Guidance

Curriculum and Standards

Pedagogy and Practice: Teaching and Learning in Secondary Schools

Unit 11: Active engagement techniques

Senior leaders, subject leaders and teachers in secondary schools

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Teaching repertoire

department for
education and skills
creating opportunity, releasing potential, achieving excellence

How to use this study guide

This study unit offers some practical strategies that teachers use to engage pupils in learning. The techniques suggested are tried and tested; they draw on both academic research and the experience of practising teachers.

By working through this guide you can build your teaching repertoire step by step, starting with strategies that are easy to implement and moving on to those that will help pupils develop their skills still further. The unit contains 'reflections', to help you reflect on an idea or on your own practice, as well as practical tips and tasks to help you consider advice or try out strategies in your classroom. There are case studies to exemplify particular points, a summary of the research and some suggestions for 'next steps' and further reading. The final page invites you to reflect on the material and to set your personal targets for the future.

You can work through this unit in a number of ways:

- Start small; choose one class to work with. Ask another teacher to help by talking through what you intend to do and to act as a mentor.
- Work with another teacher or group of teachers who teach the same class. Work together on developing your approach to active engagement techniques. After three weeks compare notes. Discuss which strategies are the most effective and why.
- Find someone to pair up with and team-teach. Design the tasks together and divide the role of teacher in the lesson between you.
- Work with a small group of teacher-researchers within your school. Use the guide to help you focus your work as a professional learning community.
- Identify sections of the unit that are particularly relevant to you and focus on those.

There is space in this study guide for you to write notes and responses to some of the questions, but you may also find it helpful to keep a notebook handy. For some tasks, you might want to make an audio recording or video of yourself in action so you can review your work more easily. You could add this, along with any other notes and planning that you do as part of your work on this unit, to your CPD portfolio.

The evidence of work you gather in your portfolio could count as points towards accreditation of an MA, or could support your application for membership of a professional body, such as the General Teaching Council of England (GTCE). It could also be used to support an application to reach threshold or Advanced Skills Teacher status.

You will need access to video sequence 11, Active engagement techniques, when working through this unit.

Active engagement techniques

Contents

Introduction

Active engagement

People learn best when they are interested, involved and appropriately challenged by their work – when they are engaged with their learning.

Engagement is about promoting those approaches to teaching and learning that help pupils understand subject knowledge and its application and that demand their active participation.

Where pupils are actively engaged in their learning, they:

- have a longer concentration span;
- complete work on time;
- stay on-task and have few behaviour problems;
- maintain a good attendance record.

Consequently, they:

- develop higher self-esteem;
- make faster progress;
- develop a belief in their ability to improve and learn;
- encourage and work well with other pupils.

Common issues

The engagement of pupils in Key Stage 3 is a critical issue in progression. Where engagement declines, often in Year 7, there are short-term and long-term implications.

The short-term implications are:

- lower attainment in Key Stage 3;
- limited or wrong choices for Key Stage 4 subjects and GCSE;
- limited attainment at GCSE (and Key Stage 5).

Longer-term implications are:

- limited job choices;
- lack of flexibility in the workplace;
- increased likelihood of criminal conviction and prison sentences.

Resolving the issues

What can you do to ensure that pupils are engaged in their learning?

Pupils are more likely to engage in their learning when the teacher provides opportunities for them to:

- be clear about the purpose and relevance of their work;
- relate new knowledge and experiences provided during lessons to something they already understand;
- experience some variety in the way information is presented during lessons;
- experience activities that generate curiosity and interest;
- ask questions and try out ideas;
- see what they have achieved and how they have made progress;
- understand how they are thinking and learning;
- get a feeling of satisfaction and enjoyment from their work;
- build positive images of themselves as learners.

1 Aspects of engagement

When we speak of pupils being engaged, we usually mean that they appear interested, work hard and behave well. These are the surface signs of very important mental processes. However, there is a danger that pupils will be encouraged simply to work hard and behave well, but miss out on important processes that generate understanding. It is vital to realise that physical activity, such as performing a science experiment or drawing a poster, is not the same as mental effort or engagement. Conversely, good teacher explanations, with appropriate examples and structuring, will produce mental engagement and understanding.

Understanding is a primary goal of education. Understanding is best thought of as having a representation or model in the mind that corresponds to the situation or phenomenon being encountered. Engagement is about helping pupils to develop these mental models; it is through such structures that they *construct* understanding.

Pupil engagement depends on two complementary conditions, both of which rely on the skills of the teacher:

- the provision of an appropriate climate which enables pupils to take full advantage of the knowledge and experiences being presented to them;
- the use of a variety of strategies and approaches that allow pupils to construct their own learning.

Pupils are more likely to be engaged in their learning when the teacher provides opportunities for them to construct solutions, learning or answers that they can back up with plausible reasons. The notion of constructing solutions is an important one and it may be helpful to expand it a little.

Many activities do not require pupils to construct answers, for example comprehension exercises in which they read a passage and have to answer questions but do not need to process the text. In a simple example, pupils might read some text and then be asked the question: 'Where did Harold position his troops at the Battle of Hastings?' Pupils will answer 'He positioned his troops at the top of a hill' because that is exactly what is written in the text. However, unless there are supplementary questions, the pupils will gain no understanding of why the troops were placed there. You can test your ability to process text without understanding by looking at the following sentence:

> The Glombots, who looked durly and lurkish, were fond of wooning, which they usually did in the grebble.

