

Engaging Weaker Students in Core Mathematics

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What do we mean by weaker students?

Students who may exhibit one or more of these traits:

- Knows basic techniques but doesn't understand them
- Lacks mathematical vocabulary
- Can apply methods to simple situations but can't make the jump to harder problems
- Goes to pieces when confronted with exam questions
- Doesn't work efficiently
- Lacks experience of 'harder' examples that use standard techniques
- Lacks confidence when dealing with anything other than straightforward problems

Planning for these students

- Know what learning skills they are starting the course with.
- Have a target for the learning skills they are to develop over the year.
- Include opportunities to develop these skills throughout the year.
- Kick start their 'learning engine'

Five golden rules for engaging weaker students

1. Be openly enthusiastic about what is being taught
 - Avoid cynicism, it will be picked up on readily by students
 - Don't expect a great deal back in terms of enthusiasm but don't be disillusioned by this
2. Focus on *learning* rather than *teaching*.
 - Avoid giving too much away to start with
 - Aim for 'eureka' moments
3. Differentiate but don't 'water down'
 - Carefully select who you ask each question to
 - Assign tasks ensuring that all will gain some success
 - Take the content to the level that is required for the exam
4. Be firm about what you want but keep the pressure off
 - Expect high standards
 - Avoid backing students into a corner
 - Make the expectations 'just the way it is' rather than 'because I say so'
5. Have more than one way of *explaining* everything
 - Try to aim for three different sounding explanations for each thing taught (even if they boil down to being the same thing really)
 - Stick to the main explanation when dealing with the whole class but be prepared to use one of the others with students who are struggling
 - After you've exhausted all of your explanations, go back to the first in the hope that it has sunk in a bit more!

'Eureka' moments, fine tuning and deep understanding

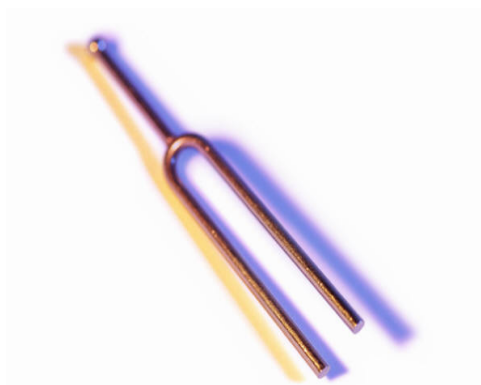


Lesson objectives - don't give the game away

"Today we are going to learn that the product of the gradients of two perpendicular straight lines is -1 ."

Use discovery activities. If there is not time in the lesson then set the work as preparation to be done before a lesson. Use the start of the lesson as a time to report on what was found.

Example - Gradients of Straight Lines - a discovery activity using Geogebra or Autograph



After the initial 'discovery' has been made, it needs to be 'fiddled with' to develop understanding more.

The aim here is to get students to the stage where they can answer exam questions on the topic because they understand it.

This can be done by looking at questions in the text book or by a specific 'fine tuning' activity. If text book questions are used, build in some discussion time. Link this to previous knowledge.

Example - Straight Line Challenges - a fine tuning activity using Geogebra or Autograph

If there is time, some extra work can be done to encourage thinking more about the maths that can be done. This will probably differentiate by outcome but should allow both able and weaker students to push their understanding.

Example - Graphs of Quadratic Functions - a deep thought activity using Geogebra or Autograph

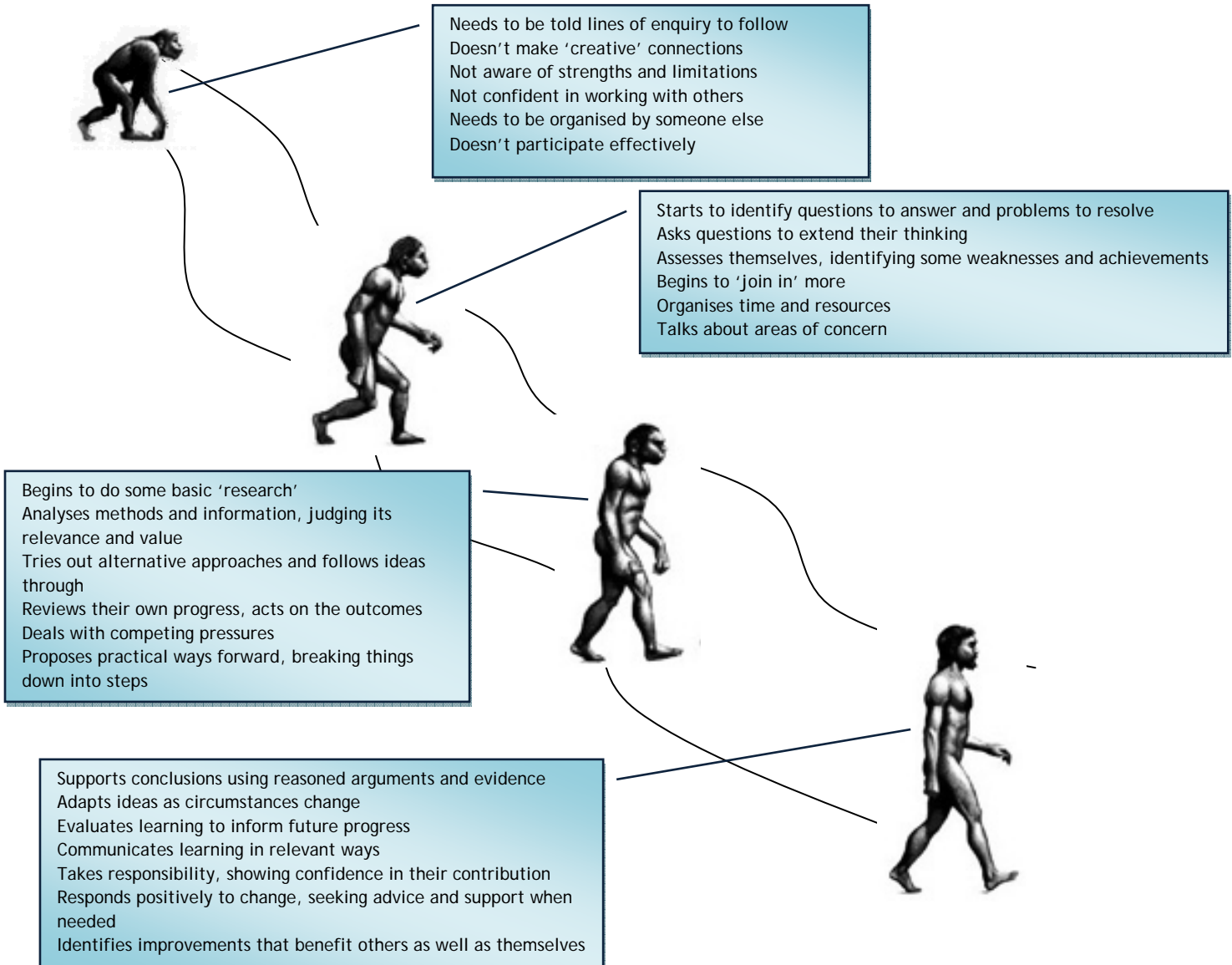
Speeding up the basic skills

- Use quick games/starters
- Involve every student
- Keep the pace up
- Make sure all can achieve some success

Example - Practising Indices - a fast paced game using Powerpoint.

Some bits of theory to remember

Developing independent learning



Kick starting the learning engine

