The Coalition Government took office on 11 May 2010. This publication was published prior to that date and may not reflect current government policy. You may choose to use these materials, however you should also consult the Department for Education website www.education.gov.uk for updated policy and resources.
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### OHTs

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Overview of the module

Objectives

- To develop teachers' self-awareness and analysis of their own questioning techniques.
- To identify key features of good questioning within design and technology.
- To enhance the planning for, and use of, questions within design and technology.
- To identify strategies that support the development of pupils' questioning skills within design and technology.
- To identify relevant skills and plans for professional development (related to questioning) which teachers can then pursue.

Session outline

<table>
<thead>
<tr>
<th>Timing</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 minutes</td>
<td>9.1 Introduction</td>
</tr>
<tr>
<td>5 minutes</td>
<td>9.2 Analysis of questions</td>
</tr>
<tr>
<td>6 minutes</td>
<td>9.3 Purposes of questions</td>
</tr>
<tr>
<td>5 minutes</td>
<td>9.4 Questioning: pitfalls and alternatives</td>
</tr>
<tr>
<td>25 minutes</td>
<td>9.5 Using questions to promote thinking</td>
</tr>
<tr>
<td>25 minutes</td>
<td>9.6 Classroom tactics for effective questioning</td>
</tr>
<tr>
<td>2 minutes</td>
<td>9.7 Questioning – an overview</td>
</tr>
<tr>
<td>3 minutes</td>
<td>9.8 Ready for more?</td>
</tr>
</tbody>
</table>

Preparation and planning

Photocopy handout 9.4 and cut it into separate questions, ready for the activity in section 9.5. Prepare one set for every three participants.

Resources

- Appendix 9.1, Questions for learning
- Handouts 9.1 to 9.9
- OHTs 9.1 to 9.7
- DVD sequence for this module
- Flipchart and pens
Special note for presenters

In this module, it is important that tutors model good practice in their own use of questions and their responses to participants. To help to achieve this, prompts have been written into various sections. It may aid participants’ understanding and learning if tutors ‘think aloud’ as they ask questions by saying, for example, ‘Now I’m going to pause and provide thinking time.’

Appendix 9.1, Questions for learning, which is part of the material for foundation subjects, includes further ideas and suggestions for developing effective questioning. It is intended to be distributed to participants at the end of the session.

At all stages within the training session the tutor should link questioning to the objectives for design and technology. Stress that good questioning can be used to generate understanding of key skills and knowledge, to assess current understanding and to ascertain whether an objective has been met.
9.1 Introduction

Welcome participants to the training and explain any domestic issues.

Show OHT 9.1 and run through the objectives for the session with the participants.

### Objectives

- To develop teachers’ self-awareness and analysis of their own questioning techniques.
- To identify key features of good questioning within design and technology.
- To enhance the planning for, and use of, questions within design and technology.
- To identify strategies that support the development of pupils’ questioning skills within design and technology.
- To identify relevant skills and plans for professional development (related to questioning) which teachers can then pursue.

### Key points

- To some extent, effective questioning is characterised by a good deal of ‘instinctive’ practice. After this training session, participants will increasingly be able to reflect on, analyse and develop further the effectiveness of what they do currently.

- The design process demands high-level thinking skills. This training session will help participants to identify specific ways of developing their own questioning techniques and plan to develop these skills in their pupils.

Show OHT 9.2, which states four reasons why questions are central to teaching and learning within design and technology.

### The importance of questioning

Questioning is a critical skill for teachers of design and technology because it is:

- the most common form of interaction between teachers and pupils;
- central to evaluating processes and products;
- a key method of providing appropriate challenge when developing, planning and communicating ideas;
- the most immediate and accessible way for a teacher to assess knowledge and understanding.
9.2 Analysis of questions

Activity 1

Ask participants to spend 3 minutes listing the questions they have asked pupils over the past week. They may choose questions they have asked a whole class, smaller groups or individual pupils within focused practical tasks (FPT), design-and-make assignments (DMAs) or product analysis. Encourage them to select questions that are typical of the normal range and type that they ask within their teaching.

Refer participants to handout 9.1 and clarify the definitions of open and closed questions.

**Open questions:** Usually have more than one possible answer and often require an extended response.

**Closed questions:** Assess pupils’ knowledge and understanding but often require just one correct answer.

Ask participants to spend a further 2 minutes using the handout individually to analyse their own questions. An example has been provided on the handout to clarify the nature of the task.
9.3 Purposes of questions

Explain that participants will now look in depth at the questions they use in lessons.

Activity 2
Ask participants, in pairs, to:
- compare their notes from their completed copies of handout 9.1;
- generate a list of three key purposes for asking questions in design and technology lessons.

In order to draw out important purposes when generating this list, suggest that participants should focus on:
- what their goals are when they pose questions, for example, asking pupils to justify decisions;
- the outcomes of questioning when it is done well.