You, and pupils, could answer questions such as 'What did the Glombots look like?', 'What were they fond of doing?' and 'Where did they like to do it?' without any need to engage actively with the text.

Task 1

Engaging with the research **15 minutes**

Constructing learning has a sound basis in accepted theory. Read the overview of constructivist theory in the summary of research on pages 20–21.

Think about some recent lessons you have taught. To what extent did these lessons give the pupils an active role in constructing their learning? Having considered the research and the information in this unit so far, can you think of other activities you could usefully have included?

To effect engagement, teachers not only have to provide pupils with the opportunity to construct their learning, they also have to draw on other aspects of their skills, in particular:

- the effective use of modelling, questioning and explaining (these issues are addressed in units 6, 7 and 8 respectively);
- providing opportunities for collaborative learning and thinking together (these issues are addressed in unit 10);
- structuring learning carefully to maintain the focus on the learning objectives and to help pupils process new ideas, identify patterns, apply knowledge independently and reflect on their learning (structuring learning is addressed in unit 1 and unit 2).

This unit focuses on the way the teacher:

- designs, organises and sets tasks;
- deploys strategies for active learning;
- provides support and intervention to ensure pupils make good progress.

2 Creating engagement

Principles for creating engagement

Activating prior knowledge

Learning is an active process of constructing knowledge and developing understanding. To aid this process, pupils make meaning by connecting new knowledge and concepts to ideas and knowledge they already possess. It is important, therefore, that teachers help pupils use what they already know to make sense of new knowledge. This can be done through looking at or handling objects, telling stories, drawing concept maps, referring to pupils' experiences or getting pupils to imagine particular scenes. An advantage of this approach is that pupils' misunderstandings are often revealed and so corrected.

Challenge

Challenge is about setting high expectations and then teaching to them so pupils surpass previous levels of achievement. Where learning is insufficiently challenging, pupils can lack stimulation and interest so their level of involvement quickly declines. This is true for all levels of ability. One way teachers create the appropriate level of challenge is by providing learning opportunities which are pitched to avoid, on the one hand, boring repetitive work and, on the other, tasks that are totally beyond pupils' capability. Pupils with special educational needs, in particular, are sometimes provided with very low-level tasks that lack the appropriate stimulation and challenge. Being given the chance to strive to solve challenging problems and think through issues leads to cognitive development and higher achievement for all pupils.

Cooperative group work

When pupils work together on a common task they interpret given information, ask questions for clarification, speculate and give reasons. They share their knowledge, ideas and perspectives and arrive at a fuller understanding than they might have done working alone. When pupils work in this way, it exemplifies Vygotsky's 'zone of proximal development', where the assistance of peers helps the development of thought in the individual. The process of cooperative work has been described as 'talking oneself into understanding'. (Further information about group work can be found in unit 10.)

Metacognition

Metacognition is thinking about thinking. The ability to stand back from a difficult task to consider how it should be done, to monitor one's progress and priorities and to reflect on successes and weaknesses is critical in becoming a successful learner. Teachers need to give pupils opportunities to plan, monitor and reflect on their work so that they can engage with learning as a process. This is typically done by asking pupils to consider how they will tackle a task or problem or by getting them to reflect on how they have done a task (see unit 2).

Modes of representing information

The brain is forced to work hard when it has to convert information from one mode to another. This could be, for example, from text to diagrammatic form or from visual representation, such as film, to music (as in writing a score to accompany some silent film footage). Such work is demanding because the individual is being forced to think about and make sense of the original information. The same degree of mental work can also be required when transforming information within the same medium, for example by summarising a text (see also unit 19).

Scaffolds

Scaffolds are structures that guide and support thinking. Complex tasks such as problem solving and extended writing make great demands on the novice. There are too many things to do at once. Scaffolds help by focusing attention on one thing at a time and providing a prompt, thus reducing the demands on the pupil's working memory. The pupil can then move on to the next part of the complex task. The intention is always that the support is temporary and that the pupil will progress to working independently over time (see also unit 14).

Deep and surface learning

Some pupils become good, motivated learners; others don't – and many pupils behave differently in different subjects and with different teachers. These differences arise partly from what the learner brings *to* the classroom (in intelligence, background, prior knowledge, attitudes, skills and interests). They are also the result of what the learner experiences *in* the classroom. 'Deep' and 'surface' approaches to learning describe the extremes of learning experience. Deep learning is the consequence of teachers using strategies which accord with the principles of engagement described above (see unit 1).

Pupils are engaged in deep learning when:

- they are trying to understand and make sense of material;
- they are relating ideas and information to previous knowledge and experience;
- they are not accepting new information uncritically;
- they are using organising principles to integrate ideas;
- they are relating evidence to conclusions;
- they are examining the logic of arguments.

When pupils are merely reproducing or memorising given facts and information; accepting ideas and information passively; not being required to look for principles or patterns or to reflect on goals and progress – then they are only engaged in surface learning. The role of the teacher is crucial in engaging pupils in constructive, deep learning.

Task 2 Working with the video 1 — 30 minutes

The grid below contains an analysis of the lesson shown in video sequence 11a. It identifies the key elements of the lesson:

- the techniques consciously planned into the lesson by the history teacher;
- the teaching skills he employs to ensure that the strategies lead to learning gains for his pupils.

Read through the analysis in the grid below and then watch the video clip. Tick off the strategies in the left-hand column as you recognise them.

