



## *Pedagogy and Practice: Teaching and Learning in Secondary Schools*

### Unit 2: Teaching models

# Designing lessons



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## How to use this study guide

This study unit offers some practical strategies that teachers can use to improve their understanding and selection of different teaching models. 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 selecting and using different teaching models. 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 2, Teaching models](#), when working through this unit.

# Teaching models

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## Introduction

### Successful lessons:

- are broken into teaching episodes, each with learning objectives and outcomes;
- have opportunities for praise and for assessment for learning;
- use an appropriate teaching model (pedagogic approach) to meet the objectives.

### Common issues

Lessons seen as being, at best, ‘satisfactory’ are those which appear to lack direction and purpose: the structure is weak; pupils are not engaged in their learning; the focus of the lesson is on the teacher, not the pupils; tasks and activities do not always contribute to the learning objectives outlined for the lesson; and pupils often are not clear about what it is they are learning.

### Resolving the issues

The content of teaching episodes will be influenced by the pedagogic approach that you choose. You will have seen in [unit 1 Structuring learning](#) that researchers have identified a variety of approaches to teaching. Each approach to teaching has a defined sequence of stages or episodes. This unit looks further at the three approaches: direct, inductive and exploratory, which were reviewed in [unit 1](#). It also looks at other approaches to teaching that have been identified as developing successful approaches to learning. You will be invited to review your own teaching to identify which of the teaching models analysed are applicable to your subject. In [task 9](#) you will have the opportunity to further explore one of the teaching models, to implement it in your own lessons and evaluate its impact on your teaching.

## Task 1

### Beginning to analyse your pedagogic approach 10 minutes

Review the three teaching models – direct, inductive and enquiry – introduced in [unit 1, page 14](#) and identify the models which exemplify, most closely, how you approach your subject teaching.

- Reflect on the [key features](#) to help you with this task.
- Note down why you feel particular aspects of your subject benefit from the model of teaching you have identified.

## 1 Developing your teaching: principles that encourage and stimulate learning

Teaching is a complex process. Complexity increases as we factor in assessment and pupil achievement; raising standards; the variety of experience that every classroom presents; and changes to curriculum models and subject specifications. Reviewing and refining the teaching process is necessary for teachers to be able to meet the demands of the changing classroom.

What you know as a teacher is not confined to your subject or ‘content’ knowledge. As a teacher you should expect to know about how the content is defined for the range of pupils that you teach and about the common misconceptions that are a feature of your subject and how to deal with them, e.g. by using appropriate models and analogies.

You will know about general principles and strategies of classroom management and organisation, about the pupils you teach, about the community in which your school is situated and about the aims and values of the education system in which you work.

As a teacher you make decisions all the time about how you will apply your different knowledges in order that pupils might learn effectively. You will identify appropriate learning outcomes and plan how best to ensure that these outcomes are to be met in the lessons you teach. This will involve selecting and preparing resource materials to enable all pupils to progress in their knowledge, skills and understanding.

The knowledge that you have about your subject, the curriculum and the decisions that you make will inform how you teach and how you organise the classroom to focus on pupils’ learning. Your knowledge about the pupils and their rates of progress will change your view of the teaching process for each class that you take: you will amend your ‘teacher actions’ to foster appropriate learning opportunities.

You may have determined from [task 1](#) that you have one preferred model of teaching. Alternatively, you may have found that you are applying a variety of pedagogic approaches dependent upon the subject content and upon the pupils you are teaching.

## Teaching for learning

The combination of knowledge, decisions and action should provide an impetus for effective teaching in the classroom. Effective teachers promote effective learning in a culture of high expectations. Pupils achieve more when lessons are well structured and sequenced (see [video sequence 1c](#)), when teachers make objectives clear and where pupils know what they are supposed to be learning. Effective teachers interact with pupils through targeted prompting and feedback and review learning and pupil progress regularly. They see the development of themselves as teachers as a continuous process.

