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THE PRINCE'S  
TEACHING  
INSTITUTE

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SUMMER SCHOOL, QUEENS' COLLEGE, CAMBRIDGE 2009

Mathematics and Science



## CLARENCE HOUSE

It has given me enormous pleasure to see how positively teachers have responded to the development of my Summer Schools since their launch in 2002. The whole-hearted enthusiasm evident in their evaluations year by year has strongly reinforced my long-held view that teachers really do want to be reconnected with their subject and with the passion that brought them into teaching in the first place. All I can say is that I am glad to have been able to provide them with a worthwhile opportunity to do so.

The enthusiastic response to the earlier Summer Schools has encouraged me to expand their scope with the creation of The Prince's Teaching Institute and the establishment of a strategic partnership with the University of Cambridge. As the number of alumni grows, the Institute enables them to keep in touch and exchange ideas through the Schools Programme, the website and through regional, subject-based training days.

One result of this growth is a demand for the inclusion of additional subjects. So, having started with English and History, a Science programme was started in 2007 and included Geography a year later. Now my Institute is introducing Mathematics for the first time.

The importance of good Science education is obvious. Finding solutions to problems like the effects of climate change, the responsible use of technology, and the sustainable development of agriculture is essential to our future. We also need Mathematics for a proper understanding of the natural world and of the universal order that is reflected in such things as the Golden Ratio observable in the structure of plants, crystals and chemical compounds.

The role of the teacher is crucial in ensuring that the next generation has the knowledge and the vision to understand and to value and manage its inheritance successfully. I hope that this Summer School will help towards this by providing informative lectures, stimulating discussion and plenty of material of real value for you to take back to your schools.



## Welcome

I am delighted to welcome you to this, the ninth Prince of Wales Education Summer School. Every year since the first pilot in 2002, these Summer Schools have provided an opportunity for teachers to stand back and reflect on the nature of their subjects and on what is most important in the teaching of them. The teachers themselves tell us that such opportunities are rare in their professional lives and all the more welcome for that.

In response to this evident demand, the Summer School programme is constantly developing. Two years ago we included Science for the first time, and today we are breaking new ground again with the introduction of Mathematics.

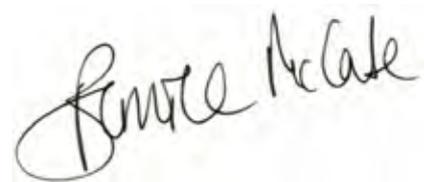
The Summer Schools place emphasis on academic content and offer a chance to discuss subject issues in depth with academics and experts. Accordingly we have included in this year's programme a number of seminars, presentations and lectures by speakers eminent in various fields of Science and Mathematics. We are most grateful to them for agreeing to come and delighted to have them with us.

In the workshop sessions our aim is to offer teachers a chance to discuss their 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?

Each year at the end of the Summer School we have presented our findings to a panel of educationalists from a variety of backgrounds. This provides an opportunity not only for them to hear what the teachers are thinking, but also for delegates from different disciplines to listen to each other and perhaps find the reassurance of common ground. We do hope that this session will generate an active debate about aspects of education in your subject that concern you; even indeed a consensus that we can then feed through to the policy makers.

But the most powerful effect of the Summer School 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."

I look forward to meeting you all in Cambridge this year. 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.



**Mrs Bernice McCabe**  
*Course Director*

**The Prince of Wales's long standing concern about the teaching of English Literature and History was the original driving force behind the creation of his annual Education Summer Schools. Two years ago a programme for Science teachers was added, and last year Science was paired with Geography, with particular focus on the interface between the two subjects in exploring the topic 'Planet Earth and its People'. Today we are breaking new ground again with the introduction of Mathematics.**



### SUBJECT KNOWLEDGE

Now in their eighth year, these short but intense courses have provided teachers from all over the country with (to use their words) 'life-enhancing' and 'inspirational' opportunities to discuss their subjects with professional colleagues, leading academics, and those concerned with directing national education policy. The discussions in previous Summer Schools focused on the central importance of particular subjects: the aspects of them that could or should be taught at different levels, and the best ways for teachers to meet the challenge of doing so effectively.

It will not be surprising if the same is true this year. The 2008 Ofsted Report on Maths Teaching and Learning pointed out that "The essential ingredients of effective Mathematics teaching are subject knowledge and understanding of the ways in which pupils learn Mathematics." And the public appetite for scientific knowledge, seen in the success of popular scientific television programmes, is clear.

Those who are actually involved in teaching have no doubt about the importance of the subject knowledge that underpins their own enthusiasm for their subjects; and this is what they want to pass on to their students. It is not always easy for them to do so. For the centrality of subject knowledge is not universally considered a priority in the drive to raise standards in schools, and, it has been argued, it has too often taken second place to a concern with teaching methodology and skills. Furthermore the desire to make subjects 'relevant' to young people has led to much energy being spent on devising cross-curricular topics rather than focusing on acquiring the depth of knowledge needed to study such topics seriously.