Technique	Teaching skill	Learning gains
Visual starter Pupils are asked to generate questions about the mystery object shown and to offer ideas about what it might be.	Setting a challenge Creating a two-part task for those who go beyond generating questions Creating a positive climate, accepting all ideas, linking ideas to learning focus	Involves all pupils individually Activates prior learning Encourages speculation Creates an investment in the learning Motivates pupils to make links and connections
Sharing learning objectives Key questions are used as a means of sharing objectives. Key words are displayed for reference throughout the lesson.	Clarifying the area of learning in language that pupils understand Linking the objectives to key words Using questioning to ensure shared understanding before moving on	Actively engages pupils in pursuit of the answers Provides a measure of success Defines learning outcomes, i.e. pupils should be able to answer the questions at the end of the lesson Focuses learning

Task continues

Simulation The trade triangle is simulated by asking pupils to move around the room to designated points as if they were products.	Creating an assessment opportunity; the teacher can see who has understood, but pupils are supported because they can confer with those who have not been given cards	Challenges selected pupils to demonstrate their understanding Creates new links and connections through physical re-creation of an abstract concept (trade triangle)
Sequencing Pupils are asked to sequence a series of pictures related to the slave trade – with or without using captions as directed by the teacher.	Careful planning of the task; the teacher knows both the benefits and limitations of the task (it is 'basic'); he plans for differentiation and challenge Intervention using questioning to extend thinking	Begins to link one sequence of causation with another (the trade triangle with the capturing of slaves)
Focused video sequence Pupils are asked to look for new pieces of information and note them on blank caption cards.	Using the video to build on the sequencing task; taking pupils beyond the 'basic' to the more complex	Develops a more complex model (the sequence of causation related to capturing and trading of slaves) Develops a personal relationship to the area of learning; increases interest and motivation
Final plenary* Pupils are asked to present an aspect of their learning to the whole class using the OHP. Learning is summarised and linked back to the key questions.	Creating an assessment opportunity biased consciously towards those who are orally confident Sharing learning gains	Consolidates learning Pupils share understanding Pupils gain confidence in expressing ideas Pupils see what they have learned

**Note*: This teacher uses mini-plenaries throughout the lesson for a number of purposes. The pace and length of these vary according to purpose. However, each contributes to making overall links and connections and to consolidation and extension, leading to the next stage in the learning.

Task 3

Working with the video 2 — 30 minutes

Now watch video sequence 11a again. This time focus on the third column and the learning gains being made by the pupils as an outcome of the techniques and the teaching skills being employed.

Underline the learning gains as you identify them in the video. It is a good idea to pause the tape as you watch, to give yourself thinking time.

3 Developing engagement

The teacher in video sequence 11a has a clear understanding of the key principles that underlie the practice of developing active participation. He understands that teaching which has high expectations of pupils and which promotes their active participation is likely to engage them with their learning. He also demonstrates the paramount importance of creating the right climate and environment for active learning.

The following principles and ideas can help you to continue developing this active participation in your own lessons:

Develop good teacher–pupil relationships: This is the most important factor in the classroom climate. A good relationship is created when:

- the teacher creates a warm, supportive environment;
- pupil opinions are solicited, valued and respected;
- wrong answers are greeted with positive probing of the thinking processes that led to the response;
- the teacher shows enthusiasm for the subject and the strategies being used;
- the teacher has high expectations and lets pupils know this, avoiding stereotypical reactions (e.g. 'What do you expect with our kids?').

Attend to the physical environment: Pleasant classrooms and colourful displays of pupils' work show that the teacher cares and that pupils' work is valued.

Establish clear routines and ground rules: These enable pupils to become engaged in their learning.

In the video, pupils used a number of different learning strategies. Providing such a range means that individuals have the opportunity to work in a variety of learning styles and to engage in different ways of processing information and of constructing and deepening knowledge. Not every lesson has to be structured in this way, but over time – say across a unit of work – you can offer this kind of variety. Sections 4 to 7 offer some specific strategies for developing engagement.

4 Directed activities related to text (DARTs)

Reading is a complex, active process in which readers use past experience and present skills to construct meaning. One of the most common reasons for lack of engagement in the classroom is the difficulty experienced by many pupils in working with texts. This is clearly most pronounced in classrooms where a high proportion of the pupils needs support with literacy. However, strategies for focusing on the structure and meaning of different texts are applicable to all pupils.

Directed activities related to text (DARTs) are a range of strategies for processing texts developed by Lunzer and Gardner in the 1970s and 1980s. DARTs encourage pupils to read a text carefully, to go beyond literal comprehension and to think about what they read. ('Text' can be interpreted broadly and includes, for example, visual texts such as pictures, diagrams and graphs.)

Advantages of DARTs

- They are engaging and encourage teachers and pupils to tackle difficult texts.
- DARTs are popular with pupils because they seem a bit like games or puzzles.
- They do not require definitive answers, thus enabling pupils to be tentative and exploratory.
- They offer a good focus for group work.
- Some initiative is handed over to the pupils.

Categories of DARTs

DARTs can be grouped into two main categories.

