

by nctm 22 days ago

What is the best way to plan a maths lesson?

Summary of the #mathscpdchat discussion on 27 March 2018, hosted by @MrsMathematica



MrsMathematica
@MrsMathematica

Good evening everyone! Welcome to another #mathscpdchat... Housekeeping, as ever: 1. Please use the hashtag in replies and posts so we can keep track of the conversation! 2. Please no polls in the tag during this time, as it breaks the official record!

23 DAYS AGO

What does 'lesson preparation' mean to you?



MrsMathematica
@MrsMathematica

Let's get started with an open ended question! Q1. What does the phrase 'lesson preparation' mean to you? #mathscpdchat twitter.com/mathscpdchat/s...

23 DAYS AGO



Jess
@FortyNineCubed

@MrsMathematica Working out what you want your students to have learnt (or done/performed) by the end of a lesson and deciding upon the necessary steps to get them there. #mathscpdchat

23 DAYS AGO

When you prepare for your lessons, what do you do? Does this differ from what you WANT to do?



MrsMathematica
@MrsMathematica

Q2. When you prepare for your lessons, what do you do? Does this differ from what you WANT to do? #mathscpdchat

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

@MrsMathematica How best to prepare students for learning to maximise their understanding and engagement within a topic #mathscpdchat

23 DAYS AGO



Jess
@FortyNineCubed

@MrsMathematica I try to prepare/plan for units/topics of work - the lesson isn't the right unit of time to think about - different concepts will require different lengths of time. #mathscpdchat

23 DAYS AGO



Paul Tallent
@MrT_math

@MrsMathematica What misconceptions might students have and how will we deal with them? #mathscpdchat

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

@FortyNineCubed @MrsMathematica Yes, it's looking at a lesson in the wider context rather than just a stand-alone lesson. #mathscpdchat

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Jenny Koenig
@JennyAKoenig

oops #mathscpdchat [twitter.com/JennyAKoenig/s...](https://twitter.com/JennyAKoenig/status/954888888888888888)

23 DAYS AGO



MrsMathematica
@MrsMathematica

Where do you find these misconceptions? Experience? Research? #mathscpdchat [twitter.com/MrT_math/statu...](https://twitter.com/MrT_math/status/954888888888888888)

23 DAYS AGO

The human activity of planning for the future is about imagining yourself as fully and completely as possible in that situation... what is really effective is imagining myself in the lesson as vividly as possible, my emotional, physical and cognitive state... and that helps you wake up in that moment, in the relevant moment, and enact whatever it is you wanted to enact...
John Mason

Mathematics Teaching Self-evaluation Tools

1. When I am planning a lesson, or a series of lessons:

'Playing the lesson through' in your mind is an important aspect of planning a lesson. Visualising how the learners are likely to be acting at each stage, and what you will be doing and saying to encourage learning will suggest appropriate teaching strategies, including where it may be helpful to pause.

While playing the lesson through in your mind, you can:

- ▶ think about previous learning on which the lesson will build,
- ▶ focus on mathematical language that you may introduce,
- ▶ anticipate misconceptions and stumbling blocks,
- ▶ decide which resources are essential or might be helpful.

Visualising yourself in the classroom with the learners, can also suggest ways of:

- ▶ using learners' current interests
- ▶ including real life applications
- ▶ linking the lesson to other curricular areas, such as music, art or drama.

When you play a lesson through in your mind beforehand:

- ▶ you can ask yourself what it is you want learners to become aware of, and what you need to do so that the tasks and interactions between learners, and between learners and yourself, will lead to these awarenesses;
- ▶ remembering that mathematics is fundamentally about becoming aware of and expressing generality, you can think about how the lesson will call upon learners to generalise;
- ▶ there is strong evidence to suggest that when learners generate their own questions they think more deeply about the mathematics that they are doing, so you can consider how you will enable learners to see problems in the lesson as their own problems;
- ▶ finally you can ask yourself what, after learners have experienced the tasks of this lesson, you will do next.

[@FortyNineCubed](#) [@MrsMathematica](#) Yes! And 'playing the lesson through in your mind' as an aspect of doing that ... [#mathscpdchat](#) pic.twitter.com/7aZZSWZiE

 MARY PARDOE [@PARDOEMARY](#) · 23 DAYS AGO



Kathryn
[@Arithmaticks](#)

I'm still unpacking so will dip in and out if I can... but you should all join in! [#mathsepdchat](#) twitter.com/mrsmathematica...

