

Methods of ongoing assessment by teachers

WORKSHOP LEADER'S NOTES

Aims

The activities of this module aim to promote discussion and understanding of methods which can be used by teachers to conduct ongoing, formative assessment of pupils, that is, to carry out assessment and to use the results as part of teaching. The interpretation and use of the results is the focus of Module D. In the present module the main methods for assessing skills and ideas are discussed.

Objectives

1. Identification of the advantages and disadvantages of using a checklist of criteria for observing pupils during practical work.
2. Recognition of the types of question that teachers can ask to assess pupils' ideas.
3. Consideration of how drawing and writing can be used for ongoing assessment.
4. Recognition of the value of collaborative group work and of the possibility of group assessment.

Task C1

This task considers observation as a means of gathering information for assessment. For science, observation has an important role in assessment, particularly for process skills. However it has disadvantages in practice and so should be used where no other way of assessing is as useful. In this task the use of observation is considered for assessing two aspects of scientific achievement – pupils' skill in *observing* and in *investigating*. The task also enables participants to consider the value of using a checklist (from Resource 5) to assist in the assessment.

Organisation: Participants working in groups of about five.

Materials needed: Task C1, Resources 5 and 6.

Time: Allow at least 20 minutes for participants to work in groups to produce agreed answers to the questions and then 30 minutes for a plenary discussion.

Instructions: Tell participants to:

- Imagine they were the teacher of the class described in Resource 6 and consider what information they could obtain by observing the children, using sections on *observing* and *investigating* from Resource 5.
- Consider whether using the criteria in Resource 5 as a checklist is of help in assessing by observation.
- Consider the advantages and disadvantages of using observation for assessing science, including the problems of very large classes.

Task C1

Working as a group, answer questions (i), (ii) and (iii) and be prepared to share your answers with other groups.

- (i) Read the account in Resource 6. Imagine you are the teacher. By observing the children, what would you be able to find out in relation to the sections in Resource 5 on *observing* and *investigating*?
- (ii) To what extent do you think the lists of criteria would help you, as the teacher, in assessing the children's process skills by observation?
- (iii) What are the advantages and disadvantages of assessing children by observing them?

Plenary discussion

Ask one group to report answers to question (i) and others to add points not already made. Repeat with other groups for (ii) and (iii).

Points to emphasise

- The focus has been on two process skills only in order to reduce the burden in the task. However it is useful to note that information relevant to all the skills can be collected in the same way, although some can be assessed through pupils' records.
- Look at the attitudes in Resource 5. Note that it would be difficult to assess these except through observation and discussion with pupils.
- The main value of having the list of statements of what pupils do, as in the lists in Resource 5, is to give a focus to observation, to indicate what to look for. Without this, observation by the teacher will be less efficient. At the same time the lists should not blinker the teacher to other aspects of the children's behaviour.
- Among the disadvantages of using observation will be the time needed to use a checklist of criteria in practice. For this reason the checklist is best seen as a way of preparing oneself for what to look for and it should, with a little practice, become internalised as a mental checklist, not one on paper.
- When starting to use this as a method for assessing it is wise to select a few skills and attitudes only. When these have become routine, in the head rather than on paper, then others can be added.
- Observing is not just looking, but listening. It can be enhanced by asking certain kinds of questions so that what is heard reflects children and skills ideas. This takes us to the next task.

Task C2

The two parts of this task take up the subject of the kinds of questions that the teacher might ask pupils in the context of assessing to help learning. This means that interest is in what the pupils think, whether correct or not. Once this is known, then the teacher can take some action to help children develop their ideas. So questioning is an important aspect of assessment.

Organisation: Participants in pairs for part (i) and in groups of four to six for part (ii).

Materials needed: Task C2, Resource 7, a sealed matchbox with two small objects inside – one for each pair.

Time: Allow at least 30 minutes in total for the two parts of the task.

- Instructions:** Tell participants to:
- Work in pairs for part (i). Each person in turn is to handle the matchbox *without talking* and decide what might be inside. Then they each think up three questions which they will ask the other to try to find out what the other person *thinks* is inside.
 - They ask each other their questions in turn and then discuss which questions were best for finding out the other's idea.
 - In part (ii) consider the questions in Resource 7. Divide them into two groups : those you think more helpful for assessment as part of teaching and those less helpful for this purpose.

Task C2

- (i) Divide into pairs. Each pair has a sealed matchbox. Neither of you knows what is inside the matchbox. Handle it and form your own ideas of what is inside *without saying anything*. The idea is to find out by questioning what the other person *thinks* is inside. Each person should devise three questions and then take turns to ask each other their questions. Then decide which question(s) were most productive in finding out the other's idea.
- (ii) Work as a group with Resource 7. Read the examples of questions asked of pupils by teachers. Divide them into groups of different *kinds* of questions (ignoring the subject matter). Do this in any way you think makes distinctions between questions that are helpful for the purposes of ongoing assessment and those not so helpful. Be prepared to say what it is that makes some questions more useful for this purpose. Record your result using the numbers of the questions and write these on a large piece of paper.

