

Planning for success in secondary Mathematics

An online resource for high school teachers, students and parents

Information for families and parents

What's in the resource?

This brochure tells you about a new resource produced by the Board of Studies, Teaching and Educational Standards NSW that shows how Mathematics teachers can help all their students improve.

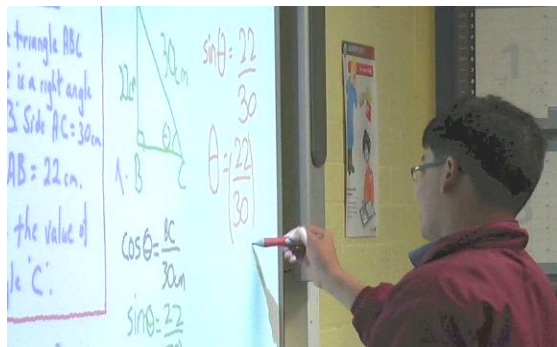
The [resource](#)¹ includes a demonstration lesson on video in which the teacher is using specific strategies to help students to successfully learn a mathematical process.

Teaching mathematical processes

The strategies shown in the video focus on one part of Mathematics teaching practice: demonstrating mathematical processes.

Mathematical processes are the steps students use to solve problems. As students progress through the Mathematics curriculum, these processes become more complex.

In the video, the class is learning a process for calculating angles in a triangle using trigonometry.



In any mathematical process, there is a sequence of steps that is typically modelled by the teacher in the first instance.

As teachers show the class how to do the process, they explain each step. To understand the process, students have to:

- follow each step of the teacher's explanation
- understand all the words used by the teacher
- recognise what is being written on the board
- remember the whole sequence.

Students are then expected to practise the process themselves through additional problems.

Some students can do all this easily. When they come to practise solving problems themselves, these students get most of their problems correct and get the most benefit from the practice.

Other students miss parts of the explanation or misunderstand some of the words the teacher uses. These students are less likely to get their problems correct and they get less benefit from the practice.

The strategies shown in this resource are designed to overcome these problems. The key here is to give the whole class more practice before students have to do their problems independently.

¹ <http://www.boardofstudies.nsw.edu.au/7-10-literacy-numeracy>

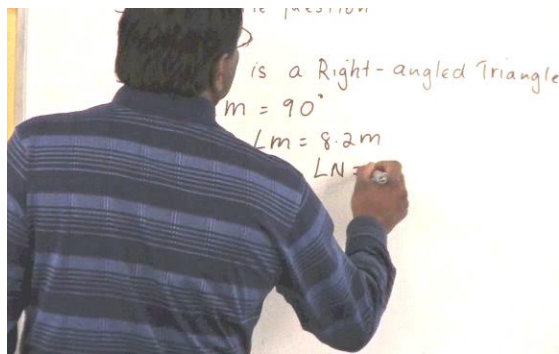
The Mathematics teacher guides the class to do the process three times, with three different examples. Each time, the students take over more of the process until they all know it well. The class then writes down the steps in the process together, before doing their problems independently.

This guided practice helps all students to solve their problems more successfully. Less able students are given the opportunity to understand and remember the steps needed to undertake a mathematical process, while more able students learn to better explain how they solve problems.

The strategies are described in four stages:

Stage 1: Teacher modelling

Before the lesson, the teacher carefully plans how they will explain each step in the process.

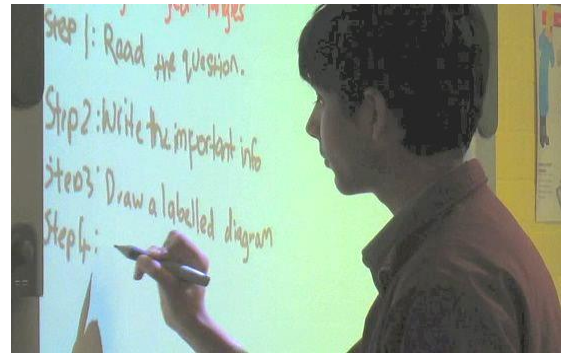


After writing the problem on the board and reading the problem to the students, the teacher models the steps of the mathematical process, naming each step as it is written on the board.

Stage 2: First guided practice

In the second stage, a second question has been written on the board.

The teacher starts asking the class what to do in each step. Students are called on to repeat the description that the teacher has used in Stage 1. Students take turns to come to the board and write the steps they describe.



Because they have seen and heard the teacher explain each step, students are more confident to contribute in this stage.

Stage 3: Second guided practice

In the third stage, another example is practised in the same way but this time more students are asked to say and write each step. Students' responses are affirmed by the teacher.

It is this experience of success and praise that engages students in learning and can be used to engage all students in learning Mathematics.

Stage 4: Joint construction

Finally, the class describes each step of the process and writes it on the board. Students take turns to come out and write each step as the class tells them what to write, with the teacher as a guide. This activity is known as **joint construction** because the class is jointly constructing a text on the board, in this case, a procedure for undertaking a mathematical process.

Students then make a copy of the procedure as a reference for helping them to solve mathematical problems independently.

What you can do

If you are concerned about students in your family or community who are not succeeding in Mathematics, you can read and watch the videos in this resource to find out how the strategies work. You can practise the strategies at home together. You could also approach your school, the P&C or your local Aboriginal Education Consultative Group (AECG) to ask about teachers studying the strategies in detail. Many teachers have been trained in the use of these strategies and are currently using them successfully in the classroom.