Allow 3 minutes, then ask each pair quickly to select one key purpose of questioning they would like to report back to the whole group. Ask them to justify their choice and explain why they made their choice. Promptly take feedback and record responses on a flipchart.

Show OHT 9.3 and use it, with the information recorded on the flipchart, to summarise.

OHT 9.3

Purposes of questioning
- To interest, engage and challenge pupils.
- To check on prior knowledge.
- To stimulate recall and use of existing knowledge and experience in order to create new understanding and meaning, e.g. responding to a design brief.
- To focus thinking on key concepts and issues.
- To extend pupils’ thinking from the concrete and factual to the analytical and evaluative, e.g. giving reasons for choices, justifying decisions.
- To lead pupils through a planned sequence which progressively establishes key understandings, e.g. the development of design criteria.
- To promote reasoning, problem solving, evaluation and the formulation of hypotheses.
- To promote pupils’ thinking about the way they have learned.

Explain that this activity modelled effective questioning techniques, demonstrating:
- thinking time – each pair was asked to select one key purpose of questioning; (20 seconds would be an acceptable amount of time for them to reach their decisions. Using a timer would also model good practice and reinforce the importance of accuracy in timings.)
- probing for explanation and justification. (indicating that an extended response is expected.)
**9.4 Questioning: pitfalls and alternatives**  
**5 minutes**

Explain that participants are now going to model an excellent question–response strategy for pupils. They are going to practise using a technique to discuss common pitfalls that they have encountered in asking pupils questions.

**Activity 3**

Introduce and explain the concept of ‘Think, pair and share’.

- **Think:** Spend a few moments thinking about the topic individually.
- **Pair:** Share ideas and responses with a partner and possibly record results.
- **Share:** Join with another pair, share information and select the key information to report back to the whole group.

Ask participants:

- What are the common pitfalls when questioning within design and technology?

Take participants through the ‘Think, pair and share’ process. Take brief feedback and record responses on the flipchart.

Show **OHT 9.4** and go through it to summarise common pitfalls in questioning.

![OHT 9.4](image)

### Pitfalls in questioning

- It is easy to fall into the trap of:
  - asking too many closed questions;
  - What type of plastic is this?
  - What does CAD stand for?
  - asking pupils questions to which they can respond simply with ‘yes’ or ‘no’;
  - Would you buy this product?
  - Did your design proposal match your criteria?
  - asking too many short-answer, recall-based questions;
  - dealing ineffectively with incorrect answers or misconceptions;
  - focusing on a small number of pupils and not involving the whole class;
  - not giving pupils time to reflect, or to pose their own questions;
  - asking questions when another strategy might be more appropriate;
  - too much teacher-led questioning.

### Key points

- The final three pitfalls are key issues within design and technology; currently, pupils are not developing the independent questioning skills that the curriculum requires.

  - Avoiding these pitfalls can have two key outcomes:
    - greater pupil participation in lessons;
    - greater depth in teaching and learning.

  - Questions that start with ‘Can you …?’ or ‘Are you …?’ may be unhelpful for pupils with special educational needs as they may interpret the question literally and the response will be ‘yes’ or ‘no’.

- Teachers may need to consider how to use a range of questions sensitively in order to maintain the self-esteem of individual pupils.
Refer participants to *handout 9.2*, which identifies a variety of alternatives to direct questioning. Ask participants to consider the examples and, if they can, add more ideas or examples of alternative strategies.

**Handout 9.2**

<table>
<thead>
<tr>
<th>Alternative strategy</th>
<th>Example within design and technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share pupils’ designs</td>
<td>Would you like a little more about your design? I am not sure I know now that resolution will work, could you explain a little bit more to me?</td>
</tr>
<tr>
<td>Speculate about the subject under discussion</td>
<td>I wonder what might happen if ... Have you considered the possibility of ...?</td>
</tr>
<tr>
<td>Seek a suggestion</td>
<td>Could you try ...</td>
</tr>
<tr>
<td>Connect the topic</td>
<td>Perhaps, we have a way of tackling the real issue... Let’s bring all these ideas together...</td>
</tr>
<tr>
<td>Clarify ideas</td>
<td>It might be useful to discuss this. The predictions is going seem to point to ...</td>
</tr>
<tr>
<td>Make a suggestion</td>
<td>Not sure what ... - because ... The impact of your development work is excellent</td>
</tr>
<tr>
<td>Check the idea</td>
<td>What came to the discussion is a result of ... The impact of ... and results ...</td>
</tr>
<tr>
<td>Check the idea</td>
<td>We had planned to ... however ... Your potential end user is ... Therefore ...</td>
</tr>
<tr>
<td>Acknowledge contributions</td>
<td>So you think ...</td>
</tr>
<tr>
<td>Non-verbal interventions</td>
<td>Make eye contact, smile, nod, use open, positive body language to encourage extended response, to challenge assumptions, to reward the use of supporting evidence, etc.</td>
</tr>
</tbody>
</table>

### 9.5 Using questions to promote thinking    25 minutes

Show [OHT 9.5](#), which outlines Bloom’s taxonomy of questioning, and refer participants to *handout 9.3*.

