Pedagogy and Practice: Teaching and Learning in Secondary Schools

Unit 17: Developing effective learners

Department for Education

Guidance

Curriculum and Standards

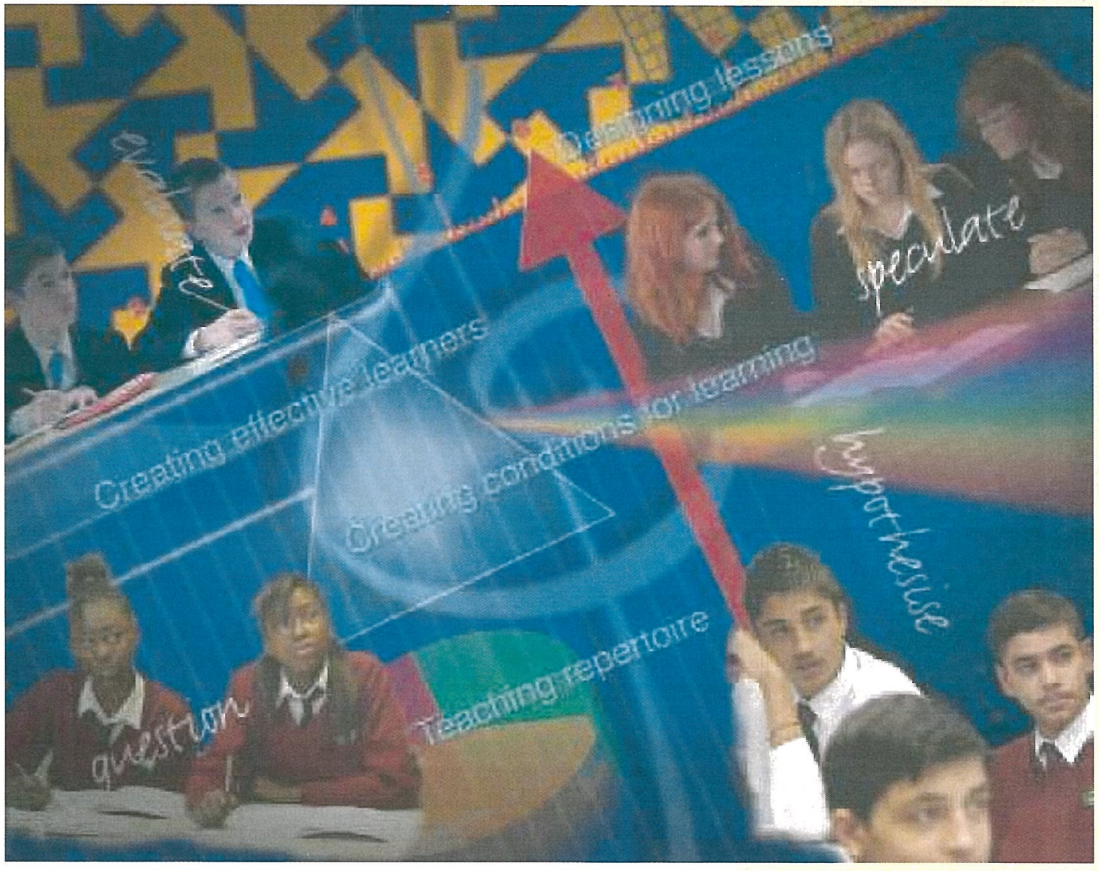
Creating effective learners

Pedagogy and Practice: Teaching and Learning in Secondary Schools

Unit 17: Developing effective learners

Senior leaders, subject leaders and teachers in secondary schools

Status: Recommended
Date of issue: 09-2004
Ref: DfES 0440-2004 G



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 develop effective learners. 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 your approach to developing effective learners. 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 17, Developing effective learners, when working through this unit.

Developing effective learners

Contents

Introduction

Effective learners

Pupils who are effective learners have the skills to learn on their own. They can be relied on to work independently, even for long periods. They can:

- organise and sequence their work;
- solve complex problems;
- appreciate when they need to seek help or ask questions;
- read and gather information and take notes;
- share ideas or work in a group;
- appreciate the purpose of what they are doing and make connections with other work;
- evaluate their work and plan what to do next.

Common issues

Some pupils, or even whole classes, lack the necessary skills to work independently of their teachers. Consequently, in most lessons these pupils:

- are disorganised;
- give up when they meet a challenge;
- rely on others to do their work for them;
- make poor use of resources provided;
- opt out of discussion and group work;
- constantly question the purpose and value of their work;
- go off-task, waste time or misbehave.

Resolving the issues

Research (a summary of which can be found on pages 21–23) has shown that pupils can be taught to become more independent in their work and thus become more effective learners. As pupils mature, they can be increasingly encouraged to develop these skills. In most circumstances, good progress can be made if you start small, with a very specific focus. To begin with, you could:

- concentrate on a particular learning skill, for example organising information;
- model for pupils how a particular skill is carried out;
- select exercises carefully:
  - to match your objectives;
  - to ensure that pupils experience success;
- give good examples and clear success criteria;
- monitor individuals and the whole class and deal with difficulties;
- provide positive feedback, not just marks.

As you begin to foster new habits in your pupils, you can gradually increase expectations. You could:

- set challenging tasks for the whole class, building in the necessary support;
- as a whole class, work collaboratively through the stages of solving a problem, gradually reducing the support you provide;
- focus particularly on understanding problems and planning the solutions;
- include short spells of carefully structured paired or small-group work;
- expect pupils to share, comment on and evaluate each other's work;
- develop thinking skills by raising questions about ways of working and encouraging reflection on strategies for learning.

