chapter 3 of 'Learning Intelligence' with kind permission from the author Grady Vanville and the editors)

Thinking through history - Jews in Germany

This case study illustrates a number of features which contribute to the successful implementation of a thinking skills approach, particularly scaffolding to support pupils' thinking and debriefing to assist the process of metacognition or thinking about thinking. It is taken from 'Thinking Through History' published by Chris Kington publishers, Cambridge. A mixed ability Year 9 class had been studying a unit of work about Hitler's Germany and the teacher had decided to adopt an approach based on 'reading' photographs to explore the treatment of Jews by the regime. The main thrust of the activity was for the children to work

collaboratively using the photographs to help them to construct images about the lives of Jewish and non-Jewish people and to suggest why ordinary people allowed the Holocaust to happen.

How did the teacher use scaffolding to draw pupils into the activity?

The teacher drew on contemporary events such as the Louise Woodward trial in the US at that time, and the publicity surrounding it, to engage pupils in a discussion about how people made up their minds about issues before they had read all the evidence. This prompted pupils to speculate on the ways in which media presentations influenced people as illustrated by comments such as:

'It depends on which television station or newspaper you read, you are given snippets of information and not the whole picture.'

'People are biased because of their nationality or race.'

'People believe what they want to and refuse to look at alternatives.'

As soon as the teacher felt that the pupils had appreciated that photographs provided a selective view of reality she moved them on into the main activity.

What were the pupils' tasks?

The teacher asked pupils to explore the question 'What kind of life would you have had - if you were either a German or a Jew?' The pupils were organised into pairs and then divided into two groups - some pairs looking at things from a non-Jewish perspective, the other pairs examining the issue through the eyes of Jewish people. The teacher provided each pair of pupils with a selection of photographs illustrating features of Jewish and non-Jewish lives in Hitler's Germany, including, for example:

- burning of 'un-German' books
- mass rallies
- youth group activities
- life in the camps
- a smiling Hitler with children.

Working in pairs - a more able pupil paired with a less able one - the pupils discussed the photographs and what they meant, sorting them chronologically, interpreting and creating a history of the people in them. Basing their interpretations of events solely on the selection of photographs before them was a core feature of the activity. Afterwards pairs were joined to make fours with each pair looking at Jewish lives complemented by a pair exploring non-Jewish lives. Each pair then related their interpretation to the other. Finally the teacher steered pupils towards thinking about how ordinary Germans allowed the Holocaust to happen.

How did the teacher use debriefing to help develop metacognition?

In the debriefing part of the lesson the teacher posed a number of searching questions designed to set the pupils reflecting on why and how they came to their decisions. The following extracts from the discussion give a flavour of this part of the lesson:

Pupil 1: But would we really know what life was like for the Jews?
Pupil 2: Of course, you would have seen the Jews being taken away.
Pupil 1: Yes but would we know where they were going? Because from our evidence, Hitler is a really good person who gives us jobs. Would we think he could do anything really bad?.....
Teacher: So then, from the evidence you have Hitler shows up very well, and you do not want to believe the

stories if your life is good. But remember I only gave you a small amount of evidence. Surely people there at the time would have seen the truth in their everyday lives?...

Pupil 1: People had different experiences so it would depend who you were. Some Germans would believe the propaganda and so believe Hitler was a good man winning the war.

Pupils commented that the photographs had helped them understand life in Germany better, that the visual images helped them remember things better and also provided stimuli for their imagination. Pupils seemed to be more able to understand that the combination of the ordinary German's fear and the selected information they were given worked to prevent people from doing anything to help the Jews.

Peter Fisher, Thinking Through History.

'Far transfer' effects in CASE project schools

This study provides information about the transferability of children's thinking processes to other subjects. It summarises the method and findings of the CASE project team's analysis of GCSE results in 1999 in a number of schools who had adopted the CASE approach.

Which data did the CASE team collect and how did they analyse them?

The researchers collected the following data:

- GCSE results (for the 1999 examinations) from 11 schools that had used the CASE approach for these pupils when they were in Year 7
- GCSE results (for 1999) from 14 non-CASE schools
- Performance data from Year 7 pupils at all 25 schools also for 1999.