**OHT 9.5**

**Bloom’s taxonomy of questioning**

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation
Key points
Spend about 5 minutes going through these points with participants.

- Bloom researched thousands of questions that teachers asked, and categorised them.
- Research has consistently shown that the large majority of questions asked by teachers come from the first two categories, which relate to factual recall and comprehension.
- Few questions come from the other key categories, which relate to higher-order thinking skills.
- Application, analysis, synthesis and evaluation are crucial, independent thinking skills required of pupils within design and technology at Key Stage 3.
- Research has shown that pupils’ levels of achievement can be increased by regular practice of higher-order thinking.
- Achievement at level 5 and above within design and technology requires pupils to have developed the independent thinking skills identified in Bloom’s higher-order categories of application, analysis, synthesis and evaluation.

Ask participants to consider how well their own pupils are able to apply, analyse, synthesise and evaluate.

Activity 4
Ask participants to work in groups of three. Give each group a set of 18 questions cut from handout 9.4. Participants should categorise the 18 questions, according to the different levels of Bloom’s taxonomy (handout 9.3). Acknowledge at the outset that prior knowledge and context may have a significant influence on the ‘order’ of thinking required by each question.
After 10 minutes, take brief feedback.

**Key points**

- There are deliberate subtleties built into the list of questions, especially questions 3 and 4. These are designed to provoke deeper thought about the detail of wording. The main point to be drawn from these two questions is that teachers can enhance their questioning significantly by attention to their wording.

- Changes can readily be made which improve the engagement and involvement of pupils and, at the same time, encourage higher-order thinking.

Explain that this feedback session provides opportunities to model effective questioning techniques, particularly:

- the use of ‘wait time’;

- the use of supplementary questions to elicit justification and broaden thinking;

(It would be particularly helpful to ask participants how a question might have been posed differently, to ensure a higher order of thinking by pupils.)

- referring one participant’s answer to another participant to generate discussion not dependent upon the teacher.

The list below provides an outline answer sheet, although it could be argued that some of the questions could be categorised differently.

**Bloom’s taxonomy – answers**

| Knowledge: | 2, 3, 11 |
| Comprehension: | 10, 15 |
| Application: | 5, 9, 13, 16, 18 |
| Analysis: | 4, 14, 17 |
| Synthesis: | 6, 12 |
| Evaluation: | 1, 7, 8 |
Refer participants to **handout 9.5**, which lists questions typically used within design and technology. Suggest that they use it as a discussion document within their own departments.

**Design and technology questions linked to Bloom’s taxonomy**

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is it made from?</td>
<td>Explain why the product was developed.</td>
<td>Demonstrate how the system is effective.</td>
</tr>
<tr>
<td>What kind of category is it?</td>
<td>What is its cost in relation to the income of the</td>
<td>How would you use what you have learned to solve</td>
</tr>
<tr>
<td>Where is it sold?</td>
<td>potential users?</td>
<td>the problem?</td>
</tr>
<tr>
<td>What is it made of?</td>
<td>What makes it durable?</td>
<td>Predict what would happen if …?</td>
</tr>
<tr>
<td>What is its cost?</td>
<td>How can you judge it has the correct size, shape</td>
<td>What would be the result if …?</td>
</tr>
<tr>
<td>How is it made?</td>
<td>Does it have the right colour, texture, weight?</td>
<td>How would you organise to show …?</td>
</tr>
<tr>
<td>What other products are like this?</td>
<td>State, in your own words, how … and why …</td>
<td>What facts would you select to show …?</td>
</tr>
<tr>
<td>Why has this been constructed in this way?</td>
<td>Illustrate potential design flaws.</td>
<td>What modifications would you make in order to …</td>
</tr>
</tbody>
</table>

**Demonstration**

Show how the selection of questions from the activity on Bloom’s taxonomy could be used within product analysis. Place a product in the centre of the grid on **handout 9.6** and then use the grid as a frame to initiate product analysis and questioning. Suggest that pupils could use this activity within a working group to evaluate their own products or those of others. This strategy will promote focused discussion, extend analysis and improve pupils’ questioning repertoire.
9.6 Classroom tactics for effective questioning 25 minutes

Explain that effective questioning is not just a matter of planning which questions to ask. It requires careful planning, to stage or sequence the questions so that they guide pupils towards key lesson objectives. Effective questioning also depends on how questions are asked.

Tell participants that they are going to watch a DVD which illustrates some tactics and strategies used by one teacher in her questioning. Refer participants to handout 9.7 and invite them to use it, as they watch the sequence, to list the tactics that they observe being used.