Directed Activities Related to Text (DARTs): a summary	
Reconstruction activities use modified text	**Analysis activities** use straight text
Pupil tasks: completion-type activities with deleted or segmented text	Pupil tasks: text marking and labelling or recording
1 Text completion Pupils predict deleted words (cloze), sentences or phrases	**1 Underlining or highlighting** Pupils search for specific target words or phrases that relate to one aspect of content, e.g. words that support a particular view
2 Diagram completion Pupils predict deleted labels on diagrams using text and other diagrams as sources	**2 Labelling** Pupils label segments of text, which deal with different aspects, e.g. labelling a scientific account with labels provided by the teacher, such as prediction, evidence, conclusion
3 Table completion Pupils complete deleted parts using table categories and text as sources of reference	**3 Segmenting** Pupils segment paragraphs or text into information units or label segments of text
4 Completion activities with disordered text **a** Predicting logical order for sequence **b** Classifying segments according to categories given by the teacher	**4 Diagrammatic representation** Pupils construct diagrams from text, e.g. flow diagrams, concept maps, labelled drawings or models
5 Prediction Pupils predict the next part(s) of text with segments presented in sequence	**5 Tabular representation** Pupils extract information from a written text, then construct and represent it in tabular form

Adaptation from *Reading for learning in the sciences*. Davies, Florence, Green and Terry, (1984). Oliver and Boyd. ISBN: 0050037684.

Pointers for planning DARTs

- Time is required to train pupils to talk constructively in pairs and groups, if it is new to them. There is more on developing the necessary social skills in unit 10, section 5.
- If you laminate resources such as sequencing strips, they can be used again.
- Learning may be implicit. Teachers need to plan to draw out the learning and relate it to subject-specific objectives.

Practical tips

DARTs are most effective when:

- worked on in pairs or small groups;
- speaking and listening is the main activity, because the discussion of possibilities leads to closer examination of the text and develops engagement and understanding.

Care must be taken:

- not to overuse DARTs – they can then become counterproductive;
- to make sure that texts, although challenging, are also accessible.

Case study 1

This case study shows how a number of different DARTs can be planned to support pupils' understanding of the text. The one you use will be determined by the learning objectives, the pupils and the context. All refer to the text in appendix 1.

Example 1: text marking (analysis)

If your learning objective was to develop pupils' understanding of the processes affecting ripening, you might ask pupils to work in pairs and provide each pair with a copy of the text. You could ask them first to skim-read the article, then to highlight in pink those things that happen as the apple ripens, and highlight in yellow ways of preventing ripening. Following this you might ask them to complete a table under the following headings.

How to slow ripening	What process does it stop?

Example 2: table completion (analysis)

If your objective was to develop an understanding of cells and storage of fruit, you might ask pupils to work in small groups, to skim-read the text and then to find reasons for the statements in the left-hand column.

Statement		Explanation
Apples are imported from other countries, such as New Zealand	because	
When you bite into a ripe apple it is sweet and juicy	because	
The apple store is cooled	because	
Levels of oxygen are decreased	because	
You cannot use freezing as a method to store apples	because	

Example 3: sequencing activity (restructuring)

If your learning objective was to consider what affects cell respiration and how to construct a logical argument, you might ask pupils to work in pairs, provide each pair with a fragmented paragraph on cards and ask them to reformulate the paragraph.

Once picked the apple will continue to ripen, so this process needs slowing down.	An apple is living, and each of its cells continues to respire.
This means that they continue to absorb oxygen from the air and emit carbon dioxide.	As each cell respires, some of the stored food is converted to energy.
The apple also emits a gas called ethylene that helps ripen the fruit.	Controlling the atmosphere in the store can slow the respiration rate down in the apple cells.
A slowly turning fan can keep the air circulating and blow away the ethylene as it is formed.	If you decrease the level of oxygen and increase the level of carbon dioxide, then the cell respiration slows.
Some varieties of apple will tolerate high levels of carbon dioxide in the atmosphere.	The Cox, for instance, will tolerate 9% of carbon dioxide.

Table continues

These varieties can be stored for longer.	Apples such as the Worcester will tolerate less so cannot be stored for long periods.
The apple store is also cooled.	This makes sure that any chemical reactions such as respiration will take place at a slower rate than normal.

Task 4

Classroom assignment: text restructuring — 1 hour

Create your own text-restructuring grid. It can be designed as a general-purpose tool that will support many different learning objectives. You could choose one of the following:

- a compare-and-contrast grid that requires pupils to look for similarities and differences. The text selected for use with the grid can be visual (e.g. two painted portraits with subjects in a similar pose but in different artistic styles) or written (e.g. two news reports dealing with the same event but from two different newspapers, one broadsheet and one tabloid);
- a cause-and-effect grid that requires pupils to highlight or underline key events which are then sorted under the headings *cause* and *effect*. Allow for ambiguity: some events might be categorised as both! Narrative texts or recount texts are best for this kind of activity.

Plan the use of your grid into a lesson where the activity is appropriate to the learning objectives. Make a note of how pupils responded to the task.

Which principles of engagement (see pages 4–6) underpin this approach to increasing engagement?

There is a more extended account of the use of DARTs in module 5 of the Key Stage 3 *Literacy across the curriculum* training materials.

5 Thinking skills

Raising standards requires that attention is directed not only to *what* pupils learn but also to *how* they learn – and what teachers do to influence this. Thinking-skills activities are concerned with the process of learning – in other words, pupils learn how to learn. The National Curriculum defines five categories of thinking skills: information processing, reasoning, enquiry, creative thinking and evaluation. Teaching thinking means addressing how pupils think and learn, and consciously sharing that understanding with them. Teachers can encourage pupils' development as learners by giving them tasks that really make them think.

Lessons that are effective in developing thinking skills have the following characteristics.

