National Centre for Excellence in the Teaching of Mathematics

#mathscpdchat 25 February 2020

What are your most effective/favourite ways to start and end maths lessons?
Hosted by Dani Quinn

This is a brief summary of the discussion – to see all the tweets, follow the hashtag ***#mathscpdchat*** *in Twitter*

Some of the areas where discussion focussed were:

purposes of 'starter' tasks:

- that a 'starter task' ought **to 'ignite some thinking' about the content of the lesson** … that a 'starter' ought always to support the intended learning-focus of the lesson … that supporting classroom management supports learning;

- that the **purpose may be to reduce students' maths anxiety** … for example creating booklets that present ten similar 'starters', one of which students 'do' at the start of each of ten consecutive lessons ('by the fifth lesson or so the students are more confident') … that this way of starting lessons gives the teacher time to 'read the room', to 'read students' faces';
- the purpose of a lesson 'starter' that teachers 'hear' most often is 'to **revise/practise previously-taught skills** that are required by pupils in order for them to learn whatever is planned for that lesson';
- the purpose of a starter task may be to **'get pupils into 'learning mode''**;
- to **check prior learning in order to 'guide' the lesson appropriately**;
- to '**settle' the class while waiting for 'late arrivers'** (it may be a large site) … that 'starters' can interfere with 'settling' as pupils gradually 'learn' that there is no need to get to the lesson on time because 'missing-the-starter' doesn't matter ('it's stuff I've already done and know well!') … that 'off-task talk' may develop while students are waiting for the 'proper lesson' to start … overcoming this by requiring students to show their responses to 'starter-tasks' on mini-whiteboards;

start-of-lesson routines that are NOT presenting pupils with a set of retrieval or numeracy questions:

- using a 'starter' that looks 'mundane', but that has the **potential to prompt thought and discussion** … for example challenging Year 7 pupils to do, and then describe their 'ways-of-doing', calculations such as $5 \times 7 \times 8 \times 2$, 35×18, $92 \times 17 + 34 \times 4$, and $6 \times 14 \times 25$;
- **students silent-reading books that they have brought in** (for five minutes), thus providing the teacher with time to 'access' the group, and 'access' (set-up) the lesson … whether this is a whole-school policy … that **showing a short film sequence** can serve the same purpose (links to example film sequences below);
- opening a Key Stage 3 maths lesson with **'rolling numbers'** (link below);
- Year 11 students starting each lesson by working on **four questions presented in a two-by-two grid** from a collection of such grids compiled into a booklet used for half a term (two questions are 'retrieval' from scheme-of-work, one question addresses a 'gap' revealed in mock GCSE exams, and one question assesses skills to support future learning);

on not using a 'starter' at all:

- that whether or not it is effective to begin a lesson with a 'starter' depends on the group of students and **the time of the lesson during the school day** … that a starter can be used to 'wake up' students if it is the first lesson of the day … that it

might be interesting to **conduct research** into whether/how the time of a maths lesson during the school day effects students' learning;

- **getting 'stuck in' straight away to 'the new concept of the day'** … that retrieval sessions go elsewhere in the lesson … that not using starters at all, **getting all students quickly 'on the main task of the lesson'**, pays huge dividends in engagement and motivation;

using 'starter tasks' that can be described as 'accessible questions focussing on fluency with the basics' or as 'mixed retrieval practice':

- that the **maths addressed in 'retrieval practice' that is done as a lesson starter** ought to be **that which students need to use often**, such as aspects of algebra, fractions and negative numbers;
- that **if students become genuinely 'stuck' when they are trying to answer 'retrieval practice questions' used as starters**, a small part of the lesson may be used to try to sort out difficulties, or the medium-term/long-term learning plans may need to be changed;

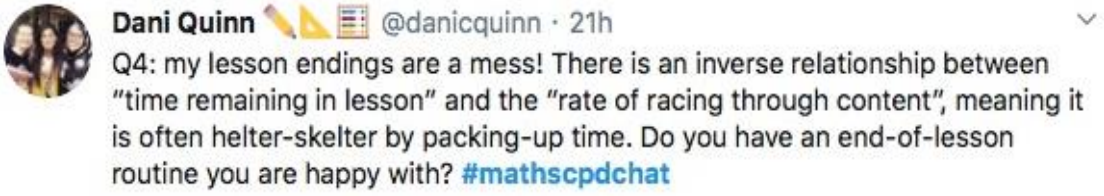
lesson endings:

- requiring students to **write a sentence about what they learnt during the lesson** … saying that you want them to use 'key mathematical words' from the lesson … saying 'talk like a mathematician';
- **using the last part of a lesson to check whether students seem to have learnt what was intended** … that at the end of a lesson students may appear to have learnt what was intended when actually their grasp of it is very 'shaky' … that a 'retrieval-starter' at the start of the next lesson can confirm/reveal/start to address inadequate learning from the previous lesson (for example some teachers use Edexcel 'check in' tests for this purpose);
- that it can be **hard to time the teaching so that the lesson ends 'in a sensible place'** … ignoring lesson breaks when planning teaching and learning … incorporating flexibility into lesson plans (not feeling that plans have to be 'stuck to' rigidly);
- at the end of a lesson the **pupils and teacher together devising a question that addresses any aspect of the lesson with which pupils struggled** … that the devised question can be tackled during the next lesson … pupils writing a 'surprise' question in their exercise books 'five pages on';
- **using a timer** set to 'go off' five minutes before the end of the lesson;
- just 'packing up' at the end of the lesson and **continuing the next lesson from 'where we were'**;

- when planning a sequence of lessons creating four **'key example questions'** … 'consolidating' by challenging students with these questions 'when the time is right', but **never at the end of a lesson**;
- using **multi-choice diagnostic questions** at the end of a lesson;
- using **'exit tickets'** on which there are three questions, one addressing a 'foundational skill', one being a 'challenge', and one giving a preview of the next lesson … that pupils' responses provide useful information for planning … using **'end-now' tasks**, one that 'looks back' and one that 'looks ahead' …. **adapting/creating plans for future lessons according to pupils' responses**;
- **not thinking that each lesson has to start with a new 'topic**' … using alternative approaches, different materials and resources, when continuing to explore what was the focus of the previous lesson;
- **in the last minutes of a lesson 'beginning the next lesson'** in order to 'leave an echo ready for the next day';
- **pupils reflecting on the lesson at the end of it** … asking 'has today's work answered your questions about this mathematical idea?' … inviting pupils to tell partners, then the whole class, 'what was the hardest part of the learning today' … that a short session of reflection by pupils and teachers together provides **opportunities for the teacher to encourage and reassure pupils**, and indicates to pupils that the teacher is interested in their learning.

In what follows, click on any screenshot-of-a-tweet to go to that actual tweet on Twitter.

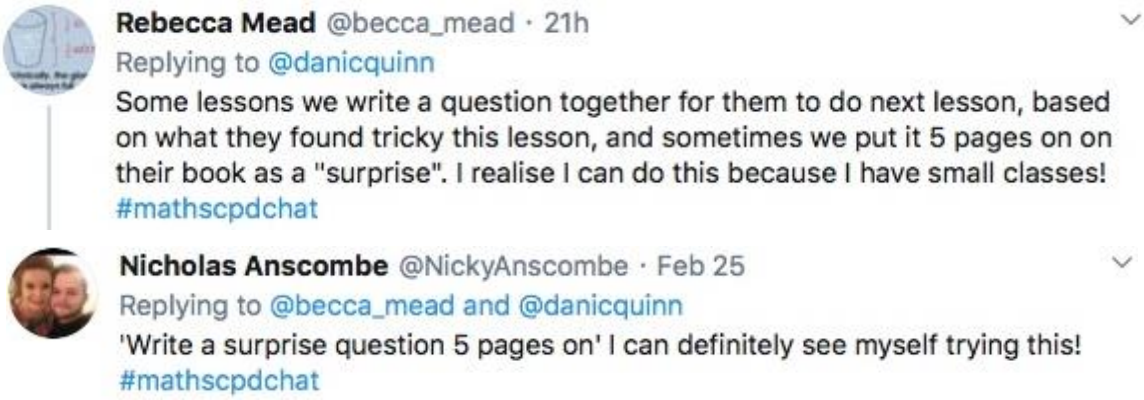
This is a part of a conversation about the value of ending a lesson with students briefly sharing with each other and the teacher their reflections on that lesson. The conversation was generated by this tweet from Dani Quinn:



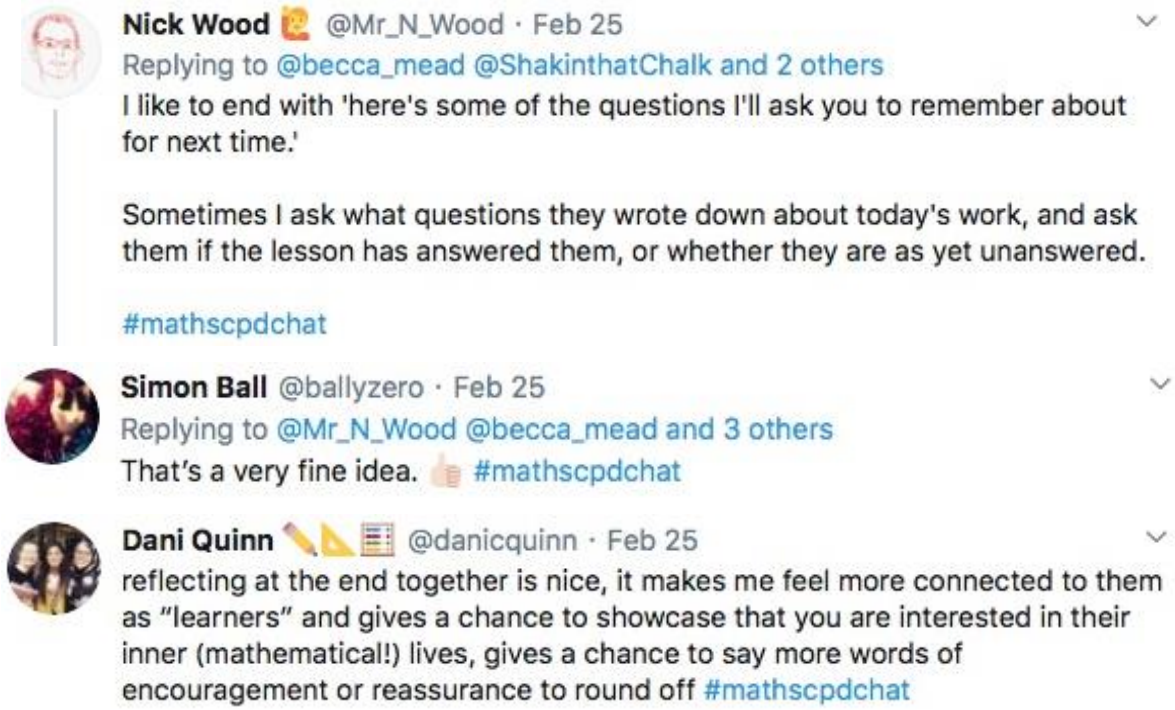
and included these from Simon Ball and Nicholas Anscombe:

these from Dani Quinn and Rob Brown:

these from Rebecca Mead and Nicholas Anscombe:



and these from Nick Wood, Simon Ball and Dani Quinn:



(to read the discussion-sequence generated by any tweet look at the 'replies' to that tweet)

Among the links shared were:

The A-team Rolling Numbers which is a video showing Class A from King Solomon Academy starting a lesson by 'rolling numbers' with the aim of getting faster and more accurate at their times tables. It was shared by Dani Quinn

Retrieval practice - my way which is a blog by Nick Wood about how he starts lessons with a 'do now' ten question no-stress test. It was shared by Nick Wood

Pinpoint Learning which is a website providing material intended for use in teaching maths, including 20-minute tests that can be personalised to address the 'needs' of individual students. It was shared by Amanda McKay

Focus on ... short image sequences which is an article in an NCETM Secondary Magazine suggesting ways to help students cultivate their powers of imagery. It includes references to (ways of using) the short film sequences that are linked to below. It was shared by Mary Pardoe

Notes sur un triangle which is a dazzling five-minute film by René Jodoin. It is packed with interesting arrangements of triangles that slide smoothly into each other in fascinating ways. A teacher might be showing this short film sequence as students arrive at the start of a lesson. It was shared by Mary Pardoe

Dance Squared which is an entertaining short film sequence in which squares ‘dance’ in interesting ways in time with very jolly and ‘catching’ music. A teacher might be showing this short film sequence as students arrive at the start of a lesson. It was shared by Mary Pardoe

Journey to the Center of a Triangle which is a short film by Bruce and Katharine Cornwell that illustrates attractively ways of finding the four centres of any triangle. A teacher might be showing this film as students arrive at the start of a lesson. It was shared by Mary Pardoe

Margaret Jones' reflections on using 'Journey to the Center of a Triangle' which is an article in *Mathematics Teaching 206* in which the author describes how she used the film *Journey to the Center of a Triangle* with a group of 15-year-old pupils. It was shared by Mary Pardoe