Explain that the video was filmed at Kettlethorpe High School in Wakefield. Dawn Barraclough-Green is leading a Year 9 lesson focused on an investigation of pasta products.

Show the DVD sequence on Questioning.

After they have watched the sequence, take feedback and responses from participants. Record their ideas on a flipchart, referring back to OHT 9.4, to build up a list of tactics that made the questioning successful.

A wide range of responses is possible. These notes are provided not as ‘answers’ but to support discussion and to help to identify positive features.

Key points

The questioning in the sequence could help to stimulate and promote:

- **Thinking**
  - Pupils are required to formulate their own questions.
  - A range of open-ended questions is asked.

- **Reasoning**
  - ‘Why’ is frequently used to open questions.
  - Higher-order questions which require analysis, evaluation and justification are regularly employed.
  - Speculative, ‘what if’ questions requiring reasoning are used.
Extended/sustained responses
- Explanations of answers are routinely required.
- Questions which engage emotions or require opinions are set.
- Challenging ‘why’ questions are posed.
- Pupils’ answers are valued by the teacher.
- The teacher’s positive eye contact and body language encourage pupils to continue.

Active listening
- Variety is built into the questions.
- Pupils are required to generate their own questions.

Interaction between pupils
- Pupils are encouraged to ask each other questions.
- Pupils are requested to add to and challenge the answers provided by others.

Refer participants to handout 9.8.

### Handout 9.8

#### Effective tactics for questioning

<table>
<thead>
<tr>
<th>Tactic or device</th>
<th>Benefits/gains</th>
<th>Example/context</th>
<th>Used regularly?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciously waiting for a pupil to think through an answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using a planned mix of ‘conscripts’ and ‘volunteers’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Phone a friend’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Hot-seating’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previewing a question in advance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair rehearsal (of an answer or question)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eavesdropping and deploying specific targeted questions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘You are not allowed to answer this in fewer than 15 words’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberately asking a child whom you know will provide only a partly-formed answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the ‘no-hands-up’ rule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing signals to pupils about the kind of answer that would best fit the question being asked</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Explain that it lists a number of other very useful techniques that teachers, often instinctively, use to make their questioning more productive.

### Activity 5

Ask participants, in pairs, to:
- complete the grid, identifying possible benefits and contexts for using each tactic;
- identify those tactics they use regularly.

Take feedback as a ‘whole class’ by asking participants for quick examples from their own teaching. As tutor, model some of the devices and techniques listed in order to provide further exemplification. Refer participants to handout 9.9, which gives examples of some gains, to be used as a basis for further discussion.
9.7 Questioning – an overview

2 minutes

Show OHT 9.6 to summarise the key characteristics of effective questioning.

Illustrate these generalisations by referring back to examples seen in the video or discussed in the group or whole-class activities.

Effective tactics for questioning

<table>
<thead>
<tr>
<th>Tactic or device</th>
<th>Benefits/gains</th>
<th>Example/context</th>
<th>Used regularly?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciously waiting for a pupil to think through an answer (before you break the silence)</td>
<td>Prompts depth of thought and increases levels of challenge</td>
<td>Enhances engagement and challenge for all</td>
<td>Often</td>
</tr>
<tr>
<td>Using a planned mix of ‘conscripts’ and ‘volunteers’</td>
<td>Encourages whole-class listening</td>
<td></td>
<td>Sometimes</td>
</tr>
<tr>
<td>‘Phone a friend’</td>
<td>Encourages listening for detail and provides challenge</td>
<td></td>
<td>Occasionally</td>
</tr>
<tr>
<td>‘Hot-seating’</td>
<td>Signals the big concepts and learning of the lesson</td>
<td></td>
<td>Rarely</td>
</tr>
<tr>
<td>Previewing a question in advance</td>
<td>Facilitates informed differentiation</td>
<td></td>
<td>All the time</td>
</tr>
<tr>
<td>Pair rehearsal (of an answer or question)</td>
<td>Develops speaking and reasoning skills</td>
<td></td>
<td>Sometimes</td>
</tr>
<tr>
<td>Eavesdropping and deploying specific targeted questions</td>
<td>Excellent for building understanding from pupil-based language</td>
<td></td>
<td>Often</td>
</tr>
<tr>
<td>‘You are not allowed to answer this in fewer than 15 words’</td>
<td>Improves engagement and challenges all pupils to think</td>
<td></td>
<td>Always</td>
</tr>
<tr>
<td>Deliberately asking a child whom you know will provide only a partly-formed answer (when asking difficult whole-class questions)</td>
<td>Helps pupils to recognize the range of possible responses and to select appropriately</td>
<td></td>
<td>Seldom</td>
</tr>
<tr>
<td>Using the ‘no-hands-up’ rule</td>
<td></td>
<td></td>
<td>Rarely</td>
</tr>
<tr>
<td>Providing signals to pupils about the kind of answer that would best fit the question being asked</td>
<td></td>
<td></td>
<td>Occasionally</td>
</tr>
</tbody>
</table>
9.8 Ready for more?  
Refer participants to appendix 9.1, Questions for learning, which is drawn from the foundation subjects materials. Draw attention to the last section. Show OHT 9.7. Emphasise that this module has been designed to increase awareness of effective questioning techniques in order to encourage participants to enhance their own practice.