 23 DAYS AGO



Jess
[@FortyNineCubed](#)

[@MrsMathematica](#) I spend a lot of time thinking about 'what's the hardest possible thing they could be asked to do?' for a topic, and then planning backwards from that. Good planning means students can access those higher level questions. [#mathscpdchat](#)

 23 DAYS AGO



MrsMathematica
[@MrsMathematica](#)

How does this change your planning / make it more effective? [#mathscpdchat](#) twitter.com/TwinklMaths/st...

 23 DAYS AGO



Heather Scott
@MathsladyScott

@MrsMathematica #mathscpdchat I think of the stdts Then I think of the topic and what comes before and what comes afterwards - then I choose an activity to introduce the concept + what they will use to practice + extensions and back ups

23 DAYS AGO



Kathryn
@Arithmaticks

@MrsMathematica A lot is experience I think but sometimes asking a colleague can help. I often use @mrbartonmaths @getdiagnostics to find them if I'm really stuck for a topic. Some schools include them in SoW documentation too. #mathscpdchat

23 DAYS AGO



MrsMathematica
@MrsMathematica

What are your "go to"s for extension work? #mathscpdchat twitter.com/MathsladyScott...

23 DAYS AGO



Martyn
@martynyeouk

Found this today thanks to @HyperHelga as a planning tool for teaching for mastery!
[#mathscpdchat twitter.com/missa_maths/st...](https://twitter.com/missa_maths/st...)

23 DAYS AGO



Kathryn
@Arithmaticks

@MrsMathematica I often come up with a series of examples to illustrate a topic. I don't often have the time I'd like to structure these well but really trying after #mathsconf15 and all the sessions I went to! #mathscpdchat

23 DAYS AGO



Jess
@FortyNineCubed

@MrsMathematica I think a sign of a well-planned lesson is where the teacher is able to answer 'what are the students thinking about?' for any point in that lesson. That question has changed so much of practice! #mathscpdchat

23 DAYS AGO



Twinkl Maths KS3/4

@TwinklMaths

@FortyNineCubed @MrsMathematica Sometimes, I try to include a GCSE question or a question which they think to be 'too hard' at the beginning of a lesson then they use their learning from the lesson to answer it. #mathscpdchat



23 DAYS AGO



Ben Gordon

@mathsmrgordon

@MrsMathematica Plan the unit if work and atomise the skills you want students to learn by the end of it. Plan for forgetting because it WILL happen. Plan for misconceptions because they always exist. Collate these as a team. #mathscpdchat



23 DAYS AGO



Heather Scott

@MathsladyScott

@MrsMathematica A variety of places. Here's an example when teaching area I would use The Transum Area challenge here: [transum.org/Maths/Puzzles/...](https://www.transum.org/Maths/Puzzles/) You could use this to practice or as a puzzle at the end of a lesson? #mathscpdchat



23 DAYS AGO



MrsMathematica

@MrsMathematica

How do you manage this so that students don't just give up when they see that question? #mathscpdchat twitter.com/TwinklMaths/st...



23 DAYS AGO



Twinkl Maths KS3/4

@TwinklMaths

@MrsMathematica I think it encourages you to think about the order of learning and how best to build on a solid foundation. If you know where they've come from and where they're going, it helps to build an effective lesson through a thorough understanding of learning and progress. #mathscpdchat



23 DAYS AGO



Ben Gordon

@mathsmrgordon

@MrsMathematica Planning shouldn't be done in isolation. The idea of 11 maths teachers planning 11 different units with different examples and tasks is absurd. Consistency of language and representations should be discussed through dept and through the unit. #mathscpdchat



23 DAYS AGO



MrsMathematica
@MrsMathematica

Such a good tip! [#mathscpdchat](#) [twitter.com/FortyNineCubed...](https://twitter.com/FortyNineCubed)

23 DAYS AGO



Jess
@FortyNineCubed

[@mathsmrgordon](#) [@MrsMathematica](#) YES to atomisation of content and retrieval practice being planned for explicitly- way too important to leave it to chance. [#mathscpdchat](#)

23 DAYS AGO

An effective teacher is aware of common misconceptions that may become obstacles to the learning planned for a lesson. close

An obstacle to learning may have been unintentionally created during previous teaching by a teacher, or other authority such as a textbook, conveying something to the learner as a 'generalisation' which is not in fact generally true. For example:

- ▶ 'take three from two, you can't';
- ▶ 'when you multiply by ten, you add a nought';
- ▶ 'multiplying makes bigger, dividing makes smaller';
- ▶ 'if tan A is bigger than tan B, angle A is bigger than angle B';
- ▶ 'two minuses make a plus'.

