BOWLAND
MATHS
Professional development

Follow-up session

Questioning and reasoning

'How do I get my pupils to think, reason and explain?'

Activity 1 — Report and reflect on the lesson — 20 minutes

Reflect on the lesson you have just taught and listen to any recordings you made of your questioning.

- What strategies did you use?
- Which questions appeared to promote thoughtful and reasoned responses from pupils? Why was this?
- Which questions didn't work so well? Why was this?

You may like to watch the video of the three teachers discussing these same issues.

Activity 2 — Solve a problem, "thinking aloud" — 10 minutes

Problem solving is an invisible, messy process that goes on inside people's heads. One reason why some pupils are reluctant to persist in problem solving is that they do not recognise that it is perfectly natural to get stuck, make mistakes, backtrack, look for alternative strategies and so on.

It is helpful for a teacher to model this process by tackling a problem from start to finish, thinking aloud and involving the class by careful questioning.

Try working out an answer to the following problem, thinking aloud as you do so:

About how many dentists are there in the UK?

Afterwards think what it would feel like, doing this with a class, not knowing the answer beforehand.

If you are working with colleagues, one could take the role of the teacher and try to tackle the problem step by step, thinking aloud. The others could take the role of pupils and try to assist when asked to do so.

- What should we try first?
- What helpful representation can we use here?
- How can we check this step?
- Where have we gone wrong here?
- Is this heading in the right direction?

Activity 3 — Watch some teachers "thinking aloud" — 15 minutes

Watch Gwen, Jeff and Chris as they solve the dentists problem together.

After watching the video clip, compare their comments with your own experience:

- Did you feel under similar pressure?
- Would you feel afraid of thinking aloud like this in front of a class? Why?
- What other ideas have you got for making thinking more "visible"?

The following strategies illustrate the last point.

Speaking the teacher's mind…
Before solving a problem, appoint one or two pupils to stand at the front and 'speak your mind'. They try to give reasons for each step. (E.g. Why did I do put the 7 here on this multiplication grid?).

Evaluating other pupils' reasoning...
Photocopy a few anonymous pieces of pupils' work (or create your own exemplars) and ask the class to work in groups of two or three to analyse and discuss where good reasoning is shown and to give suggestions of where the reasoning could be clarified or improved. Alternatively, write out solutions, incorporating errors, misconceptions and inconsistencies and ask the pupils to work together to find, correct and comment on the 'errors in reasoning'. They should also comment on where the reasoning was good so that they can use these ideas again.

Activity 4 — Plan questioning and "thinking aloud" for future lessons — 15 minutes

Plan some ways of applying what you have learned in this PD module to other mathematics lessons that you teach.

Choose one topic that you plan to teach soon.

Think of some ways in which you might build in effective questioning and "thinking aloud" into your teaching of that topic.

Further Reading

See Handout 7 for suggested further reading.