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## Many right answers: learning in mathematics through speaking and listening

Conference or Workshop Item

How to cite:

De Geest, Els (2007). Many right answers: learning in mathematics through speaking and listening. In: Leicestershire Mathematics Subject Leaders Conference, 26 Jun 2007, Leicester, U.K..

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Version: Accepted Manuscript

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## What I hope we will do...

- Think and ponder about pedagogical issues to do with speaking and listening
- Explore how MRA could be used to provoke similar thinking within your department
- Get an insight of the content of MRA

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## How...

- By creating an awareness that discussing beliefs is really important because of the impact it has on the teaching of mathematics
- Linking practice with theory and theory with practice
- Using MRA as a model for triggering CPD

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## Imagine...

Thinking about the effect of beliefs on the teaching of mathematics

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## Imagine that you believe that...

(Version A)

- All knowledge – even mathematical knowledge – only exists as a set of beliefs in human minds: minds that are themselves produced in human societies. This means that mathematical 'knowledge' is necessarily partial, relative and subjective. There are no 'absolute' truths.
- Pupils create their personal version of mathematical 'reality' by making sense of, and systematising, their various mathematical experiences, interactions and discussions.

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## Imagine that you believe that...

(Version B)

- There are reliable truths in the world. William the Conqueror **did** invade England in 1066, Ottawa **is** the capital of Canada, and  $2 + 2 = 4$ . The truths of mathematics may be different to the truths of history or geography, but they retain a veracity, objectivity and existence that are independent of the beliefs of any particular learner.
- Pupils have, in reality, very little 'freedom' to 'invent' mathematics. The rules of mathematics are just as real and binding as the rules of Latin grammar.

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## Please discuss, based on your imagined beliefs...

- Should pupils talk about the mathematics they are learning?
- Why? Or why not?

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## The structure of *Many right answers*

- generate
- experiment
- reflect

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## The mathematics task

In groups of about 4, please explore the following:

I am watching the street from my hotel room. It is night (dark) and the street is illuminated by one lamp post. A man walks down the street, past the lamp post.

What is the locus of shadow of the top of his head?

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## Reflecting during the locus task...

Try to notice when there is a shift in your learning, in your thinking.

What triggered this shift?

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## Discussion questions

In what ways is it different teaching low attaining pupils to teaching high attaining pupils?

'Mathematics and mathematical learning are hierarchical.' What are the implications of this belief for low attaining pupils?

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**Is there anything you would like to share? Or would you prefer to move on?**

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## Discussion questions

Do you think speaking and listening heightens mathematics attainment in class? Why?

Do you think low attainment is linked to intelligence? Is intelligence fixed or not fixed?

How do you feel about working with misconceptions and disturbances with low attaining students? Should they be avoided? Or not?

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## Discussion questions

How have you experienced speaking and listening as part of CPD so far? Has anything changed within you? Have your views/beliefs changed?

What questions/prompts/tasks could you give yourself and your colleagues to trigger reflectiveness on existing practice and CPD?

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## Available on-line

Journal

Prompting questions

Some literature

Discussion forum on NCETM website

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