Or learners may themselves have generalised falsely from a restricted set of examples. Common misconceptions that arise in this way include believing that:

- ▶ the bigger the 'arms' of an angle are, the bigger the angle is;
- ▶ shapes with longer perimeters have larger areas;
- ▶ the 'base' of an isosceles triangle is always 'horizontal';
- ▶ perpendicular lines are always horizontal and vertical.

Some cognitive obstacles are the result of incorrect reasoning or of not knowing conventions. For example:

- ▶ deducing from $8^n = 8^2$ that $n = 2$;
- ▶ believing that there are more integers than there are multiples of three;
- ▶ believing that $(a + b)^2$ means $a^2 + b^2$

Part of planning a lesson is preparing strategies for dealing with possible or suspected misconceptions. For example a good teacher may give learners a task that will expose a particular misconception and lead to discussion of it.

[@MrsMathematica](#) There is some advice about that (being aware of possible misconceptions in planning a lesson) in one of the NCETM Self Evaluation 'Examples' in a lesson-planning section re KS3 here: [ncetm.org.uk/self-evaluatio...](https://www.ncetm.org.uk/self-evaluation) [#mathscpdchat](#) pic.twitter.com/xvNMvqxv3u

MARY PARDOE @PARDOEMARY · 23 DAYS AGO



Ben Gordon
@mathsmrgordon

[@MrsMathematica](#) In year 7, consider/find out what has been taught and HOW it's been taught - what concrete/pictorial models have been used? Can you use these before going straight for the abstract? [#mathscpdchat](#)

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@MrsMathematica I project the question and students come up with a post-it note and they say something about it - something as simple as the length of a side or a number which is involved in the question to actually having a go answering the question or remembering a formula.

#mathscpdchat



23 DAYS AGO



MrsMathematica

@MrsMathematica

How would you suggest handling this to allow for personal style of delivery and autonomy of teachers? Bearing in mind that some schools only have a Department meeting once a term or half term? #mathscpdchat [twitter.com/mathsmrgordon/...](https://twitter.com/mathsmrgordon/)



23 DAYS AGO



Jess

@FortyNineCubed

@MrsMathematica I think group planning should be about discussing misconceptions/writing questions (including multiple choice Qs) - this is far more productive than 'let's make a PowerPoint together' and getting waylaid by discussing about font/colour choices!

#mathscpdchat



23 DAYS AGO



Twinkl Maths KS3/4

@TwinklMaths

@MrsMathematica I think also that students are able to know where they are and why they're doing something. #mathscpdchat



23 DAYS AGO



Ben Gordon

@mathsmrgordon

@MrsMathematica Autonomy is good. We all want it but have some "steel pillars" that are agreed on that all teachers use such as agreed examples to use that elicit key ideas and misconceptions with intelligent variation. Hirsch calls this a communal curriculum - a shared language #mathscpdchat



23 DAYS AGO



Paul Tallent

@MrT_math

@FortyNineCubed @MrsMathematica Agree, and also whether there is a meaningful context/problem that can be developed. #mathscpdchat



23 DAYS AGO



MrsMathematica
@MrsMathematica

[@FortyNineCubed](#) How do you record these questions for future use? In my experience, so far, paper tends to disappear, shared online documents tend to not get opened even though some of the questions created were wonderful [#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@mathsmrgordon](#) I like this! This would minimise the effect of different teachers with the same class on the fundamental approaches! [#mathscpdchat](#)

23 DAYS AGO



Jess
@FortyNineCubed

[@MrsMathematica](#) Also...sometimes individual autonomy (although good!) can cause problems when classes get new teachers - if you've taught solving equations in one way, contrary to rest of department, makes it difficult for students. Need to discuss fundamentals explicitly.
[#mathscpdchat](#)

23 DAYS AGO

Mathematics Teaching Self-evaluation Tools

Also, research shows that, in a lesson, learners often make progress in topics and techniques that are not part of the current topic. This is because a complex network of mathematical concepts and ideas feed into any topic, and any topic feeds into a further network of ideas. So a teacher cannot know in advance exactly what learning will result from a lesson or series of lessons. The teacher can only offer opportunities for people to learn from their experience, and cannot do the learning for them. For example, during a lesson focussing on the concept of area, a learner might make progress in using and understanding decimals and place value, while hardly altering their previously established ideas about area.

