#mathscpdchat 22 November 2022

How can we get pupils/students of any age to become more resilient in maths?
Hosted by Alice Ward-Gow

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

The links shared during this discussion were:

Mistakes, mindsets and mathematics which is an *Impact* article by Dave Bowman. The author looks at the 'academic' mindsets, which are described as the 'purpose, belonging, self-efficacy and growth' mindsets. It was shared by Dave Bowman

Growth mindset and brain plasticity - the neuroscientific underpinnings of learning which is another *Impact* article by Dave Bowman. The author looks further at positive mindsets that result in resilience. It was shared by Dave Bowman

Expressing Generality which is one of the booklets in the Open University *Update* series that was created, by a team under the leadership of John Mason, to support mathematics education courses. It contains a paragraph in which John Mason explains/describes the kind of learning environment in which there exists a 'conjecturing atmosphere'. It was shared by Mary Pardoe

An illustrated summary of the discussions in this #mathsCPDchat follows.

The host's first main question, with a poll, …

Miss Ward-Gow @mcwardgow · Nov 22

Let's kick off tonight's #mathscpdchat with a poll:
When did you last hear a student say "I don't get this" [or equivalent]

Don't forget to use the hashtag #mathscpdchat in your replies tonight 😎

Today (or yesterday)	**86.4%**
Last week	10.6%
Last month	1.5%
Last year	1.5%

66 votes · Final results

… prompted this discussion about consequences of students' poor 'basic numeracy' …

MrHawesMaths @HawesMaths · 17h

Replying to @mcwardgow

Normally by the ones who have broken concentration. Try and encourage them to use alternative language and unpick what it is they don't 'get' #mathscpdchat

Miss Ward-Gow @mcwardgow · 17h

Replying to @HawesMaths

Do you think it comes back to a lack of listening? #mathscpdchat

MrHawesMaths @HawesMaths · 17h

Replying to @mcwardgow

Mostly down to poor numeracy. For example, any fraction work really (only involves simple times tables) yet fractions of amounts and operations etc cause major dramas due to poor foundational knowledge. #mathscpdchat

Miss Ward-Gow @mcwardgow · 17h

Replying to @HawesMaths

Great observation - how do we address these prior knowledge issues? #mathscpdchat

MrHawesMaths @HawesMaths · 17h

Replying to @mcwardgow

I do loads of times table work on dr frost maths. My starters/retrieval tasks are heavily numeracy based with a focus on what skills are required for the lesson. Just have to plough through. It is annoying that the only maths they do is just classroom based. #mathscpdchat

MrHawesMaths @HawesMaths · 17h

Replying to @HawesMaths and @mcwardgow

Also, I would really like it if we had some regular numeracy tasks outside of the classroom. Currently, there is reading that happens for 15 mins a day. Would love some numeracy slots in there instead to boost numeracy and build up the profile of maths. #mathscpdchat

Miss Ward-Gow @mcwardgow · 17h

Replying to @HawesMaths

Is there a whole-school focus on reading/literacy at the moment? #mathscpdchat

MrHawesMaths @HawesMaths · 17h

Replying to @mcwardgow

Every form has a reading slot for 4 x 15 minute slots. An extra hour makes a good bit of difference. Imagine what an extra half hour a week could do?? #mathscpdchat

Miss Ward-Gow @mcwardgow · 19h

Any other schools with time included for reading/literacy? Is there also additional time for numeracy? **#mathscpdchat**

… a reminder about emphasising 'not yet' in the context of 'achieving understanding' …

Dave Bowman @Maths4ukplc · 17h

Replying to @mcwardgow

#mathscpdchat Within a month of being with me, all my students add "yet" when they don't understand something or know what to do when solving a problem. YET is a very powerful word.

o

Miss Ward-Gow @mcwardgow · 17h

Replying to @Maths4ukplc

Does this link with growth mindset? #mathscpdchat

… and a single comment:

The host's (Alice Ward-Gow's) second main question prompted comments about the resilience of Y11 and Y7 students and primary pupils, and thoughts about how people's resilience may 'fluctuate'. The sequence of (linked to Twitter) screenshots below show all responses to Q2. In those replies and conversations **only** you can **click on any screenshot-of-a-tweet to go to that actual tweet on Twitter.**

The second main question from Alice Ward-Gow …

Miss Ward-Gow @mcwardgow · 18h

Q2 - Which year group are currently the most resilient?

