

## #mathscpdchat 26 November 2019

**Finding and using authentic contexts to generate mathematical learning.**

Hosted by [Catherine van Saarloos](#)

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

**#mathscpdchat**  
TONIGHT – Tuesday, 26 November, 7-8pm

China  
1.34 billion

facebook  
400 million

Many people have documented the growth of Facebook using infographics. Use the infographics given to write a short article about the growth and use of Facebook.

**Finding and using authentic contexts to generate mathematical learning.**

Hosted by Catherine van Saarloos @CoreMathsCat  
ncetm.org.uk/mathscpdchat

Some of the areas where discussion focussed were:

- that **authentic contexts are not necessarily those in which maths is applied to real-world problems** ... for example they may be puzzles, fictitious situations, or even areas of mathematics ... the essential characteristic is that they are real in students' minds;
- that a well-chosen authentic context **clarifies both what the mathematics illuminates and how the mathematics 'works'** ... that it generates productive mathematical questions naturally;

- that a **good context establishes a need for the mathematics that the teacher wants the students to learn** ... for example, seeing the need for understanding and using exponents when repeated multiplication by the same number arises ... that choosing at random a context, and then 'looking around' for some maths to do in it, is not usually a good strategy;
- that a **well-chosen, considered, context makes learning 'realisable' rather than being necessarily 'realistic'** ... it facilitates/supports, rather than getting-in-the-way-of, mathematical thinking ... for example, using areas as a context for expanding and factorising algebraic expressions may make that learning realisable;
- that authentic, considered contexts provide **opportunities for (mathematical) reasoning, problem-solving, and revealing then addressing misconceptions;**
- that the **investigative nature of some contextual work** can help students acquire the ability to investigate (see the possibility of investigating) purely mathematical phenomena;
- that authentic contexts can be '**hooks**' for the **mathematical learning of GCSE resit students**, who will have 'been exposed to' almost all the maths before ... they provide new experiences that may help students understand what they previously did not, and they often generate genuine curiosity;
- that students easily relate to **authentic 'real-life' contexts that develop skills 'necessary to do basic things in life'** ... for example, pupils may want to understand, and be able to use, percentages in order to manage their own personal finance (such as when calculating take-home salary after tax);
- that **when GCSE resit students start by discussing non-mathematical aspects of a context they gain confidence** (in their own thoughts), and so become more able to look-at and discuss mathematics that is generated by the context;
- contexts that contributors to the chat have found to **work really well with students** ... including lifetime earnings, prices of goods and VAT, best deals, misleading graphs, data about sustainability/rubbish-disposal/recycling, special offers;
- that **financial contexts can generate exploration of many mathematical ideas and procedures** ... such as correlation, estimation, rates, distributions and confidence intervals, numerical calculations, percentages, sampling, averages, variables, accuracy in measurement, and so on ... ;
- that, with pupils of any age, using well-chosen contexts can provide '**ways-in-to-lessons-or-topics**' that are **different to, fresher than**, the well-worn 'what the teacher always does when we start a new topic';

- using **aspects of music** as hooks for mathematical learning ... for example exploring and practising the 4 and 8 times tables during country dancing ... finding/seeing/using the Golden Ratio;
- that **using mathematics to explore and ‘examine critically’ sustainability or extinction issues** is currently popular with students, and helps them check some of the facts reported in the many ‘stories’ presently appearing via social media ... for example, using Royal Geographical Society material (see link below) to investigate climate-change evidence;
- that pupils and teachers enjoy using/answering **‘Would you rather ...?’ questions** (such as ‘Would you rather have a holiday for two weeks or for 1,000,000 seconds?’) ... they can ‘place some mathematics in context, even if the problems aren’t quite real-life’;
- that it may be **hard to find a context** (that isn’t contrived or doesn’t require more advanced mathematics than is wanted) to support the learning of some mathematics ... that not all mathematical learning can be supported by a context;
- sharing with pupils the **love of pure mathematics** ... of exploring implications and relationships within mathematics itself;
- that **contributors to the discussion** are currently working in, or have worked in, primary schools, secondary schools, Further Education, and Adult Community Learning, and included Professional Development providers and coordinators ... that many contributors are experienced teachers of GCSE resit students.

