



History, Mathematics, Modern Languages and Science

Subject Enrichment Residential

June 2018, Downing College, Cambridge



Downing College, Cambridge, June 2018

Downing was the 17th College to be founded within the University of Cambridge. The College's beautiful neo-classical buildings are set among spacious and peaceful gardens in the heart of Cambridge city centre, close to many University faculties and departments.

COVER PHOTOGRAPHS

FINALISTS IN THE ROYAL PHOTOGRAPHIC SOCIETY INTERNATIONAL IMAGES FOR SCIENCE COMPETITION

Thermal infra-red image of lotus flower (*Nelumbo nucifer*) shows central receptacle temperature reaches 30-36°C.
By Heather Angel Hon FRPS

Light micrograph of a longitudinal section through a 45 bass guitar string. Captured field width 2.5mm.
By Gerd-A. Günther

Beautiful light refraction and magnification of pixels in water drops.
By Matouš Píkous



Welcome from the Course Director

I am delighted to welcome you to this Prince's Teaching Institute Summer Residential. Every year since the first pilot in 2002, these courses have provided an opportunity for teachers to stand back and reflect on the nature of their subjects, on what is most important in the teaching of them, and how they can improve their teaching to inspire the next generation of children. The teachers themselves tell us that such opportunities are rare in their professional lives and all the more welcome for that.

The PTI places an emphasis on academic content and we have, as usual, included in this year's programme a number of seminars, presentations and lectures by speakers eminent in their various fields to enable you to discuss subject issues in depth with academics and experts.

In the workshop sessions our aim is to offer you a chance to discuss your work with colleagues and to explore some of the more difficult aspects of subject delivery: what parts of our subject should we be teaching and why, and what are the best ways of doing so? To ensure that these discussions do not remain just at the theoretical level but lead to effective action in the classroom, this residential acts as an introduction to our Schools Programme which is designed to help you focus your departmental planning on inspiration and enrichment.

The most powerful effect of the PTI courses to date has been that teachers have gone back to their schools feeling it is within their power to change their classroom approach; to put scholarship and a delight in their subjects at the heart of their teaching. For example, one teacher writes, "this course has given me back my belief in myself and reawakened my passion for my subject. It has also taught me that I am empowered and that I can."

We have designed a course that I am sure you will find both stimulating and challenging, and I hope you will return to your classrooms inspired to share your experiences with your pupils and your colleagues.

A handwritten signature in black ink, reading "Bernice McCabe".

Bernice McCabe OBE
June 2018

Context

Since the first Prince of Wales Education Summer School in 2002 these residential courses have aimed to inspire, invigorate and empower teachers. Teachers have used this time away from school to explore their subjects with professional colleagues and leading academics. Discussions focus on the educational importance of every subject represented, what could or should be taught at different levels, and the best ways for teachers to do so effectively.