1 Effective learners

Task 1

What makes an effective learner? 10 minutes

Before reading the section below, spend a little time thinking about the skills that are needed to be an effective learner at Key Stage 3 and Key Stage 4. One skill, from the introduction, is the ability to plan and organise.

You might find it useful to bring to mind a pupil you know. Write a list describing his or her learning skills.

In recent years there has been renewed interest in considering how best to develop pupils' learning skills. Joyce, Calhoun and Hopkins (2002) argue that some ways of teaching provide models for learning that help pupils acquire these skills.

Case study 1

Southampton LEA had identified the need to improve pupils' learning skills. A small steering group comprising LEA staff and headteachers met over a two-year period to develop strategies that would help schools and colleges improve the learning skills of their pupils and students. The steering group was keen to involve both pupils and teachers in helping to identify what skills effective learners need and then to suggest what to do to help them develop those skills.

Two areas were investigated in schools and colleges.

1. First, many teachers were asked to complete a questionnaire, about what good learners look like at different ages. When the results were collated, there was remarkable agreement. From these results, 'end-of-key-stage statements' were developed to describe effective learners at ages five, seven, eleven, fourteen and sixteen. The statements set out milestones that indicated to teachers what to develop in each key stage. Together, the statements set an agenda for which learning skills to teach and when.
2. A detailed questionnaire was given out in one secondary school to investigate the pupils' perceptions of how they learned best. The responses gave the school some valuable insights. This led to discussions between staff about learning skills and the physical environment as well as to the senior management team investigating what could be done to improve classrooms.

The findings were shared between schools via conferences and the LEA website.

The end-of-key-stage statements for Key Stages 2, 3 and 4 are set out in grids on the next two pages.

By age 11 effective learners:

Statement	Reflection
are well organised, able to plan systematically	
break tasks down into manageable bits and have a range of strategies to solve problems	
are prepared to ask for help using appropriate well-formulated questions	
when searching for information, are clear about what they are looking for and how to use the conventions of information storage systems	
work with others, participating well as a team member, and may take a lead role	
see the 'bigger picture' and can see where the learning is going	
are able to evaluate their work and discuss how they might improve	

By age 14 effective learners:

Statement	Reflection
are well organised, they plan their work independently so that it is completed on time	
show confidence in the range of strategies they have to solve problems but are quick to realise when they need help and choose the most efficient means of gaining an answer	
when gathering information, understand the advantages and constraints of a range of resources and media including electronic and can use these independently and discerningly	
take appropriate notes in a form that is suitable and can adapt information with a clear sense of audience	
work well in a team, recognising the advantages of a collaborative approach; they take a lead role confidently when they see the need	
look for reasons for learning, recognising when it is purposeful and when it is not; they are capable of linking ideas together so that the 'bigger picture' becomes clear	
can set their own targets and evaluate their progress towards them	

By age 16 effective learners:

Statement	Reflection
are well organised and plan their work confidently, balancing priorities	
show independence in solving problems, selecting the most effective strategy with confidence, and will seek help when needed	
when gathering information, do so efficiently and will take notes in a variety of ways, selecting the method to suit the purpose	
can reorganise their work and re-present it with a clear sense of audience	
are effective team members and can recognise the different roles needed to complete a task and will often take on that role to ensure completion	
search for purpose for learning and will challenge and question to ensure that what they are learning is appropriate	
will explore how this fits with existing knowledge and will accommodate any changes to their overall 'map'	
assess their own work and can identify areas for improvement and seek help to clarify how they can improve	

Note: This section, based on the work of Southampton LEA (2001), is exemplified in *Bridging Plans: from Key Stage 3 to Key Stage 4*: *English* (DfES 0080-2004), *Mathematics* (DfES 0081-2004) and *Science* (DfES 0082-2004).

2 Planning to teach learning skills

Focusing on a particular skill

To help pupils become more effective and independent learners, it is best to start with one or two basic learning skills and concentrate on those. Taking into account the list of characteristics of effective learners on page 1, you might start by:

- focusing on how pupils organise and sequence their work;
- encouraging pupils to appreciate when they need to seek help or ask questions.

To make it even simpler, the skill of knowing when to seek help can be put into the context of organising and sequencing work.

Task 2

Choose a class to work with — 30 minutes

Choose one class in which you would like to enhance pupils' learning skills. In this unit, you will teach three appropriately phased key lessons with that class. The approach is one of 'starting small' – focusing on simple changes that will make a difference to your teaching. Think carefully about which class or group to choose.

- It should be one where you judge that a significant number of pupils lack the necessary learning skills.
- Do not be too ambitious, however. Choose a class with whom you are willing to take some risks and try out new ideas.
- Before making your final decision, talk to colleagues who teach the same pupils (or a majority of them). Ascertain their views of the pupils' learning skills and check that one of them is willing to be observed for one of their lessons with the class.

Having identified a suitable class to work with, reflect on their effectiveness as learners. Refer to the grids of age-related descriptions on pages 4–5 to complete the task.

- Reflect on the list of learning skills nearest to the age of your chosen class, e.g. if it is a Year 7 group refer to the age 11 competencies.
- Use the right-hand column to record the skills that you think they already exhibit.
- Record in the right-hand column the learning skills that they most need to develop.

Task 3

Observe the class with another teacher — 90 minutes

It can be invaluable to have the opportunity to observe your pupils being taught by another teacher in another subject. This can help you to identify:

- pupils' strengths and weaknesses as learners (as these are common to different subjects and teachers);
- the positive and negative effects of the different approaches you and your colleague adopt in teaching and relating to the class;
- differences in the opportunities provided in different subjects.