The researchers adopted a 'value-added' approach and used Piagetian Reasoning Tasks (PRTs) to predict the likely GCSE grades of the Year 7 intake. they used these predicted grades as a baseline against which to compare actual GCSE grades. Although the comparison did not involve the same students, the researchers made the assumption that the ability spread of the intake each year remained relatively constant from year to year, so that the predicted grades would serve as a baseline for any GCSE cohort in that school or schools with a similar intake. They argued that this was justifiable over a large number of schools as in this case.

What did the comparison show?

By comparing the actual GCSE grades with the baseline predictions, the research team found that all the CASE schools had achieved higher than expected grades at GCSE, and so achieved a significant value-added effect. The improvements were averaged out over the 11 CASE schools and in summary they were:

Subject
Mean added value (grades)
Mean added value (% grade C or above)

Science
1.01
+21.0

Mathematics
0.95
+18.8

English
0.90

+20.9

The non-CASE schools GCSE performance in all cases came out very close to the expected values, demonstrating little or no value-addedness, which helped to confirm the reliability of the analytical methods used. The research team argued that as the only systematic difference between the two sets of schools was the CASE intervention itself, the added value must be attributed to the CASE approach.

What was the evidence for transfer and why did it happen?

The researchers highlight the significant gains made by pupils on the GCSE examinations in mathematics and English, which were not the subjects through which the CASE intervention was delivered. In the words of Michael Shayer:

'...although the CA (Cognitive Acceleration) reported was delivered by science teachers in science lessons with activities set in a science context, the students who experienced the activities attained significantly higher grades in English GCSE...'

The author went on to suggest that the most likely reason was that the learning activities had a fundamental effect on the pupils' general ability to learn, which they were able to transfer to all their subjects.

Shayer, M., (2000) GCSE 1999: Added-value from schools adopting the CASE Intervention, Centre for the Advancement of Thinking, King's College, London.
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Further reading

What else might I enjoy reading?
Freeman, J. (2000) Able Underachievers. London: Whurr

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

Watts, D. (2002) Assisting Performance: a case study from a primary science classroom. Cambridge Journal of Education, 32 (2), pp. 165-182.

Raiker, A. (2002). Spoken Language and Mathematics. Cambridge Journal of Education, 32 (1), pp. 45-60.

McGuinness, C. (1999) From Thinking Skills to Thinking Classrooms: A Review and Evaluation Of Approaches Fore Developing Pupils' Thinking. Norwich: HMSO

Shayer, M. and Adey, P. (2002) Learning Intelligence. Buckingham: Open University Press

Adey, P. and Shayer, M. (1994) Really Raising Standards. London: Routledge

Nunes, T., Schliemann, A.D. & Carraher, D.W. (1993) Street Mathematics and School Mathematics. Cambridge: Cambridge University Press

Adhami, M, Johnson, D.C. and Shayer, M. (1998) Thinking Maths: The Programme for Accelerated Learning in Mathematics. Oxford: Heinemann Educational; Books

Leat, D. (1998) Thinking Through Geography. Cambridge: Chris Kington Books

Fisher, P. (2001) Thinking Through History. Cambridge: Chris Kington Books

Higgins, S. (2001) Thinking Through Primary Teaching. Cambridge: Chris Kington Books

Miller, L. (1996) Towards reading: Literacy development in the pre-school years. Buckingham: Open University Press.

James, K. (2002) 'A place to learn': How young children construct meaning from their sociodramatic play. [Ph.D thesis]

Where can I find out more online?

Can thinking skills be taught?
http://www.gla.ac.uk/faculties/education/scre/
Article by Valerie Wilson, Scottish Council for Research in Education (SCRE) Spotlight series.

SAPERE
http://www.sapere.org.uk/
A UK based educational charity offering training in philosophy for children.

Accelerated Learning
http://www.alite.co.uk/

King's College London: Cognitive Acceleration
http://www.kcl.ac.uk/schools/sspp/education/research/projects/cognitive.html

Northumberland LA's Thinking for Learning site
http://ngfl.northumberland.gov.uk/

International Centre for the Enhancement of Learning Potential ICELP)
http://www.icelp.org/asp/main.asp

Robert Fisher's Teaching Thinking site
http://www.teachingthinking.net/

Thinking Together http://www.thinking-together.org.uk/
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Appraisal

Robustness

In the context of the current drive to improve standards and the inclusion of thinking skills in the national strategies the ideas of the Russian developmental psychology Lev Vygotsky are likely to be of interest to both classroom teachers and school leaders.