Would be great to hear why you made your choice? #mathscpdchat

[Would've included more options, but Twitter will only let me have 4 😁]

Today (or yesterday)	**86.4%**
Last week	10.6%
Last month	1.5%
Last year	1.5%

66 votes · Final results

… generated this conversation, which includes a reference to a 'problem solving curriculum', between Gemma Scott and Alice Ward-Gow …

Director of Maths @DirectorMaths · 18h

Replying to @mcwardgow

Year 11- we have built in "safe" opportunities for them to show resilience through goal free problems etc also they have had the opportunity to see success since lockdown #mathscpdchat

Miss Ward-Gow @mcwardgow · 18h

Replying to @DirectorMaths

Do other year groups get the same opportunities? #mathscpdchat

Director of Maths @DirectorMaths · 18h

Replying to @mcwardgow

Yes, built into the curriculum in KS4. We will have them in KS3 too once we can free up current pandemic recovery time (hopefully that time will come!!) #mathscpdchat

Miss Ward-Gow @mcwardgow · 18h

Replying to @DirectorMaths

Sounds great 😃 what prompted the inclusion of goal-free problems? #mathscpdchat

Director of Maths @DirectorMaths · 17h

Replying to @mcwardgow

We developed a problem solving (conditional knowledge) curriculum alongside our declarative and procedural curriculum so goal feee problems are one activity we use as part of that #mathscpdchat

Miss Ward-Gow @mcwardgow · 17h
Replying to @DirectorMaths
What do you do when students are reluctant to start solving a problem? #mathscpdchat

Director of Maths @DirectorMaths · 17h
Replying to @mcwardgow
Accept that it something students will develop at different rates and is dependent on so many external factors. Then practically we will change the familiarity or autonomy or provide scaffolding/ prompts #mathscpdchat

Director of Maths @DirectorMaths · 17h
Replying to @DirectorMaths and @mcwardgow
That and take a step back to assess their declarative and procedural knowledge #mathscpdchat

… this discussion, about positive experiences, between Matt Hawes and Alice Ward-Gow … …

MrHawesMaths @HawesMaths · 18h
Replying to @mcwardgow
I am loving my year 7s. Whatever I throw at them, they want more and more. They are really liking the stretch and the challenge. Some love the pain of getting it wrong and working out how and why they made a mistake. Literally love it. #mathscpdchat

Miss Ward-Gow @mcwardgow · 18h
Replying to @HawesMaths
That's great to hear! 😃How do we maintain this when they get to Year 8? #mathscpdchat

MrHawesMaths @HawesMaths · 18h
Replying to @mcwardgow
We carry them through so we just build on what we are doing and then use some rich tasks to build their thinking skills. #mathcpdchat

… the following observations from Tazreen Kassim-Lowe to Alice Ward-Gow …

Tazreen Tershanah @tershanah · 18h
Replying to @mcwardgow
#mathscpdchat Primary aged children can be surprisingly resilient especially in environments which embrace the struggle, emotions of maths and beauty of mistakes.

Miss Ward-Gow @mcwardgow · 17h
Replying to @tershanah
Great point! 🙂What do you think we do/say at secondary schools that slows down this resilience? #mathscpdchat

Tazreen Tershanah @tershanah · 17h

Replying to @mcwardgow

#mathscpdchat Perhaps an increase in testing? But Secondary colleuges will know more about this.