[@FortyNineCubed](#) [@MrsMathematica](#) Need to take care if you are thinking that you CAN know exactly what pupils are learning in a well-planned lesson! [#mathscpdchat](#)
pic.twitter.com/aRDYMFvVP

MARY PARDOE @PARDOEMARY · 23 DAYS AGO



Jess
@FortyNineCubed

[@MrsMathematica](#) Hm! Within my context, we have a very well resourced shared drive that everyone would consult - will have a ponder on how I would create this if wasn't in place already.
[#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

@MrT_math @FortyNineCubed I've led sessions on adding twists to legacy spec questions to turn them into the style new spec questions and they have been invaluable at helping teachers unpick how the new spec looks to the students. So very useful for everyone involved
[#mathscpdchat](#)

23 DAYS AGO



Heather Scott
@MathsladyScott

@MrT_math @FortyNineCubed @MrsMathematica [#mathscpdchat](#) (Sorry 🙄)

23 DAYS AGO



Jess
@FortyNineCubed

@PardoeMary @MrsMathematica Oh, 100% agree! Is next to impossible to ascertain whether 'learning' has taken place within such a short frame of time. [#mathscpdchat](#)

23 DAYS AGO



Ben Gordon
@mathsmrgordon

@MrsMathematica I certainly don't mean script lessons but the idea of having a base to begin from is desirable surely? Not starting from scratch each time. How teachers deliver, provide practice, use formative assessment is down to them. "Autonomous delivery of an agreed design"
[#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

@mathsmrgordon Couldn't agree more! [#mathscpdchat](#)

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

@MrsMathematica The importance in the consistency of language can't be understated. I think sometimes to use one method may not benefit all learners. The aim is that students have a depth to their learning and a thorough understanding - can this be done in different ways?
[#mathscpdchat](#)

23 DAYS AGO



Heather Scott
@MathsladyScott

@MrsMathematica @mathsmrgordon #mathscpdchat ☐ for approx 25 yrs I have advocated that pupils should use calculators to become familiar with number relationships - most depts disagreed with me - I've held true and was pleased this week to see the BBC article on why using calculators might be a good thing! 😊

23 DAYS AGO



Ben Gordon
@mathsmrgordon

@MrsMathematica “This is how we do things here because it’s best for mathematical understanding and provides the best chance for students to grasp the idea, challenge misconceptions, remember and provide a common language to talk about it with other students in other classes” #mathscpdchat

23 DAYS AGO



Heather Scott
@MathsladyScott

@mathsmrgordon @MrsMathematica #mathscpdchat Maybe this is different for different people - I have always planned from scratch every time ... but ... I do have a wealth of resources and ideas to make great choices for my classes and the resources and ideas for teaching different topics I'm always open to 😊

23 DAYS AGO



MrsMathematica
@MrsMathematica

@TwinklMaths Multiple representations are almost always a good thing! But when it comes to things like solving equations, there should probably be a preferred method & explanation within the dept to allow for embedding & understanding to develop from yr7-11 regardless of teacher #mathscpdchat

23 DAYS AGO



Heather Scott
@MathsladyScott

@FortyNineCubed @PardoeMary @MrsMathematica #mathscpdchat I'm not so sure this is true? The students can tell you what learning has taken place so you can ask them to say what they have learnt and you can use this as a basis for planning the next lesson ☐ 😊

23 DAYS AGO



Ben Gordon
@mathsmrgordon

[@MathsladyScott](#) [@MrsMathematica](#) And it's that wealth of resource and experience that makes you a great planner. Planning isn't really a skill that you can practice and "get better at" - it's a build up of domain specific pedagogical knowledge and experience accrued over time

[#mathscpdchat](#)

23 DAYS AGO



Paul Tallent
@MrT_math

[@MathsladyScott](#) [@mathsmrgordon](#) [@MrsMathematica](#) I also tend to plan from scratch informed by previous experiences, partly because I am terrible at filing! [#mathscpdchat](#)

23 DAYS AGO



Jess
@FortyNineCubed

[@MathsladyScott](#) [@PardoeMary](#) [@MrsMathematica](#) I would suggest that is performance, not learning - if definition of learning is 'a change in long term memory' then the fact that they can do it (eg, add fractions) in one lesson doesn't constitute evidence of learning. [#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@MathsladyScott](#) [@mathsmrgordon](#) I think it comes down to that actual experience and wealth of resources. Planning is all about sharing your expertise with your students with clear and precise language, examples and practice so they can learn from you. [#mathscpdchat](#)

23 DAYS AGO

Recognising, and possibly expressing, a generality deserves to be the highpoint around which a lesson is constructed. A teacher can, for example, look at a page of a textbook and ask herself what generalities are implicit in it. The generalities may not be explicit because the wording often obscures the generality of a statement. For example, in the statement 'the interior angles of a triangle add up to 180° ' the word 'a' means not just a particular triangle someone is thinking about, but any triangle whatsoever. (Examples could include a very long, thin triangle with a tiny base and with the third corner millions of miles away.)