Arrange to observe one of your colleague's lessons, first agreeing the purpose of the exercise and sharing the checklist of learning skills you have developed. During the lesson:

- use the checklist to focus your observations of the pupils;
- note features of the teaching which foster pupils' learning skills.

After the observation, arrange to have a discussion with your colleague – you will need up to 30 minutes. Use your notes as a basis for the discussion, remembering the points you want to tease out about similarities and differences between the lesson you observed and your own lessons (from the three bullet points above).

Modelling

To be successful in any task, pupils need to understand the task and possess the learning skills. Through modelling you can help with both (see unit 6).

Like most teachers, you are probably familiar with the experience of having explained a task very carefully to a class, only to find that many of them cannot get on with it! Modelling can be more effective than verbal explanations, especially for pupils who prefer a visual learning style. With modelling, the teacher:

- demonstrates the task by doing it in front of the class;
- links the task to skills or processes that learners can already perform;
- goes through the task in a clear, structured and sequential way, thinking aloud and explaining what they are doing;
- invites pupils to memorise the steps involved in the task and then imitate what they have seen (perhaps supported by reminders written on the board).

An advantage of modelling is that you can make hidden processes – such as the thinking behind alterations and revisions – explicit. This helps give pupils the confidence to use the processes themselves. It is particularly beneficial to pupils learning English as an additional language because you can model the subject-specific language for them in the context of the work being done.

It is also possible to model a learning skill directly. For example, to model the skill of asking useful questions you could set up a role-play where two people question each other in a conversation. In this way you could, for example, look at what sorts of question are useful and what sorts are useless if you are a GP or a detective.

Examples of processes or skills that can be modelled are:

- writing an account;
- constructing a concept map;
- considering options when receiving the ball in an invasion game such as football or netball;
- evaluating a finished product in design and technology;
- drawing a field sketch in geography.

Case study 2

A geography teacher wanted his class to practise drawing field sketches. Before asking them to do so, he modelled the task himself. He sketched the landscape on an OHT, giving the following commentary.

'OK, now where do I start? If I want to make an accurate sketch then I need to make sure I draw a frame that is the same shape as the "view".

Now I'm ready to draw the field sketch itself. It's important to draw in the main landscape lines first so that I divide up the different areas of land use.

Now I have an outline of the main areas, I can put in the detail … a few outlines of buildings … oops … it doesn't really matter that they don't look like buildings … this isn't a piece of art … the most important thing is that the labels we add in next are detailed and accurate.

Now to start annotating the sketch. Because this sketch is about Chester as a tourist destination, it's important that I pick out the main attractions … hmmmm … first the cathedral … I'll pick out some important details from this guidebook to Chester.'

Reflection

This geography example should give you an idea of how the modelling process works. How could you exploit this strategy to its full potential?

Think of a topic you are currently teaching and identify an aspect that would be suitable for modelling to the class. Talk through a short 'script' to yourself, imagining that you are starting the process with your pupils. Does it feel different from what you would normally do? In what ways? List any additional equipment that you would find useful to have in the classroom.

For more on modelling, see unit 6.

Giving good examples and feedback

Having had the skill modelled for them, pupils need to engage with it for themselves. During this time, it is essential that you monitor the work and give good feedback. As well as giving practical help, this encourages pupils to perceive their work as valued and to learn how to improve it. Where possible, aim to observe the following guidelines for monitoring and feedback.

- Monitor individuals, groups and the whole class in a balanced way.
- Engage proactively, not just waiting for pupils to seek help. Use questions or requests which encourage pupils to explain or think more deeply, such as 'Take me through what you have done so far', 'What are you doing at the moment?', 'Why have you done this?'
- Encourage pupils to check each other's work and to use other pupils as a first source of help. (You could model this for the class with a role-play exercise.)
- When appropriate, draw the class together to deal with common issues or difficulties, getting members of the class to help where possible.
- Give constructive comments on samples of written work. (Research evidence clearly indicates that this is far more likely than marks or grades to help pupils improve their work.)

Building the skills in lessons and increasing expectations

Although you may be looking for immediate signs of effect in one lesson, bear in mind that the lasting benefits will only be apparent over time. Gradually, pupils will start to use the learning skills you have fostered without needing to be prompted continually. The following strategies will help.

- Make your expectations explicit, enlisting the help of pupils and teaching assistants to ensure that everyone follows the rules.
- Gradually increase your expectations of pupils. Reduce the support you provide, for example by modelling the task in less detail, and increase the demand, for example by introducing longer or more complex tasks.
- Only move on to developing new or higher-order learning skills when you feel that most of the class are developing good learning habits. Even then, you will need to continue providing opportunities for practice.
- Be consistent. Changing pupils' habits involves changing your own first, so be vigilant and do not slip back into old ways.

Task 4

Classroom assignment: teaching learning skills 90 minutes

Choose a learning skill to develop

Using the checklist you prepared in task 2, decide what learning skill or skills you will focus on with your chosen class. At the beginning of this section (page 6) it was suggested that the basic learning skills to develop in pupils are:

- organising and sequencing their work;
- appreciating when they need to seek help or ask questions.

Alternatively you might decide to focus on a learning skill you saw successfully taught by the teacher you observed in task 3, for example:

- working effectively in small groups: pupils are given a clear brief, strict time limits and specific feedback points to prepare;
- working on a skill not previously given much attention in your subject (e.g. drafting and re-drafting, much practised in English lessons, could be used in science to help pupils to develop written explanations).

Whatever you choose, keep it specific and fairly simple. That way you are more likely to see a clear positive response from the class.

Plan and teach the lesson

Plan your lesson, giving specific attention to how you will:

- model the task and the learning skills for the class;
- monitor and give feedback, involving pupils as much as possible.