… and a single comment from Gemma Scott:

Director of Maths @DirectorMaths · 18h

Replying to @mcwardgow

It's tough because resilience fluctuates over the course of the year for year groups and especially for individuals (myself included!!) #mathscpdchat

There were no replies to Alice's third question …

Miss Ward-Gow @mcwardgow · 18h

Q3 - Which year group are currently the least resilient? Why do you think this is the case? Replies in the comments with the hashtag **#mathscpdchat**

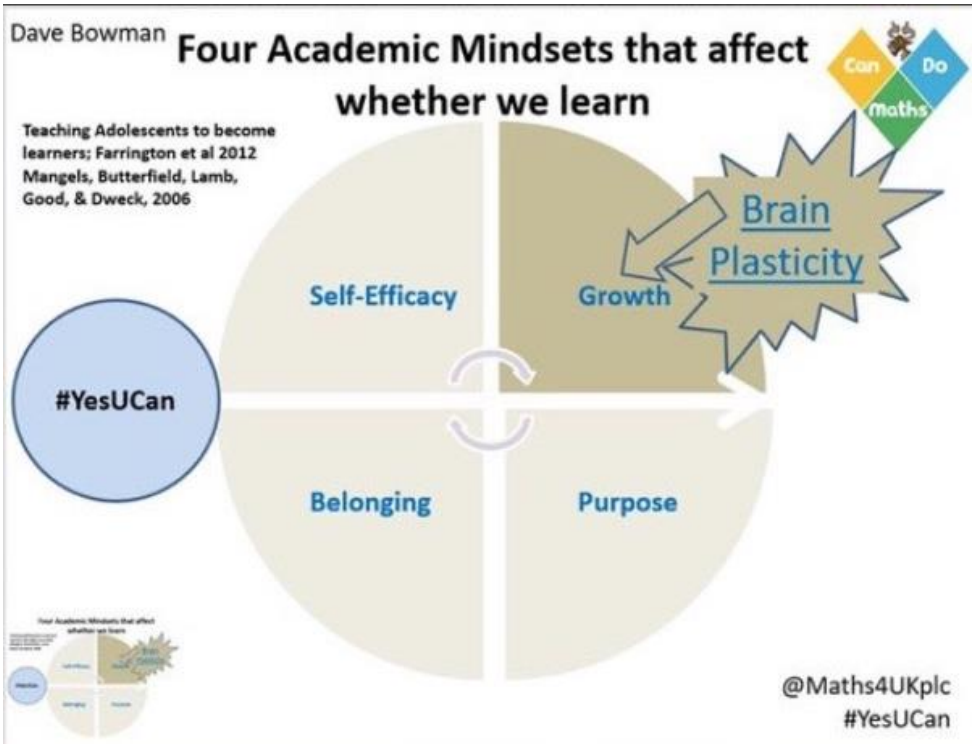
Today (or yesterday)	**86.4%**
Last week	10.6%
Last month	1.5%
Last year	1.5%

66 votes · Final results

… but Dave Bowman, not as a reply to any question, shared an image …

Dave Bowman @Maths4ukplc · 18h

The #YesUCan belief that addresses the four academic mindsets leads to resilience and self belief in all year groups #mathscpdchat



… which prompted the sharing of some more images (and comments):

Mary Pardoe @PardoeMary · 18h

Replying to @Maths4ukplc

Great! And you are doing so much to help students be resilient! When I was a young teacher (SOME time ago!) it was reading this that prompted me to try to establish a conjecturing atmosphere in all my lessons. Really helped students become resilient! (Link next) #mathscpdchat

Some brief remarks about what is meant by a *conjecturing atmosphere* may be appropriate before you begin. A conjecturing atmosphere is a supportive atmosphere in which making judgements about your own behaviour, or that of others, is not appropriate. Rather, a conjecturing atmosphere is fostered by simply noticing the manner and content of contributions and responses to others, and modifying that behaviour when appropriate. It is based on the explicit premise that you learn much more from trying to express ideas that are still fuzzy and half-formed, than you do from telling someone things about which you are confident . By expressing ideas, in words, gestures, pictures and writing, they can be looked at, worked on and modified, whereas if they stay inside your head they may just go round and round. Bear in mind that even though, perhaps because, you are uncertain, others can also learn from your struggle.

The essence of working in a conjecturing atmosphere is therefore listening to and accepting what others say as a conjecture which is intended to be modified. Consequently, it is well worth noticing how you go about:

- developing and using a vocabulary which fosters conjecturing, (e.g. use words such as 'I suggest that . . .' or 'Perhaps . . .' rather than 'No!' or 'That's right!').
- listening to others and being listened to.