- Pupils are given open and challenging tasks that make them think hard.
- Pupils are encouraged to use what they already know so that new learning is built on existing knowledge structures.
- Opportunities are offered to work in collaborative groups where high-quality talk helps pupils to explore and solve problems.
- Pupils are encouraged to talk about how tasks have been done. This gives them the opportunity to gain insights into how they have learned and helps them to plan their future learning.
- There are learning outcomes at different levels. Some relate to the subject content but others relate to how learning can be used in other contexts. The aim is for pupils to be able to apply these strategies independently.

Using thinking-skills strategies

There are a number of thinking-skills strategies that you can use in the course of your subject teaching.

Classification

Sorting cards with words, short pieces of text, photographs or diagrams uses the basic skill of classification. Pupils have to sort the pieces of information into groups with similar characteristics. They have to justify their groupings and explain them to others and thus the groupings are collectively refined and improved. The categories are likely to be remembered because they are meaningful to the pupils who developed them. Classification is a stage in the inductive teaching model (see unit 2).

Case study 2

A modern foreign languages teacher gave her pupils a text that described a family's pets. The pupils worked in groups to identify and underline all the adjectives. They then classified those adjectives in any way they chose, writing them in lists and giving each list a heading that described what the items had in common.

There were several ways of doing this, for example by the position of the adjective in relation to the noun, by agreement with the noun, or by meaning. Pupils had to explain to the class the reasons for their groupings and work out rules about French adjectives.

Practical tips

It is essential that you do not interfere with or interrupt groups whilst they are doing the sorting unless it is absolutely necessary. They need to struggle in order to construct the learning. You may feel you ought to be helping, but this can easily stop pupils thinking for themselves. It is more useful for you to listen to the discussions in order to pick up information that can be used during the feedback session. Only if groups are completely stuck or have digressed should you ask one or two questions to help get them started again.

It is also essential that you accept different ways of grouping as long as they are justified. You should praise pupils' thinking, even if you have a different classification in mind as the final outcome. The important thing is the process. Also, pupils will be engaged if their efforts are acknowledged. Repeated success will help to move pupils towards independence.

Reflection

Another type of classification activity would be to sort a collection of pictures – for example, sorting postcards in geography could lead into notions of physical, human and environmental geography. The key is to present words or pictures which could be classified in a number of different ways so that pupils are faced with making decisions and justifying their classification. This requires inductive reasoning.

Think of an area in your subject where you could use a classification activity.

Odd-one-out

This is a popular and useful activity as it can be used as a lesson starter or as the basis of a full lesson, depending on the objectives being pursued. It is a technique relevant to almost every subject. Important words in a topic are put into groups of four and pupils have to select the 'odd-one-out', justifying their choice. Ambiguous sets of words are useful to show that there may be more than one answer and may lead to pupils using higher-order thinking skills as they reason and argue. Subject objectives are achieved as pupils develop their familiarity with and understanding of the important words and concepts in a topic. This technique is developed further in the concept attainment teaching model (unit 2).

Maps from memory

Subjects such as art and design and technology rely heavily on visual literacy, and thinking-skills activities can help with this. In this activity, pupils work in groups of three or four. Group members take turns to visit the teacher's desk to observe a map, picture or diagram for 10 seconds, with no pencil or paper for recording. They return to their group and draw or write what they can remember, adding to what previous group members have seen. Give groups time to plan their strategies before starting and give them further time to review their strategies as the activity progresses. As they plan, check and cooperate in developing the best strategies, groups become involved and really enjoy the challenge. Maps from memory also helps pupils develop insights into part–whole relationships.

Case study 3

A head of PE had a bottom-set Year 10 GCSE group in a school with a low-ability intake. He knew from experience that as soon as theory work started, the pupils would not be engaged. He decided to begin teaching the bones of the body by doing a maps-from-memory activity, using a poster of a skeleton with the bones labelled. He reported that the pupils became very motivated and asked to do it again. They also used the difficult vocabulary successfully. In the debriefing session, the pupils were able to discuss the strategies they had used and were willing to think about how they might improve, both personally and as a group, next time they had to deal with a diagram.

Practical tips

Ensure that pupils think about how they are going to collect information before they see the map or diagram. They may then have to change the strategy as they progress.

It is important that they talk explicitly about where they did well and how they could improve. You should ask them to explain their strategies for completing the task and to consider how they could improve another time. (Pupils can find debriefing difficult, and it may help if you model it the first time round.) It is also a good idea to ask them in which other subjects they could use this strategy so that their improved visual literacy transfers to all their learning.

Task 5

Identify maps-from-memory stimuli — 20 minutes

For each year group in Key Stage 3 and Key Stage 4, identify a map, diagram or plan in your subject which would benefit from being taught in this way.

Mysteries

Pupils are posed one big, open question. Information or data are provided on small pieces of card which pupils can move round on the table as they develop, shape and evaluate ideas to answer the big question.

Case study 4

A design and technology teacher introduced a unit of work on structures for Year 9 with a mystery and the big question: 'Why did the Tay Bridge collapse?' Groups of pupils were given 36 pieces of information about the train crash and how the bridge had been built. They were asked to do a first sort, then reject about 10 cards that they thought were not relevant. With the big question firmly in mind, they then sorted the information again to arrive at an answer. Using pictures of the bridge and words from the cards, each group constructed a poster that explained their answer to the big question. Each group used their poster to inform the rest of the class of their reasoning.

You can find more detailed information in unit 16 Leading in learning.

Task 6

Classroom assignment: using thinking-skills strategies **30 minutes**

Plan (and then teach) a lesson in which you try one of the thinking-skills strategies outlined above.