OHT 9.7

Ready for more?

Use a tape or video recorder to record a whole-class question-and-answer session. Replay the tape to help you to evaluate the different aspects of your own questioning.

Did you:
- ask too many questions
- have a balance of open and closed questions
- encourage opinion, informed speculation and tentative answers
- provide thinking time?

Begin to build key questioning strategies into your lesson planning.

In a departmental meeting, discuss how you might plan sequences of questions that build up pupils' understanding of important concepts.
Design and technology: Framework and training materials

Training module 9

Questioning for teaching designing

Appendix and handouts
Questions for learning

Why is questioning important?

- Questions are the most common form of interaction between teachers and pupils in whole-class lessons as well as in group and individual work.
- Questioning is a key method of altering the level of challenge provided and determining the progress made in lessons.
- It is an immediate way for the teacher to check the effectiveness of teaching.

The purposes of questioning

- Questions prompt pupils to inspect their existing knowledge and experience to create new understandings.
- Questions can help pupils to develop thinking from the concrete and factual to the analytical and evaluative.
- Questions help pupils to focus on the key issues.
- Questioning models for pupils ways in which experienced learners seek meaning.
- Closed questions are useful in recap sessions and during explanations to assess understanding.
- Open questions are useful during class discussions and debriefings.

What is effective questioning?

- It is closely linked to the learning objectives in the lesson.
- It is staged so that the level of challenge in the lesson increases as the lesson proceeds.
- Questions in group and paired work can be matched to the level of challenge needed to move different pupils forward in their learning.
- Closed questions assess pupils’ knowledge and understanding.
- Open questions have more than one possible answer. A well-designed set of questions leads pupils from unsorted knowledge to organised understanding. It models the way in which learning evolves.
- Effective questioning provides opportunities for pupils to ask their own questions, seek their own answers and provide feedback for each other.
- Effective questioning makes space for pupils to listen to each other’s questions and answers, as well as to the teacher’s.
- Effective questioning requires an atmosphere in which pupils feel sufficiently secure to take risks or be tentative.
Risks of questioning

- Sometimes, questioning is used in situations where explanation would be a more appropriate teaching strategy.
- It is easy to fall into the trap of asking bogus questions of the ‘Guess my answer’ type.
- A period of interrogation may evolve which continues until the ‘right’ answer is reached.
- Teachers may retain control over the process so that pupils do not have opportunities to initiate questions or provide feedback.
- Sometimes oral comprehension exercises predominate.
- There can be too many closed questions requiring one-word answers.
- Teachers can be diverted by the pursuit of ‘red herrings’.
- There can be problems with fielding incorrect, wayward, glib and unexpected answers.

Improving questioning

Whole school

- Include guidance on questioning in the school’s teaching and learning policy.
- Instigate whole-school training, using good practice from within the school.
- Use Bloom’s taxonomy in training sessions to develop understanding of the way in which questions can trigger higher-order thinking skills.

A Knowledge
Describe
Identify
Who, when, where?

B Comprehension
Translate
Predict
Why?

C Application
Demonstrate how
Solve
Try it in a new context

D Analysis
Explain
Infer
Analyse

E Synthesis
Design
Create
Compose
F Evaluation
Assess
Compare/contrast
Judge

Departments
- Include work on subject-specific questioning at department meetings.
- Use Bloom’s taxonomy to analyse the different types of question being asked and to determine the extent to which these questions are developing pupils’ skills of application, analysis, synthesis and evaluation.
- Ensure that examples of effective questioning are included in schemes of work.
- Try different techniques and seek feedback from colleagues.
- Arrange peer observation of lessons to share and improve practice in questioning.
- Teachers could record and evaluate examples of their questioning techniques to improve their own practice.

Tips for effective questioning

1 Planning for questioning
- Ensure that examples of effective questions are included in schemes of work.
- Use Bloom’s taxonomy to ensure that you are asking questions which demand more than recall of knowledge and demonstration of understanding.
- Share key questions at the start of a lesson – a different way of sharing learning objectives. *These are the questions we shall be trying to answer in this lesson.* Ensure that these key questions are answered by the lesson. The plenary can then be based on these questions.
- Forewarn pupils about some key questions. *Later in this lesson I am going to ask you a question about ….*
- Stop during the lesson to check whether these key questions have been answered. *Have we answered this? Discuss with your partner. What else do you need to know?*
- Ensure that there is a balance between asking and telling.