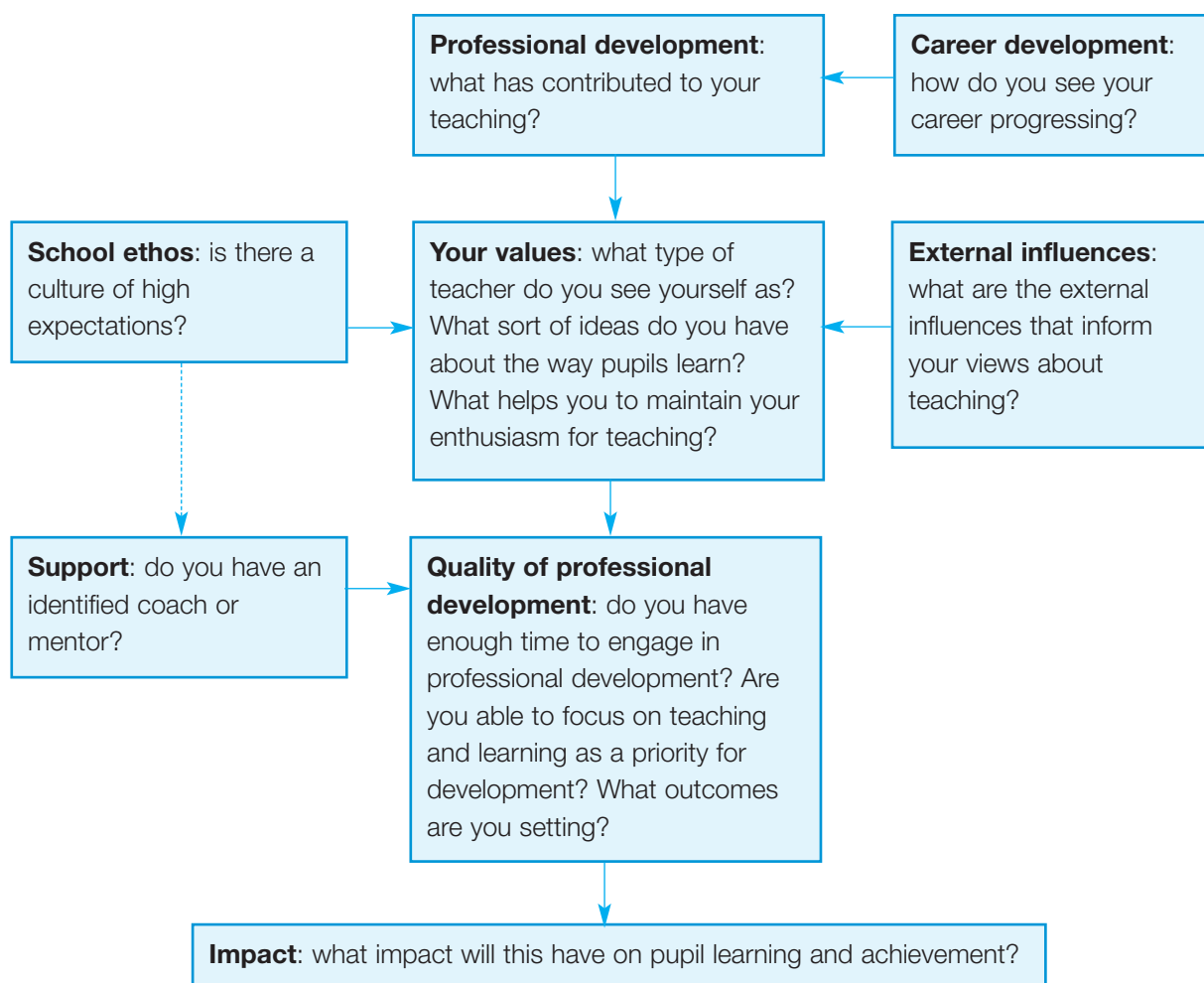
### Task 2

#### Effective teaching – effective learning

30 minutes

The diagram below describes the factors that contribute to effective learning. Each factor has associated questions and prompts for you to consider.

Jot down your responses to the questions and prompts as you work through the factors – how does your preferred teaching style encourage and stimulate learning?





Skilful teachers create effective learning situations and promote powerful learning. The impact of the teacher and the approaches to teaching that are selected cannot be overstated.

Some teaching models not only help to develop pupils' understanding of the subject-matter being taught, but can also, if approached in the right way, provide pupils with a tool they can use to support their own learning – both now and later in life. Inductive teaching, for example, requires pupils to sort, classify information and generate hypotheses and/or rules. The process of thinking inductively can be a powerful tool for solving problems, as can deductive reasoning.

Teaching in these ways can provide pupils with skills and techniques they can use later in life. This will only happen, however, if the teacher not only *teaches* the lesson, but also makes explicit what they are doing through the use of metacognitive processes and by involving the pupils in 'thinking through' the lesson.

## 2 Developing your teaching: metacognition and teaching for learning

Metacognition is broadly thought of as 'thinking about thinking' and enables us to become effective learners. As such, it has an important function in any model of teaching which requires pupils to identify how they are going to approach tasks and activities, which checks on pupil understanding and which evaluates how pupils are progressing towards the completion of a task or activity.