To appreciate generality learners must appreciate the scope of what can be changed while leaving some aspect the same. One way of getting learners to appreciate the scope of permissible change is to invite them to think of qualifying examples. Invitations such as 'write a number which no-one else in the room will write' can, for example, prompt learners to expand the range of the set of permissible examples that they have in their heads.

Whether or not a learner who manages to solve a problem is likely to be successful with a similar problem another time depends on whether they appreciate the generality of which that particular problem is an instance. It is possible that they are satisfied with success in a single instance, giving no thought to the generality underlying it. When a learner successfully solves a problem the teacher can ask what changes could be made to the problem and still the same solution method would work.

Looking for a generality to be the 'highpoint' of a lesson when planning it, can focus ones thinking [#mathscpdchat](#) (quote is also from an 'example' in the NCETM self-evaluation tools here: ncetm.org.uk/self-evaluatio...) pic.twitter.com/YjxOWYbAq

 MARY PARDOE @PARDOEMARY · 23 DAYS AGO



Mike Thain
@ThainMike

[@MrsMathematica](#) Try Craig Barton's ssddproblems.com [#mathscpdchat](#)

 23 DAYS AGO



Heather Scott
@MathsladyScott

[@FortyNineCubed](#) [@PardoeMary](#) [@MrsMathematica](#) [#mathscpdchat](#) I promise I am talking about understanding and learning - I agree that saying you can do something is not necessarily evidence of learning - but when you explain the concept and explain your understanding of it ... I'd accept that? ☐

 23 DAYS AGO



MrsMathematica
@MrsMathematica

[@MathsladyScott](#) [@TwinklMaths](#) Have that professional discussion and if necessary open it up to the entire department! And always, always, do what is best for the greater good/your students [#mathscpdchat](#)

 23 DAYS AGO



MrsMathematica
@MrsMathematica

Couldn't agree more - so useful! [#mathscpdchat](#) twitter.com/ThainMike/stat...

 23 DAYS AGO



Jess
@FortyNineCubed

[@MathsladyScott](#) [@PardoeMary](#) [@MrsMathematica](#) In part, yes! But I have taught students concepts and been delighted with how quickly they've grasped them and can clearly explain the concept. And then three months later it's as though that never happened....hence it's not sufficient to say it's been 'learnt'. [#mathscpdchat](#)

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

[@MathsladyScott](#) [@MrsMathematica](#) Absolutely. As the class teacher we know our learners best. Students must understand the maths they're learning. I know I've had to be careful about the language I use, e.g. I must use 'subtract' instead of 'take away' as some think I'm on about the local take away! [#mathscpdchat](#)

23 DAYS AGO



Ben Gordon
@mathsmrgordon

[@MathsladyScott](#) [@FortyNineCubed](#) [@PardoeMary](#) [@MrsMathematica](#) The problems lies when we ask a trainee to plan and an experienced teacher to plan from scratch - the lessons are often worlds apart with no consistency or agreed principles of learning over time. Let's model *not* planning from scratch as the norm - it's damaging [#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@MrT_math](#) [@MathsladyScott](#) [@mathsmrgordon](#) I sometimes regret switching to the visualiser instead of the SMART board for KS5 delivery because I haven't got that digital record of where the lesson went and how we developed it (my paper filing is terrible) [#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@FortyNineCubed](#) [@MathsladyScott](#) [@PardoeMary](#) I think this ties into the interleaving and retrieval practice that has been such an important part of maths education conversations over the last year or so. If students don't see it for months of course they'll forget! [#mathscpdchat](#)

23 DAYS AGO



Mike Thain
@ThainMike

@MrsMathematica @TwinklMaths This is so important. Key skills need to be consistently taught. so does the use of CPA models/resources so that students are able to develop their understanding in a consistent way. I hate picking up a class that have been taught short cuts without understanding #mathscpdchat

23 DAYS AGO



Ben Gordon
@mathsmrgordon

Maybe it is a systemic problem that we don't meet more regularly as a dept to hash out planning of units together. I'd argue the opportunity cost for meeting more regularly would yield better quality and no more work for staff planning individually. #mathscpdchat

23 DAYS AGO



Mike Thain
@ThainMike

@MathsladyScott @MrsMathematica @TwinklMaths Then I'd tell them not to and share various articles published by the MA and ATM showing why this is shocking practice. #mathscpdchat

23 DAYS AGO

Learners try to do what they think the teacher wants them to do

Learners may really want to understand ideas by re-constructing the underlying reasoning, so that they can re-construct the facts and techniques for themselves again in the future. But they will be prevented from doing this if the teacher habitually shows them exactly what to do. This is because learners try to do what they think the teacher wants. If a teacher indicates that learners should follow his method exactly, the underlying message is that they should use that method without actually generating it for themselves. The message that they receive is that the criterion for whether or not they understand a topic is the extent to which they copy exactly what the teacher does. They are therefore prevented from developing their own criteria for whether they understand a topic.