### SCIENCE AND MATHEMATICS

No-one who has spent any time in a classroom will undervalue the importance of knowing how to teach, as well as what should be taught. But by concentrating on the methodology of teaching and assessment we can lose sight of the simple truth that good teaching is about communicating with enthusiasm and passion what lies at the heart of our subjects. Science encompasses a wealth of world-changing discoveries and insights, to which every child is entitled to be introduced. Teachers of Science must also be able to provide – for some if not for all – the detailed and up to date knowledge of the subject on which further scientific progress essentially depends. A knowledge and understanding of Mathematics underpins modern scientific study, and there is growing concern among scientific bodies about the difficulties experienced by even the most promising pupils with the Mathematical aspects of Science questions. Numerical fluency lays a foundation for a deeper appreciation of the power of Mathematics in applications both practical and aesthetic, as well as being an important and endlessly fascinating subject in its own right.





## EXAMINATION AND ASSESSMENT

Examination and assessment are essential elements in any formal process of Education; they should also encourage good learning. But there has been a widespread and strongly-held belief amongst teachers who have attended previous Summer Schools that there should be more incentive for teachers trying to communicate the richness of their subjects and to impart bodies of knowledge. The lack of critical thinking and problem-solving skills evident among Science pupils is cited by the Royal Society of Chemistry as adding to “the growing body of evidence that dedicated teachers are working under a system which encourages teaching to the test and which fails to meaningfully differentiate pupils’ performance”. Similarly, the Ofsted Report on Mathematics teaching referred to above stated: “Evidence suggests that strategies to improve test and examination performance, including ‘booster’ lessons, revision classes and extensive intervention, coupled with a heavy emphasis on ‘teaching to the test’, succeed in preparing pupils to gain the qualifications, but are not equipping them well enough mathematically for their futures.”

## CURRICULAR DEBATE

Science and Mathematics are both core subjects, compulsory elements in the curriculum up to the end of Key Stage 4. This presents the challenge of reconciling the needs of the many and the few: ensuring that all pupils are given the basic knowledge and competence in Science and Mathematics that they will need in their future lives, while at the same time stimulating the interest of the abler pupils and encouraging them to specialise in these areas which are so important for the country’s development. There have been curriculum changes which have been perceived as the interest of the many, trying to devise syllabuses that are ‘relevant’ and ‘accessible’. But these are widely criticised for lack of rigour and as providing no sort of preparation for the higher levels of study.

There are real and live issues here. What is the right balance, and how should the curriculum in Science and Mathematics be determined? In bringing teachers together to discuss such questions, the Summer Schools not only give them as individuals a renewed sense of purpose; they also demonstrate to the teachers that the future of the subjects they love lies, more than they imagine, in their own hands. Identifying the difficulties in their way is only a start. They must also identify the solutions that really will work in the classroom, and achieve what they want to achieve. That is what the Summer Schools are for.





The Prince's Teaching Institute believes that all pupils, irrespective of background or ability, are entitled to a subject-based curriculum, taught with rigour and passion. It was created in 2006, and works in partnership with the University of Cambridge. It has grown out of The Prince of Wales Education Summer Schools which, every year since 2002, have provided an opportunity for teachers to come together to debate and where necessary challenge teaching approaches to their subject.

Its aims are:

**Promoting and providing subject-based professional development for teachers**

**Creating an inspirational forum for teachers, enabling them to step away from the classroom and rediscover their love of subject**

**Promoting the idea that subject knowledge, subject rigour and the enthusiasm for communicating them are essential requirements for effective teaching**

**Encouraging and inspiring teachers, by demonstrating good use of academic rigour and challenge in the classroom**

**Creating stronger links between academic departments in schools and universities**

**Promoting and enabling a more constructive dialogue between teachers and government educational agencies**

**Exercising a beneficial influence on the development of policy in the areas of curriculum development, assessment and training**

The institute brings together teachers and leading academics with a view to encouraging rigorous and challenging subject teaching in all schools for children of all abilities. It demonstrates how children can be inspired, and consequently achieve higher standards, by teaching that goes beyond the constraints of exam syllabuses and by rich subject provision that incorporates extra-curricular activities. It also provides an additional pathway of communication between teachers and Higher Education and Government Agencies.