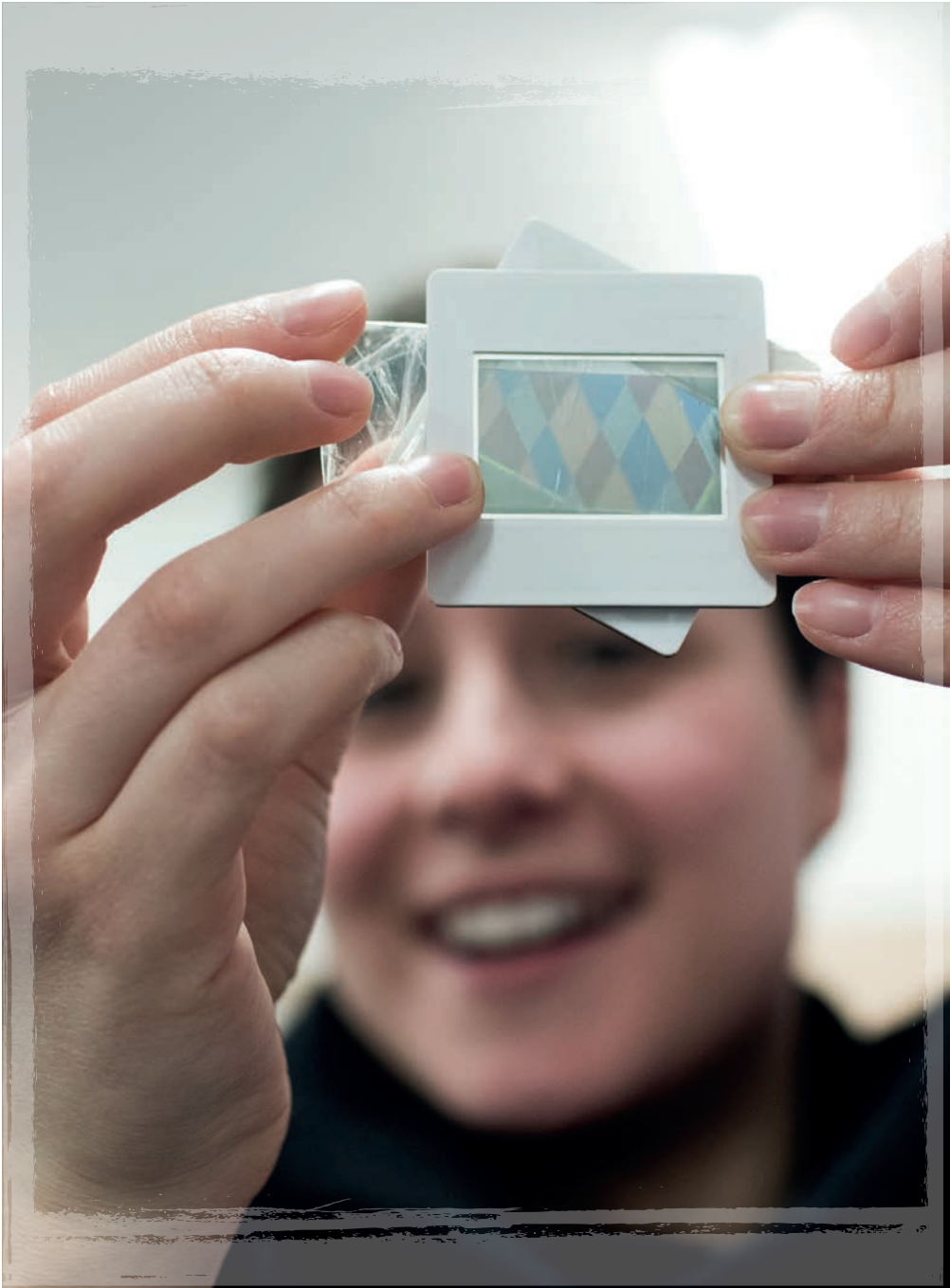
The PTI's Subject Enrichment Residentials provide an introduction to the Schools Programme, a community of subject leaders that encourages more challenging departmental objectives that enrich the learning of all students.

History, Modern Languages, Mathematics and Science

In a challenging recruitment environment, support for teachers to develop their own understanding and passion for their subjects can be a means of both attracting more high-quality specialists into the profession and retaining the best practitioners.

History and Modern Languages are crucial in deepening pupils' understanding of our cultural heritage and opening up a world of opportunities for them to explore other cultures and times. Mathematics has applications ranging from the everyday and practical to the highest levels of abstract thought. Science encompasses a wealth of world-changing discoveries and insights, to which every child is entitled to be introduced. Teachers of Science must be able to provide the detailed and up-to-date knowledge of the subject on which further progress depends.

For all these subjects, whether it is a matter of enthusing more pupils to study them, or giving them a better understanding of the concepts involved, good teaching is surely the key: teaching that stimulates the interest, excites and inspires. Delegates attending this Residential will all have their own ideas about how to achieve this, and the PTI is happy to provide the opportunity for them to learn from each other.



The aims of the PTI

By putting subject-centred teaching at the heart of schools, The Prince's Teaching Institute aims to inspire teachers to transform all students, whatever their background or ability.

