

Subject Specific ‘Points to Consider’ or Target Ideas

Subject specific target setting is a really important consideration for us - somebody reading one of our reviews should be left in no doubt that it is a *maths* trainee being reviewed. Can I encourage you to consider, when setting the maths specific target, the details of what makes maths teaching uniquely challenging and the particular devices we have at our disposal to support maths learning?

Ideas for how this can developed include:

- maths specific reading - DfE non-statutory guidance for example, Doug French, Anne Watson, John Mason
- maths specific tools - algebra tiles, DESMOS, GeoGebra, cuisenaire rods
- maths specific pedagogy - the use of diagrams, representations and structures, linking areas of the curriculum (for example supporting numerical fluency by including fractions on lessons on area), use of non-standard and non-examples, identifying component and composite skills

Examples from previous reviews:

Looking at the previous review, there were two successful approaches. First, (example 1) to look at an upcoming topic and give some focussed actions and secondly (example 2, 3 and 4) to look at a broader mathematical approach.

Example 1: Considering a specific area of the curriculum

Target: Develop your teaching of geometry with year 10 so that the students have a firm understanding of the use of mathematical language and develop their reasoning further.

Actions: Read Doug French's Teaching and Learning Geometry: Issues and methods in mathematical education. Use this to help you consider the component and composite skills which will be required for the sequence of lessons. Consider how you can use tools such as DESMOS to explore the material, (circle theorems for example). Make sure you include non-examples in your explanations to ensure a richer understanding.

Example 2: Developing as a mathematical practitioner

Target: Develop further your understanding of the barriers to learning maths and how you can support this in the classroom. For example, mathematical misconceptions, maths anxiety and the question "when will I ever need this".

Actions: Before starting on a topic, read the non-statutory guidance, or look at the NCETM website, to raise your awareness of possible misconceptions. For each misconception consider a diagram, a representation or a manipulative you could use to support the understanding of that piece of learning. When planning, consider "why this? why now?" for each activity so that each has a purpose in supporting the learning. Look for opportunities for pupils to be successful and reward this accordingly. Be prepared for, and actively encourage, the question "when will I ever need this" and consider the value of each piece of learning - often there isn't a direct and genuine context but there are still valuable skills in problem solving, logical thinking and reasoning.

Example 3:

Target: Develop your use of mathematical scaffolding

Actions: Consider a range of diagrams that you can use in your explanations, for example ratio tables. Think about the language that you use and how you use it; using technical definitions but breaking down the language to make it accessible. For example 'prime factor decomposition', 'completing the square' - go through what each part means. Consider using the strategy of 'minimally different questions' in order to focus on one key learning point at a time.

Example 4

Target: Develop mathematical medium term planning CCF 2 and 4

It has been good to see how you are drawing on the 5 Big Ideas in teaching mathematics, particularly looking at Kris Boulton's work on atomisation. It would be good to see this used to inform the planning of a more significant sequence of lessons, for example the full 'indices' topic you will be teaching to year 10.

Actions:

- Read again Kris Boulton's blog.
- Identify the key concepts in teaching indices (by speaking to colleagues, looking at the textbook and looking at the GCSE spec). Use the 'hardest example' approach.
- Sequence these key concepts across 5 lessons, stating where you would introduce each and where you would review each.
- Check this with your host teacher before planning the lessons!

Other ideas for lesson observations:

They could be about the use of **language** – object/image... expression/equation/formula....

How and when to introduce these, how to assess pupils' understanding and use of them

E.g. 'You could have a task where pupils need to perform 2 successive transformations – do they know which picture to perform the second transformation on? Use this as an opportunity to introduce object and image to distinguish between the 2'

They could be about **the small steps within** a topic - considering how the topic of solving equations progresses in difficulty, or how to choose your denominators in the topic of adding and subtracting fractions.

E.g. 'Once pupils had grasped how to solve $4x+2=2x+10$ you could have assessed their understanding further by having questions written as $2x+10=4x+2$, $10+2x=2+4x$, then considered $4x+2=10-2x$ and even $2-4x=10-2x$

E.g. 'Why was $12/13 + 17/19$ not a good choice of question for these pupils? Was the time spent completing long multiplication helpful in the class achieving their objective?'

They could be to do with **developing pupils' mathematical thinking** – helping our students develop explanations that aren't just recipes but that develop understanding

E.g. 'How could you use a tool such as "sometimes/always/never" in this lesson? Was there an opportunity for students to justify their answers, make a conjecture or compare different approaches?'

It could be about **subject knowledge**

E.g. 'When teaching A-level it is important to know a bit more than the specification so that you can answer student questions confidently – this also helps inspire trust in you. It would have helped in today's lesson on the binomial expansion if you were ready to answer questions like "What happens if n isn't an integer?"'

It could be about **planning and resourcing** effectively

E.g. 'In today's lesson on finding the percentage of an amount, pupils picked up the method very quickly. You could have made more progress in this topic if you were ready with some calculators and could have looked at what to do with more difficult numbers. This would have further extended the learning because you could have encouraged students to compare and evaluate which method to use and justify their choices

It could be about **curriculum knowledge**

E.g. 'Your explanation on bearings in today's lesson was very clear and your worksheet was motivational and beautifully designed. Pupils do, however, find the wording of exam questions difficult to decipher, such as find the bearing of A from B – they don't know which point to start at, so in future you need to have some questions which are in the style of how they will be formally assessed

It could be about **assessment**

E.g. 'At the end of this lesson on evaluating indices you asked pupils to work out the value of $27^{2/3}$. This just assesses the process, it would have been better to ask a question like "tell me something that has the same value as $27^{2/3}$ ", this would allow you to see how much pupils could apply of what they had learnt.