Teach the lesson, then do an evaluation. Consider whether the class, or at least some of the pupils:

- began to show more independence in the area you were trying to develop;
- showed fewer signs of disorganisation or over-reliance on others.

Continue to develop the same learning skills with your chosen class, modelling a variety of tasks in subsequent lessons. It will take time for the new skill to be embedded into everyday learning.

3 Supporting pupils in developing independence

The following strategies are useful in helping pupils to develop as independent learners.

Modelling the learning process and learning habits: Modelling is a powerful teaching strategy for making explicit your expectations:

- What should the class do, and in what order?
- How should they do it and deal with issues and difficulties?

(See page 7.)

Planning teaching sequences that lead towards independence:

- Provide 'scaffolding' which you remove when pupils are ready.
- Encourage learning skills to become learning habits.
- Gradually increase expectations, for example modelling more difficult problem solving or introducing collaborative group work.

(See case study 2.)

Setting clear objectives and sharing with pupils the criteria for success: This involves more than simply announcing the objectives at the start of the lesson. Pupils need to know why they are doing something, how it links with other work and what a good answer will look like.

Using key words and 'quality boards' to explain and clarify:

- Have key words on display (or taped to the desk for pupils with special educational needs) and make it clear to pupils when they are to be used.
- Illustrate expectations by displaying annotated written work: 'Note that there are three clear sections …', 'It is good that the report addresses …'.

(See also case study 3 where the teacher draws pupils' attention to how they should work by saying 'In a good group I will see …'.)

Helping pupils develop self-assessment skills: Getting pupils to evaluate their own work helps them to make links, gain a sense of purpose and develop independent judgement. For example, in the plenary you could try the following:

- invite pupils to tell the class what they have done and evaluate it together;
- identify errors, difficulties and misconceptions and begin to deal with them;
- pose a fresh problem to test whether pupils can apply their learning.

(See case study 5.)

Case study 3

Video sequence 17a shows a mathematics teacher with a Year 8 class, teaching a lesson on the interpretation of data, presented in the form of bar charts and pie charts.

Interpretation of data is recognised as a weak area for many pupils. In this case there was an additional challenge because, at the beginning of the school year, it was agreed that this particular class needed to develop their speaking and listening skills. By the time this lesson was recorded, they had made significant progress in this area as a result of the teacher focusing on these skills over a period of several months, using very specific teaching strategies.

Whole-class discussion in this lesson was based on comparing two data charts, using a 'hide and reveal' strategy. The teacher covered the labels and scales and then asked pupils to conjecture what the charts might be about, gradually revealing more information. This is a particularly effective strategy for provoking exploratory talk: pupils feel free to come up with ideas and to comment on each other's suggestions.

If you would like to see an extended extract from this lesson, look at the video in the pack *Interacting with mathematics in Key Stage 3: Year 8 materials*, which your mathematics department will have (it was given to departments on courses in summer 2002).

Reflection — Developing independence

From pupils' responses in the video sequence, what evidence do you see that the mathematics teacher's strategies are improving their learning habits?

Consider:

- the use of key words, expecting pupils to say them aloud;
- working with a partner on a problem;
- sharing different views; explaining other views 'in your own words';
- the use of positive teacher language;
- giving teacher summaries of pupils' views, showing how they agree with each other;
- encouraging extended thinking by asking: 'What else?', 'Who can add to that?'

Developing exploratory talk

Exploratory talk is a way of communicating which enables pupils to think together effectively. But it does not happen by chance: you have to establish ground rules. Everyone should:

- be encouraged to contribute opinions and ideas and to give reasons;
- share all relevant information and ask other people for information and reasons;
- feel free to disagree if they have a good reason, but be willing to change their minds if they are persuaded by someone else's good reasoning;
- treat other people's ideas with respect and try to come to an agreement.

Case study 4

A Key Stage 3 history teacher identifies opportunities for talk and explains his strategies for encouraging group discussion:

'The class are asked to choose the people they want to work with, forming groups of up to five. These friendship groups help motivation. The less able are supported by their friends and teaching assistants are advised which group to work with. If someone doesn't want to join a group, I let them work alone for one session and this helps them to see the disadvantage of having no one to discuss things with. Sometimes I work with a child who has elected to work alone – I think it's important to bring them in by experience and example. This way I respect their wishes and avoid conflict. At the start of the year many of them are rather quiet, but by the end of the year they are all buzzing – the activities and groups give them confidence to speak out. The less able do especially well; they learn, for example, that they can read aloud without anxiety.

The Year 7 topic is the Black Death in 1348. Each group is provided with a separate set of information about the plague. All the pupils have a clipboard and a structured worksheet. The groups talk about their information and create a bulleted list of key points. Then members of the group go off to collect other information from other groups. They must keep one person at their table, or 'learning station', to teach the 'visitors' who arrive from other groups what they know. Finally, each group makes up a song, using any tune they like, about the topic. One group, for example, used "Wild Thing". I record the songs with the digital video camera – always in my desk drawer – and we all watch the results on the TV, here in the room. As well as being very motivating, the approach involves multiple intelligences.'

Reflection

From the case study above, identify one or two strategies you could employ in your teaching to improve the value of talk in groups.

Reflection

Reflection is important if pupils are to understand more fully what and how they have learned. It is one way in which pupils can develop a language about learning. With this awareness they are more likely to become independent learners, better equipped for lifelong learning.

The experience of teachers suggests that, where pupils have had no chance to reflect on their learning and thought processes, their accounts of learning outcomes are dominated by describing lesson content. Where teachers have made learning more explicit, for example by using collaborative groups and conducting whole-class plenaries which focus on processes, the pupils' accounts of learning outcomes are broader and include greater awareness of how learning has been achieved.