2 Asking open questions
- Make sure the question has more than one possible answer.
- Don’t have in your head a single ‘right’ answer that pupils have to ascertain.
- Follow up answers with words and phrases such as Explain, Why?, What makes you think that? and Tell me more, to provide greater challenge, to encourage speaking at greater length and to start pupils thinking around the question in greater depth.
- As part of the development of their enquiry skills, encourage pupils to ask their own questions.
- Use questioning techniques such as What do you already know about …? What do you want to know? What questions will help you to find out? How will you find out?
3 Using questioning to develop collaborative work

- Begin a lesson by giving pairs of pupils a question to answer from the last lesson.
- Ask pairs to discuss a question for a minute before they answer it.
- Set up structures for groups and individuals along the lines of *Who wants to be a millionaire?* – ask a friend, ask a group, ask the class – to seek discussion and support for answers.
- Make questions a normal part of the lesson.
  
  *Earlier in this lesson I asked you two questions. Turn to your partner and see if you’re ready to answer them yet.*
- Ask one group or pair to set questions for another group or pair to answer.

4 Treat questions seriously

- Give pupils time to answer; count a few seconds in your head to allow slower pupils to form a response and put their hands up.
- Allow pupils time to research answers to more complex questions, either individually or collaboratively.
- Provide structures to enable pupils to find answers and to form their own questions. Sorting and matching exercises are useful for this.
- Encourage pupils to seek answers to their own questions.
- Treat answers with respect and give pupils credit for trying.
**Improving your own questioning**

Try this evaluation exercise to check your current questioning techniques, and then see whether your practice improves.

Tape-record a 5-minute question-and-answer session. Fill in the grid when you play the tape back. Then try the same activity again, having planned to include a wider range of questioning activities.

<table>
<thead>
<tr>
<th>Questioning activity</th>
<th>Number of occurrences in 5-minute session (first sample)</th>
<th>Number of occurrences in 5-minute session (second sample)</th>
<th>Number of occurrences in 5-minute session (third sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed – factual information and comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open – prompting more than one answer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time for reflection before answer required</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Further prompts to elicit extended answers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunities for pupils to explain why they have offered that response</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Opportunities for pupils to confer before answering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teacher initiates, pupils respond, teacher provides feedback</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupils initiate their own questions</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Did your questioning skills improve as you became more conscious of the techniques you were using?

Were the questions used to move coverage of the learning objectives forward?

Did your questions have increasing levels of challenge?

Were the questions helping to develop the kinds of thinking described in Bloom’s taxonomy in categories C, D, E and F?
### Analysis of questions

<table>
<thead>
<tr>
<th>Question posed</th>
<th>Open/closed</th>
<th>Purpose</th>
<th>Evaluation of pupils’ responses (impact on learning)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do we call this style of printing? Technical</td>
<td>Closed</td>
<td>To stimulate recall</td>
<td>Helped pupils to recall a key term</td>
</tr>
</tbody>
</table>
### Alternatives to questions

<table>
<thead>
<tr>
<th>Alternative strategy</th>
<th>Example within design and technology</th>
</tr>
</thead>
</table>
| Invite pupils to elaborate      | Would you say a little more about your design?  
                                       I am not sure I’m certain how that mechanism will work.  
                                       Could you explain a little bit more for me?  |
| Speculate about the subject     | I wonder what might happen if …  
                                       Have you considered the possibility of … ?  |
| under discussion                |                                      |
| Make a suggestion               | May I suggest that … ?  
                                       You could try …  |
| Reflect on the topic            | Perhaps we now have a way of tackling this next time you …  
                                       Let’s bring all these research findings together.  |
| Offer extra information         | It might be useful to know also that …  
                                       The predictions in Vogue seem to point to …  |
| Reinforce useful suggestions    | I especially liked … because …  
                                       This aspect of your development work is excellent because …  |
| Clarify ideas                   | We have come to this decision as a result of …  
                                       The impact of … will result in …  |
| ‘Correct me if I am wrong … ’   | You had planned to …, however …  
                                       Your potential end-user is …, therefore …  |
| Echo comments/summarise         | So you think …  
                                       So your evidence is suggesting …  |
| Non-verbal interventions        | Make eye contact, smile, nod, use open, positive body language to encourage extended response, to challenge assumptions, to reward the use of supporting evidence, etc.  |
Bloom's taxonomy of questioning

• Knowledge
  Describe
  Identify
  Who, when, where?

• Comprehension
  Translate
  Predict
  Why?