Plenary discussion

Go straight into the feedback from sub-task (ii) since points arising from (i) will be included in the discussion. Ask each group to display their results using the numbers of the questions in Resource 7. Invite everyone to look for patterns across the lists. Where there are large difference, ask one group to explain the basis for their division of the questions.

Points to emphasise

- The purpose of asking questions in the context of ongoing assessment is to get an answer. Therefore there is no point in asking questions in such a way that children are unable to answer. Thus the form of the question is important as well as the content.
- If there has been a separation of questions into those which require more than a single correct answer and those which ask for one answer, introduce the distinction between *open* and *closed* questions. eg 6, 8 and 13 are closed whilst 5, 7 and 15 are open.
- Similarly, point out the difference between questions which ask for 'what the pupils think' and those which require them to know the right answer. For example, questions 2, 7, 9, ask for what the children's ideas are and can be answered whether or not the 'right' answer is known. These can be called 'person-centred' questions. Questions 5, 12, and 14, although open, cannot be answered unless you think you know the right answer. Children often give no answer when they feel that they have to give the right one and may not know it. (See background information.)
- It is important to ask open and person-centred questions to find out what children are thinking so that the teacher knows where they are in developing ideas. Thus the questions will be the most useful for assessment purposes.
- Sometimes children can draw things which they can't explain so well only in words. This leads to the next subject and task.

Task C3

Drawings can be a good way of enabling children to express their ideas, particularly if they are annotated and if possible discussed with the children. This task gives participants an opportunity to explore the use of drawing both in their own experience and through discussing children's drawings.

Organisation: Participants in pairs for part (i) and in groups of four to six for part (ii).

Materials needed: Task C3, for each group a clockwork toy or home-made elastic band cotton reel 'tank', Resource 8 to be distributed *after* sub-task (i) has been completed.

Time: Allow at least 30 minutes in total for the two parts of the task.

Instructions: Tell participants to:

- Work in pairs at the start. Watch the clockwork toy or 'tank' after it has been wound up and then, without discussing it with anyone, make a drawing which shows how you understand the way it works. Don't write any words on it.
- Exchange drawings with your partner and ask each other questions to help you to understand the other's ideas about the mechanism. Then annotate your drawings with labels to answer the questions you were asked.
- Show your drawing to another pair and look at theirs.
- For part (ii) look at the drawing in Resource 8 and, working as a group, answer the questions.

Task C3

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| <p>(i) Wind up the toy or 'tank', set it moving and watch it for a short while. Then, working alone, make a drawing to show what is happening to make it move in the way it does. Don't label the drawing. Now exchange your drawing with that of your partner. Ask your partner questions to help you understand his/her drawing of how the toy is moving. Now let your partner question you about your drawing. Then add labels and annotation to your drawings that answer the questions you have been asked. As a pair, exchange your annotated drawings with another pair and see how well you can understand their drawings from the start after they have been annotated.</p> <p>(ii) Look at the examples of children's drawings in Resource 8. What can you tell about the children's ideas from these drawings? Discuss how you would set up the tasks for these children so that they annotated their drawings to show their ideas.</p> |
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Plenary discussion

There is no need for plenary feedback for part (i). For part (ii) collect the results from one group about what ideas are revealed in the drawings. Ask other groups to add anything. Then ask another group to say how they would set up the tasks so that the children annotated their drawings in a way which showed their ideas.

Points to emphasise

- The use of words enables the teacher to be clear about what the drawing means. In drawing 1 the child appears to see that a 'line' connects the cogs to each other. If this were not stated explicitly it might be difficult to interpret the line between the cogs as indicating the child's idea about how one cog makes another go round. In drawing 2 the

labels only give the names of the parts, whilst the description above indicates that the child has begun to develop ideas about energy being used and used up in movement. Drawing 3 is another example of an added description revealing the child's ideas. The drawing itself indicates that the child is aware that vibrations pass along the string. But in the writing it becomes clear that the child considers the sound travelling as vibrations only along the string and being 'transferred back to a voice' in the yoghurt pot.

- The main point to note is that the drawing task needs to be set so that the child tries to explain what is happening and not just to represent what can be seen. For example, the child who drew the telephone may not have included the vibrations if (s)he had been asked just to 'draw the string telephone'. This drawing was made in response to the request: 'make a drawing to show how you think the sound gets from one end of the telephone to the other'. There is a small but important difference between these requests.
- The points made about questioning in Task C2 are also relevant to setting drawing tasks. It should be made clear to the child that the teacher wants to know what the child thinks is happening.

