MAKING SENSE THROUGH MODELLING
Modelling vignettes

Education Endowment Foundation

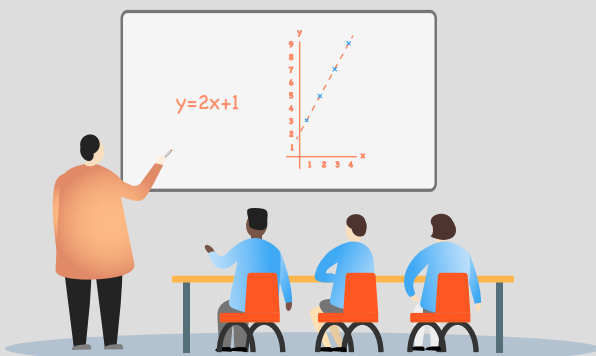Integrating evidence into maths teaching

These vignettes seek to represent current practice in schools: not best practice, nor poor practice. They prompt reflective questions for school leaders and teachers regarding their existing practices in supporting the development of mathematics teaching.

Scenario 1:

'Copying down a worked example'

$y=2x+1$

A Year 8 class are studying solving linear equations. Their teacher models a worked example on the whiteboard, with each step of the solution included, as the pupils watch on in silence. Upon completion, the pupils are asked to copy the example into their books exactly as it appears on the board. This is followed by a series of practice questions.

Reflection questions:

• How can we ensure that worked examples are being used in a way likely to maximise their impact on learning?

• Are pupils given the opportunity to study the worked examples we provide, and to explain the steps in a solution – either to their peers, their teachers, or to themselves?

• Do we take opportunities to use partially completed examples and those featuring deliberate errors alongside accurate fully completed examples?

This approach is not uncommon and is not without its merits. But evidence suggests there are nudges in practice that could lead to a maximising of the impact of the worked examples we use. These include allowing pupils time to study worked examples to better understand the steps in the example and why they were taken, and then to explain this to a peer, a teacher, or to themselves ('self-explanation'). In addition, as well as using accurate and complete examples, the use of partially complete examples and examples containing deliberate mistakes for pupils to find are also of benefit.

Scenario 2:

'Think aloud' modelling

A Year 6 class are studying how to calculate missing angles on a straight line. Instead of simply working through an example, their teacher approaches the problem – presented using a visualiser - by asking a series of questions and modelling her thinking out loud:

'What angle facts do I know that might help me in solving this problem?'

'Does this look like any problems I have solved before?'

'Which angles should add up to make 180?'

'Why should I not include this angle?'

'What calculation will help me to find the missing angle?'

'Does my answer seem sensible?'

As the teacher is doing this, she annotates the example with key questions and thoughts which might support the children as they start to work independently.

Reflection questions:

- Are worked examples used in this way in your classroom, in order to make the thinking of the teacher explicit and to support pupils in the early stages of learning?

- Are modelling strategies such as this one employed widely in classrooms in your school, with teachers 'thinking aloud' and sharing their thinking with pupils?

- Are teachers of mathematics supported to develop approaches such as these consistently in classrooms with professional development and time to discuss with colleagues?

Evidence suggests that teachers should model metacognition by simultaneously describing their own thinking or asking questions of their pupils as they complete a task. Worked examples could be usefully employed by the teacher to make their thinking explicit. Teachers should carefully increase their expectations regarding pupils' independence as the pupils gain competence and fluency.