#mathscpdchat 28 September 2021

What does literacy in mathematics mean to you? How do you address it in your teaching? Hosted by Jenny Hill-Parker

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

Among the links shared during the discussion were:

Literacy in Mathematics which are educational resources created by Jenny Hill-Parker to support literacy in Mathematics. The ‘Guided Reading’ resources are organised in themes such as ‘Famous Mathematicians’. Each resource consists of a few paragraphs of text about the topic, followed by ten comprehension questions, and can be downloaded as a PDF file. It was shared by Jenny Hill-Parker

Disciplinary Literacy which is an online article from the Durrington Research School by Fran Hayes, Assistant Director of the school. The author provides initial guidance to support teachers who are considering how they can begin to establish disciplinary (subject-specific) literacy as embedded practice across their school. It was shared by Jenny Hill-Parker
Cracking the Academic Code which is a blog post by Alex Quigley in which he describes ‘strategies to help pupils ‘code-switch’ between everyday talk and its academic counterpart, and to support academic reading and writing’. It was shared by Jenny Hill-Parker

Frayer Models which is a website from which you can download editable Frayer Models. A Frayer Model is a simple five-section structure, in which some (general) thing (usually an idea or an object, such as ‘square number’ or ‘insect’) is named in a central section, with the other four sections providing respectively a definition of that thing, some ‘characteristics’ of it, a few examples of it, and a few non-examples. It was shared by Jenny Hill-Parker

Understanding Mathematics for Young Children which is a book by Derek Haylock and Anne Cockburn. The authors’ intention is to help primary maths teachers ‘understand mathematical concepts and how children come to understand them’, and thereby develop their ‘own confidence with mathematical activities’. It was shared by Jennifer Read

The Whetstone of Witte which is a Wikipedia entry about the mathematics book, written by Robert Reecorde and published in 1557, of which those words are a shortened version of its twenty-nine word title. According to the article, it contains the first recorded use of the equals sign, and the first book in English to use the plus and minus sign. It was shared by Atul Rana

Brahmagupta's Brahmasphutasiddhanta Vol 1 which is an online representation by the Indian Institute of Astronomical and Sanskrit Research of a book written c 628 in Sanskrit. The English translation of the title is ‘Correctly Established Doctrine of Brahma’, and it includes ‘a good understanding of the mathematical role of zero, and rules for manipulating both negative and positive numbers’. It was shared by Atul Rana

The Secret History of Writing which is a YouTube video that reveals all sorts of fascinating facts and links associated with the history of human permanent-record-making-in-visual-form behaviour. It was shared by Atul Rana

Recommended Books which is a list of books from NRICH, that are recommended for young people who are interested in mathematics. Each book is described briefly, and they are presented in ascending order of the youngest age of people for whom the book is thought to be suitable (from 7+ to 17+). It was shared by Mary Pardoe

The Avonwood maths library which is a thread on Twitter. It was shared by Mr Hawes Maths
The screenshots below, of chains of tweets posted during the chat, show parts of a conversation about challenges presented by words that do not have the same meaning in maths as in ordinary language, or have different meanings when used in different branches of maths. Click on any of these screenshots-of-a-tweet to go to that actual tweet on Twitter.

The conversation was generated by this tweet from Jenny Hill-Parker:

Jenny Hill-Parker @JennyHillParker · Sep 28

With tier 2 vocabulary being high frequency and multiple meaning. Take the word ‘sample’

What does it mean specifically in Maths and what other uses are there of the word? #mathscpdchat

and included these from Catherine Edwards, Mary Pardoe, Jenny Hill-Parker, Simon Ball and Sudeep:

Catherine Edwards @Edwards08C · Sep 28

Replying to @JennyHillParker

This is something we’ve discussed as a department, there are some words in common usage which have specific meaning in maths. We make a big deal out of explaining them (my mind has gone blank for any examples though 😅)

#mathsCPDchat

Mary Pardoe @PardoeMary · Sep 28

Replying to @JennyHillParker

A problem with some ‘maths words’ is that they have very different meanings in ordinary language?