We have 15 years' experience of helping teachers to re-discover their love of their subject, encouraging them to become more effective, enthusiastic and influential, and supporting them to make lasting improvements in what and how they teach.

Our aims are to:

- develop teachers to drive transformational change by creating a culture of high aspiration in the classroom
- promote the idea that teachers' subject knowledge, combined with rigour and challenge in the classroom, are essential to ensure effective teaching to children of all abilities
- encourage a culture of in-school research as a means to enable a greater focus on inspiring teaching and enriching subject provision, both within and across schools, and as a means to create a body of evidence-based knowledge of what works
- provide inspiring subject-focused professional development for teachers, enabling them to step away from the classroom and rediscover their love of subject
- enable dialogue between teachers and policy makers on issues relating to school leadership, curriculum development, assessment and training.



The aims of the course

This Subject Enrichment Residential aims to:

- ensure there is continued debate about the importance of studying Mathematics, the Sciences, Modern Languages and History, and their places in the curriculum
- enrich subject knowledge, develop subject expertise through academic input, and facilitate the sharing of good teaching practice
- encourage leading teachers to reflect on curricular and extra-curricular provision in their schools, planning for developments to improve engagement and raise standards of achievement
- provide opportunities to re-inspire, engage and motivate teachers, giving them the confidence to introduce pupils, whatever their background or ability, to challenging and enriching materials that promote an interest in the subject, intellectual independence and critical thinking
- promote an understanding of the nature and scope of Mathematics and the Sciences, and of the combination of comprehension, technical and practical expertise and logical reasoning necessary for the successful pursuit of these disciplines
- highlight the value of History and Modern Languages for introducing pupils to important bodies of literature and history, for developing their communication skills, broadening their linguistic range, extending their cultural horizons and understanding their place in a global context.



The objectives of the course

To re-inspire teachers to teach their subject in more rigorous, ambitious and creative ways, and to influence their colleagues to do the same.

HISTORY

- To explore ways to make a broad and deep study of History engaging, rewarding and inspiring for all young people, whatever their ability
- To identify the best ways of approaching the teaching and learning of thematic history covering a long period of time, such as the story of democracy
- To exchange ideas about what kinds of teaching are most likely to develop in pupils a capacity for independent critical thinking combined with intellectual rigour
- To find ways to help pupils to develop a sense of the big picture in History, while retaining the rigour of History in depth
- To discuss what role, if any, school History should play in developing individual and national identity, a sense of shared values and whether it should play a part in public commemoration



"It is easy to forget why we do this job and why our subject is of great value. The course has helped me to consolidate my convictions on why History matters."

"Having three days away from the classroom with colleagues to reflect on current practice and have an injection of new ideas was immensely beneficial. Listening to inspiring lecturers has made me want to make my students feel as I do when listening to them."

MODERN LANGUAGES

- To explore why we teach Modern Languages, what language learning contributes to education in a wider sense and why it should be part of core study for young people
- To identify what is important and what is relevant in the teaching of Modern Languages, to ask what languages we should teach, and what literature should be taught to allow students to better explore and understand different cultures
- To exchange ideas about how we can best teach Modern Languages and which teaching and learning strategies inspire, excite and are most effective
- To gain, as well as contribute to, real-life ideas of examples and activities of best practice





"The course has made me reflect on the importance of teaching Maths. I felt curious and excited by listening to the speakers and I want my students to feel the same way in my classroom."

