Formative assessment and developing understanding: why pupil talk should dominate in our classrooms

> *"In mathematics classrooms, teachers tend to work too hard while pupils are not working hard enough, resulting in the old joke that schools are places where children go to watch teachers work."*

I've been inspired to write this blog, after recently rereading Jeremy Hodgen and Dylan Wiliam's 'Mathematics Inside the Black Box', in which the above quote can be found. Having visited several hundred classrooms over the last four years, I have seen the hard-working teachers described, with the majority of pupils not engaged in developing 'relational' understanding' for much of their lessons (according to Richard Skemp, this is the goal of mathematics education).

Hodgen & Wiliam's seminal work focuses on assessment for learning in the mathematics classroom. They start by presenting five principles of learning and go on to set out formative assessment practices that will sound familiar to anyone who has been in the classroom in the last ten years, including focused feedback & marking and both self- and peer-assessment. However, by far and away the lengthiest section in the paper (in fact, two thirds of the entire document!) is dedicated to the topic of classroom dialogue, which is what I wish to focus on.

Hodgen & Wiliam's Principles of Learning

- *Start from where the learner is*
- *Students must be active in the process*
- *Students need to talk about their ideas*
- *Students must understand the learning intention*
- *Feedback should tell pupils how to improve*

As the authors say, talk is central to their view of teaching maths formatively. Neil Mercer (1995) presents the case for language being crucial in guiding learning and to the 'construction of knowledge'. He emphasises developing exploratory talk to 'co-construct robust, generalisable explanations'.

From Mathematics Inside the Black Box:

> *"…mathematics…ideas and concepts can be expressed in a very concise form…[which] makes mathematics difficult to teach and learn. Hence, providing opportunities for pupils to express, discuss and argue about ideas is particularly important in mathematics."*

In line with the first two principles of learning, to make sense of concepts and to develop their *own* understanding, learning has to be done *by* pupils; it cannot be done *for* them. Each pupil must participate in this process so they can assess, reform and build upon their current thinking. The role of the teacher is to be aware of pupils' current conceptions and to provide questions and prompts that guide this process; not to tell pupils what it is that they should know. As Hodgen & Wiliam say:

> *"…to merely add to those ideas [*i.e. what pupils currently understand*] an overlay of new ideas, tends to lead to an understanding of mathematics as disconnected and inconsistent."*

Moving on to the third principle of learning, Hodgen & Wiliam describe the importance of pupils 'talking the talk', using and constructing the language of mathematics. Again, Mercer provides additional perspective. He refers to 'educated discourse' [e.g. of mathematics] being the goal of education; being able to use the language of that discipline to effectively communicate ideas, with reasoning that is made visible (through talk) and knowledge that can be held accountable. If we are unable to justify our ideas (whether through lack of understanding or lack of precise language) we are unable to take part in this discourse.

I believe Clare Lee (2006) is referring to the same idea when she refers to David Pimm's 'mathematics register', which pupils need to learn to use in order to 'have control over the concepts

of mathematics'. She goes on to state "The more pupils are able to 'talk like a mathematician' the more they will take on the identity of a 'mathematician'".

Learners will only learn the precise and formal language of mathematics through being given opportunities to talk about maths and, over time, being guided to know how their current understanding and use of language relates to the educated discourse of mathematics. As they construct their understanding and develop fluency with the language of mathematics, learners become part of that educated discourse.

You may be asking at this point, "So what has all this got to do with formative assessment?" In a nutshell, it is through dialogue, providing opportunities for pupils to talk mathematically and listening carefully to their current conceptions, that we as teachers can understand how to guide their learning.

Going back to my opening paragraph, learners who are not actively engaging in talk are unlikely to be developing their understanding. In many classrooms, not only does the teacher often do the majority of the talking but the few pupils who are able to contribute (and are most frequently given the opportunity to do so) are the very pupils who probably have a more developed understanding already. How does a teacher become aware of their pupils' current conceptions if they are not explicitly involved in the dialogue?

Creating classroom environments that encourage <u>all</u> learners to participate in *meaningful* mathematical talk allows us to achieve three things:

- We learn what our pupils understand, which informs our teaching and how to guide their learning through feedback and questioning;
- Our pupils construct shared meaning which is accountable (through reasoning and justifying) to the 'educated discourse' but also *makes sense to them*; if our pupils all participate in developing this shared meaning we can be more sure of what they understand;
- Our pupils become increasingly proficient in the language of mathematics, which supports them to be involved in the learning process, to have more precise control over their ideas and, ultimately, to feel like mathematicians.

What is there to stop us from allowing pupil talk to dominate in our classrooms?

Consider:

- How many of your pupils contribute daily to meaningful mathematical talk?
- For how many pupils could you say, with confidence, that you have a clear awareness of their current understanding of the topic you are teaching?

The final section of Mathematics Inside the Black Box, talks of the need for changing practice slowly. Teachers who most successfully changed their practice, focused on only one or two aspects at a time and, crucially, had the collaborative support of peers engaging in the same process of development.

All three of the referenced texts (see below), contain excellent advice on how to support meaningful mathematical dialogue in our classrooms.

References:

Hodgen, J. & Wiliam, D. (2006) *Mathematics Inside the Black Box: Assessment for Learning in the Mathematics Classroom.* King's College / Granada Learning

Lee, C. (2006) *Language for Learning Mathematics: Assessment for Learning in Practice*. OUP / McGraw-Hill

Mercer, N. (1995) *The Guided Construction of Knowledge: Talk Amongst Teachers and Learners.* Multilingual Matters