In the 1920s and 1930s Vygotsky was very influential in Soviet psychology but his work was not taken up in the West until the 1960s, long after his death in 1934. His major contribution to education is his elaboration of the so-called 'zone of proximal development' and the role of the teacher in helping children construct their own learning within a social context. For Vygotsky the object of experimentation was radically different from

traditional practice. Vygotsky was interested less in performance level data than in the methods by which the performance was achieved - what the children are doing and why they are doing it rather than what the children achieved. In his work, detailed descriptions based on careful observation constituted an important component of experimental findings. Whilst he did not give details of numbers of children involved in his studies it is clear from his writings that experimental intervention and observation were conducted in a range of play, school and clinical settings.

Relevance

The work undertaken by Vygotsky and his colleagues provides a powerful foundation for social learning in all phases of education and has come to underpin and inform teaching and learning strategies, which are commonly referred to as 'Thinking Skills'. Vygotsky's concept of the 'zone of proximal development' also offers teachers a powerful pedagogic framework for an analysis of their own teaching and learning and is thus an instrumental component of successful professional development. We believe his work is particularly important because it offers schools the opportunity to look at teacher development and pedagogical change through the same lens - and so think about their own and their pupils' learning coherently thus increasing the potential for making a real difference in the classroom on a consistent basis.

Applicability

Reference to Vygotsky and the 'zone of proximal development' concept can be found in teaching and learning activities in almost all subjects from mathematics to PE, and from pre-school settings to key stage 4 classrooms. Approaches to teaching and learning that incorporate Vygotsky's ideas continue to be developed in major projects in science (Cognitive Acceleration through Science Education - CASE), mathematics (Cognitive Acceleration in Mathematics Education - CAME), geography (Thinking through Geography), history (Thinking through History) and in primary education (Philosophy for Children).

Writing

Vygotsky's *Mind in Society* is an edited version of Vygotsky's original writings, which covered several volumes. The book unavoidably refers to terms and ideas that will be more familiar to psychologists than to teachers. However, by conveniently dividing the book into two parts - 'Basic Theory and Data' and 'Educational Implications' - the editors offer teachers direct access to those features of Vygotsky's work which are closest to their practical needs and interests. Whilst some of Vygotsky's ideas are necessarily detailed, the language dealing with educational implications is, perhaps surprisingly, mainly straightforward and relatively uncomplicated.

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Research tasters: Five activities

Below are five practical research activities that take aspects of the RfT summary as their starting point, which you could try in your classroom, either on your own or with the help of a colleague.

1. How might we extend pupils' thinking through the language we use?
An important implication of Vygotsky's ideas about language is that by encouraging children to use the appropriate language, teachers can reinforce and extend their thinking, as in this example from a primary science classroom:

- Teacher: Who can tell me what a gas is like? This group ought to be able to tell me. What can you do to a gas?
- Pupil: You can push it.
- Teacher: I'd say there's a better word than that isn't there?

- Pupil: Squash it.
- Teacher: Squash it, you can compress it.
- Pupil: You can squeeze it to a certain amount.
- Teacher: Yes you can compress it. Can you compress a solid?
- Pupil: No

Investigating learning in your classroom

You might like to think together with your pupils about which subjects or topics have involved them in learning technical language which has helped them to describe their ideas and thinking. Then you could look for an opportunity coming up soon when you could record your pupils' and your own use of appropriate language so that you can build a detailed picture of the common words for important ideas and any words that seem to help build connections towards the appropriate language.

Next steps

You might like to consider how you could increase the frequency of these kinds of exchanges and improve your handling of them in another lesson. You may also like to work with a colleague to build a bank of technical terms and synonyms that your pupils are likely to use, to help you to be alert to opportunities when you could push your pupils to develop and refine their vocabulary.

2. Learning with others - how might we enhance our pupils' learning through talking with them?
Vygotsky believed that social interaction was essential if children's thinking was to develop. Getting to grips with other people's ideas and skills, especially the ideas and practices of older, more experienced and knowledgeable people and explaining their own ideas, helps pupils test out and refine their thinking. In so doing, pupils gain control over ideas and skills so that they can use them in a range of contexts. In this example, the teacher helps a group of pupils consider the optimal conditions for the fermentation of sugar using yeast.

- Teacher: What do you know about yeast?
- Pupil 1: It's a fungus.
- Pupil 2: In beer and wine.
- Pupil 3: In water it bubbles.