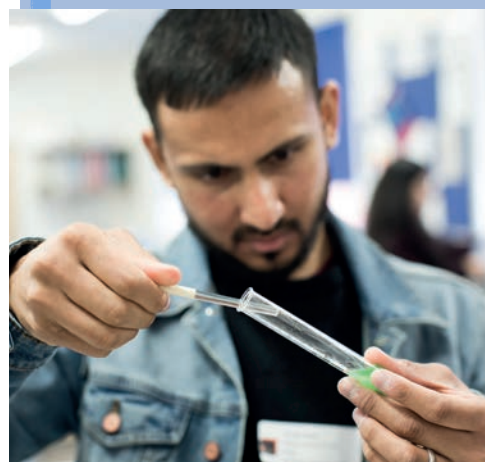
MATHEMATICS

- To promote self-confidence in teachers to present curriculum ideas in a more flexible, creative and mathematically rigorous way
- To share and refine ideas for challenging, exciting and sustainable developments in the Mathematics programme at their schools
- To consider practical applications of Mathematics, and the best ways to signpost students to future opportunities
- To promote greater challenge for both teachers and students in the classroom and give students a better understanding of mathematical reasoning

SCIENCE

- To share best practice and engage in supportive, constructive discussion with colleagues about the work of their department
- To plan for developing some innovative curricular and extra-curricular activities with ideas that work, ready to take straight back to school
- To experience some exciting examples of current developments in the Sciences, through speaker presentations and collaborative workshops which can be used to bring Science teaching to life
- To reflect on the key role of the wider 'STEM agenda' (Science, Technology, Engineering and Mathematics) in effective provision for the future

"This residential has reminded me why I teach Science, where Science can take my students and how I can show them."



TIME	LANGUAGES	HISTORY
0900-1000	Registration	
1000-1020	Course welcome by Bernice McCabe OBE, Co-Director, The Prince's Teaching Institute	
1025-1125	Keynote <i>Confessions of a modern linguist</i> Sir Christopher Hum KCMG	Keynote <i>Rethinking the Tudors</i> Dr Anna Whitelock , Royal Holloway, University of London
1130-1145	Refreshment break	
1150-1245	<i>Moving forward bravely</i> In conversation with Joe Dale and Rachel Hawks	Carousel <i>Women's history</i> Claire Kennan <i>Migration</i> Martin Spafford <i>Empire</i> Ian Chambers
1250-1330	Lunch	
1340-1435	Lecture <i>Helicopters, cows and counterinsurgency: neocolonial policing and La Haine</i> Dr Amanda Crawley Jackson , University of Sheffield	Lecture Dr Sylvana Tomaselli , University of Cambridge
1440-1535	Lecture <i>Using film creatively in the Spanish Language classroom</i> Dr Carmen Herrero Manchester Metropolitan University	Lecture Dr Martin Ruehl , University of Cambridge
		Teaching idea <i>Thematic history</i>
1540-1600	Refreshment break	
1605-1700	Seminar <i>Finding your voice</i>	Lecture <i>Using primary sources and teaching with them: How the Churchill Archive for Schools can help you</i> Natalie Adams , Churchill Archives
	Teaching idea <i>Exchanging ideas/best practice</i>	
1700-1800	Teacher-led workshop <i>Why do we teach languages?</i>	Teacher-led workshop <i>Shock, amaze and disgust: Why do we teach history?</i>
1800-1845	Break and check in	
1845	Drinks reception and dinner After dinner speaker Professor Nicola Padfield , Master, Fitzwilliam College, University of Cambridge	

TIME	MATHEMATICS	SCIENCE
0900-1000	Registration	
1000-1020	Course welcome by Bernice McCabe OBE, Co-Director, The Prince's Teaching Institute	
1025-1125	Workshop <i>Realisable Mathematics</i> Vinay Kathotia , Cambridge Mathematics	Keynote Dr Giles Yeo , University of Cambridge
1130-1145	Refreshment break	
1150-1245	<i>STEM careers: what are your questions?</i> Yvonne Baker , National Science Learning Centre Garrod Musto , Kingswood School Ina De , JP Morgan Emily Whyte , LGC Professor Paul Beasley , Siemens	
1250-1330	Lunch	
1340-1435	Keynote <i>How to make everything about Maths...</i> Dr Tom Crawford , University of Oxford	Workshop <i>Relating up-to-date Science to everyday teaching</i>
1440-1535	Teaching ideas	Lecture <i>Frozen in time: The archive of past climate and atmospheric change</i> Dr Robert Mulvaney OBE , British Antarctic Survey
1540-1600	Refreshment break	
1605-1700	Talk <i>Secrets of a digital world</i> Dr James Grime	Lecture <i>Medical imaging: not just a pretty picture</i> Dr Ellen Donovan , The Royal Marsden Hospital
1700-1800	Teacher-led workshop <i>Why do we teach Mathematics and how do we overcome the difficulties that occur when teaching mathematics?</i>	Teacher-led workshop <i>Why do we teach Science?</i>
1800-1845	Break and check in	
1845	Drinks reception and dinner After dinner speaker Professor Nicola Padfield , Master, Fitzwilliam College, University of Cambridge	