Dave Bowman @Maths4ukplc · 18h

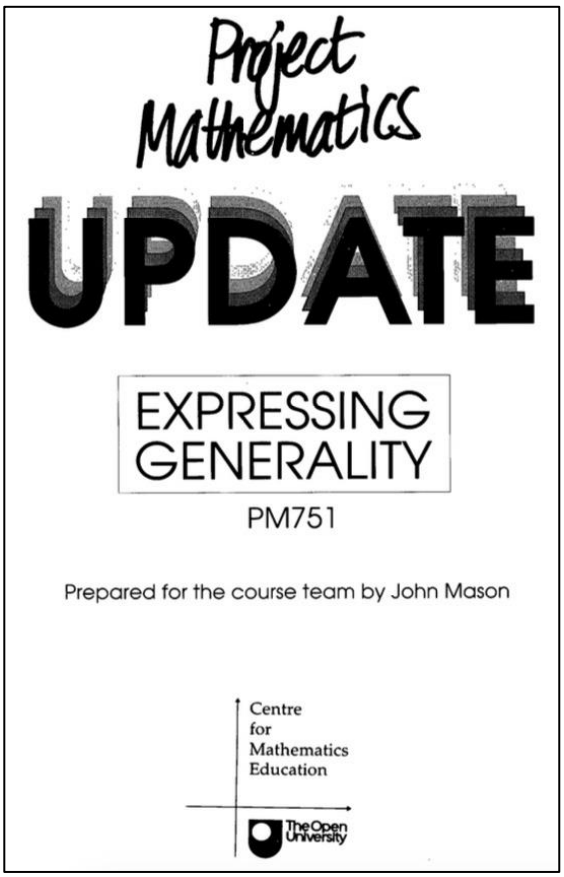
Replying to @PardoeMary

Love "conjecturing atmosphere"

Mary Pardoe @PardoeMary · 18h

Replying to @PardoeMary and @Maths4ukplc

Link: open.edu/openlearncreat



Project MATHEMATICS UPDATE Course Team

Gaynor Arrowsmith, Project Officer, Open University
Lynne Burrell, Academic Editor, Open University
Leone Burton, External Assessor, Thames Polytechnic
Joy Davis, Liaison Adviser, Open University
Peter Gates, Author,Open University
Pete Griffin, Author, Open University
Nick James, Liaison Adviser, Open University
Barbara Jaworski, Author, Open University
John Mason, Author and Project Leader, Open University
Ruth Woolf, Project Secretary, Open University

Dave Bowman @Maths4ukplc · Nov 22

Replying to @PardoeMary

What a team! AND project leader!

Another sharing of images, that was not a reply to any question, prompted a short conversation:

MrHawesMaths @HawesMaths · 19h

What has been good this year is we have had a shift in how we assess students based on 6 'subject strands'. Proven quite effective. Some below. #mathscpdchat

Reviewing and improving, leading to independence

Emerging	Requires direct input in target areas for improvement. Doesn't respond effectively to constructive feedback. Unable to reflect on the tasks that have been set
Evolving	Requires some input into target areas for improvement and identifying misconceptions. Listens to constructive feedback but needs to be prompted to act. Starting to review their own performance and identify strengths and weaknesses
Expected	Appreciate and identify ways in which they can improve as a learner. Responds adequately to constructive criticism and advice.. Starts to use success criteria to review and assess their work.. Can reflect on their own and other people's strengths and weaknesses
Exceeding	Appreciate and identify ways in which they can improve as a learner. Responds well to constructive criticism and advice.. Uses success criteria to review and assess their work.. Can reflect on their own and other people's strengths and weaknesses
Exceptional	Appreciate and identify ways in which they can improve as a learner. Responds positively to constructive criticism and advice. Sets own clear objectives with success criteria and timescales. Uses success criteria or scales to review and assess their work. After discussion, reviews progress and plans ways to improve. Can review own and other people's strengths and weaknesses

Perseverance : Logical and analytical approaches (leading to independence)