(The teacher now selects the third of these random contributions in order to make the discussion more structured, and to develop it more scientifically.)

- Teacher:: Air bubbles?
- Pupil 4: Carbon dioxide.....
- Teacher:: What does yeast need to make gas?
- Pupils: Water, yeast, sugar.......
- Pupil: You need heat as well.

(The teacher now aims to help the pupils construct a reasoning pattern, in this case, control of variables)

- Teacher:: What are the variables?
- Pupil: Water, sugar, heat.
- Teacher: Can you explain?
- Pupil: Because if you change them you get more or less gas.

Investigating learning in your classroom

You and a colleague might like to explore interactions you both engage in with your pupils. You could tape record a session or ask your colleague to listen in and record some examples. How many of your exchanges were about getting pupils to demonstrate ideas and push them beyond what they know already? Were there any opportunities you missed - perhaps times when you used a more telling style?

Next steps

You might like to set about finding more opportunities where you could build on your pupils' ideas to deepen their thinking. You could plan for this and record another session, or ask a colleague to listen in and note down any interactions in which you asked pupils to explain their ideas and refine their thinking.

3. How can adults accelerate children's development to solve problems?
Watching children solve a problem with an adult's assistance, led Vygotsky to the view that children already have capacity for solving more advanced problems which they have not yet used. He observed how when an adult helped a child with a problem, the child was able to make use of his/her partially completed skills and concepts. Vygotsky was impressed by the sometimes dramatic acceleration some children showed in their ability to solve problems when working with an adult in this way.

Investigating learning in your classroom

You might like to ask a colleague to observe a teaching session you feel confident about and help you unpack examples of the problems you set, the assistance you offered and the resulting effects on learning. Your colleague could record his/her observations using an observation schedule such as:

Child's problem	Your assistance	Child's response	Child's solution to the problem
result	result	result	result

After the session, you could discuss with your colleague the problem solving an adult would deploy and what skills look like in groups of pupils at different stages of development. This should help you to further develop the support you offer your pupils.

Next steps

You might like to consider opportunities for supporting pupils in solving more complex problems. You could identify parts of the curriculum coming up that present opportunities for problem-solving. Perhaps you have resources in school you could use such as Thinking through geography or you could find an aspect you could turn into a treasure hunt or mystery game? (See the case study section for examples of these kinds of activities). You might also plan with your colleague ways you might help the pupils as they set about the task.

4. How might we probe our children's existing knowledge more effectively?
Evidence from clinical studies caused Vygotsky to believe that effective teaching built on what children already knew or believed.

Investigating learning in your classroom

You might like to explore the different ways you identify your pupils' existing knowledge (or misconceptions) through considering the questions you pose and the answers your pupils give. You could record a lesson, or part of it, or ask a colleague to observe you. You could focus on the types of questions you ask (distinguishing between factual questions requiring recall of knowledge and process questions that require pupils to explain their thinking) and the answers your pupils give by recording your observations in a table:

Question	Type of question (factual or process)	Pupil's response
What answer did you get?	Factual	-

How did you work that out?	Process	-
Can you explain why?	Process	-

What do your pupils' contributions tell you about their individual levels of understanding?

Next steps

You might like to work with a colleague on turning your factual questions into process questions so that you probe your pupils' understanding more often and more deeply. You could also work with your colleague to compare pupils' contributions and explanations and plan together how you could use these insights to plan future lessons.

5. How could we go about providing fulfilling and stimulating learning activities?
Vygotsky concluded that play (acting out scenarios, trying things out and learning by doing) not only fulfils pupils' emotional and physical needs, it provides a major stimulus to cognitive development.

Investigating learning in your classroom

Early years teachers are well used to using play to enhance their children's cognitive development, but role play, active learning tasks, experimentation or learning by doing is just as important for older pupils too. You may like to evaluate the stimulus of the various activities you offer in two or three lessons by asking a colleague to focus on a particular pupil. Your colleague could record all the activities in terms of what the pupil was required to do (write, listen, watch, experiment or 'play' etc), their purpose, how they stimulated cognitive development and how they fulfilled the pupil's emotional and physical needs. You and your colleague might like to consider the following questions about the activities on offer:

- Is there a planned highlight for each lesson?
- Are there long sequences of seatwork and/or writing?
- Is there a reasonable degree of variety between active and passive tasks?
- Is there a reasonable degree of variety between pupils working alone, in small groups and as a whole class?
- Are there opportunities for 'play', experimentation or learning by doing or role play?