TIME	LANGUAGES	HISTORY
0900-0910	Welcome to day 2	
0910-1000	Pupil panel Chaired by Oliver Blond	
1000-1100	Teacher-led workshop <i>What do we teach?</i>	Teacher-led workshop <i>Sharing best practice</i>
1100-1115	Refreshment break	
1115-1215	Lecture <i>Translation activities in the classroom</i> Dr Emilia Wilton-Godberfforde, University of Cambridge	Lecture <i>Political extremism</i> Dr Damian Valdez, University of Cambridge
1215-1315	Teacher-led workshop <i>Sharing best practice</i>	Teacher-led workshop <i>Beyond History: practical use of sources</i>
1315-1400	Lunch	
1400-1415	Introduction to the PTI Schools Programme by Jacqueline Pierce	
1415-1515	Language taster workshop <i>Arabic, Hebrew or Hindi</i>	Lecture Andrew Payne, National Archives
1515-1530	Refreshment break	
1530-1630	Teacher-led workshop <i>Developing subject provision</i>	Teacher-led workshop <i>Developing subject provision</i>
1630-1700	Plenary <i>MFL: our most pressing challenges and solutions</i>	Plenary
1700-1845	Break	
1845	Drinks reception and dinner After dinner speaker Jamie King , Head of History, Stewards Academy	

TIME	MATHEMATICS	SCIENCE
0900-0910	Welcome to day 2	
0910-1000	Pupil panel Chaired by Jack Jackson	
1000-1030	Maths and Science move to the Department of Applied Mathematics and Theoretical Physics	
1030-1130	Teacher-led workshop <i>Sharing good practice</i>	Teacher-led workshop <i>Current issues and solutions in Science</i>
1130-1145	Refreshment break	
1145-1245	Workshop Rachael Horsman , University of Cambridge	Lecture <i>Black holes and penguins: Capturing the sun with black silicon</i> Dr Paul Coxon , University of Cambridge
1245-1330	Teacher-led workshop <i>Beyond the curriculum: Making Mathematics engaging for all</i>	Teacher-led workshop <i>Sharing good practice</i>
1330-1400	Lunch	
1400-1415	Introduction to the PTI Schools Programme by Barbara Pomeroy	
1415-1515	Workshop <i>NRICHing Mathematics in the secondary classroom</i> Charlie Gilderdale , University of Cambridge	Teacher-led workshop <i>Developing subject provision</i>
1515-1530	Refreshment break	
1530-1630	Teacher-led workshop <i>Developing subject provision</i>	Scientific walking tour of Cambridge
1630-1700	Return to Downing College	
1700-1845	Break	
1845	Drinks reception and dinner After dinner speaker Jamie King , Head of History, Stewards Academy	

TIME	LANGUAGES	HISTORY
0900-0915	Welcome to day 3	
0915-1030	Teacher-led workshop <i>How do I bring the Residential to my classroom: my objectives</i>	Teacher-led workshop <i>How do I bring the Residential to my classroom: my objectives</i>
1030-1100	Refreshment break	
1100-1200	Panel <i>How do we make this work?</i> Bernadette Holmes MBE Silke Mentchen, University of Cambridge	Panel <i>History out of the classroom</i> Gordon Ferguson, Royal Collection Trust Claire Shaw, IWM North
1200-1315	Closing plenary <i>Conference highlights and Schools Programme presentation</i> By Danny Clift, St Angela's Ursuline School and Jo Lambert, Cheadle Hulme High School	
1315-1400	Lunch	



