

Subject Passion as a Teaching Tool (SPTT) Trinity College Cambridge and World Class Schools Quality Mark (WCSQM)

Contents

For each subject passion session, you can find a recording of the presentation, and a downloadable accompanying resource to help you implement the subject teaching in the classroom.

Computer Science

Professor Stajano discusses designing an efficient priority queue data structure. His passion for this subject stems from the binary heap being an amazingly ingenious, yet very simple, construction with remarkable properties. Students can build them on their own in a few lines and, through that, understand a number of important Computer Science concepts.



The accompanying classroom resource is created by Bego Soler, Curriculum Leader for Computing at [St Albans Girls' School](#), a World Class school, to allow you to implement the subject in the classroom.

Economics

Dr Chris Rauh, University Lecturer at the Faculty of Economics, University of Cambridge, discusses socio-economic gaps in university enrolment.



The accompanying classroom resources are created by Andrew Somerville at [The Charter School](#), a World Class school in North Dulwich.

History



Dr Richard Sarjeantson, is a Fellow and Lecturer in History, Trinity College Cambridge. In Richard's research, he writes about British and broader European history between the Renaissance and the Enlightenment. He discusses the emergence in early modern Europe of ideas about the political, social, scientific, and religious perfection of society. Stimulated above all by an extraordinary and influential book – Thomas More's Utopia, published just before the beginning of the Protestant Reformation in 1516 – a genre of writings emerged which followed its lead in using a fictional framework to make serious suggestions about the reform of the state. These writings are the source of some of the most democratic and egalitarian ideas of their age. He considers some of the directions in which these ideas went, including the founding of actual utopian societies on St George's Hill (Surrey) and in New Spain (modern Mexico).

The accompanying classroom resource is created by Laura Covington, History teacher and Head of Humanities at [Harris Academy Battersea](#), a World Class school. Laura is excited about the session's subject because it is an opportunity to return to the fundamentals of historical practice by starting with the source itself. She emphasises that this is a skill that can often be overlooked and under taught at school.

Laura's resource helps you and your classes expand their understanding of the curriculum, find real-life links and consider up to date research. The resource is intended to work in conjunction with the research presented in Richard's presentation.



Land Economy (Geography)

Andreas Kontoleon is Professor of Environmental Economics and Public Policy, Department of Land Economy. In Andreas' research, he writes about environmental economics and regulation and he has mostly worked in the fields of biodiversity, climate change, energy, food security, public health and poverty alleviation. He discusses examples from his research which are about using empirical evidence to assess the efficacy of environmental policies related to climate change, how this relates to the discipline of Land Economy and implications for cross-curricular application at A-Level.



The accompanying classroom resource is created by Faye Wilson-Cressey (CGeog), Teacher of Geography and Travel and Tourism and Gifted and Talented lead for [St Andrews Catholic School](#), a World Class school in Leatherhead, Surrey. Faye is excited about this session's subject because it will allow teachers to show students the real-world applications of what they study in A-level Geography, Economics and Law and to think critically about some of the content - vital skills for students both in an exam context but as they move on to work or higher education. The resource helps you and your classes expand their understanding of the curriculum, find real-life links and consider up to date research. The resource is intended to work in conjunction with the research presented in Andreas' presentation.



Mathematics (1)

Imre Leader, Professor of Pure Mathematics, Trinity College Cambridge, discusses Chomp and the mathematical thinking skills that are essential to developing in our students to ensure they can succeed at A-Level (or equivalent) and beyond.

The accompanying classroom resource is created by John Bayle at [Thomas Mills High School](#), a World Class school, to allow you to implement Chomp in the classroom.



Mathematics (2)



Dr Ems Lord, a research fellow and Director of NRIC at the University of Cambridge, presents 'Historical Adventures in Mathematical Modelling: From the Outback to the Arctic'. After reading the First World War diaries of a Land Girl who survived a Zeppelin attack only to perish from the Spanish Flu brought back from The Front by her surviving brothers, Ems became fascinated with the historical and mathematical stories behind pandemics and population modelling. From hedgehogs plaguing Scottish Islands to a rabbit population explosion necessitating the world's longest fence, Ems will blend together historical tales alongside an introduction to mathematics (and challenges!) behind modelling real-life situations. Ems has presented her 'Beginners Guide to Mathematical Modelling' for STEM groups, Royal Institution Masterclasses and many others across the UK and is very much looking forward to meeting everyone at the Subject

Passion session.

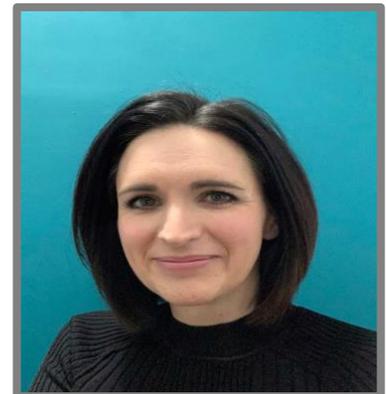
The accompanying classroom resource is created by teacher Anita Simpson. Anita has been teaching for 20 years and has responsibility for KS5 Maths and Further Maths at Dover Grammar School for Girls in Kent. She has a passion for making Maths relevant to her students' interests, with a focus on developing real-life links to the A level Maths and Further Maths curriculum.

