Welcome to issue five of Sharing Excellence.

This week we return to the topic of questioning technique. This time in the context of what to do when a student makes a mistake.

What to do when a student gets things wrong

Students get things wrong.

As teachers we know that’s ok. In fact, it’s positively useful. Some of the richest learning comes from analysing and correcting misconceptions.

Students, however, don’t always share a teacher’s enthusiasm for errors. They can see them as a sign of failure – direct evidence that they are not ‘getting it’. They may even fear that it means they will never ‘get it’. In particular, having errors corrected can be embarrassing or de-motivating.

Knowing what to do when a student gets things wrong is therefore an important aspect of professional practice. Here are some thoughts.

A mistake or a misconception
Initially it is important to decide whether the error results from a mistake or a misconception, and to be clear on the difference between the two.

We all make mistakes, even when we understand conceptually. Sometimes they are the result of an oversight, haste or simple carelessness. Usually these types of error are relatively easy to deal with - although persistent errors of this nature can be the result of poor organisational and study skills that will need an intervention with that individual learner. They might even be an indicator of dyslexia.

An error resulting from a student misconception, however, requires a different approach.

Diagnosing misconception errors
Whenever possible it is important not to leap in, take over and simply explain where a student has gone wrong. There are two main reasons for this:

• Your assumptions about the reason for the error may be wrong. If you start trying to cure the wrong problem you can add to the student’s confusion

• You have explained this once already and it has not been enough for the student to fully understand. Consequently, repeating your explanation is likely to leave the same gap or misconception in the student’s thinking

Instead try and diagnose the error with a quick ‘two-step’ approach

Step One - “Talk me through this…”
Don’t point out the error directly. Instead ask the student to explain the reasoning behind their answer.

Sometimes the act of talking through their logic out loud is enough to help the student spot their own error. They often get half way through explaining when they stop, realise the flaw and correct themselves. You can almost see the moment of insight when their thinking ‘leaps forward’.

Step Two - “Ok, but what about…”
Of course, this is not always the case. Sometimes the learner finishes their explanation without noticing any difficulty. This is just as useful as you now have a complete picture of their thinking. You know precisely which aspects of the concept they have not fully grasped. Focus in on those aspects by asking questions which expose the slight flaws in logic. A series of questions will hopefully lead to that moment of insight.
Here is an example from a foundation music course.

Students have been learning the basic music theory behind chord triads using the scale of C. They have been tasked with amending the C major triad to form Cmin, C7 and Cmaj7 (C\(\triangle\)) chords and then play them on their keyboard.

An understanding of music theory is not necessary to follow the example.

**Scale of C major**

<table>
<thead>
<tr>
<th>Root</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>5th</th>
<th>6th</th>
<th>7th</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>

Circulating around the room the teacher notices an interesting chord

Teacher: “Play that chord for me again. Thanks, what chord is it?”
Learner: “C7”

T: “Talk me through how you put that together – what notes have you used?”
L: “C, E flat, G, and...B flat”

T: “Well the key of C major has no sharps or flats so tell me why B flat is there”
L: “Erm...the seventh is B...so I’ve flattened it by a semitone to make C7”

T: “Great, but what about the E flat?”
L: “Oh.” (thinks) “That’s the flattened third.”

T: “Ok and when do you do that?”
L: “You flatten the third to make C minor”

T: “Right, so...”
L: “I see - I shouldn’t have flattened the third?”

T: “Spot on, so instead of E flat...
L: “Instead of E flat... I should have E. So what chord did I play?”

T: “Well think it through - you flattened the seventh correctly for C7, but also the third so put them together”
L: “Cmin7?”
T: “Excellent!”

**Error is the direct result of intelligence, not its absence**

Students do guess at answers, but normally they have to be ‘reduced’ to guessing after getting totally ‘lost’ or de-motivated. Consequently, most student errors are the products of intelligence, not a lack of it. That is worth remembering and respecting.

In the above example, the music teacher recognised that working with the learner’s reasoning from where they were deepened their understanding of the eventual solution. They helped the learner apply their intelligence and make meaning for themselves.

**The Humanistic perspective**

This two-step approach to dealing with student misconceptions is not only sound in terms of cognitive learning theory, but humanistic theory. Learners have self-esteem invested in their answers and simply pointing out their errors and correcting them is the verbal equivalent of a big red cross. It can be very de-motivating. By helping learners reason out their misunderstandings and self-correct the teacher nurtures their self-esteem.

‘Minesweeping’ - deliberately prompting misconception errors

As teachers we are aware of common student misconceptions that can occur with certain topics we teach. For these topics it can be worth ‘minesweeping’ for those misunderstandings by setting tasks that deliberately expose them. This is particularly true when the nature of the misconception is such that the student can perform some tasks correctly, but get other types of problem wrong. Planning to use the two-step strategy is an effective way of dealing with this.
Here is an example of a minesweeper from mathematics:

\[ 2 + 3 \times 4 = ? \]

Most learners will read left to right and add 2 and 3 to make 5, and times 5 by 4 to get 20. They are quite capable of solving most simple addition and multiplication problems, but have got this one wrong. The correct answer is 14 because mathematical operations do not work left to right – that is a misconception!

They work according to a strict order of priority. Multiplication has a higher priority than addition so it should happen first. 3 times 4 equals 12, add 2 makes 14. (Try it on a scientific calculator – type it in exactly as written)

Summary

• Try to create a learning environment where errors are seen as a positive – a chance to learn (the cartoon over the page might make a good poster for your classroom)

• When a student makes an error diagnose whether they have misunderstood or have made a mistake

• If mistakes in written work are persistent consider an appropriate intervention around study or organisational skills. Consider whether the learner might be dyslexic

• If a student has made a mistake in their practical work try to avoid the temptation always to take over and correct the work yourself as a demonstration

• Instead deepen their understanding of their craft by asking them to analyse what has gone wrong and to come up with suggestions for how to correct the situation

• If a student has misunderstood – you miss an opportunity for deepening learning if you leap in and simply tell them where they have gone wrong and how to correct the error

• Instead ask them to explain their answer and ask questions directed at any flaws in their logic. Use the two-step approach of “Talk me through this...” and “Ok, but what about...”

• Deepen understanding by using prompts to help students correct their own errors. Remember error is the result of intelligence not a lack of it

• Protect students’ self-esteem by using prompts to help students correct their own errors

• Consider using ‘minesweeper’ tasks to expose common student misconceptions

Let us know what you think

If you wish to give any feedback, make a contribution yourself or have a suggestion for topics of future issues then please contact Kit Jillings, Assistant Director Teacher Training at Kit.Jillings@lewisham.ac.uk or ext. 3271

In Issue six...

We will look at a new topic – applying Bloom’s Taxonomy of Learning.
1. Everyone looks so brainy.

2. I don't understand.

3. Excuse me, I don't understand.

4. My hero! My hero! My hero!