6 Drama activities

Drama is a specific discipline and a powerful tool for thinking together and learning across the curriculum. Through drama, pupils can explore a wide range of issues, situations, information and texts, developing insights and understanding in an active and interactive way. Drama is particularly helpful in engaging the interest of boys.

The following techniques can all be used to support, draw out and deepen learning.

A supportive and creative environment using a variety of stimuli relevant to the unit of work: Stimuli can include drawings, props, costumes, photographs, text extracts from novels, plays, poems, letters, newspaper articles, travel writing, diaries, autobiographies, television or radio.

Effective use of questions: What is happening? Who is involved? Where and when is it happening? Why is it happening? What has happened to bring this about? What do you think is going to happen next? How might the character be feeling? Why might he/she be feeling this way?

Speculative language: What would you do if …? What other alternatives are there? What could he/she be thinking/feeling? Is it possible that …? Where might this be / lead to? What other options or possibilities are there?

Each of the following activities needs to be modelled by the teacher before being tried out by pupils working collaboratively. Pupils need to be given frequent opportunities to reflect on, evaluate and explain their work. Ensure that appropriate conventions and guidelines are established to prevent improvisations from becoming unfocused.

Improvisation using written or non-written stimuli: Pupils are given a stimulus or a set of stimuli. They improvise the situation suggested by the stimulus and also show how it would develop. This is the easiest type of activity to lose control of, so tasks need to be sharply defined, with a clear outcome and structured within tight time frames.

Freeze-frame/tableau: Pupils select a key moment, theme or idea and create a group sculpture to represent it. This can be used for reflection by other groups or can lead into a thought-tapping activity.

Thought tapping: While in role, pupils speak aloud private thoughts, feelings and reactions. The teacher freezes an improvisation or scripted piece and activates an individual's thoughts by tapping them lightly on the shoulder.

Mime: Pupils show or interpret a key moment, theme or idea using exaggerated gesture and facial expression but no speech.

Hot-seating: One pupil takes on the role of a particular person or character (usually, but not necessarily, from a text, e.g. a historical figure). Other pupils plan and ask questions while the pupil responds in role.

Alter ego: Groups act as 'thoughts in the head' and offer advice to a character at a critical moment.

Forum theatre: One group acts out a scene or situation in front of the others, who surround them in a circle. Those watching in the circle are able to stop the action and make suggestions for improvement, possibly by demonstration, before the action proceeds.

Pupil in role / teacher in role: A pupil or the teacher takes on a role in a given context to explore the tensions within a particular dilemma.

Make use of the drama department if your school has one. Drama teachers are familiar with the strategies outlined above and can provide valuable INSET sessions for staff.

Task 7

Classroom assignment: teacher in role — 1 hour

'Teacher in role' is a versatile cross-curricular strategy. For example, you could take on the persona of a member of the council chairing a meeting with residents opposing the construction of a new airport. You could be a figure from history. You could be a character from literature (any genre). You could be a scientist defending the use of animals for experimentation.

Design a teacher-in-role activity. If this is your first attempt, keep it simple. You should split the task over two lessons, giving time for planning and preparation in one lesson and running the role-play in another. It is a good idea to practise responses to the questions you know you will be asked.

The most challenging aspect of this approach is moving in and out of role to intervene and guide. You must establish guidelines for this before you begin. You could even practise it like a game at first, so pupils learn when to stop in order to listen to you as teacher. Putting your hand up can work well.

7 Writing tasks

When pupils are well prepared for writing tasks, even the most reluctant writer can produce a focused and well-structured piece that is engaging and stimulating to read.

For this to happen they need to be supported throughout the writing process; the following strategies can help.

Purposeful context: You can create purposeful contexts for pupils' writing by:

- establishing both the purpose and audience for the writing;
- ensuring that the writers have something to say;
- providing a model of the text type;
- giving writers opportunities to develop, sharpen and revise ideas;
- encouraging collaboration during planning, drafting and proofreading;
- giving pupils access to reference materials to support writing, for example word banks, dictionaries and thesauri;
- providing feedback on strengths and ways to improve, both during and after the writing.

Visual support: In the early stages of writing, provide visual support. This can be in the form of visual stimuli (such as film, video, photos and computer images) to present information. Then use visual strategies (such as spider diagrams, flow charts, tables, lists, grids, Venn diagrams and for-and-against columns) for generating, sorting and sequencing ideas. Writers can also be encouraged to visualise their writing as a mental image or as a sequence of still pictures. After visualising they can be asked to tell a partner what they saw, which helps put the images into words.

You could also ask pupils to draw their ideas before they start writing. Drawing helps pupils to explore concepts, patterns and structures (including narrative). Typically, writers are asked to illustrate their writing after they have finished, but there is often more value in using it to enable the writer to explore what they are going to write.

Collaborative writing: This is a powerful strategy because the act of speaking facilitates composition. Often we are not clear about what to think and write until we hear ourselves say it. Discussing writing in pairs and small groups prompts oral drafting as pupils suggest, modify, confirm, justify, improve and refine their ideas together. Interacting with others stimulates our own powers of expression. The kind of thinking that we would want to be going on in an individual writer's head is what can go on in a discussion as pupils compose together.

Writing frames: When tackling complex extended writing tasks, pupils can be provided with writing frames that scaffold the process. Writing frames were originally disseminated by the Exeter Extending Literacy Project (EXEL) and are a means of supporting pupils in undertaking a wide variety of non-narrative and non-fiction writing tasks. In essence, teachers are encouraged explicitly to teach the writing genres they require pupils to use. The objective is to assist pupils in developing independence when organising their writing across a range of tasks and genres. Once independence has been achieved, writing frames can be discarded.