### Teaching for metacognition

There are five elements in lessons which use metacognitive approaches successfully:

- **Concrete preparation:** setting the scene for the pupils by explaining the focus and direction of the lesson. This will include a discussion about the learning objectives and learning outcomes of the lesson, and the way that pupils are going to work in order to meet the specified learning outcomes. It may also require pupils to recall aspects of the subject learned in prior lessons, or to present their ideas about the 'problem' being considered in the current lesson.
- **Action:** the pupils work on the tasks and activities presented to them – they must, however, be given opportunities to check their work against the expectations that have been set and to question their approach to the work they are doing. Science teachers using the Cognitive Acceleration in Science Education (CASE) approach will know this element as *construction*. The pupils are asked to think about their ideas about the solutions to the tasks they have been set, and about the reasons for those solutions. Their thinking is also challenged through a process of 'cognitive conflict' where situations which do not fit pupil-generated generalisations or match their expectations, have to be reconsidered.
- **Metacognition:** here the pupils are given opportunities to outline their thinking about the work they have been doing. The focus is on the evidence for their conclusions. The teacher's role here is to ask strategic questions which enable all the pupils to identify the key aspects of the problems they have been working on.

- **Bridging:** this element of the lesson is very important in making the pupils see how what they have learned in one lesson relates to other aspects of their learning. It plays an obvious role in focused starters and plenaries, and also in the transitions between one lesson episode and the next.
- **Mediation:** teachers need to be sure that the pupils understand the nature of the tasks and activities they have been allocated, to keep pupils on track and to identify where pupils are having difficulties in engaging with the subject.

## Case study 1

A class of Year 8 pupils is being reintroduced to spreadsheet modelling. They are looking at how models can be used to identify when a school fête becomes profitable. They also look at the range of tools and techniques they can employ to make the model more efficient. The teacher focuses on questions and activities that require the pupils to set targets for achievement and understanding.

- What elements of teaching for metacognition are applied in the episodes of this lesson?
- How does the teacher build 'bridging' into the lesson?

Lesson episode	Teaching for metacognition
<b>Starter:</b> the pupils are asked to reflect on their prior learning and to identify the components of a spreadsheet. The teacher questions understanding and uses pupils' responses to make assessments of the range of knowledge and experience they have.	<p><b>Concrete preparation and bridging</b></p> <p>Teacher: <i>What tools do we have in spreadsheet packages that can help us to solve problems?</i></p> <p><i>You have five minutes to complete this task.</i></p>
<b>Episode 2:</b> outlining the aim of the unit – the teacher explores with pupils the benefits of using spreadsheets to create a model, and explains the objectives for the lesson.	<p>Teacher: <i>We are learning about how a spreadsheet can be used to model what will happen if circumstances change. We will learn more about the tools and making the model more accurate.</i></p> <p><i>The context will be a school fête but we will consider where else we could use this approach to problem solving.</i></p>
<b>Episode 3:</b> using and interrogating a model – the pupils load a file from the shared area. The teacher uses this file to point out the key issues that pupils need to consider.	<p>Teacher: <i>How are you doing?</i></p> <p><i>Are you on the right track here?</i></p> <p><i>What do you need to remember? What did we say about variables in the starter activity?</i></p>

Case study continues

<p>The task requires the pupils to work in pairs to identify how the school fête model has been set up and to explore the impact of changing variables.</p>	<p><i>Can you explain why you think changing the variables affects the amount of money the school fête makes?</i></p> <p><i>Don't forget to ask me for help if you need another explanation.</i></p>
<p><b>Episode 4:</b> making the model more efficient – the teacher discusses the trial-and-improvement method for finding out when the school fête breaks even.</p> <p>The teacher then introduces a function that makes the process more efficient.</p> <p>The pupils then use the function to explore its impact on the model.</p>	<p>Teacher: <i>What do you think is happening when we use this function?</i></p> <p><i>What do you think the message 'found a solution' means?</i></p> <p><i>Why do you think the answer is not an integer? Can we have part of a person coming to the school fête?</i></p>
<p><b>Episode 5:</b> plenary – reviewing the model – the pupils are asked to consider what makes a good model, and then to reflect on the school fête model they have been using.</p> <p>For homework the pupils are to collect information about the cost of running two types of mobile phone.</p>	<p>Teacher: <i>Is the school fête model a good model? What makes you think that?</i></p> <p><i>How accurate is the model?</i></p> <p><i>How can we find out how accurate it is?</i></p> <p><i>Can we improve it?</i></p> <p><i>What do we need to know if we want to improve it?</i></p> <p><i>Where else might this approach be helpful, and why?</i></p>

### Task 3

#### Planning for metacognition

30 minutes

Select a lesson plan from your scheme of work for one of the classes you teach.

Use the list of elements and the case study to identify opportunities for developing metacognitive learning.

Identify teacher questions and pupil questions that will help the process.

What extra resources will you need to prepare?



### 3 Models of teaching – developing effective learning

In this section of the unit five models of teaching are explored. It is important at this stage to remember that teachers apply a variety of pedagogic approaches dependent upon the subject content and upon the pupils being taught.