• Application
  Demonstrate how
  Solve
  Try it in a new context

• Analysis
  Explain
  Infer
  Analyse

• Synthesis
  Design
  Create
  Compose

• Evaluation
  Assess
  Compare/contrast
  Judge
Using Bloom’s taxonomy to analyse design and technology questions

1. What evidence supports your design decisions regarding … ?

2. Where is it used?

3. Why has this been constructed in this way?

4. Why do you think this has been constructed in this way?

5. How would you solve … using what you have … ?

6. Propose an alternative solution to …

7. How would you prioritise … ?

8. How would you defend your decision to … ?

9. What would result if … ?

10. How can you judge whether it is the correct size, shape, pattern, colour, smell, taste?

11. What other products are like this?

12. Predict how this type of product will be different in 10 years’ time.

13. What facts would you select to show … ?

14. What assumptions do the manufacturers make regarding … ?

15. Summarise your key findings.

16. Predict what would happen if …

17. How are they persuading you … ?

18. What modifications would you make in order to … ?
# Design and technology questions linked to Bloom’s taxonomy

## Knowledge

<table>
<thead>
<tr>
<th>Question</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is it made from?</td>
<td>What sort/type/category of product is it?</td>
</tr>
<tr>
<td>Where is it sold?</td>
<td>When would it be used?</td>
</tr>
<tr>
<td>How has it been made?</td>
<td>Who designed and made this?</td>
</tr>
<tr>
<td>How much does it cost?</td>
<td>Why is this product high in fat?</td>
</tr>
<tr>
<td>Where is it used? (2)</td>
<td>Who is it for?</td>
</tr>
<tr>
<td>What other products are like this? (11)</td>
<td>Why has this been constructed in this way? (3)</td>
</tr>
</tbody>
</table>

## Comprehension

<table>
<thead>
<tr>
<th>Question</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explain why this product was developed.</td>
<td>What is its cost in relation to the income of the potential users?</td>
</tr>
<tr>
<td>What makes it durable?</td>
<td>What facts or ideas show … ?</td>
</tr>
<tr>
<td>How can you judge it has the correct size, shape, pattern, colour, smell, taste? (10)</td>
<td>How does it compare to other products on the market?</td>
</tr>
<tr>
<td>State, in your own words, how … and why …</td>
<td>Summarise your key findings. (15)</td>
</tr>
<tr>
<td>Illustrate potential design flaws.</td>
<td>Demonstrate how the system is effective.</td>
</tr>
<tr>
<td>Demonstrate how the system is effective.</td>
<td>Explain how it will appeal to the target group.</td>
</tr>
</tbody>
</table>

## Application

<table>
<thead>
<tr>
<th>Question</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you use what you have learned to solve … ? (5)</td>
<td>Predict what would happen if … (16)</td>
</tr>
<tr>
<td>What would be the result if … ? (9)</td>
<td>How would you organise to show … ?</td>
</tr>
<tr>
<td>What facts would you select to show … ? (13)</td>
<td>What modifications would you make in order to … ? (18)</td>
</tr>
</tbody>
</table>
### Analysis

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you classify … ?</td>
<td>How are they persuading you … ? (17)</td>
</tr>
<tr>
<td>What is the relationship between … ?</td>
<td>How do your ideas compare to … ?</td>
</tr>
<tr>
<td>Why do you think this has been constructed in this way? (4)</td>
<td>What evidence from … supports your decision to … ?</td>
</tr>
<tr>
<td>What are your perceived reasons for … ?</td>
<td>What assumptions do the manufacturers make regarding … ? (14)</td>
</tr>
</tbody>
</table>

### Synthesis

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propose an alternative solution to … (6)</td>
<td>Predict how this product will be different in 10 years’ time. (12)</td>
</tr>
<tr>
<td>What would happen if … ?</td>
<td>Consider … without the constraints of …</td>
</tr>
<tr>
<td>Propose a solution to … as a result of the problem with …</td>
<td>Show your reasoning for …</td>
</tr>
<tr>
<td>Adapt the … taking into account …</td>
<td>Construct …</td>
</tr>
</tbody>
</table>

### Evaluation

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>How would you justify … ?</td>
<td>How would you prioritise … ? (7)</td>
</tr>
<tr>
<td>What evidence supports your design decisions regarding … ? (1)</td>
<td>What is your informed opinion of … ?</td>
</tr>
<tr>
<td>How does the … meet the criteria set?</td>
<td>How would you defend your decision to … ? (8)</td>
</tr>
<tr>
<td>How accurate were your: planning decisions, modelling and testing procedures, making processes?</td>
<td>What are your conclusions regarding … ?</td>
</tr>
</tbody>
</table>
Planning questions:

Who ...?
What ...?
Place product here
Where ...?
Where next?
Why ...?
When ...?
Tactics for effective questions

In the video extract how does the teacher:

- stimulate thinking?

- promote reasoning?

- promote extended/sustained responses?

- promote active listening?