Case study 5

A Year 8 geography class had been studying tensions and problems in inner-city areas. In one lesson they were given a 'mystery' – an activity where they had to answer an open question (in this case, *Who smashed a car windscreen?*) by using information on 15 to 30 small slips of paper, some of which may have been irrelevant or misleading. In the plenary they were asked to identify the assumptions they had made in trying to reach a decision on the basis of incomplete evidence.

Teacher	What do you think you learned during that lesson?
Male pupil 1	We learned about assumptions, like you shouldn't just rush into deciding something without thinking carefully.
Male pupil 2	Yeah, you thought you were right and then you had to think about it and you weren't so sure, especially when you listened to other groups.
Interviewer	How did the teacher help you?
Female pupil	The teacher kept saying, 'Do you really know that? Is it a fact?' Usually we were wrong, well, sort of.
Male pupil 2	You had to have evidence to back it up, like in a court … like a trial.
Female pupil	At the end you could see how lots of fights start. People think they are right, but they don't think, not really. It was funny when the teacher talked about fights he used to have with his brother, just like me and my sister.

Reflection

What benefits would you say that these pupils got from the awareness they are expressing?

In what ways do you provide your pupils with opportunities to develop awareness of strategies and learning?

Reading skills

The focus of this unit is not that pupils have to work purposefully for long periods on their own. However, if they are to achieve a degree of independence in their learning, they need reading skills developed to a certain level in order to be able to retrieve and handle information effectively.

The Key Stage 3 National Strategy *Literacy progress units* are provided to contribute to and complement the teaching of English in Year 7, specifically for teachers of pupils who need help to progress from level 3 to level 4. The unit on information retrieval identifies the skills that pupils need to acquire in their non-fiction reading. They need to be able to:

- scan text to pick out specific information;
- skim text for an overall impression and the main points;
- recognise the impact of page layout and organisation;
- select relevant information;
- summarise accurately;
- make notes effectively.

These reading skills are vital to accessing other subjects of the curriculum.

Task 5

Developing reading skills — 20 minutes

Consider each of the information retrieval skills in turn and think about the needs of pupils learning the subject (or subjects) that you teach. To what extent do they need to use that particular reading skill: often, sometimes or rarely?

Next, decide which of the skills is needed most often and think about how you can help pupils develop and practise this skill.

For ideas on how to develop pupils' reading without encroaching on your subject teaching time, see unit 13 Developing reading. You might also find it helpful to talk to a colleague from the English department to help develop your understanding of the issues surrounding the acquisition of literacy skills and to discuss further strategies.

Reflection

Think of the best class you have ever known. (You may have been a member of it!) How would you describe the characteristics of their learning?

What you are aiming for with your current class is to begin to develop just some of those characteristics. It is important to hold on to the fact that small changes in your teaching can make a significant difference over time.

Task 6

Classroom assignment: developing independence 90 minutes

Developing more learning skills

Plan a lesson to further develop pupils as independent learners.

Reread and reflect again on the key strategies for developing learning skills summarised on page 11 and case studies 3 and 4 which give examples from different subjects.

Select one or more strategies from these pages to incorporate into your planning for a lesson for your class. Think creatively about how to adapt the idea to your subject.

Do not introduce too many strategies at once. Your expectations of the class need to be made explicit and they will not cope with too much. However, do reinforce any learning skills that you developed in the first classroom assignment (task 4) and subsequent lessons.

If at all possible, invite another teacher to observe this lesson. Make sure you brief beforehand on the teaching strategies you intend to employ and the pupil outcomes you are seeking.

Reviewing the lesson

Reflect on the lesson, using the following questions.

- Did you carry out the lesson plan as intended? If not, what modifications did you make and why?
- Was the response of the class what you had hoped for? If not, then why not?
- What can you learn to carry forward in future lessons?

If your lesson was successful, you will probably feel confident about continuing. If you are a little dissatisfied, then try to decide on the reasons for this, talking it through with someone else if you can. It may simply be that you expected too much from one lesson and need to persist with the strategies over a series of lessons.

4 Supporting thinking

Principles for teaching thinking are based on the premise that human intelligence is not fixed, the brain continues to develop and learning opportunities with suitable challenge can be offered to all. The main ideas behind supporting thinking are outlined below.

Cognitive conflict: Tasks need to provide appropriate challenge. 'Conflict' refers to the struggle to think through challenging problems and issues. Through experience of cognitive conflict, pupils develop the ability to hold information in their heads and to process it.

Specific thinking ability – patterns and 'the big picture': Each subject has its main ideas and key patterns of reasoning. Once pupils have learned these they can relate new information and detail to these key patterns and ideas. Moving between detail and overview is essential to completing many tasks. In science, for example, if pupils understand the two key scientific ideas of particles and energy, they will be able to use this to explain the process of dissolving.

Sharing thinking: Exploratory talk facilitates interpreting, questioning, connecting, summarising, speculating and predicting. This shared activity develops the individual's thinking because the group generates and refines a range of ideas and knowledge that are gradually internalised. (See case study 4.)

Metacognition: This involves monitoring and regulating thinking. Pupils can be encouraged to step back and review what they are doing, to question whether or not they are using the most appropriate strategies to deal with a particular problem and are taking account of all the relevant information (see unit 2).

Disposition to think: Pupils have views about themselves as learners. Many have negative views and will say 'I am no good at …'. Teaching needs to be planned to encourage such pupils to think that they can become better learners.

Teaching thinking involves managed discussion and focused intervention, as well as effective instruction. Pupils who lack learning skills will certainly not develop them if these challenges are sidestepped.