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0900-0915	Welcome to day 3	
0915-1030	Teacher-led workshop <i>How do I bring the Residential to my classroom: my objectives</i>	Teacher-led workshop <i>How do I bring the Residential to my classroom: my objectives</i>
1030-1100	Refreshment break	
1100-1200	Workshop and discussion <i>STEM vs STEAM: do the arts belong in the Maths classroom?</i> With Tom Bree, The Prince's Foundation School of Traditional Art	Panel <i>Increasing practicals in the science classroom</i> Frances Evans, The Association for Science Education Dom McDonald, The Royal Institution Dan Walker, Head of Apprentice Delivery at the National Training Academy for Rail
1200-1315	Closing plenary <i>Conference highlights and Schools Programme presentation</i> By Danny Clift, St Angela's Ursuline School and Jo Lambert, Cheadle Hulme High School	
1315-1400	Lunch	



Featured Speakers

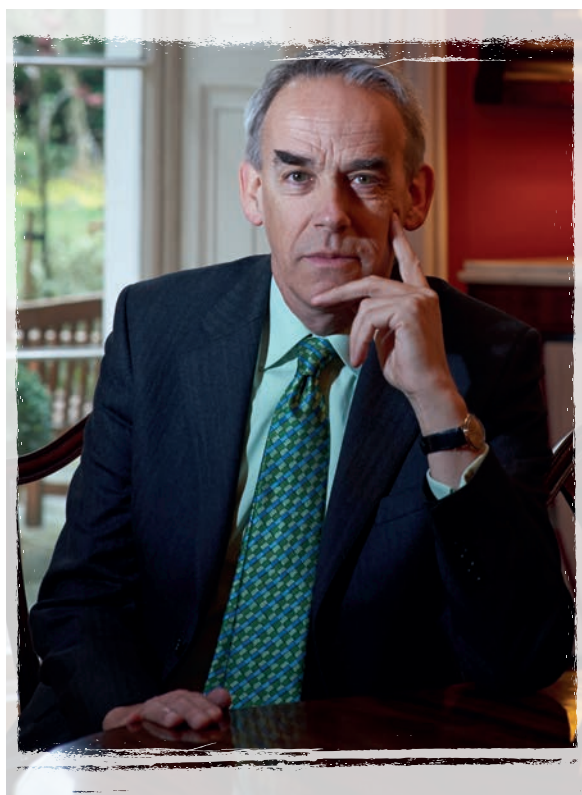


▶ DR ANNA WHITELOCK HISTORY KEYNOTE

Dr Anna Whitelock is a historian, author and broadcaster. She is Reader in Early Modern History at Royal Holloway, University of London and is Director of the London Centre for Public History and Heritage. Anna is a regular media commentator on the Tudors, the monarchy, gender and politics as well as on public history and heritage. She is the author of the award winning *Mary Tudor: England's First Queen* (Bloomsbury, 2009) and *Elizabeth's Bedfellows: An Intimate History of the Queen's Court* (Bloomsbury, 2014). She is currently writing a book called *Succession* on the years after 1603 and the arrival of James I and the Stuarts in England.

JAMIE KING AFTER DINNER SPEAKER

Jamie King is Head of History at Stewards Academy, an 11 to 16 mixed school in Harlow. He has been in this role since April 2014 and manages a department of four History teachers. Jamie participated in the inaugural PTI New Teacher Subject Days in 2011/12 and has since worked closely with the PTI as a consultant for History. He is passionate about teaching his subject and particularly enjoys teaching the Cold War and race relations in the USA at GCSE. Jamie believes subject knowledge is at the very heart of effective teaching and learning and makes it an absolute priority for teachers in his department. ▲



▼ SIR CHRISTOPHER HUM KCMG MFL KEYNOTE

Sir Christopher Hum KCMG is the former British Ambassador to China. He studied French and German at school and university, then joined the Foreign Office, where he lived in foreign capitals for twenty years and worked in four foreign languages. In his talk he will reflect on the way in which learning languages has shaped and enlivened his life.