Next steps

You could discuss the outcomes from this exercise with your colleague and try to work out the reasons for any patterns you identify. If you judge it appropriate, what could you do to make your learning tasks and activities more varied and stimulating?

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CPD leader resource: Diamond 9

Do you want to find out more about how children learn? Are you interested in the importance of play, learning through talking and how teachers can extend children's learning and help them move beyond where they can get on their own?

These activities, based on the work of Lev Vygotsky, can help you and your colleagues explore these issues.

Diamond 9 Activity: What can we learn from Vygotsky?
The Diamond 9 is a workshop tool designed to help people collectively prioritise a long list of issues. It is an excellent way of facilitating conversations between people who rarely meet, enabling them to discuss important issues together.

Why use Diamond 9?

The aim is to produce focussed discussion between people in a relatively short space of time. It is also an effective way of getting everyone to agree a short list of priorities.

Why is it called Diamond 9?

Participants are given a list of issues. They are asked to select nine of the most important items and place them on a large, diamond-shaped grid.

The most important item is usually placed in the top of the diamond. The least important of the nine is placed at the bottom of the diamond. Items in each row are of equal importance. (However, some groups prefer to put the most important card in the centre; either approach is fine, as it's the discussion surrounding the group's decisions that is important.) The diamond shape enables the group to encompass a range of priorities and perspectives.

Purpose of this Diamond 9

To identify and to agree a shared understanding of the key messages from the RfT on Lev Vygotsky, in order to encourage and to support participants to think about evidence about their students' learning by accessing the RfT in a way that is helpful and interesting to them.

Prior knowledge

Essential

- Some outline knowledge of teaching and learning.

Highly desirable

- Some understanding of thinking skills principles, definitions and core terms.
- Some understanding of early years teaching or the value of play.

Using the Diamond 9 with your CPD session

Environment/Organisation

Each group needs:

- a set of the statement cards (see final page for how to generate these)
- an A3 Diamond 9 base (a diamond shaped grid to record their choices)

Timing

- Introduce the game and how to play it 5 minutes
- Colleagues play the game 20 minutes
- Debrief colleagues' choices 10 minutes
- Introduce the RoM; discuss taking learning further 10 minutes

Playing the Diamond 9

Introduce the game and how to play it (5 minutes)

Divide people into groups of 3-5, ideally made up from people who don't normally work closely together.

Set the following question:

'If you could travel back in time, what would be the most important issues that you would choose to discuss with Vygotsky to inform your teaching practice? (Or, for school leaders, the question could end: ... to inform teaching and learning in your school?)'

Give each of the groups a full set of cards and ask them to read them together.
Ask each group to choose the most important issues for them and organise them onto the diamond pattern according to order of importance. (A good way of doing this is by sticking the diamond on the wall so that everyone in the group can see it.) In this case, you'll want to use the cards stuck onto post-it notes

Play the game (about 20 minutes)

If there are more than three groups we suggest that you merge two groups after playing the game, allowing them to explain their choices to each other. Allow the merged groups time to identify a common choice before presenting their selection to the whole group.

Debrief colleagues' choices (about 10 minutes)

Each small group presents their top three choices to the whole group and explains briefly how they arrived at this selection. The facilitator asks each group to explain why they prioritised one item over another.

The whole group now attempts to identify any common choices that most of the smaller groups selected or rejected.

Activities to take learning further

- When you have completed the activity, introduce the RfT 'Vygotsky's ideas on teaching and learning'. Say that all the extracts have been taken from this Research for Teachers summary and explain how to access it on the GTC website.

- Take a few minutes to discuss and agree which of the following activities you wish to use to take your learning further. If you have time, try some of them now.

- Identify the issues that were seen as most important or where there was significant disagreement. Use these 'hot issues' to identify other areas of research that might provide some interesting perspectives and ideas.

- Use the questions in the **Vygotsky treasure hunt** (see PDF attached) to explore the RfT.

- Create a reading or study group from amongst those most interested and invite them to study the RfT on Vygotsky and report back on behalf of the whole group. What advice would they offer colleagues based on their enquiry?

- Construct a light touch audit of thinking skills approaches and practices within the schools represented in the group. How might the RfT be helpful to these colleagues?

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