

PD1 • Getting started

Purpose

To encourage participants to:

- reflect on their current assumptions, beliefs, and teaching practices;
- consider the aims of the approaches in this resource;
- begin exploring ways in which learners might become more actively engaged in their own learning.

Materials required

For each participant you will need:

- Sheet PD1.2 – *How participants describe their practices*;
- Sheet PD1.3 – *How learners describe their learning strategies*;
- Sheet PD1.4 – *Eight principles for effective teaching*.

For each group of participants you will need:

- Card set PD1.1 – *Sorting belief statements*;
- scissors;
- large sheet of paper for making a poster;
- felt tip pen.

Supporting materials

To support this session, you may wish to use:

- extract from the DVD/video *Improving learning in mathematics: an overview*;
- PowerPoint presentation of poster examples in *Materials/Professional development* on the DVD-ROM;
- PowerPoint presentation in *Materials/Professional development* on the DVD-ROM. This will be useful when running the session and includes slides of the aims, and of appropriate handouts and tasks.

Time needed

From 1 to 2 hours.

Suggested activities 1. Discussing beliefs about learning and teaching

Ask participants to work in groups of three or four.

Hand out Card set PD1.1 – *Sorting belief statements*. You can cut out the cards in advance or ask participants to cut them out.

Ask participants to reflect on each statement in turn and discuss whether or not they agree with it. Some statements are controversial and should provoke some lively discussion and disagreement.

- Put the statements you **all agree** with into one pile. If you feel that, before you can all agree with the statement, it needs to be qualified in some way, then modify the statement accordingly.
- Put the statements you **all disagree** with into a second pile. If you feel that, before you can all disagree with the statement, it needs to be qualified in some way, then modify the statement accordingly.
- If you **cannot reach agreement** about a statement, then place it in a third pile, noting the reasons for your disagreements.

Ask each group to share some of its decisions with the whole group.

2. Looking at some research results

Give each participant a copy of PD1.2 – *How teachers describe their practices* and PD1.3 – *How learners describe their learning strategies*. These show the results when a sample of 120 teachers working with 779 learners following GCSE resit courses were asked to describe their usual ways of working.

They clearly show that most teachers preferred 'transmission' ways of working, and most learners normally adopt 'passive' learning strategies.

Discuss with participants:

- Why do you think this is the case?

Discuss the statements that occur relatively rarely, on both sheets.

- Why do these occur less often?
- What actions can be taken to encourage learners to become more actively involved in their own learning?

3. Discussing the aims of the project materials

Give each participant a copy of PD1.4 – *Eight principles for effective teaching*.

Take each principle in turn and discuss what it might mean in practice.

- Do participants agree with this principle?
- What are the advantages of implementing this principle?
- What would implementation look like in practice?
- What are the difficulties in implementing this principle?

Explain that these are the principles that underpin the approaches contained in the resource.

4. Trying a learning activity – making a poster

Give each pair of participants a large sheet of paper and a felt tip pen. Challenge them to make a poster showing all they know about **one** of the following:

- decimal numbers;
- proportion;
- circles;
- quadratic functions.

They should try to illustrate all the different facts, results and relationships they know. They might also illustrate methods and applications. Encourage them to select only the most important and interesting facts, both at a basic and a more advanced level.

Share with the whole group what each pair has produced.

Now discuss how this approach can be adapted for use with learners to achieve some of the principles outlined in the previous discussion.

Show the group some examples of posters that learners have produced. Ask the group to comment on what might have been learned in producing each poster. You will find a PowerPoint presentation containing these posters in *Materials/Professional development* on the DVD-ROM.

Invite participants to try a poster activity the next time they meet with learners and to report back on what happens.

BLANK FOR NOTES

Card set PD1.1 – *Sorting belief statements*

Discuss these statements and group them into categories: Agree, Disagree, Cannot decide. You may modify a statement if you wish.

Mathematics is best learned through practice.	Mathematics is best learned through discussion.
Learners learn mathematics best when they work on their own.	Learners learn mathematics best when they work collaboratively.
Mathematics is a network of ideas.	Mathematics is a hierarchical subject.
It is best to begin teaching mathematics with easy problems, working gradually up to harder ones, otherwise learners make mistakes and lose confidence.	It is best to begin teaching mathematics with complex problems, or learners won't appreciate why mathematics is necessary.

Card set PD1.1 – *Sorting belief statements (continued)*

<p>Mathematics is a creative subject. Learners learn best by creating their own questions and methods.</p>	<p>Learners learn mathematics best by working through carefully constructed exercises.</p>
<p>It is better to spend time on fewer questions and solve them in more than one way, even if this slows the session down.</p>	<p>I always feel in a hurry when I teach mathematics. There is so much to cover in the time.</p>
<p>Learners are at such different levels of competence that I have to allow each one to work at their own pace.</p>	<p>I try to teach the whole group at once and keep them at the same pace.</p>
<p>I find out which parts of mathematics learners already understand and don't teach those parts.</p>	<p>I start teaching mathematics from the beginning, assuming they know nothing.</p>
<p>I try to avoid learners making mistakes when learning mathematics.</p>	<p>I encourage my learners to make and discuss mistakes when learning mathematics.</p>

Sheet PD1.2 – How teachers describe their practices

Statements are rank ordered from most common to least common.