PROFESSOR NICOLA PADFIELD

AFTER DINNER SPEAKER

Nicola Padfield is Professor of Criminal and Penal Justice at the Law Faculty, University of Cambridge, and has been a Fellow of Fitzwilliam College since 1991. She has held a number of posts in the College including President, Director of Studies and Admissions Tutor.

After her first degree at St Anne's College, Oxford she came to Cambridge (Darwin College) to study for the Diploma in Criminology. Her teaching and research has covered a broad canvas in criminal law, sentencing and criminal justice more generally. She sat as a Recorder (part-time judge) in the Crown Court from 2002-2014, is a Bencher of the Middle Temple and served as the University Advocate for several years. She was appointed as Honorary Queen's Counsel in 2018. She has been active in a number of pan-European research networks and writes the monthly editorials in the Criminal Law Review.



DR TOM CRAWFORD MATHEMATICS KEYNOTE

Dr Tom Crawford is a tutor at St Hugh's College at the University of Oxford where he teaches maths to the undergraduate students and also works at St John's College as the Access and Outreach Associate for STEM helping to run the Inspire Programme. When not teaching, Tom can be heard talking all things numbers on BBC radio with his weekly *Funbers* series as well as stripping back equations on his YouTube channel @tomrocksmaths. He also writes articles on his website, www.tomrocksmaths.com, discussing the maths of Pokémon and explaining his PhD thesis on river outflows in simple terms.

Tom completed his undergraduate degree at the University of Oxford in 2012, before obtaining his PhD at the University of Cambridge in 2016. He then spent one year working with the Naked Scientists public engagement team at Cambridge, helping to produce a weekly radio programme and podcast for the BBC and ABC Australia.

DR GILES YEO SCIENCE KEYNOTE

Giles Yeo is a geneticist with nearly 20 years' experience studying obesity and the brain control of food intake. He obtained his PhD from the University of Cambridge in genetics in 1998 and has been there ever since. He was in the initial vanguard that described a number of genes that when mutated, resulted in rare forms of severe obesity, thus uncovering key pathways in the brain that control food intake. His current research focuses on understanding how these pathways differ between lean and obese people, and the influence of genes in our feeding behaviour. Giles also presents science documentaries for the BBC. His critically acclaimed investigative piece *Clean eating – The dirty truth*, for BBC Horizon, was screened in January 2017 and prompted an important national debate about dieting advice and evidence-based science. He has also just joined BBC2's *Trust Me I'm a Doctor* as one of the new doctors.





Keeping in touch

The PTI Schools Programme

As you have attended this Residential, your department is eligible to join The Prince's Teaching Institute Schools Programme. The Schools Programme is a membership scheme that gives you the opportunity to stay in touch with teachers you have met and allows you to continue to promote the spirit of the Residential once back at school. Members share ideas and projects that enhance their department's subject provision, and meet every year to share experiences and devise further ideas.

Membership gives all staff in your department access to the resources of the Staffroom area of the PTI website, discounts on professional development courses and, after a year, the opportunity to use the PTI Mark on your school's stationery and website (above).

You can join the programme by discussing and agreeing your departmental objectives with your Residential Development Partner, with the agreement of your school's head and chair of governors. For further details please talk to any member of the PTI team at the Residential, or email Nicola Bentley: nicola.bentley@princes-ti.org.uk.

Professional development

The Prince's Teaching Institute provides one-day subject-based professional development courses. Combining academic lectures and teacher-led workshops, the courses are similar to a day of the Residential, but are usually focused on a particular area of the curriculum. The days are devised and led by practising teachers, and the PTI provides all logistical support, including inviting guest speakers.

Past speakers have included Dr David Starkey CBE, Professor Marcus du Sautoy OBE, Dr Peter Wothers MBE and Dr Martin Ruehl. Details of forthcoming events can be found at: www.princes-ti.org.uk/events.