The specific teaching of thinking skills can be studied using unit 16 Leading in learning.

Supporting thinking

Subjects such as art or design and technology rely heavily on visual literacy, and thinking-skills activities can play an important part in their development. 'Maps from memory', reading photographs and pictures, and 5Ws (who, what, when, where and why) all contribute to pupils' ability to process visual information, to question the validity of images, to detect bias or to evaluate the work of an artist or photographer.

Case study 6

A teacher of food technology used a version of maps from memory as an introduction to packaging. The task was for each group to draw collectively their own version of a collapsed and flattened cereal packet. Working in groups of three or four, pupils took turns to visit the teacher's desk to observe the flattened packet for 20 seconds, with no pencil and paper for recording. They then returned to the group to draw and write what they could remember, adding to what previous group members had seen. The class greatly enjoyed the challenge as well as the competitive aspect.

The activity provided a superb opportunity for pupils to develop insight into part–whole relationships (information processing). Planning, checking and group cooperation were also developed as the pupils decided on the best strategies. These skills are at the heart of the enquiry methods (posing and defining problems, planning what to do, predicting outcomes and anticipating consequences, and improving ideas). The intense study of the information and layout of the packet led to wide-ranging work about requirements of food labelling, design and construction of packets, and artwork. The task was also used as revision at the end of the unit of work.

Reflection

In educational debate there is sometimes a tendency to emphasise the verbal and to neglect the visual dimension of human capabilities. This has several unfortunate consequences. Firstly, success in many subjects may require a greater emphasis on spatial thinking than is perhaps recognised. Secondly, pupils who are better thinkers spatially than they are linguistically may be disadvantaged.

Reflect on the following questions.

- Is there a visual dimension to your subject to which you could give more attention?
- Do you have pupils who might respond better to lessons if concepts were presented in a more visual way?

Using the environment to support thinking

It is possible to have a beneficial impact on learning and pupils' learning skills by paying careful attention to the detail of the classroom environment. Here a deputy head teacher describes a whole-school approach which has created significant changes in classroom interactions and pupil's effectiveness as learners.

Case study 7

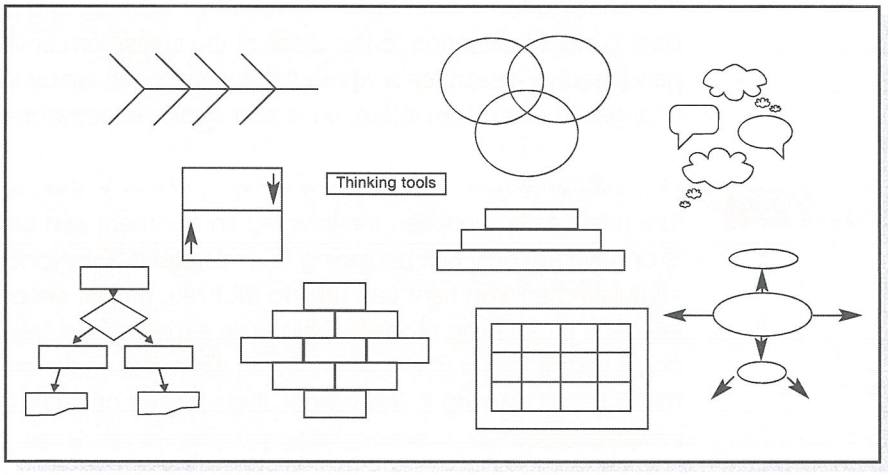
The relationship between the learning environment and pupils' learning and thinking is one we are only just beginning to understand. Everyone knows that a really stimulating environment can help to motivate pupils, especially those who are visual learners; it can even probably help raise expectations. We wondered whether we could take things a step further. Could we make a difference to the actual talk, the thinking and learning in the school, if we looked carefully at the detail of classroom environments?

Case study continues

We were prepared to do the usual things, such as repairing damaged walls and equipping rooms with OHTs and, when we could afford it, interactive whiteboards. The real challenge, however, was whether we could influence interactions and actions that take place in the learning environment, considering that rooms vary a great deal. Some of that variation was seen as constructive because it helped give pupils a flavour of different subjects. Other aspects were much less helpful. Some rooms had bright and interesting displays to help stretch pupils' thinking and imagination. Other rooms looked tired and the displays were dated and possibly irrelevant to pupils' work. It had become wallpaper – seen only on the first occasion that pupils entered the room. Could we change that and provide teachers and pupils with visual material which propelled them into different kinds of talk and deeper learning?

As a first step, we pushed for greater consistency of displays by providing all teachers with a way to subdivide their available space. We provided common titles, for example 'News and notices' and 'Important words', and also some back-up help to mount materials. We then encouraged teachers to think about the kinds of useful talk they were trying to promote and to display more high-level work generated by previous groups. We thought that would help teachers move forward with conversations about success criteria and how to improve. We also encouraged them to develop their 'word walls' by adding a range of thinking and learning words, which would progressively help pupils talk about, and even analyse, their learning. Words such as 'reflection', 'evaluation' and 'classification' were added, and teams began to talk increasingly about how they wanted pupils to use the words. A lot of implicit things began to be made much more explicit to pupils.

We also decided that if we were to influence pupils' thinking we should give them a better idea of the 'thinking tools' that are available to them. As a supplement to the disparate work going on in departments (designed to encourage subject-based thinking skills development) we drew up an array of what might loosely be called generic 'thinking tools' – devices which any pupil could use to help focus their thinking whenever they were faced with challenging work in any subject. Initially, we just thought about tools such as concept maps, but then we decided to add other structures, such as 'diamond ranking' and 'force field analysis'. At first we considered display versions, one for each room, but then we decided to put a laminated sheet on every table or workspace where it might be needed. That A3 sheet, laminated to the table, provides scaffolding for any individual or group and, perhaps equally importantly, enables teachers to push pupils into both discussion and problem solving for themselves.