For example, a teacher directly prompting learners to use a number line when tackling a certain type of question, can result in learners drawing number lines that they do not actually use to think with. There is evidence, from national key stage 3 tests, of learners arriving at answers and then inserting number line pictures that they did not use to get the answers. These learners have not developed the confidence to rely on their own thinking; they believe that to show 'understanding' they have to copy exactly what their teachers did with that type of question.

Learners often use worked examples as templates (sometimes for working through a list of questions in a text book)

Worked examples do not enable learners to cope in new situations if they offer too much opportunity for learners to pick up on irrelevant details, or focus on the wrong features. Also learners may use them to act superficially, giving the illusion of understanding.

Whether or not a list of questions generates learning depends on how learners interact with the questions. It can be a vehicle for learning if learners have been encouraged to think about what they are learning by tackling the questions. For example they can be encouraged to ask:

- ▶ What is the same about all these questions?
- ▶ How are the questions different?
- ▶ What do I need to know and understand to answer each question?
- ▶ Can I make up my own question?
- ▶ Can I answer my own question?
- ▶ What have I learnt by answering these questions?

@MathsladyScott @FortyNineCubed @MrsMathematica Yes, I agree. But sometimes lessons can be dominated by pupils doing examples after following a 'worked example'. It is not possible from that to draw conclusions about what they have learnt. #mathscpdchat pic.twitter.com/ljo6dpQHlJ

MARY PARDOE @PARDOEMARY · 23 DAYS AGO

How do we ensure that students retain what we have taught them?



MrsMathematica
@MrsMathematica

So as we head into the final 15minutes of [#mathscpdchat](#) how do we ensure that our students retain what we have taught them? We know they could do it 2 weeks/months/years ago. How do we ensure they can still do it?

23 DAYS AGO



Heather Scott
@MathsladyScott

[@ThainMike](#) [@MrsMathematica](#) [@TwinklMaths](#) [#mathscpdchat](#) Maybe if we all agree to teach for understanding we don't need to worry about 'misconceptions' or 'different methods' as everything that has been taught will contribute to the whole experience of the concept?

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@ThainMike](#) [@MathsladyScott](#) [@TwinklMaths](#) [#EvidenceBased](#) [#mathscpdchat](#)

23 DAYS AGO



Ben Gordon
@mathsmrgordon

[@MrsMathematica](#) Regular low stakes cumulative quizzing. I blog about it here teachinnovatereflectblog.wordpress.com/2018/02/17/why... [#mathscpdchat](#)

23 DAYS AGO



Heather Scott
@MathsladyScott

[@MrsMathematica](#) [@MrT_math](#) [@mathsmrgordon](#) [#mathscpdchat](#) I haven't tried this but ... I believe you can take a photo of each page as your progress using the visualiser? Maybe somebody out there can confirm or otherwise?

23 DAYS AGO



Mike Thain
@ThainMike

[@PardoeMary](#) [@MathsladyScott](#) [@FortyNineCubed](#) [@MrsMathematica](#) But learning happens over time. The problem is so many people are still wedded to the idea of showing learning has happened in a 20 min window due to old ofsted framework. We need to break this myth and focus on how to embed learning over time [#mathscpdchat](#)

23 DAYS AGO



Jess
@FortyNineCubed

[@MrsMathematica](#) Planning for retrieval with starters/ low stakes quizzes. SO important this is carefully planned in advance - if it isn't, it ends up at the discretion of the individual teacher. And if you're busy thinking 'y=mx+c' you'll forget to include 'fractions of amounts'
[#mathscpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@MathsladyScott](#) [@MrT_math](#) [@mathsmrgordon](#) some can, pretty sure mine can record video too! I've just never figured out how to make it work.... [#needtoinvestigate](#) [#mathscpdchat](#)

23 DAYS AGO



Heather Scott
@MathsladyScott

[@PardoeMary](#) [@FortyNineCubed](#) [@MrsMathematica](#) So important for students to have different ways of 'practicing' including 'problem-solving' and 'unfamiliar work' with an interesting twist to it? [#mathscpdchat](#)

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

[@MrsMathematica](#) Revisit topics often in starters, plenaries, games, make links in learning in topics. [#mathscpdchat](#)