For example … ‘complement’!

#mathsCPDchat

Jenny Hill-Parker @JennyHillParker · Sep 28

Absolutely! And translate, power, prime, average, difference #mathscpdchat

Simon Ball @ballyzero · Sep 28

My favourite? ‘Range’. In A-Level Maths it means something different in each of the components. Thanks, Maths! #mathscpdchat

Sudeep @boss_maths · Sep 28

Eg order (of rot. symm. or a polynomial), lines, segment, mean, right (angle), distribute, root, range… it’s a minefield! #mathscpdchat

Jenny Hill-Parker @JennyHillParker · Sep 28

Yes! Confusing for the students, especially of the different meanings in different contexts is not examined together in class #mathscpdchat
The following screenshots show parts of a conversation about ways of using Frayer models.

Again, click on any of these screenshots-of-a-tweet to go to that actual tweet on Twitter.

The conversation was generated by this tweet from Jenny Hill-Parker:

Jenny Hill-Parker @JennyHillParker · Sep 28

Replying to @boss_maths and @Edwards08C

And imagine the minefield it is for students who have EAL, or a low reading age!
#mathscpdcchat

Catherine Edwards @Edwards08C · Sep 28

This is the reason for our focus on literacy, huge proportion of our cohort are EAL, new to English and/or low reading age. Along with area of high deprivation and high level of SEND we really need to support them every way we can. Literacy focus is an easy choice #mathscpdcchat

The conversation was generated by this tweet from Jenny Hill-Parker:

Jenny Hill-Parker @JennyHillParker · Sep 28

We’re in the process of writing Frayer models in order to gain an understanding of the different meanings of the tier 2 words as staff first. Will fill these in together:
#mathscpdcchat

and included these from Catherine Edwards, Jenny Hill-Parker, Alice Ward-Gow and AC:

Catherine Edwards @Edwards08C · Sep 28

Replying to @JennyHillParker

I love them, but spent 40min with Y8 last week filling one in for ‘half’ it was valuable, but I don’t know if it was 40min of valuable #mathsCPDchat

Jenny Hill-Parker @JennyHillParker · Sep 28

Yes! I think this needs some thought. Should they be on display and referred to briefly and often? #mathscpdcchat

Miss Ward-Gow @mcwardgow · Sep 28

When we use Frayer models, sometimes we give students the definition and ask them to come up with examples and non examples. I think this can help with students' understanding of the vocab more than if we just shared the completed Frayer model with them 😊 #mathscpdcchat

Jenny Hill-Parker @JennyHillParker · Sep 28

I agree! Otherwise their role is necessarily more passive
The following screenshots show two conversations about ways of generating etymological explorations that can help students grasp more firmly the meanings of mathematical words that they encounter. **Again, click on any of these screenshots-of-a-tweet to go to that actual tweet on Twitter.** Both conversations were generated by this tweet from [Jenny Hill-Parker](https://twitter.com/JennyHillParker):

![Origin diagram](image)

and included these from [Alison Hopper](https://twitter.com/AlisonHopperMEI), [Jenny Hill-Parker](https://twitter.com/JennyHillParker), and [Sudeep](https://twitter.com/Sudeep):

**Alison Hopper** @AlisonHopperMEI · Sep 28
Replying to [@JennyHillParker](https://twitter.com/JennyHillParker)
This is a favourite of mine too – a different sort of hook for memory for soma. They got very upset about quad bikes after one discussion 🤣 #mathscpdcchat

**Jenny Hill-Parker** @JennyHillParker · Sep 28
Replying to @AlisonHopperMEI
Ooh, I need to know more! #mathscpdcchat

**Alison Hopper** @AlisonHopperMEI · Sep 28
I think we had probably been discussing either the roots of quadrilateral or looking at prefixes in English and they queried the fact that a 4-wheeled vehicle had the words for 4 and 2 in the name and not 4 and wheel #mathscpdcchat
Sudeep @boss_maths · Sep 28
Replying to @JennyHillParker
One of my favourites too. Even the ones that may not love maths always seem to show genuine interest when we look at etymology. Lifts the energy levels in the room. Then it’s just a question of trying to capitalise on the now more attentive group! #mathscpdchat

