Australian Education Research Organisation

Teacher vignette
Explicit instruction in secondary mathematics

Teacher vignettes are short stories from practitioners about how they use an evidence-based practice in their classroom. The reflection questions at the end are designed to encourage your thinking about how you could adapt aspects of the practice into your own setting.

Lesson context

This teaching vignette comes from a Year 9 trigonometry lesson. The students in this class have been working with right angled triangles, and have just learned about the sine, cosine and tangent functions. The teacher has also been working with the students to understand how to solve equations before using their calculators for the final step.

Modelled practice

When I am presenting new learning to students, I make sure to plan examples where I can model my thinking process and have students follow along with me. This way, I can have students follow along with me and I can ask lots of questions to check for understanding and engagement. My class is full of reluctant speakers, so I love using mini whiteboards to elicit responses, as it means everyone can share their ideas, not just my vocal few. This lesson, each student had one in front of them from the moment class started. The learning objective is also displayed clearly on the main whiteboard throughout the lesson, and it is always in student friendly language, so that my class know what to expect to learn this lesson.

Learning objective: we will be finding the height of objects using the tangent function. By the end of the lesson, you will be able show me that you can find the relevant information in worded problems, fill in the gaps of the tangent formula and use the right functions on your calculator to produce the answer.

Once I explain this, I introduce the first problem of the day.

> There is a ball stuck on the school roof and I need to figure out how tall the school is so that I can find an appropriate ladder. When I stand 10m from the base of the school, the angle of elevation is 70°. How tall is the school?

As I read the problem, I had students to draw with me. We all drew the school, and then drew the line between the me and the base of the school. I asked them to label the distance of the line, and to hold it up for me to check.

I then called on students to tell me what the angles that we know are, allowing for many students to share their answers. Once we established that this problem included a right-angled triangle, I asked students to write down the function we would be using on their whiteboards and hold it up, reinforcing the thinking pattern for figuring out which formula we will need and how it links to our overall learning ("because we know that we want to find the height of the side opposite of our known angle, we are going to use the tangent function. You will also see that this is in our learning intention for today.").

The students then solve the equation with me, and I walk them through the steps to simplify their equation, checking their working at each step. Once I am confident that all their whiteboards have the correct formula on it, I release a little bit of responsibility to them by asking them to plug it into their calculators to get the final answer. This helps me formatively assess how well they can recall using the functions of their calculators, as well as how well they have understood the process of solving for x. I share my answer, and all check for understanding.

Transitioning to guided practice

The next part of the lesson is guided practice. For this, I partner up students and ask them to work through another problem together. This problem is always like the one we did together, so that students can solidify their understanding. As they are working, I walk around the room to make sure that no one gets stuck, checking in with each group to ensure that they are being methodical with their process. This also gives me the opportunity to work with students who may need additional support, or who I could see needed to correct a lot of their answers during the modelled practice, employing more of a "we do" strategy to help them engage with the work.

Reflection questions

What explicit instruction practices are happening in this vignette?

In what ways is the teacher eliciting student responses?

Do you think this gives them enough information about whether the students are following along?