23 DAYS AGO



Paul Tallent
@MrT_math

[@MathsladyScott](#) [@ThainMike](#) [@MrsMathematica](#) [@TwinklMaths](#) What about misconceptions that come from incorrect generalisations by students? [#mathscpdchat](#)

23 DAYS AGO



Mike Thain
@ThainMike

[@MathsladyScott](#) [@MrsMathematica](#) [@TwinklMaths](#) I think we always need to worry about misconceptions because what we say isn't always what is heard. Hence the need for constant checking and feedback to pick up on these before they become embedded. [#mathscpdchat](#)

23 DAYS AGO



Mike Thain
@ThainMike

@MathsladyScott @MrsMathematica @MrT_math @mathsmrgordon You can snapshot each page if your visualiser has that function. #mathscpdchat

23 DAYS AGO



Heather Scott
@MathsladyScott

#mathscpdchat and I think we can capture the time when it has happened. I have seen this done in infant schools when the teacher knows that the pupil can now count ... it's a question of what we capture and how we capture it ☐ 😊 twitter.com/ThainMike/stat...

23 DAYS AGO



Jess
@FortyNineCubed

@MrsMathematica Or all of a sudden you'll think, 'we've not done FDP conversions in a while, let's do that' but this is such an ineffective method of promoting regular retrieval (including giving opportunities to forget). #mathscpdchat

23 DAYS AGO



MrsMathematica
@MrsMathematica

@ThainMike @MathsladyScott @TwinklMaths when students are introduced to something they look for the patterns & make their own rules. If we don't choose our numbers carefully we risk the wrong patterns being embedded as 'the rule' and that is almost impossible to shake. Classic Eg - gradient of a st line. #mathscpdchat

23 DAYS AGO



Mike Thain
@ThainMike

@MrT_math @MathsladyScott @MrsMathematica @TwinklMaths Again with carefully chosen qs used during whole class teaching you can tease a lot of these out. Then follow up individually to check they understand #mathscpdchat

23 DAYS AGO

Effects of actions

Learners are prompted to carry out some actions, and initiate other actions for themselves. They internalise and make sense of these actions by becoming aware of the effects of the actions, and the relationships between the actions and their effects.

For an appropriate technique for solving a problem or completing a task, such as counting, predicting or imagining, to come to mind it is essential that the learner has become aware of the appropriate action-effect connection.

Also becoming aware of an action-effect relationship can lead to new awareness. For example, becoming aware that the action of adding 1 makes a number bigger leads to the awareness that there can be no largest number.

Therefore, when you prompt learners to carry out an action, it is helpful to draw their attention to the effect of that action. When you want to teach a new concept, an effective strategy is to find an action which learners can already carry out, but which needs modifying, and help learners focus attention on the effects of the modified action.

[@MathsladyScott](#) Yes ... it's about pupils understanding effects of mathematical actions, and showing that understanding ... [#mathscpdchat](#) pic.twitter.com/bDHA6wrpGY

 MARY PARDOE @PARDOEMARY · 23 DAYS AGO

Final question: how does your planning change in the final run to public exams?



MrsMathematica
@MrsMathematica

Last question before we wrap up tonight. How does your planning change in the final run to public exams? GCSE/GCE etc [#mathscpdchat](#)

 23 DAYS AGO



Mike Thain
@ThainMike

[@MrsMathematica](#) [@MathsladyScott](#) [@TwinklMaths](#) Yes. The whole idea of small changes to questions during deliberate practice is vital. Craig Barton did a session on this at the weekend & someone blogged it. Can't remember who though ☺ [#mathscpdchat](#)

 23 DAYS AGO



MrsMathematica
@MrsMathematica

[@ThainMike](#) [@MathsladyScott](#) [@TwinklMaths](#) I've seen a few! (will look through my bookmarked tweets and see if I can find one) The last podcast is up too and it may get a mention there! [#mathscpdchat](#)

 23 DAYS AGO



Mike Thain
@ThainMike

[@MrsMathematica](#) I base it on QLA analysis from mock exams. Also include lots of modelling exam technique followed by practice of that skill. [#mathscpdchat](#)

 23 DAYS AGO



Heather Scott
@MathsladyScott

[@MrsMathematica](#) [#mathsdpdchat](#) With the previous GCSE I used to plan for 'cramming' in the last month to the exam. With the new GCSE I plan for more problem-solving experiences with the maths turning up in surprising places 😊 I much prefer it 😊

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@PardoeMary](#) definitely worth reading then :) [#mathsdpdchat](#)

23 DAYS AGO



Twinkl Maths KS3/4
@TwinklMaths

[@MathsladyScott](#) [@MrsMathematica](#) Yes lots of problem-solving! [#mathsdpdchat](#)

23 DAYS AGO



Heather Scott
@MathsladyScott

[@MrsMathematica](#) [@ThainMike](#) [@TwinklMaths](#) Yes I like to make 'surprising' changes that creates an 'upset' and 'deeper thinking' ☐ [#mathsdpdchat](#)

23 DAYS AGO



DLWilson
@DLWilson_maths

[#mathsdpdchat](#) Misconceptions key to learning. Set challenging homeworks and spend a lesson tackling their misconceptions. Time well spent. Use technology to facilitate this, to minimise workload.