Inspired by the many media references to *mathematical modelling* and *flattening the curve* during the pandemic, Anita went on a journey to unearth the maths behind the news story. The result is an easy reading resource, for busy A level teachers, and those who want to understand a bit more about *that* curve, together with suggestions for the A-Level classroom.

As an overview of Anita's resource, she has looked at 3 models for the spread of an infectious disease:

- Geometric model (using Geometric Progressions)
- S-I model (based on differential equations, separating the variables, partial fractions)
- S-I-R model (these differential equations can't be solved with A-Level techniques but there is a great Geogebra file that will plot each equation as a gradient function and produces the outbreak curve we are familiar with on the news)

In all 3 cases there is an *understanding* section where she has gone through the maths quite thoroughly. It is aimed at teachers who simply don't have the time to fully explore the mathematical modelling behind 'flattening the curve' or 'delaying the peak' but would love to know how it could be brought into their A level teaching. The style is suitable for teachers who are new to teaching and is directly relevant to A-Level students. She also produced follow up *tasks* for each model so that a teacher could use them when teaching.



Medicine (with a focus on biology and chemistry)

Dr Richard Hayward is a Senior Lecturer in Microbiology at the University of Cambridge. Richard will be presenting on 'Microbes Matter - Biology and Chemistry at the Forefront of the Fight against Bacterial Disease' and discussing how fundamental biology and chemistry contributes to the understanding of bacterial disease and opens up avenues for the development of novel 'anti-virulence' therapeutics.



In Richard's view, there is a clear avenue to build on KS4 bacteriology and to raise awareness of antimicrobial resistance, which is a key strategic policy priority in the UK at the current time. Further, it was [antimicrobial resistance awareness week](#) this week and this is something we are very involved in at Trinity, particularly through our Master, Dame Sally Davies (preceding Chief Medical Officer (CMO) for England and the current UK Special Envoy on Antimicrobial Resistance).

He is passionate about this because he is keen to show how deciphering fundamental biological mechanisms contribute to understanding and treating infectious disease, and also to understanding how our own cells function and malfunction. He is also keen to communicate that microbiology is multidisciplinary, involving not only biology and chemistry but also links to the physical sciences.



The accompanying classroom resources are created by Cicely Alsbury and Ella Elms at [St Mary's College in Hull](#), a World Class school, to allow you to implement the subject in the classroom. The resources are created to help you and your classes expand their understanding of the curriculum, find real life links and consider up to date research by Cambridge University. All of the resources work in conjunction with the research

presented in Richard's slides and in the article provided. Our idea here is that the research should be read first by the students, and then the tasks can be completed in class or potentially in conjunction with some home learning activities.



- The first resource has potential to be used across the key stages, offering a variety of different whole class activities, workshops, discussion and group work to engage the students together.
- The second resource is specifically directed towards students who are looking to apply to medical school. It offers ways to practice for potential mock interviews, engage with the topics presented, and reflect on potential cross curricular links.
- The third resource is specifically directed towards students in health and social care who may be studying public health or infection, prevention and control. There is an additional resource with guidance provided for differentiation (resource 4) as well to support all students engaging with the material.

Modern Foreign Languages



Emma Widdis is Professor of Russian and Film Studies at Trinity College, Cambridge. In Emma's research, she writes about the visual culture of Soviet Russia, with particular focus on the period before the Second World War. We are used to thinking about the kinds of images created in Soviet Russia as 'propaganda'. But our students may be slightly less attuned to thinking about their own culture as itself a form of propaganda. They may not think about, or notice, the kinds of implicit messages and relationships that are present in even the most apparently innocuous

romantic comedy or James Bond.

Emma's session, then, focuses on how we can encourage our students to see how learning a foreign language can tune us into how cultures work: to how meanings are conveyed and shared across music, film, social media. When we watch films from France, from Spain, from Russia, we can learn about those places, of course - but we can also learn how to look critically, how to think about difference, and how to understand ourselves.

The accompanying classroom resource is created by Lola Russell, Head of Spanish at [St Andrew's Catholic School](https://www.standrewscatholic.org/), a World Class school in Leatherhead, to allow you to implement the subject in the classroom. The resource is editable and available in both English and Spanish. If you use the resource and translate it into a different language you teach, which would be fantastic, please do let me know so I can add it to the folder for everyone's use. She has created this resource to help you and your classes expand their understanding of the curriculum, find real-life links and consider up to date research. The resource is intended to work in conjunction with the research presented in Emma's presentation.