#### Inductive teaching

Inductive teaching is a model which encourages pupils to categorise the subject knowledge, skills and understanding they are learning, and to test and use those categories in challenging their level of understanding. It is a model that nurtures thinking skills and allows pupils of all abilities to process the information at their disposal effectively.

This teaching model is very powerful in helping pupils to learn how to build knowledge and as such is closely related to constructivism as a support for pupil learning. Inductive teaching is intended to help pupils to master large amounts of information. The inductive model requires pupils to sort, classify and re-sort data to begin to make hypotheses that can be tested in future work. It is used when teachers want to explore the concepts that underpin subject knowledge, and want pupils to recognise the ways in which their knowledge is constructed.

There are six phases in the inductive teaching model, which can be divided into episodes.

- Outline the nature of the problem and clarify the objectives and learning outcomes.
- Put together the first data set and label the items of data.
- Examine the items in the data set and identify the attributes that they have.
- Classify the items in the data set, share results and add data to the set and prompt a reclassification (this may happen a number of times).
- Identify any differences between the categories and group categories as appropriate.
- The final phase involves looking again at the resource materials to identify any other items of data that can add richness. This is then pulled together by writing about the problem being researched, using the categories to structure the writing.

#### Inductive teaching in practice

A Year 10 history class is exploring the factors which contributed to the outbreak of the First World War. One of the learning outcomes of this topic is the understanding that the assassination of Archduke Franz Ferdinand in Sarajevo in June 1914 was not the only cause of the war. The use of a series of lessons using the inductive method allows the pupils to understand the relationship between the factors in some depth. In the first lesson the teacher puts the class into groups of four. The pupils are told that they have to collect information about the causes of the First World War from a range of different sources and to record their findings on a form set up by the teacher in advance of the lesson.

During the lesson all groups collect the data from their allocated sources using the form and complete this by the end of the lesson. The second lesson involves the groups putting the factors into groups using their own sets of criteria (prompted by the teacher). The pupils are given a sheet to record their factor groups and to identify the common issues that prompted them to put the factors together.

During the plenary the teacher asks each group to present one of their factor groups to the class. This is recorded on the board. All the other pupils have to suggest possible reasons for categorising the factors in this way.

The teacher pulls this together by highlighting the causes of the First World War.

This provides the basis of the third lesson that covers the generation of hypotheses. Using the data the pupils have collected, and the teacher's guidance during class discussion, the class comes up with examples of hypotheses, which the teacher records on the board using prompts such as: 'Had Britain come out clearly on the side of Belgium and France earlier in July, war would have been avoided'; 'France was "desperate for revenge" after the disastrous defeat against Germany in 1871'.

## Task 4

### Observe and analyse an inductive lesson

20 minutes

[Video sequence 2a](#) shows a Year 9 English lesson which uses inductive learning to build pupils' understanding of the persuasive writing strategies used in advertising.

Watch the video sequence and identify the main stages of the inductive approach.

The teacher has planned the lesson so that it progresses from individual consideration of the information (the cards with advertising slogans) to paired and then group work. How does that sequence help to make the lesson more effective? More information on this technique can be found in [unit 10 Group work](#).

How does the teacher help the pupils crystallise and consolidate what they have learned from the classification task?

How does the teacher get the pupils to apply what they have learned?

In the lesson the information or 'data set' is presented in the form of a series of cards with brief written extracts. What other forms would be applicable in your own teaching?

Discuss with a colleague when an inductive learning approach would be most appropriate to help pupils develop understanding in your subject, and jointly trial the approach in one lesson.

## Deductive teaching

Deductive teaching focuses on subject concepts and, specifically, on the pupils' understanding of 'the concept rule': a definition or rule which is stated about the topic of the lesson.

For instance, if a teacher of English wishes to teach about phrases, they may create the concept rule as 'phrases are not sentences'. Similarly, with a concept of democracy in a citizenship lesson, the concept rule might be that 'Democracy is government of the people by the people'.

Concept rules are defined by their critical attributes: those attributes that must exist for the rule to be 'true'. For example, a critical attribute of a sentence is that it begins with a capital letter; a critical attribute of a war is that it involves two opposite forces in some type of conflict.

Getting to the critical attributes is certainly helpful for pupils. However, understanding the concept, and being secure in their understanding, requires pupils to identify the non-critical attributes: those characteristics which might be present for the concept to match the concept rule. For example, a non-critical attribute of a sentence is that it may or may not end with a full stop. (*Punctuation* is a critical attribute, but the *full stop* is non-critical because sentences may end in different ways according to their meaning.)

The deductive teaching model has five phases which can be divided into episodes.