23 DAYS AGO



Sharon Malley
@mathsmumof2

[@MrsMathematica](#) Real focus on technique, reminders of not losing marks on the basics and really building confidence. [#mathsdpdchat](#)

23 DAYS AGO



MrsMathematica
@MrsMathematica

[#mathsdpdchat](#) twitter.com/stan_tilly/sta...

23 DAYS AGO

Key Learning Point

Do it

Can you do it?

'What it is' (Standard)
'What it's also' (Non-standard)

Deepen it

Can you Apply it?
Solve it?

- + Solve Problems
 - Empty Box/ Symbols
 - Here's the answer ...
generate the questions
 - Always/Sometimes/Never
- + Apply to unfamiliar contexts
- + Make connections

Secure it

Are you secure?

'What it's not !'

Focus on misconceptions and opportunities to reason about mistakes
'Active Argument'

Difficulty Point

Opportunities for pupils to describe, explain, justify, convince, prove

Richard
@RichardDeakin

@PardoeMary Wheres this quote online!? #mathscpdchat twitter.com/PardoeMary/sta...

🐦 23 DAYS AGO

Jess
@FortyNineCubed

@MrsMathematica Don't fall into the 'give them loads of past papers' trap - use mock QLAs and your knowledge of students to identify gaps and plan to fill those via careful reteaching.
#mathscpdchat

🐦 23 DAYS AGO

Heather Scott
@MathsladyScott

Yes this is so important - steady Tai Chi mathematics one step at a time to ensure accuracy 🙏

☐ 😊 #mathscpdchat twitter.com/mathsmumof2/st...

🐦 23 DAYS AGO



MrsMathematica
@MrsMathematica

Aaaaaaaaaaaaaand it's 8pm - thank you so much for all your contributions tonight! It's been great reading all your thoughts and ideas, until next time, have a good week and a good holiday!
[#mathscpdchat](#)

23 DAYS AGO



Jess
@FortyNineCubed

[@ThainMike](#) [@MrsMathematica](#) [@MathsladyScott](#) [@TwinklMaths](#) I've been working on this lots recently! [twitter.com/fortyninecubed...](https://twitter.com/fortyninecubed) [#mathscpdchat](#)

23 DAYS AGO



Mary Pardoe
@PardoeMary

Very many thanks to Esther, [@MrsMathematica](#), for excellent hosting tonight, and to all contributors for sharing so much expertise and experience. Read it all again tomorrow here: ncetm.org.uk/resources/41729 [#mathscpdchat](#)

23 DAYS AGO



Richard
@RichardDeakin

[@PardoeMary](#) [@MrsMathematica](#) What was the theme of [#mathscpdchat](#) . I was at my sons year 5 parents evening so missed the start.

23 DAYS AGO



MrsMathematica
@MrsMathematica

[@RichardDeakin](#) [@PardoeMary](#) What is the best way to plan a maths lesson and how do you do it? [#mathscpdchat](#)

23 DAYS AGO



Effa Pheasant
@stan_tilly

[@MrsMathematica](#) Ok, thank you. It's my first time. What a great idea and so useful!
[#mathscpdchat](#)

23 DAYS AGO

**Effa Pheasant**

@stan_tilly

#mathscpdchat twitter.com/stan_tilly/sta...

23 DAYS AGO

**Mary Pardoe**

@PardoeMary

[@RichardDeakin](#) [@MathsladyScott](#) [@FortyNineCubed](#) [@MrsMathematica](#) It's here Richard: ncetm.org.uk/self-evaluatio... #mathscpdchat

23 DAYS AGO

**Mary Pardoe**

@PardoeMary

[@RichardDeakin](#) [@MathsladyScott](#) [@FortyNineCubed](#) [@MrsMathematica](#) It's in an 'example' in the section on the first question - I'm afraid that you'll have to look through those 'examples' #mathscpdchat

23 DAYS AGO

**Ben Gordon**

@mathsmrgordon

THIS 🙌 🙌 🙌 🙌 🙌 🙌 #mathscpdchat twitter.com/byrchalljh/sta...

23 DAYS AGO