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

This is part of a long ‘conversation’ of tweets about what an authentic context is, how it can support learning, whether it should be chosen before or after choosing the maths, and when it is sometimes hard to find a context to ‘fit’ the topic. The conversation was generated by this tweet from [Catherine van Saarloos](#):



**Catherine van Saarloos** @CoreMathsCat · Nov 26

First qn: What do feel constitutes an ‘authentic’ context? To what extent do you agree or disagree with this statement from @realisticmaths? #mathscpdchat

Contexts are not necessarily situations where the mathematics is applied to real-world problems; what is important is that they allow students to take ownership of the mathematics. Puzzles, fictitious situations and even formal mathematics can all provide suitable contexts, as long as they are real in the students’ minds.

and included these from [Mars @ MarsMaths #FE](#), [Tess Maths](#), [Blastmaths - Andy](#) and [Catherine van Saarloos](#):



**Mars @ MarsMaths #FE** @MarsMaths · Nov 26

Replying to @CoreMathsCat and @RealisticMaths

A1 I've always striven for that authentic context to be coming from real-life, so that learners can easily relate to it but also improve the skills necessary to do basic things in life. #mathscpdchat



**Tess Maths** @tessmaths · Nov 26

Replying to @CoreMathsCat and @RealisticMaths

#mathscpdchat

Resit students have seen all of the maths before...mostly...so context is a chance to re-vision the maths...see it differently. A hook is usually an authentic context which makes a student see/understand what they didn't before & it may even develop some curiosity



**Blastmaths - Andy** @blastmaths · Nov 26

Replying to @CoreMathsCat and @RealisticMaths

Interesting this definition, I generally try to strip all context out initially to look at method but @tessmaths suggestion of 'hooking' in with a context has got me thinking as it's a fair point that students will have seen methods before.

#mathscpdchat



**Catherine van Saarloos** @CoreMathsCat · Nov 26

Yes I think it is a good technique. I also found that once resit students had commented about context at the start of the lesson they were more likely to answer mathematical qns in the lesson too. Their confidence is very low

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these from [Tess Maths](#), [Catherine van Saarloos](#) and [David Connell](#):



**Tess Maths** @tessmaths · Nov 26

Replying to @CoreMathsCat and @RealisticMaths

#mathscpdchat

For me 'authentic context' is about clarity...looking at something and realising what the maths does...or how it works...



**Catherine van Saarloos** @CoreMathsCat · Nov 26

Really interesting! So do you feel that the context works better if it comes first? Rather than say, practice a skill then do a qn in context which requires that skill.

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**David Connell** @Dave\_Connell\_11 · Nov 26

I like a context to come first; to 'set the scene' and establish a need for the mathematics. But in this context (pardon the pun), the context must serve the mathematics to be learned. As opposed to choosing a random context and then searching for an existing skill.#mathscpdchat



**Tess Maths** @tessmaths · Nov 26

Replying to @Dave\_Connell\_11 @CoreMathsCat and @RealisticMaths

Of course, it's not a random context...it is carefully chosen

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and these from [Alison Hopper](#), [Sarah Allott](#), [Catherine van Saarloos](#) and [Anne Watson](#):



**Alison Hopper** @AlisonHopperMEI · Nov 26

Replying to @blastmaths @CoreMathsCat and 2 others

It was interesting to hear that the R in RME really translates as 'realisable' rather than realistic. Contexts that allow pupils to see the maths I used a lot but often the numbers in 'real life' were difficult to fit with primary math #mathscpdchat



**Sarah Allott** @sarah\_allott\_17 · Nov 26

I've found it can sometimes be tricky to think of a context that isn't contrived, or require much deeper mathematics than is actually being taught



**Catherine van Saarloos** @CoreMathsCat · Nov 26

I agree, I think it really depends on the topic and context certainly doesn't work for everything on the curriculum. Are there particular topics that you feel should work with context but have struggled to find? #mathscpdchat



**Sarah Allott** @sarah\_allott\_17 · Nov 26

Replying to @sarah\_allott\_17 @Dave\_Connell\_11 and 3 others

I think the hardest I've struggled with this year has been a justification for laws of indices that weren't simply a question that they'd be required to solve. I don't think I came up with one in the end!