The frames take a variety of forms, but commonly comprise a set of sentence stems which pupils complete, and around which they may shape a piece of discursive or informative writing, or develop a line of argument.

An example of a writing frame is given in the case study below. Before you ask pupils to use a writing frame, it is important to explain it properly and model its use.

Case study 5

At the end of a unit on the slave trade taught to a Year 9 class, a history teacher wanted to use the Durban Conference on Racism, which took place in 2001, as a context for a text-restructuring activity. The end product was to be a debate on the question: Should the British government pay reparations to Africa for the ongoing effects of the exploitation of its natural resources that began with the slave trade?

He planned the activity as follows.

Step 1: Share the learning objective of the lesson using the key question: Should the British government pay reparations to Africa for the ongoing effects of the exploitation of its natural resources that began with the slave trade? At this point, explain the key phrases and the homework task.

Step 2: Explain the concept of reparations using the Durban conference as the context from which examples and illustrations can be drawn.

Step 3: Provide the text-restructuring grid (below) for pupils to use when analysing the historical sources provided.

Step 4: After they have looked at the sources, give pupils a fixed time to prepare their contribution to the debate. Explain the format for the debate, including guidelines for participation.

Step 5: The whole class, including those who present arguments, take a vote. In the plenary ask pupils to explain why they voted as they did, selecting the pieces of evidence that carried the most weight for them.

Source	**Conclusion drawn from the source (proves Britain was responsible or not)**	**Explanation of how the source supports the conclusion drawn**
1		
2		
3		
Overall conclusion		

Task 8

Classroom assignment: using a writing frame **1 hour**

With another teacher, devise a writing frame for a particular lesson that you can both use with your classes, if possible. You could adapt examples from the Internet or from commercial sources. Try and arrange to observe each other using the frame with a class, and evaluate its success. Make a record of the outcome, considering both negative and positive aspects.

Summary of research

Constructivist theory

Constructivist theory emphasises the active role of the learner in constructing his/her learning. Learning in this view does not result from transmission of information by the teacher to be 'soaked up' by the learner but consists of the learner reconfiguring her/his reality based on her/his actions on the environment. This means that learning needs to be active and that teaching can have unpredictable effects on learning.

The two main theorists to influence this view are Piaget (Inhelder and Piaget 1958) and Vygotsky (1973). The Swiss psychologist Jean Piaget argued that, in order to understand how children think, one must look at the qualitative development of their ability to solve problems. Cognitive development, in his view, is much more than the addition of new facts and ideas to an existing fund of information. Rather, children's thinking changes qualitatively; the tools which children use to think change, leading children and adults, and indeed children at different stages of development, to possess different views of the world. A child's reality is not the same as that of an adult.

According to Piaget, one of the main influences on children's cognitive development is what he termed 'maturation', the unfolding of biological changes that are genetically programmed from birth. A second factor is 'activity'. Increasing maturation leads to an increase in children's ability to act on their environment, and to learn from their actions. This learning leads in turn to an alteration of children's thought processes. A third factor in development is 'social transmission', learning from others. As children act on their environment, they also interact with others and can therefore learn from them to differing degrees depending on their developmental stage.

The Soviet psychologist Lev Vygotsky (a contemporary of Piaget) was primarily interested in the study of language development, which he believed initially develops separately from thought but starts to overlap with thought more and more as the child grows up. According to Vygotsky, a non-overlapping part remains later in life, some non-verbal thought with some non-conceptual speech remaining even in adults.

A major disagreement between Piaget and Vygotsky was that Vygotsky did not think that maturation in itself could make children achieve advanced thinking skills. Vygotsky, while seeing a role for maturation, believed that it was children's interaction with others through language that most strongly influenced the level of conceptual understanding they could reach.

Vygotsky thus believed that we can learn from others, both of the same age and of higher ages and developmental levels. This can be put into operation through scaffolding in the zone of proximal development. This concept, one of Vygotsky's main contributions to learning theory, refers to the gap between what a person is able to do alone and what they can do with the help of someone more knowledgeable or skilled than themselves. It is here that the role of teachers, adults and peers comes to the fore in children's learning, in that they can help bring the child's knowledge to a higher level by intervening in the zone of proximal development by providing children's thoughts with so-called 'scaffolds', which the child can discard once the learning process is complete. Not all children are as educable in this respect, some being able to learn more in the zone of proximal development than others.

Thus, for Vygotsky, it is *cooperation* that lies at the basis of learning. It is – formal and informal – *instruction* performed by more knowledgeable others, such as parents, peers, grandparents or teachers, that is the main means of transmitting knowledge of a particular culture. Knowledge for Vygotsky, as for Piaget, is embodied in actions and interactions with the environment (or culture); but unlike Piaget, Vygotsky stresses the importance of *interaction* with a living representative of the culture. For Vygotsky thinking can be viewed as a set of cultural tools passed down from one generation to another.

References

- DfEE (2001) *Literacy across the curriculum*: module 5, Active reading strategies; module 6, Reading for information. Ref. DfEE 0235/2001.
- Lunzer, E. and Gardner, K. (1984) *Learning from the written word*. Oliver and Boyd. ISBN: 0050037676.

Next steps

This unit has explored an aspect of teaching and learning. You may wish to develop your ideas further, to consolidate, apply ideas in different contexts or explore an aspect in more depth and innovate.