	Mean
Learners start with easy questions and work up to harder questions.	4.26
I tell learners which questions to tackle.. . . .	4.02
I teach the whole group at once.	3.90
I know exactly what maths the lesson will contain.. . . .	3.80
Learners learn through doing exercises.	3.67
I try to cover everything in a topic.	3.56
I avoid learners making mistakes by explaining things carefully first.	3.31
Learners work on their own, consulting a neighbour from time to time.	3.30
I teach each topic from the beginning, assuming they know nothing.	3.29
I tend to teach each topic separately.	3.19
Learners use only the methods I teach them.	3.18
I draw links between topics and move back and forth between topics.. . . .	3.03
I tend to follow the textbook or worksheets closely.. . . .	2.99
I only go through one method for doing each question.	2.95
I encourage learners to make and discuss mistakes.. . . .	2.63
Learners work collaboratively in pairs or small groups.	2.57
Learners learn through discussing their ideas.. . . .	2.53
I jump between topics as the need arises.	2.51
I find out which parts learners already understand and don't teach those parts. . .	2.44
I teach each learner differently according to individual needs.	2.43
Learners compare different methods for doing questions.. . . .	2.24
I am surprised by the ideas that come up in a lesson.	2.08
I encourage learners to work more slowly.	2.03
Learners choose which questions they tackle.. . . .	1.98
Learners invent their own methods.	1.73

Each statement was rated as follows:

1 = almost never, 2 = occasionally, 3 = half the time, 4= most of the time;

5 = almost always.

The sample consists of 120 teachers and trainers from more than 60 providers.

Source: Swan M., *Learning mathematics through reflection and discussion: the design and implementation of teaching*, unpublished PhD thesis, 2005, University of Nottingham.

Sheet PD1.3 – How learners describe their learning strategies

Statements are rank ordered from most common to least common.

	Mean
I listen while the teacher explains.	4.28
I copy down the method from the board or textbook.. . . .	4.15
I only do questions I am told to do.. . . .	3.88
I work on my own.. . . .	3.72
I try to follow all the steps of a lesson.	3.71
I do easy problems first to increase my confidence.	3.58
I copy out questions before doing them.	3.57
I practise the same method repeatedly on many questions.	3.42
I ask the teacher questions.. . . .	3.40
I try to solve difficult problems in order to test my ability.	3.32
When work is hard I don't give up or do simple things.	3.32
I discuss my ideas in a group or with a partner.	3.25
I try to connect new ideas with things I already know.. . . .	3.20
I am silent when the teacher asks a question.	3.16
I memorise rules and properties.	3.15
I look for different ways of doing a question.. . . .	3.14
My partner asks me to explain something.	3.05
I explain while the teacher listens.	2.97
I choose which questions to do or which ideas to discuss.	2.54
I make up my own questions and methods.	2.03

Each statement was rated as follows:

1 = almost never, 2 = occasionally, 3 = half the time, 4 = most of the time;
5 = almost always.

The sample consists of 779 16–21 year old learners attending 44 different FE and sixth form colleges.

Source: Swan M., *Learning mathematics through reflection and discussion: the design and implementation of teaching*, unpublished PhD thesis, 2005, University of Nottingham.

Sheet PD1.4 – *Eight principles for effective teaching*

1. Build on the knowledge learners bring to sessions

Effective teachers assess and use prior learning and adapt their teaching to the needs of learners.

2. Expose and discuss common misconceptions

Effective teachers systematically expose, challenge and discuss common mistakes and misconceptions.

3. Develop effective questioning

Effective teachers use a variety of lower-level and higher-level open questions rather than a continuous diet of closed recall questions.

4. Use cooperative small group work

Effective teachers use cooperative small group work so that all learners are able to discuss important ideas. This has positive effects on learning, social skills and self-esteem.

5. Emphasise methods rather than answers

Effective teachers do not worry too much about whether or not learners complete every task, but instead they try to increase the power of learners to explain and use mathematical ideas.

6. Use rich collaborative tasks

Effective teachers use rich collaborative tasks that:

- are accessible and extendable;
- allow learners to make decisions;
- involve learners in testing, proving, explaining, reflecting, interpreting;
- promote discussion and communication;
- encourage originality and invention;
- encourage 'what if?' and 'what if not?' questions;
- are enjoyable and contain the opportunity for surprise.

7. Create connections between mathematical topics

Effective teachers use activities that create connections between closely related concepts and notations (such as division, fraction and ratio).

8. Use technology in appropriate ways

Effective teachers use technology to present mathematical concepts in dynamic, visually exciting ways that engage and motivate learners.