- The teacher begins the lesson with the concept rule, or a statement of what the pupils will attempt to prove during the lesson.
- The teacher provides some examples which show proof of the concept rule.
- The teacher, through questioning of the pupils, identifies the critical attributes and the non-critical attributes which are essential and non-essential characteristics of the concept.
- The teacher follows this by showing examples and non-examples of the same concept to the pupils.
- The pupils must categorise the examples or non-examples (those which do *not* show essential characteristics of the concept rule) by explaining why they do or do not fit the concept rule being discussed.

## The deductive teaching model in practice

- In a mathematics lesson pupils may use a computer to learn about the relationship between the number of sides in a regular polygon and 360 degrees.
- The teacher presents the concept rule: the number of degrees in the internal angles of a regular polygon must equal 360 degrees.
- The teacher defines a regular polygon and then shows the pupils examples, possibly objects in the classroom which have the desired qualities as well as mathematical props.

- The pupils, with guidance from the teacher, identify the characteristics that must be present for the object to be a regular polygon.
- The teacher then elicits the non-critical attributes of a regular polygon (i.e. shape is non-critical or non-essential as long as it meets other characteristics, meaning it could be two- or three-dimensional, or have any number of sides; size is also non-essential; weight is non-essential to the concept rule; etc.).
- The teacher shows more examples of a regular polygon, but mixes them in with non-examples. The pupils must distinguish the difference and verbalise it.
- The pupils should then test their understanding of the concept by testing it out using procedures in the computer program.

## Task 5

### Deductive teaching

15 minutes

Think about how the model described above could fit your teaching situation: your preferred styles; the pupils you teach; your school environment and your subject.

- Are there aspects of metacognition applied in deductive teaching?
- To which aspects of your work would a deductive model be best applied?
- When is it not likely to be appropriate?
- Is this a model you could apply – see [task 9](#)?

### Teaching using metaphor

Teaching through metaphor, or *synectic teaching*, provides opportunities for pupils to see familiar ideas from a new perspective, or to engage with unfamiliar concepts in a meaningful context.

This teaching model assumes that creativity is fundamental: we all have the desire and skill to do something creative, no matter how capable we are. By harnessing the creative urge, we can enhance the educational reward. Pupils benefit by acquiring both the necessary skills and the critical power to reflect on and analyse the learning that has taken place.

Using metaphor to teach subjects across the curriculum provides the opportunity to problem-solve in a variety of ways that might normally be thought of as illogical or ridiculous. Teaching using metaphor may be seen as offering something of value only to literate subjects such as English or drama, but the element of ‘thinking outside the box’ is what encourages innovation in science or invention in technology.

Teaching using metaphor encourages creative thought in order to move teacher and pupils away from expected to unexpected solutions to problems.

Five phases can be identified in the synectic teaching model, which can be divided into a series of episodes.

- **Recognising the familiar**  
Pupils are introduced to the topic of the lesson and asked to identify what they can remember about the subject and what characteristics they can recall.
- **Direct analogy**  
Here the teacher and pupils explore the relationship between two objects or concepts. For example, pupils in a science class may be asked why the eye is like a camera, or why the DNA molecule is like a spiral staircase. These questions are important in that pupils can relate what they know to an idea that is new to them. It allows them to build new connections between two quite different ideas.
- **Personal analogy**  
Pupils are encouraged to empathise with the ideas or problems being compared; to express how they might feel if they were immersed in the problem. In personal, social and health education they may, for example, want to express how they would feel as a heart trying to pump blood through restricted blood vessels.
- **Compressed conflict**  
During this stage pupils are asked to provide a two-word description of an object, person or situation. These words need to appear to contradict each other and so make new connections between ideas and engage in higher-order thinking.
- **Making the connections**  
During the fifth phase pupils look at the pairings of words and use them to write about the topic they are exploring.

### The synectic model in practice

- In a science lesson, pupils are put into groups of five and asked to jot down things they know about the heart. They do this individually and then share their ideas with other members of the group and agree a single set of characteristics about the heart.
- The pupils are then asked to respond to some direct analogies written on the board by the teacher:
  - How is the heart like a water pump?
  - How is the heart like a dancer?
  - How is the heart like a clock?
- The next phase requires the pupils to make personal analogies with prompts from the teacher: be a lion, how do you feel; be a butterfly, what are you like? This phase will generate lists of words that will be used for the fourth phase of the lesson.