Alison Hopper @AlisonHopperMEI · Sep 28
Replying to @JennyHillParker
The anomalies are fun too - four (from German) and then a quarter (from French) - perhaps we should go with fourths although it makes me wince a bit! #mathscpdchat

and these from Mary Pardoe, Atul Rana, Jennifer Read, Catherine Edwards and Nathan Day:

Mary Pardoe @PardoeMary · Sep 28
Replying to @JennyHillParker
I seem to remember that in the past @atulrana has posted some interesting tweets re the etymology of words encountered in maths? #mathsCPDchat

Atul Rana @atulrana · Sep 28
Equals is a fairly important one! Not just the etymology but understanding what the = symbol stands for. #MathsCPDchat

Atul Rana @atulrana · Feb 9
Equals: From the Latin word "æqualis", as meaning "uniform", "identical", or "equal", from aequus ("level", "even", or "just"). twitter.com/LaSalleEd/stat...

Jennifer Read @JenniferRead6 · Sep 28
Literally just been reading about that in: @derek_haylock

ncetm.org.uk | 6
Between Sanskrit, Ancient Greek, Latin and Arabic, I reckon most of the maths etymology is covered! #MathsCPDchat

One day I hope to read Brahmagupta's Brāhmaśphutasiddhānta in Sanskrit. Maths was written in continuous prose then!

"pati-ganita ("mathematics of procedures," or algorithms) and bija-ganita ("mathematics of seeds," or equations)"
archive.org/details/Brahma.
#MathsCPDchat

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Brahmagupta's Brāhmaśphutasiddhānta VOL I (Also Brahmasphutasiddhanta Brahma sphuta-sidhanta)
by Indian Institute of Astronomical and Sanskrit Research

Publication date 1990
Topics Brahmagupta, Brāhmaśphutasiddhanta, Sanskrit.

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That will be epic!

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I studied Sanskrit at school in India but dropped it as soon as it wasn’t compulsory 😊. Reading mathematics written in continuous prose is fascinating. So much detail it, even for example when Robert Recorde decided on the = sign.
I love getting pupils to attempt to read/understand that section of The Whetstone of Witte at the start of lessons on equations.

Based on:

1) The Whetstone of Witte by Robert Recorde (1557)

You can read it here: library.wales/digital-exhibi
The juicy bit starts on page 242.

Show this thread
Howbeit, for e caste alteration of equations. I will popounde a fewe examples, because the extraction of their roots, maie the more aptly bee wroughte. And to eavide the tedious repetition of these woordes: is equalle to: I will sette as I doe often in woorke use, a parr of paralleles, or Gemowe lines of one lengthe, thus: \[=\] , because noe 2 thynge, can be more equall. And nowe maie these numbers.

- What is this saying?
- What language is it written in?
- Are there any words you recognise?
- Are there any words you can guess the meaning of?

And to eavide the tedious repetition of these woordes:

And to avoid the tedious repetition of these words, is equalle to: I will sette as I doe often in woorke use, ‘is equalle to’, I will write as I do often when working, a parr of paralleles, or Gemowe lines of one lengthe, thus: \[=\] , a pair of parallel lines like this: \[=\] , because no 2 thynge, can be more equall.

If you subtract equal amounts from things that are equal, what remains are equal also.

If you add equal amounts to things that are equal, the amounts you get are equal.
The discussions shown in the sequences of screenshots of tweets reproduced above were generated by the last three questions tweeted by the host during the hour. Before those questions appeared other issues were discussed. Responses to the host’s first question …

Jenny Hill-Parker @JennyHillParker  ·  Sep 28
Q1;
How important is literacy within your Maths classroom/department?
#mathscpdchat

… arrived rapidly, revealing that:
• the teachers in at least one school, having recently engaged in ‘word power training’, which they obtained by following a particular CPD programme, are consequently planning to include ‘explicit teaching of vocabulary and etymology’ in some lessons;
• mathematical literacy is featuring more and more prominently in many teachers’ thinking and planning because they see a need to help pupils overcome some language comprehension difficulties that are hampering their mathematical learning … for example, pupils are struggling to cope with ‘new question formats that are wordy’ … ‘the biggest hurdle that some of my students face is the unfamiliar names of people’ …