Task C4

Children's writing will always be an important vehicle for assessing their ideas and skills. It also has a valuable role in helping the child to clarify ideas and for communication between pupils as well as between pupil and teacher. This task gives an opportunity to consider this and goes on to discuss the implications for assessing group effort.

Organisation: Participants work alone for part (i), in pairs for part (ii) and in groups of four to six for part (iii) to (v).

Materials needed: Task C4.

Time: Allow 5 minutes for sub-task (i) about another 5 for sub-task (ii) and then about 30 minutes for the rest of the task.

Instructions: Tell participants :

- For sub-task (i) spend exactly 5 minutes working in silence and alone.
- Then exchange papers with a partner and reflect on whether you gain anything from his/her ideas.
- Discuss as a group the implications for how children's writing can be used to assist their understanding and development of ideas.
- Turn to the subject of group working more generally in sub-task (iv) addressing each of the questions it poses.
- On the assumption that there are benefits from collaborative group working consider the implications for teaching and assessment as part of teaching.

Task C4

- (i) Working alone, for no more than 5 minutes, write down your ideas about the answer to this question: *Why do you think our hearts beat more quickly during and just after exercise?*
- (ii) Exchange your writing with that of your neighbour. Consider whether this helps your own understanding and answers any of your questions.
- (iii) Discuss as a group the implications of this for asking children to write in science and the use made of their writing in class activities.
- (iv) Reflect on the experience of working in a group in the tasks in this module:
 - How well did the group work together?
 - What were the reasons for this (working well or not)?
 - How did you feel when working alone at the beginning of this task compared with sharing ideas?
 - What was achieved by working with others that could not have been achieved by working alone?
- (v) Discuss the implications of the group interactions for the performance and learning of individuals. Is there a case for assessing a group of children as a whole in a particular activity?

Plenary discussion

Briefly ask one pair to share views on sub-tasks (i) and (ii), avoiding details of the content, but asking about the impact of having to write down ideas. Ask them to say:

- Did they feel that they found out anything about their own (mis)understanding of the subject?
- Did it raise questions which they would now like to have answered?
- Were they surprised that they did/ did not know something?

Ask one group to report on sub-task (iii) and add ideas from other groups, creating a list of ideas for using children's writing in science. After discussion ask another group to comment on the outcome of sub-task (iv) and take points of disagreement or expansion from others. Repeat for sub-task (v).

Points to emphasise

- It is important to pay attention to the way writing tasks are set for children. As in drawing, the task should be set so that it asks the children to give their own ideas.
- Asking for writing as a routine but not *using* the writing, can be a deterrent to some children's enthusiasm for science. Thus the writing should have a clear purpose for the children, and an evident intended readership (see other points under *communication* in the background information for Module D).
- Task (iv) is a brief one which asks participants to reflect on their own thinking and actions and then to consider an equivalent situation affecting children in class. It is not intended to be a basis for criticism of any of the groups.
- Note the big difference between collaborative working in groups, when all members combine efforts to produce a single outcome, and sitting in a group with others but working on a task individually. In schools real collaborative learning is rare, partly because teachers are afraid that some children will be doing all the work and others none. This is a major issue to be overcome.

- When there is group work going on, teachers usually have little difficulty in assessing the contribution of individuals to the work whether collaborative or individual. However in certain contexts, where genuine collaborative work is going on, it is worth questioning whether it is always necessary to assess individuals. If the purpose is to help the group along then the group might well be the focus of the assessment for formative purposes. This could be particularly relevant where there are very large classes. The purpose of the assessment has to determine how it is carried out, of course, and when it might be appropriate to assess children as groups and when it would not be.

Background information

Teachers' questions

Productive and unproductive questions

Some important distinctions between different kinds of question are made by Jos Elstgeest, drawing attention to the timing as well as the content of the questions. He gives the following example of an unproductive and a productive question:

A child was reflecting sunlight onto the wall with a mirror. The teacher asked: 'Why does the mirror reflect sunlight?' The child had no way of knowing, felt bad about it and learned nothing. Had the teacher asked: 'What do you get when you stand twice as far away from the wall?' the child would have responded by doing just that, and would have seen the answer reflected on the wall.