- Using the words from the two lists they have generated, the pupils are asked to put pairs of words together (one from each list) which seem to contradict each other, for example:
  - majestically weak;
  - fragile power;
  - fluttery resting.
- In phase five pupils are asked to make direct analogies between these word groupings.
  - ‘Give me an example of fragile power.’
  - ‘What does fluttery resting look like?’
- Having made these analogies and discussed their answers with their group, the pupils are then requested to go back to their first set of notes about the heart and to write another paragraph using the point of view of one of the direct analogies. For example:

*The heart is a very important organ. It is strong and powerful, but also very fragile. The power that it has can be swept away by little globules of fat.*

## Task 6

### Teaching through metaphor

15 minutes

Think about how the model described above could fit your teaching situation: your preferred styles; the pupils you teach; your school environment and your subject.

- To which aspects of your work would this model be best applied?
- When is it not likely to be appropriate?
- Is this a model you could apply – see [task 9](#)?

### Teaching for concept attainment

You will already have noted that other teaching models use exploration and development of concepts. You may also recognise opportunities to develop metacognition through concept attainment.

The concept attainment model requires pupils to look in detail at concepts that are defined for them, and to develop their understanding of the concept by exploring attributes and non-attributes of the concept. This model focuses on the development of pupils’ abilities in acquiring, controlling and remembering information.



It provides pupils with opportunities to engage deeply with ideas, to recognise the possibility of alternative and opposing perspectives. It is important that pupils recognise the possibility of a range of explanations.

There are three phases in teaching for concept attainment, which can be divided into episodes.

- During the first phase pupils are presented with information, some of which relates to the concept, while the rest does not. The pupils need to focus on the differences and similarities and to arrive at a hypothesis about the nature of the 'idea' by comparing the two sets of data they have.
- In the second phase the pupils need to test their understanding. This can be achieved by adding more unlabelled data which the pupils must categorise appropriately: does it fit with their hypothesis or not? They can also be asked to generate their own examples.
- In the final phase pupils begin to analyse the thinking that underpinned their work in the lesson, and to consider how they arrived at their conclusions.

### **The concept attainment model in practice**

In a Year 7 PE lesson the pupils are planning how to complete a solo orienteering course. The teacher has identified sets of data to illustrate the concepts that underpin orienteering, and presents pairs of attributes to the pupils – some that are representative of the concept, others that are not.

After the pupils have seen two or three pairs of attributes each pupil should note down what they think is common to all the 'positive' exemplars.

The pupils are then presented with a few more pairs of attributes and asked whether this matches their ideas of what made the attributes fit together. If it doesn't they are asked to think again about their original concept.

During the next phase the pupils are shown individual attributes and asked to accept the ones that fit their concept and to reject those that do not. This needs to be repeated until the teacher feels confident that the pupils can explore the question: 'What is the main idea that we're trying to explore here?'

The teacher needs now to collect feedback from the pupils and to confirm views about the concept by using examples from the list of positive exemplars. It is important that the pupils are then given the opportunity to relate the concept model they have generated to the completion of the solo orienteering course. They should be able to say how the ideas they have explored help them in their planning.

## Task 7

### Concept attainment

15 minutes

Think about how the concept attainment model could fit your teaching situation: your preferred styles; the pupils you teach; your school environment; your subject.

- To which aspects of your work would a concept attainment model be best applied?
- When is it not likely to be appropriate?
- Is this a model you could apply – see [task 9](#)?

### Teaching to construct meaning

Constructivists argue that the ability to solve problems and apply reasoning using the knowledge, skills and understanding gained in previous experiences is a vital aspect of learning.

Constructivist approaches to teaching and learning are so closely focused on the application of knowledge, skills and understanding within a range of contexts, that the teacher's primary role is to identify opportunities to create those appropriate contexts and environments in which pupils can apply critical thinking processes to the tasks in hand.

Constructivists argue further that learners, in developing their problem-solving skills, require teachers who participate in the learning process rather than in the transmission of knowledge: the teacher here is responsible for the development of guided activities and tutorial guidance. Here teachers are allowing pupils to make sense for themselves of the problems they have been given, to explore the ideas they have begun to develop, to arrive at solutions and to knit all their experiences together to reach a conceptual understanding of the practice and principles of the subject being studied.

Constructivism is, however, a construct for learning and not a teaching model. The teacher's role in the constructivist classroom is that of facilitator and manager and it is from these viewpoints that we can look at teaching to construct meaning.

There are four key phases in developing construction for meaning.

- The first element is the planning stage, and the identification of what it is pupils bring with them to the lesson. What knowledge, skills and understanding do they have, and what is it that needs to be taught prior to this learning experience that will give the pupils a foundation from which to move forward? A first episode in a lesson would be used to elicit what pupils already know (or think they know) about the subject.
- The second element requires the teacher to outline the main concepts that are to be developed during the lesson; exploring with the pupils the new knowledge, skills and understanding that are to be developed.
- During the third element of the lesson, both teacher and pupils need to identify how the new knowledge relates to what it is they know already. How does the context in which they are working relate to previous experiences? What does this tell us about the new learning that is taking place?
- The fourth element involves the assessment of pupil understanding.