Reflect

What have been the key learning points for you?

What has been the impact on pupils?

Here are some suggestions as to how you may develop practice further:

- Reflect on the suggested techniques for active engagement. Which seem to work more effectively with which groups? Can you identify techniques that relate to age and maturity and those which relate to ability? How might you take account of this in future planning?
- Further information on DARTs can be found in unit 13 Developing reading. Work with colleagues in the same subject and review the schemes of work for a year group. Which aspects would benefit from introducing DARTs? Over the course of the year plan to build a resource between you and evaluate the impact on the pupils in that year group.

- Metacognition can help many pupils to engage with their learning. You can find out more in unit 16 Leading in learning. First explore ways in which you can encourage this and try out some of the techniques with one class over a period of time, so that this becomes a routine part of the lesson. Evaluate its impact on the group compared with other groups. Is there more engagement? What else has changed?
- When using writing frames it is important not to rely on them as a permanent prop. Pupils need to be encouraged to move beyond them. Explore a unit of work that you are about to teach. Identify the opportunities to introduce writing frames and then plan a strategy for encouraging pupils to become independent. (Reference to unit 14 Developing writing will help.)

For further reading, the following publications are recommended:

General

- Newton, D. P. (2000) *Teaching for understanding*. Routledge/Falmer. ISBN: 0415227917.
- Wood, D. (1998) *How children think and learn*. Blackwell. ISBN: 063120007X.

DARTs

- Davies, Florence, Green and Terry, (1984). *Reading for learning in the sciences*. Oliver and Boyd. ISBN: 0050037684.
- Fisher, P. (2002) *Thinking through history.* Chris Kington. ISBN: 1899857443.
- Leat, D. et al. (2002) *Thinking through geography* (2nd edn). Chris Kington. ISBN: 1899857990.
- Lunzer, E. and Gardner, K. (1984) *Learning from the written word*. Oliver and Boyd. ISBN: 0050037676.
- Nichols, A. and Kinninment, D. (2001) *More thinking through geography.* Chris Kington. ISBN: 1899857435.

Active listening

- Mercer, N. (2000) *Words and minds: how we use language to think together*. Routledge. ISBN: 0415224764.

Writing

- Lewis, M. and Wray, D. (1996) *Writing frames: scaffolding children's non-fiction writing in a range of genres*. Reading and Language Information Centre. ISBN: 0704910640.

Setting future targets

Having considered your next steps, you may wish to set yourself some personal targets to support your own continuing professional development. You could use these ideas to inform your performance management discussion.

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Task 9

Setting your targets — 40 minutes

When setting targets for the future you may want to discuss the possibilities with a colleague or your line manager.

Whatever you decide to do, you will need to consider the following.

- What are your objectives for the next year?
- What are the expected outcomes in terms of pupils' achievements?
- What strategies will you employ to achieve these outcomes?
- How will you track progress over the year?
- How will you know whether you have been successful or not?

Appendix 1

How fresh is fresh?

You may have noticed that the supermarkets sell apples and other fruits all the year round. Apples ripen in England in the autumn. Once ripe they last up to a week or two. Apples are imported from other countries such as New Zealand to extend the season but this alone will not make sure that you can have an apple at any time of the year. Many apples are picked just before they are ripe and then stored in a controlled environment. Carefully stored, some varieties of apple can last up to 12 months. So the apple you buy could be a year old.

How can you store an apple so that it will stay fresh? As apples ripen the minerals and other chemicals in the cells that make up the apple tissue change. Starches in the cells change to sugars and the cell walls begin to break down, so when you bite into the apple it is sweet and juicy. If you want to keep an apple for longer you need to make sure it does not ripen too soon. You do this by picking the apple at the right time and then by storing it so that it ages slowly.

You can check how close apples in an orchard are to being ripe by testing one or two to see how much of each mineral such as phosphorus, magnesium and potassium they contain. Cell walls need some of these minerals to maintain their rigidity. As the apple ripens so the amount of each mineral in the fleshy part changes. By tracking the changes you can tell how ripe an apple is. Picking the apple at just the right time makes sure it will last longer.

Once picked the apple will continue to ripen, so this process needs slowing down. An apple is living and each of its cells continues to respire. This means that they continue to absorb oxygen from the air and emit carbon dioxide. As each cell respires some of the stored food is converted to energy. The apple also emits a gas called ethylene that helps ripen the fruit. Controlling the atmosphere in the store can slow the respiration rate down in the apple cells. A slowly turning fan can keep the air circulating and blow away the ethylene as it is formed. If you decrease the level of oxygen and increase the level of carbon dioxide, then the cell respiration slows. Some varieties of apple will tolerate high levels of carbon dioxide in the atmosphere. The Cox, for instance, will tolerate 9% of carbon dioxide. These varieties can be stored for longer. Apples such as the Worcester will tolerate less so cannot be stored for long periods.

The apple store is also cooled. This makes sure that any chemical reactions such as respiration will take place at a slower rate than normal. Fruit such as apples cannot be frozen without becoming softer and mushy. As water freezes to form ice it also expands. So, as the water in the cytoplasm freezes, sharp crystals of ice form and these burst the membrane and cell walls.

Growing and selling apples and other fruits is big business, so it is in the interests of producers to extend the shelf life of these products as long as possible. But do they taste the same as freshly picked apples? The industry claims they do. If you are lucky enough to live in an apple-growing area you could try your own experiment, but you may have to wait until next autumn.

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