- stimulate interaction between pupils?
## Effective tactics for questioning

<table>
<thead>
<tr>
<th>Tactic or device</th>
<th>Benefits/gains</th>
<th>Example/context</th>
<th>Used regularly?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciously waiting for a pupil to think through an answer (before you break the silence)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using a planned mix of ‘conscripts’ and ‘volunteers’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Phone a friend’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Hot-seating’</td>
<td></td>
<td></td>
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<tr>
<td>Previewing a question in advance</td>
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<td></td>
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<tr>
<td>Pair rehearsal (of an answer or question)</td>
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<td></td>
<td></td>
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<tr>
<td>Eavesdropping and deploying specific targeted questions</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>‘You are not allowed to answer this in fewer than 15 words’</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberately asking a child whom you know will provide only a partly-formed answer (when asking difficult whole-class questions)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the ‘no-hands-up’ rule</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing signals to pupils about the kind of answer that would best fit the question being asked</td>
<td></td>
<td></td>
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</table>
## Effective tactics for questioning

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<th>Benefits/gains</th>
<th>Example/context</th>
<th>Used regularly?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consciously waiting for a pupil to think through an answer (before you break the silence)</td>
<td>Prompts depth of thought and increases levels of challenge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using a planned mix of ‘conscripts’ and ‘volunteers’</td>
<td>Enhances engagement and challenge for all</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Phone a friend’</td>
<td>Encourages whole-class listening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘Hot-seating’</td>
<td>Encourages listening for detail and provides challenge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previewing a question in advance</td>
<td>Signals the big concepts and learning of the lesson</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pair rehearsal (of an answer or question)</td>
<td>Encourages interaction, engagement and depth</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eavesdropping and deploying specific targeted questions</td>
<td>Facilitates informed differentiation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘You are not allowed to answer this in fewer than 15 words’</td>
<td>Develops speaking and reasoning skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliberately asking a child whom you know will provide only a partly-formed answer (when asking difficult whole-class questions)</td>
<td>Excellent for building understanding from pupil-based language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Using the ‘no-hands-up’ rule</td>
<td>Improves engagement and challenges all pupils to think</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Providing signals to pupils about the kind of answer that would best fit the question being asked</td>
<td>Helps pupils to recognise the range of possible responses and to select appropriately</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Design and technology: Framework and training materials

Training module 9

Questioning for teaching designing

OHTs
Objectives

■ To develop teachers’ self-awareness and analysis of their own questioning techniques.

■ To identify key features of good questioning within design and technology.

■ To enhance the planning for, and use of, questions within design and technology.

■ To identify strategies that support the development of pupils’ questioning skills within design and technology.

■ To identify relevant skills and plans for professional development (related to questioning) which teachers can then pursue.
The importance of questioning

Questioning is a critical skill for teachers of design and technology because it is:

- the most common form of interaction between teachers and pupils;
- central to evaluating processes and products;
- a key method of providing appropriate challenge when developing, planning and communicating ideas;
- the most immediate and accessible way for a teacher to assess knowledge and understanding.
Purposes of questioning

- To interest, engage and challenge pupils.
- To check on prior knowledge.
- To stimulate recall and use of existing knowledge and experience in order to create new understanding and meaning, e.g. responding to a design brief.
- To focus thinking on key concepts and issues.
- To extend pupils’ thinking from the concrete and factual to the analytical and evaluative, e.g. giving reasons for choices, justifying decisions.
- To lead pupils through a planned sequence which progressively establishes key understandings, e.g. the development of design criteria.
- To promote reasoning, problem solving, evaluation and the formulation of hypotheses.
- To promote pupils’ thinking about the way they have learned.
Pitfalls in questioning

It is easy to fall into the trap of:

- asking too many closed questions;
  
  *What type of plastic is this?*
  
  *What does CAD stand for?*

- asking pupils questions to which they can respond simply with ‘yes’ or ‘no’;
  
  *Would you buy this product?*
  
  *Did your design proposal match your criteria?*

- asking too many short-answer, recall-based questions;

- dealing ineffectively with incorrect answers or misconceptions;

- focusing on a small number of pupils and not involving the whole class;

- not giving pupils time to reflect, or to pose their own questions;

- asking questions when another strategy might be more appropriate;

- too much teacher-led questioning.
Bloom's taxonomy of questioning

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation
Effective questioning:

- reinforces and revisits the learning objectives;
- includes ‘staging’ of questions to draw pupils towards key understanding or to increase the level of challenge as a lesson proceeds;
- involves all pupils;
- engages pupils in thinking for themselves;
- provokes justification and promotes reasoning;
- creates an atmosphere of trust in which pupils’ opinions and ideas are valued;
- shows connections between previous and new learning;
- encourages pupils to speculate and hypothesise;
- encourages pupils to ask questions as well as receive them;
- encourages pupils to listen and respond to each other as well as to the teacher.
Ready for more?

- Use a tape or video recorder to record a whole-class question-and-answer session. Replay the tape to help you to evaluate the different aspects of your own questioning.

Did you:

- ask too many questions?
- have a balance of open and closed questions?
- encourage opinion, informed speculation and tentative answers?
- provide thinking time?

- Begin to build key questioning strategies into your lesson planning.

- In a departmental meeting, discuss how you might plan sequences of questions that build up pupils’ understanding of important concepts.
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