Running alongside these elements are opportunities for reflection, review and recontextualisation. Reflecting on what is being learned, reviewing progress and looking at how the knowledge, skills and understanding can be employed elsewhere are strands that bind the elements of the learning together. The teacher's role in managing this process is extremely important. It is often referred to as 'scaffolding'.

## Teaching to construct meaning in practice

In a Year 7 lesson in mathematics, pupils are exploring ways to add and subtract whole numbers. They have had some problems in developing their understanding of the concepts involved. The teacher has decided to focus on specific problems and to encourage the pupils to work in pairs and to sort out errors themselves.

During the starter activity the teacher is exploring the concept of place value with the pupils. Using a place value chart, pupils are asked to demonstrate and explain the number 7023, and other similar examples.

They then explore the effect of adding 2 to 199, then 999 and then writing in digits the number that is 2 more than 1 999 999.

During the second phase of the lesson the teacher wants the pupils to use known number facts and place value to consolidate mental addition and subtraction, and to use standard column procedures to add and subtract whole numbers. The pupils are asked to recall addition and subtraction facts within 20 and complements of 100 using a number line or a 100 square. They explore a range of addition and subtraction problems mentally, discussing their approaches to the solution with their partner. The teacher reviews work as it is progressing and reminds pupils to focus on what they know when they encounter errors. If appropriate the teacher models solutions using the number line or 100 square to focus the pupils on the methods to be applied.

The lesson moves into its next phase. The pupils are asked to think about what they have learned so far, and then to look at the following problems and to choose how they want to approach the answers.

**Work out these calculations without a calculator.**

For each question, decide whether you:

- can do it in your head;
- need some jottings to help you to get the answer;
- need to use a written method.

1  $523 + 98$

2  $436 + 253$

3  $345 + 457 + 789$

4  $716 + 897$

5  $1076 + 57$

6  $674 - 233$

7  $547 - 289$

8  $1784 - 98$

9  $6052 - 1567$

10  $7894 - 8792 + 2358$

The pupils, in their pairs, discuss approaches to the problems and their methods of solution. The teacher draws out responses, identifying, for example, that changing the order of calculation in question 10 makes the question easier.

During the plenary the teacher asks pupils to identify particular errors they have made, and uses appropriate examples to relate what they have learned to what they already know, focusing on what new learning will take place in the next lesson.

## Task 8

### Teaching to construct meaning

15 minutes

Think about how the model described above could fit your teaching situation: your preferred styles; the pupils you teach; your school environment and your subject.

- To which aspects of your work would the constructivist model be best applied?
- When is it not likely to be appropriate?
- Is this a model you could apply – see [task 9](#)?

## 4 Changing practice

The models described above represent a range of teaching models that can be applied in secondary classrooms.

### Task 9

#### Changing practice

45 minutes

##### **Decide**

Which of the teaching models described do you want to explore further?

##### **Reflect**

What implications does this have for your teaching? Look back at the notes you made during the task associated with the model you have chosen to apply.

##### **Action**

Implement the principles of the model you have chosen in one of your lessons.

##### **Talk**

Discuss your plans and the perceived impact on your teaching and on the pupils' learning.

##### **Evaluate**

What changes do you plan to make to future lessons as a consequence of this work?

## 5 Building capacity in school

The table below explains the characteristics of a school or department with a well-developed capacity for improvement in teaching and learning approaches.

Attribute	Examples at whole-school level	Examples at department level	How are you doing?
It routinely shares its expertise	Staff meetings regularly feature teachers demonstrating or illustrating how they teach	Collaborative planning involves teachers sharing their ideas on how work can be delivered. The department shares demonstration lessons with staff	
It uses external support and challenge to enhance practice	Teachers are regularly encouraged to attend external INSET. LEA school advisers are drawn in to contribute to school self-review processes	The department uses the LEA KS3 consultants to observe lessons and provide feedback	
It has a clear, operational focus	The SMT signals clearly that certain items in meetings are significant in improving teaching and learning and ensures they are given significantly more time	Meetings are focused on teaching and learning issues. The team is clear about which items require only a little time. Administrative items are given later slots in meetings	
It has a well-developed set of priorities	It has a clear and operational (not cosmetic) development plan which guides resource decisions and action taken	The department has an action plan based firmly on an audit of teaching strengths and weaknesses. Resource decisions are based on declared priorities of strengths and weaknesses	

Table continues



It elevates professional development to a continual process	Individual teachers are enabled to watch colleagues teach on a regular and systematic basis	An audit of each team member's skills is used as a basis for termly review discussions and lesson observations	
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## Summary of research

### Structured sessions

Lessons should have a clear structure to help pupils understand the content of the lesson and its relationship to what they already know. Many researchers have found that effective lessons use starters which review and practise what was learned during the previous lesson. This allows the teacher to find out what pupils remember of the content of previous lessons, and to identify what needs to be reviewed in further detail before moving to other learning contexts. This may mean going over homework with the class, and may mean revising schemes of work and planned lessons so that the pupils' learning can be developed appropriately. The objectives of the lesson should be made clear to pupils from the outset, with examples such as 'today we are going to learn about ...', or through writing the objectives on the board or on a flipchart.