It has made a difference. Pupils do refer to the tools when they face dilemmas and challenges. They talk to each other much more about how to do things. When asked, they say they feel more in control of their own learning. If they don't have access to one of the sheets, they will be quite assertive in asking for one. Some even feel that working like this helps them to remember.

These changes were about influencing the nature and quality of talk in classrooms. At the same time as making these changes, we made one of our best decisions, which went on to influence the talk between teachers. We arranged for all staff to hold departmental meetings in other subjects' departmental bases. It was that simple – a 'low cost' or even 'no cost' change. Some people complained a little but the benefits soon became clear and have continued ever since. It was capacity building, virtually by accident. Whenever any teacher went to a departmental meeting, they spent time looking at the resources around them. Almost inadvertently, they learned about the approaches and thinking that other departments were trying to promote. It created common ground, discussion and collaboration across the subject boundaries. Inch by inch it moved discussion away from 'the worst possible child' to talk about aspects of teaching and learning. Partly by chance, but also partly by design, we – pupils as well as teachers – all began to feel we were moving in the right direction.

Task 7

30 minutes

Reflect on the implications that this case study might have for how you organise your own classroom.

- What features of your classroom and your practice help pupils to talk about and understand their learning?
- What might you add to encourage further development?
- Share your ideas with colleagues and generate a set of strategies you might all apply so that your efforts are reinforced by those of other teachers.

Task 8

Reflecting on outcomes

15 minutes

Reflect briefly on the pointers to pupils' progress towards becoming more independent learners, set out on page 1. Make brief notes on signs of progress with your chosen class.

Next, turn to the summary of research on pages 21–23 and identify the teaching strategies that you have employed to help pupils achieve these outcomes.

Spend a minute or two repeating task 1 on page 2 (reflecting on your teaching with this class), comparing results this time with your previous response.

Summary of research

Motivation

One of the most important areas of research that helps illuminate effective learning is the work of Carol Dweck (1999) on 'self-theories'. One of her research findings is that the majority of pupils have one of two contrasting theories in relation to intelligence. She labels the two theories 'Entity theory', in which you believe that you are born with a fixed amount of intelligence, and 'Incremental theory', in which intelligence can be developed through effort and engagement.

> *A belief in fixed intelligence raises students' concerns about how smart they are, it creates anxiety about challenges, and it makes failures into a measure of their fixed intelligence. It can therefore create disorganised, defensive, and helpless behaviour.*
>
> *A belief in malleable intelligence creates a desire for challenge and learning. Setbacks in this framework become an expected part of long-term learning and mastery and are therefore not really failures. Instead they are cues for renewed effort and new strategies.*

In order for pupils to be effective learners they need to have a belief that they can become better learners. To encourage this, teachers need to reinforce effort and risk-taking in learning rather than neatness. The 'self system' is fundamental because it underpins motivation.

Emotional intelligence

Emotional intelligence has attracted a lot of attention as an appealing explanation of success (or lack of it) in life. Because it is a new area of work, research evidence is thin on the ground. However, there is a fairly recent claim that EQ (Emotional Quotient, the equivalent of IQ) is the most important determinant of success and happiness in life ('All in the Mind', BBC Radio 4, 9 March 2004). The significance of EQ is that it may govern much of our ability to work well with others and our ability to manage our own feelings and emotions in the pursuit of learning.

Helping pupils become more independent

A compelling piece of research was carried out by Boaler (1997) who compared the teaching in two mathematics departments. At 'Amber Hill' pupils were subject to a class-taught, traditional model with the demonstration of set routines and many practice exercises from books and worksheets. At 'Phoenix Park' pupils were taught through a problem-solving approach and were taught methods and procedures when they were needed. The pupils achieved broadly similar results at GCSE, although the Amber Hill pupils did better on the 'procedural' or routine questions and the Phoenix Park pupils did better on the 'conceptual' questions.

However, the interviews and observations undertaken by Boaler indicated that the Phoenix Park pupils did not see any boundary between mathematics in the real world and school classrooms. The Amber Hill pupils, however, saw little use for the mathematics that they had learned in school in out-of-school situations and tended to forget what they had learned rather quickly. Encouragingly, Phoenix Park pupils

reported that they had developed self-motivation and self-discipline and that the openness of work encouraged them to think for themselves.

The metacognitive approach

An important element in problem solving is metacognition. This term basically encompasses knowledge about one's own thought processes, self-regulation and monitoring of what one is doing, why one is doing it and how what one is doing helps to solve the problem. It is particularly useful when faced by new and difficult problems. This allows one to ascertain whether the strategies one is using are effective, and thus to change strategies if necessary (Schoenfield 1992). It is clear that these kinds of thinking skill are of great importance to children, not only to develop their problem solving, but also to develop thinking skills more generally. Developing metacognition will also lead pupils to be more aware of their own strengths and weaknesses (Schoenfield 1987).

A range of studies provides compelling evidence that teaching approaches which include metacognitive aspects are very effective. For example, Wang, Haertel and Walberg (1993), in a review of research on instruction, found that metacognitive approaches to learning a process had some of the biggest impacts.

Schoenfield (1987) suggests activities such as showing a video of other pupils engaged in cooperative problem solving, so that pupils can see others using effective problem-solving strategies. This can impress upon them the importance of awareness of what they are doing.