Emerging	Immediately raises hand and seeks support before even considering the question or problem; rarely makes use of materials on offer to think independently about a problem.
Evolving	Still a little over-reliant on help but has begun to spend a brief period considering the question before asking for help
Expected	Is beginning to spend time thinking about and experimenting with a problem and knows when it is advisable to seek some help
Exceeding	Shows a determination to work through a problem independently, using many skills and ideas, seeks help effectively
Exceptional	Has developed an enjoyment of being stuck and has developed mathematical strategies to help further understanding. Is happy to research ideas independently to further own understanding. Is interested in small indicators to help but is eager to reach a final solution as independently as possible.

ASCmaths @Scott_Math83 · 18h

Replying to @HawesMaths

Really interesting, how do you use them in practice?

MrHawesMaths @HawesMaths · 18h

Replying to @Scott_Math83

Often we refer to during lessons.It forms part of our assessment criteria for reporting and over time,it could potentially be part of reporting back to parents. Its not about assessment data but rather the 'soft skills' and creating resilient independent learners.

ASCmaths @Scott_Math83 · 18h

Replying to @HawesMaths

Thanks. Did you come up with the idea? Is there any other reading or examples that I could look up?

To Alice's fourth main question …

Miss Ward-Gow @mcwardgow · 19h

Q4 - How do you encourage students to be more resilient? Whether it's solving a problem or simply getting started with any task #mathscpdchat

… there were two single replies, this …

Dave Bowman @Maths4ukplc · 19h

Replying to @mcwardgow

#mathscpdchat Encourage students to decide which one of Cucuo et Al "Habits of Mind" might be of use

… and this:

MrHawesMaths @HawesMaths · 19h

Replying to @mcwardgow

the opportunity to view answers straight away and get feedback means that students can potentially start to unpick their own misconceptions before having to ask for help straight away. I feel success rates have improved and students are figuring it out themselves #mathscpdchat

The host's last (fifth) question prompted this response …

Dave Bowman @Maths4ukplc · 19h

Replying to @mcwardgow

Resilience is developed over time and depends on what you are trying to achieve. Welsh football showed it last night because they have clear goal and believe in themselves to progress towards it. Students in maths can, over time if they see purpose and benefit . #mathscpdchat

Miss Ward-Gow @mcwardgow · 19h

Replying to @Maths4ukplc

Great example 😃 and good point about purpose - if we know "why" we are doing something, this often motivates us doesn't it #mathscpdchat

… and this …

Mary Pardoe @PardoeMary · 19h

Replying to @mcwardgow

Lesson atmospheres and expectations. See what @Maths4ukplc 'said', and what I linked to ('conjecturing atmosphere') … v important/influential/effective. #mathscpdchat

… and this:

Dave Bowman @Maths4ukplc · 18h

Replying to @mcwardgow

@PardoeMary This comment from @angeladuckw seems pertinent to tonight's #mathscpdchat

> **Angela Duckworth** @angeladuckw · 18h
>
> For the record, no.
>
> True grit is *not* grinding yourself into a burned out shell of a human being.
>
> True grit is pursuing a goal that is meaningful to you in a way that is sustainable--and while sometimes hard, brings joy and pride.
>
> washingtonpost.com/technology/202..

… and this …

Mary Pardoe @PardoeMary · 19h

Replying to @mcwardgow

Lesson atmospheres and expectations. See what @Maths4ukplc 'said', and what I linked to ('conjecturing atmosphere') … v important/influential/effective. #mathscpdchat

… and the sharing of another link:

Dave Bowman @Maths4ukplc · 19h

Replying to @mcwardgow

Thanks for hosting tonight's **#mathscpdchat** . @GLOWMaths promotes #YesUCan and has more information here.
glowmathshub.com/page/?title=Wh...
Also early
@CharteredColl article my.chartered.college/impact_article...

The hour of this #mathscpdchat was over:

Miss Ward-Gow @mcwardgow · 19h

That's all we've got time for tonight - thank you for all the contributions 😃 the polls are open until tomorrow night - still plenty of time to vote 😎 enjoy the rest of the half-term! **#mathscpdchat**