We welcome offers to run these courses. If you are interested, please email Danielle Robinson at the address below: danielle.robinson@princes-ti.org.uk

Website www.princes-ti.org.uk

Our website contains details of all of our activities and events. Membership of the Schools Programme allows you to access the Staffroom area of the website and its expanding library of resources. As well as the opportunity to listen again to many of the lectures from this Residential, you will be able to hear podcasts of speakers from previous PTI events, and access a wealth of presentation materials and teaching resources. Should you join the PTI Schools Programme, all members of your department will gain access to these resources.



"I've found this course incredibly inspiring. It's easy to get lost in students, deadlines and lots of marking, but this residential has lifted me up and reminded me why I went into teaching."

Residential delegate 2017

The Curiosity Project

Our Science Programme is supported by Siemens as part of The Curiosity Project. The Curiosity Project is an engagement programme by Siemens, broadening existing investment to bring science, technology, engineering and mathematics (STEM) to life in the UK. By supporting organisations that reach out and nurture the innate curiosity in young people, Siemens hopes to influence millions of children, as well as their parents and teachers. The project is underpinned by an extensive education programme providing free, stimulating and unique STEM-related resources that bring STEM education to life and help inspire the next generation of engineers.

Curious?

You'll find everything you need to know - from teaching resources to all the latest news - at : [siemens.co.uk/education](https://www.siemens.co.uk/education)

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Acknowledgements

BERNICE MCCABE OBE Course Director

Bernice McCabe OBE has been a Headteacher in the state and independent sectors for 27 years and is Director of International Schools and Education Strategy for North London Collegiate School (NLCS) Enterprises, and Co-Director of The Prince's Teaching Institute. In her NLCS role she is responsible for ensuring the educational standards in the expanding group of NLCS International Schools and chairs the Academic Board of all NLCS Headteachers.

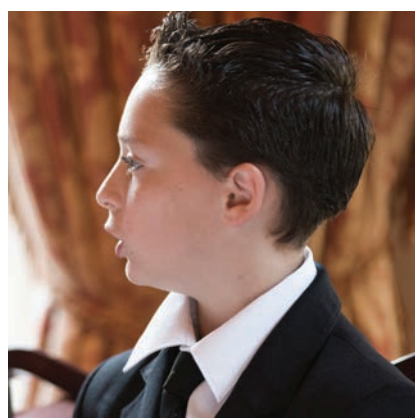
She studied English at Bristol University and has an MBA. She taught for 16 years in mixed comprehensive schools in Bristol and London, including five years as Head of Department and four years as Deputy Head of The Heathland School, London Borough of Hounslow, before becoming a Headteacher in Essex in 1990. From 1997 to 2017, she was Head of North London Collegiate School, a 4-18 school which opened its first overseas campus, a co-educational boarding school in South Korea in 2011. NLCS Dubai, a 3-18 coeducational day school, opened in 2017.

She has served on national education committees, including the National Curriculum Advisory Committee from 2010, and the London Schools Excellence Fund which tackles underperformance in London Maintained schools, from 2013. She is a governor of the London Academy of Excellence, Tottenham (LAET).

In 2002, she directed the first Prince of Wales Education Summer School. In 2006, the annual summer schools grew into The Prince's Teaching Institute (PTI) which she now co-directs.

The PTI would like to thank Oliver Blond, Annie Gouldsworthy, Helen MacGregor, Robert Ferguson and Richard Russell for the design of this Residential. We would also like to thank all of the speakers and workshop leaders for their contributions and Siemens for their continued support of the Science Programme.

Brochure design by Robina Newman; audio recording and audio visual support from Peter and Sue Harris. All photographs in this brochure, except where otherwise indicated, are © Benjamin Ealovega.



"This residential has been a reminder of the wider impact that teachers have on our community and on society. We help to create future analysts, engineers and doctors and this has a direct impact on our economy."





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in partnership with



www.princes-ti.org.uk