Catherine Edwards @Edwards08C · Sep 28
We get confusion over names, or unfamiliar ingredients in recipe questions, not knowing what an electricity meter is due to using cards, don’t know about interest because it’s Haram. The hinterland of vocab rather than the stuff that’s explicitly maths #mathsCPDchat

• this anecdote was appreciated by teachers …

MrMorganMaths @matha_morgan · Sep 28
Replying to @JennyHillParker
I once heard of students who couldn’t understand a question about the area of a patio, because they read it to rhyme with ratio and thought it was a mathematical process they hadn’t been taught. Sir, you never taught us patios, they said.

• teachers who regard the aim of improving the standard of mathematical literacy of their pupils as very important are using various strategies to try to achieve it …for example:

Pete Atkinson @MrA_Maths · Sep 28
Replying to @JennyHillParker
Very - we are trying to develop students’ reasoning skills through extended writing and discussion, we all took part in @Mannermaths SLAM CPD over lockdown to ensure we use consistent & accurate vocab across the Dept and encourage it in students too #mathsCPDchat

• this reminder that mathematical situations, relationships, actions, problems, … and so on, may be represented in Concrete, Pictorial, or Abstract (CPA) forms, or using spoken or written language, was appreciated:

Alison Hopper @AlisonHopperMEI · Sep 28
Replying to @JennyHillParker
I think language needs to be seen as a representation in the classroom - we need CPLA perhaps (although I would like them to be in no fixed order and certainly not a linear journey) #mathsCPDchat

less discussion was generated by the host’s next question …

Jenny Hill-Parker @JennyHillParker · Sep 28
Q2: does your Maths department have a literacy policy? If it does, what are the main features? #mathsCPDchat

… and the replies that were tweeted were from teachers in maths departments that have not developed, or are not in the process of developing, a maths-specific literacy policy:
teachers who replied positively to the host's third question ...

Q3: do you give students specific opportunities to read in Maths lessons? We have Guided Reading lessons six times a year; resources available here:

padlet.com/jhill_parker/7...
#mathscpdpchat

... were enthusiastic about such materials, which require students to read some text, and then respond to questions about or discuss what they have found out or learnt from their reading:

Catherine Edwards @Edwards08C · Sep 28
They are super, I used them a lot as starter activities during remote teaching.
#mathsCPDchat

Sudeep @bossa_maths · Sep 28
I really like these. Used a couple of Nicola’s before the summer with Ss in AP. Think it was valuable for them and quite eye-opening for me to appreciate how much they could comprehend.

when the host then asked whether teachers believe that reading in maths lessons is ‘a good use of curriculum time’, the responses from teachers acquainted with material designed specifically to improve mathematical literacy, or that is otherwise appropriate, were positive:
in replies to the host's fifth question ...

Jenny Hill-Parker @JennyHillParker · Sep 28
Q5: how can a knowledge of disciplinary literacy aid high quality teaching and learning in the Maths classroom? #mathscpdpchat

... teachers pointed out that 'looking at the meanings and derivations of words helps' students see links between topics and ideas ...

Catherine Edwards @Edwards08C · Sep 28
Making links across and between topics can really help with the recall of information. Understanding the root behind words can reduce the amount of disparate facts/processes to learn #mathsCPDchat

Laura @mathsteacher09 · Sep 28
Replying to @JennyHillParker
Had a great moment today when year 9s had been looking at roots of words in literacy time in registration - fact had come up this morning and they'd found examples such as ‘factory’ which makes things. Then in maths we did factors and someone said they ‘make numbers’. 😊

... but if students can't spell words correctly ...

Catherine Edwards @Edwards08C · Sep 28
There are so many! The other thing I find is if they can't spell them they can't link them. When asking for words beginning with 'Equi' I was offered Aquarium. #mathCPDchat