(Elstgeest, 1985, p36)

The teacher's reason for asking this question is not clear and may not have been thought out. Many questions of this kind emerge from what Elstgeest calls the 'testing reflex'. The impulse to ask such questions has to be controlled and the purpose of questions more clearly worked out. Elstgeest suggested dubbed the 'testing' questions as *unproductive* and suggested the following sequence of *productive* questions, which roughly correspond with the order in which they could be used to encourage a child's investigation:

- *Attention-focusing questions*, which have the purpose of drawing children's attention to features which might otherwise be missed. 'Have you noticed...?' 'What do you think of that?' These questions are ones which children often supply for themselves and the teacher may have to raise them, only if observation is superficial and attention fleeting.
- *Measuring and counting questions* – 'How much?' and 'How long?' take observation into the quantitative and lay a foundation for the next type of question.
- *Comparison questions* – 'In what ways are these leaves different?' 'What is the same about these two pieces of rock?' draw attention to patterns and lay the foundation for using keys and categorising objects and events.
- *Action questions* such as – 'What happens if you shine light from a torch onto a worm?' or 'What happens when you put an ice cube into warm water?' are the kinds of question which lead to investigations. There are also some useful action questions suggested in Harlen and Jelly (*Developing Primary Science*, Longman, 1997).
- Asking *problem-posing questions* gives children a challenge and leaves them to work and how to meet it. Questions such as 'Can you find a way to make your string telephone sound clearer?' 'How can you make a coloured shadow?' require children to have experience or knowledge which they can apply in tackling them. Without such knowledge the question may not even make sense to the children. It is in relation to this point that the matter of the right time for a question arises.

Elstgeest uses this anecdote to illustrate the importance of choosing the right moment for a particular type of question:

I once asked a class of children, 'Can you make your plant grow sideways?' For a short time they had been studying plants growing in tins, pots, boxes and other contraptions made of plastic bags. I was just a little too anxious and too hasty and, quite rightly, I got the answers, 'No we can't'. So we patiently continued with scores of 'what happens if...' experiments. Plants were placed in wet and dry conditions, in dark and in light corners, in big boxes and in cupboards, inside collars of white and black paper, upside down, on their side, and in various combinations of these. In other words, the children really made it 'difficult and confusing' for the plants. Their plants, however, never failed to respond in one way or another, and slowly the children began to realise that there was relationship between the plant and its environment which they controlled. Noticing the ways in which the plants responded, the children became aware that they

could somehow control the growth of plants in certain ways... When the question 'Can you find a way to make your plant grow sideways?' reappeared later there was not only a confident reaction, there was also a good variety of attempts, all sensible, all based on newly acquired experience, and all original.

(Elstgeest, 1985, p39-40)

Open and closed questions

Open questions give access to children's views about things, their feelings and their ideas, and promote enquiry by the children. *Closed questions*, whilst still inviting thought about the learning task, require the child to respond to ideas or comments of the teacher. For example these questions:

'What do you notice about these crystals?'

'What has happened to your bean since you planted it?'

are more likely to lead to answers useful to both teacher and pupils than their closed versions:

'Are all the crystals the same size?'

'How much has your bean grown since you planted it?'

Closed questions suggest that there is a right answer and children may not attempt an answer if they are afraid of being wrong.

Person-centred and subject-centred questions

Another way of avoiding the 'right answer' deterrent is to recognise the difference between a *subject-centred* question, which asks directly about the subject matter, and a *person-centred* question which asks for the child's ideas about the subject matter. Subject-centred questions are such as:

'Why do heavy lorries take longer to stop than lighter ones?'

'Why did your plant grow more quickly in the cupboard?'

which cannot be answered unless you know, or at least think you know, the reasons.

By contrast the person-centred versions:

'Why *do you think* heavy lorries take longer to stop than lighter ones?'

'Why *do you think* your plant grew more quickly when it was in the cupboard?'

can be attempted by anyone who has been thinking about these things (and we assume the questions would not be asked unless this was the case) and has some ideas about them, whether or not they are correct. Where there is interest in children's reasoning, person-centred questions are clearly essential, but at other times they are a more effective, and more friendly, way of involving children in discussions which help in making sense of their work.

Examples of questions for finding out children's ideas

The following questions were designed to be used by teachers to find out children's ideas. These particular question were used when children had been involved in handling, observing and drawing sprouting and non-sprouting potatoes:

'What do you think is coming out of the potato?'

'What do you think is happening inside the potato?'

'Why do you think this is happening to the potato?'

'Do you think the potato plant will go on growing?'

'Can you think of anything else that this happens to?'

They can readily be seen to be open, person-centred questions, giving children every encouragement to express their thoughts so that the teachers would know the children's initial ideas before investigation of the growing potatoes began.

Assessing groups or individuals?

In science pupils are generally working in groups and the composition and coherence of the group influences what is achieved. Teachers generally have no difficulty in identifying the separate contributions of children even when they are combining their ideas and skills in a group enterprise. However, we might question whether, *for the purpose of ongoing assessment for informing teaching*, it is necessary always to assess individual pupils. If the information is used to make decisions about the activities and help to be given to children *as a group*, then assessment of the group is all that is needed for this purpose. There is research evidence that in heterogeneous groups all pupils benefit when they are encouraged to share ideas and skills. Thus a group assessment may be considered to be all that is necessary in certain circumstances. However this would not apply to summative assessment or when a record of individual achievements is being made.