Subject-based approaches: cognitive acceleration in science and maths

Some research has shown that it is more effective to teach thinking skills in a subject-based rather than a decontextualised way. The Cognitive Acceleration in Science Education Project (CASE) (Adey and Shayer 1994) and Mathematics Education Project (CAME) follow from this research.

The CASE project, containing 32 lessons, has five main elements.

- Concrete preparation is needed to introduce the necessary vocabulary and clarify the terms in which the problem is to be set. This means that the teacher needs to set the problem in context, and explain the meaning of the vocabulary that the pupil will need.
- The teacher needs to introduce 'cognitive conflict'. This occurs when pupils are introduced to an experience which they find puzzling or which contradicts their prior knowledge or understanding.
- Pupils then need to move on to a construction zone activity. This is an activity which ensures that pupils go beyond their current levels of understanding and competencies. Teachers can help pupils do this by helping them to build up, step by step, the higher-level reasoning patterns they need to access.
- Pupils need to reflect consciously on their problem solving (metacognition) in ways similar to those described above.
- Pupils then need to 'bridge' their new skills or knowledge, in other words to be able to apply it in different contexts.

Learning to learn

The Campaign for Learning is also conducting research into developing learning skills. Early findings by Jill Rodd (2002) in the Learning to learn in schools project support the idea that pupils become more motivated to learn and so standards improve when teachers:

- spend time creating a safe, comfortable yet stimulating classroom environment;
- are aware of pupils' different learning styles and adapt their teaching accordingly;
- help pupils to develop an understanding of how they learn most effectively and teach them strategies to enhance their learning skills;
- motivate pupils by relating learning to pupils' personal experience in relevant ways;
- encourage pupils to see learning in its widest context in and outside the classroom.

Summary of research findings from Rodd. J. (2002) *Learning to learn in schools: phase 1 project research report*. Campaign for learning. Used with permission.

References

- Adey, P. and Shayer, M. (1994) *Really raising standards: cognitive intervention and academic achievement.* Routledge. ISBN: 041510145X.
- Boaler, J. (1997) *Experiencing school mathematics.* Open University Press. ISBN: 0335199623.
- Dweck, C. (1999) *Self-theories – their role in motivation, personality, and development.* Psychology Press. ISBN: 1841690244.
- Joyce, B., Calhoun, E. and Hopkins, D. (2002) *Models of learning: tools for teaching.* Open University Press. ISBN: 0335210155.
- Lucas, B., Greany, T., Rodd, J. and Wicks, R. (2002) *Teaching pupils how to learn.* Network Educational Press. ISBN: 1855390981.
- Pressley, M., Woloshyn, V. and Associates (1995) *Cognitive strategy instruction that really improves children's academic performance.* Brookline Books. ISBN: 1571290052.
- Rodd, J. (2002) *Learning to learn in schools.* Southgate. ISBN: 1903107121.
- Schoenfield, A. H. (1987) 'What's all the fuss about metacognition?' In A. H. Schoenfield (ed) *Cognitive science and mathematics education.* Lawrence Erlbaum Associates. ISBN: 0805800573.
- Schoenfield, A. H. (1992) 'Learning to think mathematically: problem solving, metacognition and sense making in mathematics'. In D. A. Groves (ed) *Handbook of research on mathematics teaching and learning.* Macmillan. ISBN: 0029223814.
- Wang, M. C., Haertel, G. D. and Walberg, H. J. (1993) 'Toward a knowledge base for school learning'. *Review of Educational Research* 63, 249–294.

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:

- Work collaboratively with other teachers, preferably teaching the same group in different subjects. For example, you could identify common teaching strategies for developing independent learners. This will ensure that pupils see a similar approach across lessons, enabling you and your colleagues to support each other and evaluate the effectiveness of your strategies.
- Consider a class whose learning skills you wish to develop and, working with a colleague who also teaches that class, reconsider case study 1 and the results of tasks 2 and 3. In the case study agree three or four areas where you feel most pupils fall short and jointly plan how to develop these skills over time. How might you assess the impact of your efforts?
- Select one of the key learning points you have listed above and decide how, through a suitable line of enquiry, you can pursue this further and what method of working would suit you best.

For further reading, the following publications are recommended:

- Fisher, R. (1998) *Teaching thinking.* Cassell. ISBN: 0304700665.
- Hughes, M. (1999) *Closing the learning gap.* Network Educational Press. ISBN: 1855390515.
- Lucas, B., Greany, T., Rodd, J. and Wicks, R. (2002) *Teaching pupils how to learn.* Network Educational Press. ISBN: 1855390981.
- Muijs, D. and Reynolds, D. (2001) *Effective teaching: evidence and practice*. Sage (Paul Chapman). ISBN: 0761968814.

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.

-
-
-

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?

Copies of this document may be available from:

DfES Publications
Tel: 0845 60 222 60
Fax: 0845 60 333 60
Textphone: 0845 60 555 60
e-mail: dfes@prolog.uk.com

Ref: DfES 0440-2004 G

Produced by the
Department for Education and Skills

www.dfes.gov.uk

If this is not available in hard copy it can be downloaded from:

www.standards.dfes.gov.uk

Disclaimer

The Department for Education and Skills wishes to make clear that the Department and its agents accept no responsibility for the actual content of any materials suggested as information sources in this document, whether these are in the form of printed publications or on a website.

In these materials icons, logos, software products and websites are used for contextual and practical reasons. Their use should not be interpreted as an endorsement of particular companies or their products.

The websites referred to in these materials existed at the time of going to print. Tutors should check all website references carefully to see if they have changed and substitute other references where appropriate.

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

Raising Standards
Standards and Effectiveness Unit

INVESTOR IN PEOPLE

Cambridge University Press 09-2004