**Anne Watson** @annemathswatson · Nov 27

Replying to @sarah\_allott\_17 @PardoeMary and 4 others

Years ago when I was a teacher I used to use powers of ten as the introductory context rather than the 2s and 3s in the textbooks because then it could be related to loads of things - distance to the moon - nanotechnology etc.

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

Among the links shared were:

[Using Realistic Mathematics Education in UK classrooms](#) which is a booklet by Paul Dickinson and Sue Hough in which teachers and students who have used *Realistic Mathematics Education* show, in detail and with examples, how it has made a positive difference to them. It was shared by [Catherine van Saarloos](#)

[Core Maths on NRICH](#) which is a collection of tasks which the NRICH team hope will be useful for teaching different aspects of Core Maths. It was shared by [Catherine van Saarloos](#)

[Quibans: Questions inspired by a news story](#) which is a collection by [Mark Dawes](#) of items that can be used to provoke mathematical questions. It was shared by [Catherine van Saarloos](#)

[Class Clips: Maths KS2: Ecomaths](#) which are BBC videos in which Stefan Gates shows how maths is used in the real world to help create a sustainable future. It was shared by [Catherine van Saarloos](#)

[The Guardian News datablog](#) which is a source of detailed information about current news-items. It was shared by [Catherine van Saarloos](#)

[Visualising the Climate Crisis](#) which are resources created by the AMSP designed to raise awareness of the impact of fast fashion on the climate. It was shared by [Catherine van Saarloos](#)

[What's Going On in This Graph?](#) which is an article by The Learning Network of the New York Times. Learners look at eight different sonic 'fingerprints', and are challenged to think about answers to questions such as 'What might be going on?'. It was shared by [Catherine van Saarloos](#)

[Puffer Fish Creates This Blue Water Art](#) which is a video about fish who create elaborately designed 'crop circles' at the bottom of the ocean. It was shared by [Catherine van Saarloos](#)

[Mathematical Hooks](#) which is a large collection, created by [Tess Maths](#), of varied starting points that can provide interesting contexts for mathematical exploration and learning. It was shared by [Tess Maths](#)

[Three Acts: Domino Skyscraper](#) which is a creation by Dan Meyer designed to generate mathematical learning. It is one of several 'three-act' productions that each consist of attention-grabbing short videos and associated questions. It was shared by [Natalie Vernon](#)

[Population Pyramids](#) which are fascinating representations of statistical data about the populations by age of places in the UK. It was shared by [Natalie Vernon](#)

[The Joy of Stats](#) which is a documentary video that takes viewers on a rollercoaster ride through the wonderful world of statistics. It was shared by [Rachel Beddoes](#)

[NCFE Maths News](#) which contains illustrated 'news reports' about contemporary topical events that could provide authentic contexts for mathematical learning. It was shared by [David Redden](#)

[Why Exponent Powers Are Important](#) which is a page, *Exponents in the Real World*, of *Passy's World of Mathematics*, that lists and describes contexts in which the use, combination, and manipulation, of numbers-raised-to-powers is central. It was shared by [Mars @ MarsMaths #FE](#)

[Data Skills in Geography](#) which is material from *The Royal Geographical Society* to support the teaching of data skills embedded in GCSE and A level Geography. It was shared by [Steve Brace](#)

[Maths For Planet Earth](#) which is a website for students and teachers of mathematics which aims to integrate climate change into the school curriculum, beyond geography and environmental science. It was shared by [Lee McJames](#)

[Focus on ... connecting mathematics and music](#) which is an article in the *NCETM Secondary Magazine Issue 71*. It was shared by [Mary Pardoe](#)

[Focus on ... square dancing](#) which is an article in the *NCETM Secondary Magazine Issue 81*. It was shared by [Mary Pardoe](#)

[Focus on ... change ringing](#) which is an article in the *NCETM Secondary Magazine Issue 70*. It was shared by [Mary Pardoe](#)

[NCETM Secondary Magazine - Issue Archive](#) which contains issues up to Issue 151, including Issues 21 to 58 that each include an *Up2d8maths* article, and Issues 59 to 88, most of which include an *It's in the News* article. Any one of these articles might provide an authentic context for mathematics learning. It was shared by [Mary Pardoe](#)