During the lesson the teacher needs to emphasise the key points of the lesson, which may otherwise get lost in the whole. The teacher also needs to plan for review points which signify the start and end of different episodes of the lesson.

At the end of the lesson the main points should once again be summarised, either by the teacher or, preferably, by the pupils themselves, perhaps by asking the pupils what they have learned during the lesson. Episodes of the lesson can usefully be summarised in the same way during the course of the lesson.

Teachers must also clearly signal transitions between lesson parts such as the start of a new topic or practice of the previous topic. It is also recommended that teachers build opportunities for repeating and reviewing general rules and key concepts, in order to facilitate pupil retention and understanding of the topic. Teachers would also do well to explain such demanding topics using a variety of media and methods, in order to help pupils with different learning styles (Rosenshine and Stevens 1986; Brophy 1992; Borich 1996; Reynolds and Muijs 1999).

Within this overall structure, it is recommended that material should be presented in small steps pitched at the pupils' level, which are then practised before going on to the next step. This allows pupils to gain a sense of mastery over the content and will stop them getting bored or losing the thread of the lesson. Information should be presented with a high degree of clarity and enthusiasm. Teachers need to focus on one point at a time, avoid digressions and avoid using ambiguous phrases or pronouns which can misdirect pupils. They need to focus also on the subject vocabulary being developed and applied during the lesson and to repeat it regularly during the lesson.

## Information processing

Cognitive information processing theory is a more recent development. It focuses on memory. The memory consists of three parts: the sensory buffer, the working memory and the long-term memory.

The working memory is where ‘thinking gets done’. It receives its content from the sensory buffer and the long-term memory but has a limited capacity for storing information, a fact that limits human mental processes. The working memory contains the information that is actively being used at any one time.

The long-term memory is made up of nodes and connectors: the nodes represent chunks in memory and the links represent connections between those chunks. Information processing theory emphasises the importance of helping pupils to memorise content, by connecting new knowledge to what they already know.

## Using real-life contexts

Pupils often experience difficulty in relating their learning to what they know about the world around them. They may also find it difficult to see the relevance of what they are learning. This creates barriers to both learning and teaching. In mathematics the use of real-life materials, such as shopping bills, can enhance the making of these connections and the generation of informal mathematical knowledge. These materials can be brought to class by the pupils themselves, furthering involvement in the lesson (Gravemeijer 1997).

It is important to take into account here that using real-life examples is more than just using words from everyday life in problems that are, as a whole, unrealistic. Many problems use a *context* which only at first sight appears realistic. To be effective, a real-life example needs to connect far more to pupils’ actual experience (Gravemeijer 1997).

## Making connections

A subject already touched on is that of clearly linking different parts of the lesson and the curriculum. New knowledge needs to be linked to concepts learned earlier and different parts of the lesson should be linked to each other, to knowledge learned earlier and to the curriculum. Subject ideas should not be taught in isolation; a strong focus should be put on the relationship between ideas. This will enable pupils to be better able to retrieve knowledge from memory and to understand how the learning in one lesson links to learning in others. These linkages must be explicitly taught. Teachers can also use questions that ask a pupil to relate a newly taught concept to a previously learned idea (Hiebert and Carpenter 1992; Askew et al. 1997).

This means that teachers must themselves be aware of the connections between different aspects of their subject and the use and application of the subject in different areas of the curriculum. This highlights the importance of good teacher subject knowledge – about both the subject itself and its contribution to other aspects of learning across the curriculum. This is linked to higher pupil achievement (Mandeville and Liu 1997).

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## 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:

- follow up some of the suggestions about these specific models by researching them further in *Models for learning: tools for teaching* (see reference below);
- consider undertaking some action research based on your evaluations of the impact of your changed practice;
- identify one teaching group which is likely to respond well to trying out a new model of teaching and learning over a longer period of time;
- review and revise the scheme of work for an examination group who could benefit from using metacognitive strategies in their learning;

For further reading, the following publication is recommended:

- Joyce, B., Calhoun, E. and Hopkins, D. (2002) *Models of learning: tools for teaching*. Open University Press. ISBN: 0335210155.

## 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 10

#### 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?