# MATHEMATICS

## The Aims

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**The course is intended to promote the primacy of subject knowledge, both among pupils of all abilities and among teachers. It aims to:**

Provide an inspirational forum to agree the central role and enabling nature of Mathematics within the school curriculum

Promote an understanding of the nature and scope of Mathematics, and of the combination of comprehension, technical expertise, logic and rigour of practising mathematicians

Develop approaches that will equip students with the confidence to acquire and apply the Mathematical knowledge and skills required in our increasingly complex and demanding society

Discuss and focus upon the core aspects of Mathematics that should be taught at different levels

Develop expertise and facilitate the sharing of good practice in the teaching of Mathematics

## The Objectives

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**The purpose of the course is that teachers should be re-inspired to teach their subject in a more rigorous, ambitious and creative way, and should influence their colleagues to do the same.**

**Specifically the course will:**

Promote sufficient self-confidence in teachers to present curriculum ideas in a more flexible, creative and mathematically rigorous way

Consider applications of Mathematics, such as social networks, the spread and control of infectious diseases and the use of geometry in art.

Promote greater challenge for both teachers and students in the classroom and give students a better understanding of Mathematical reasoning





# SCIENCE

## The Aims

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**The aim of the course is to generate discussion about the nature and purposes of Science teaching and the place of values within Science education for the future by:**

Providing an opportunity for practising teachers to consider the purposes of teaching Science and the place of values within it, to meet the challenges of the 21st century world

Offering a forum for the debate of these issues and to hear eminent scientists and leading science communicators and educators present some challenging perspectives of their own

Providing an opportunity for practising teachers to explore the principles of rigorous, relevant and responsible Science teaching in the 21st century, through participation in workshops led by experienced teachers

Probing critically current approaches to Science education and its assessment, examining the extent to which young people are being equipped to make informed judgments on the implications of scientific development and evaluate the impact of Science on the future well being of planet Earth.

## The Objectives

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### **Why should we teach Science?**

What is the role of Science as an essential foundation for understanding the 21st century world and what is its part in development for a sustainable future?

### **What Science should we teach at the different Key Stages and what should this contribute to young people's education?**

How important is the historical perspective in the teaching of Science and how is modern Science being evaluated? What aspects of Science can equip young people to make informed judgments for the well-being of their own lives and of the global society in which they live, and how can Science contribute to the constructive development of their values and their view of the world?

### **How should we teach Science?**

What are the most effective ways to encourage the lasting interest and understanding of young people in Science, and enable them to use their knowledge and develop their values to live better and participate purposefully in decisions for the future?



# Course Programme Monday 29th June

TIME	SCIENCE	MATHS
0900-1030	<b>Registration</b>	
1030-1130	Introductions Perspectives on Science and Mathematics: Pupil Discussion	
1130-1145	<b>BREAK</b>	
1145-1210	Course Welcome by Course Director	
1210-1300	Kay Nicholson Memorial Lecture <b>Prof Dame Julia Higgins</b>	
1300-1400	<b>LUNCH</b>	
1400-1530	Group Workshop 1 Why do we teach Science?	Group Workshop 1 Sharing good practice
1530-1600	<b>BREAK</b>	
1600-1700	Lecture <b>Mr Francis Wells</b> Leonardo da Vinci: 'The case for lifelong self-education'	Visit to Millennium Mathematics Project
1700-1830	Group Workshop 2 Sharing good practice	
1830-1930	<b>BREAK</b>	
1930-2200	<b>RECEPTION AND DINNER: AFTER DINNER TALK</b> by Lord Wilson of Dinton	



# Course Programme Tuesday 30th June

TIME	SCIENCE	MATHS
0900-1000	<p>Choice of Lecture</p> <p><b>Dr Lisa Jardine-Wright</b> Keeping up with the Universe</p> <p><b>Dr Julian Griffin</b> How analytical Chemistry is contributing to the functional genomic revolution</p>	<p>Lecture</p> <p><b>Prof Celia Hoyles</b> Reconciling the learner's and teacher's views of Mathematics</p>
1000-1030	Schools Programme Presentation	<p>Group Workshop 2 Reflections on Prof Hoyles' Lecture</p>
1030-1100	<b>BREAK</b>	Schools Programme Presentation
1100-1130		<b>BREAK</b>
1130-1230	<p>Group Workshop 3 Sharing development objectives</p>	<p>Choice of Lecture</p> <p><b>Dr Lisa DeLong</b> Exploring geometry through the creative arts</p> <p><b>Dr Julia Gog</b> The Mathematics of Epidemics</p>
1230-1330	<b>LUNCH</b>	
1330-1500	<p>Group Workshop 4 Issues in Science Education</p>	<p>Group Workshop 3 Issues in Mathematical Education</p> <p>Interest Group Workshops</p>
1500-1600	<p>Lecture</p> <p><b>Jonathon Porritt</b> As if the world matters: teachers on the front line?</p>	<b>BREAK</b>
1600-1700	<p>Choice of Visits: New Cavendish Museum or Zoology Museum</p>	<p>Lecture</p> <p><b>Dr Tom Korner</b> How to Sort: The Mathematics of quicksort</p>
1700-1830		<p>Group Workshop 4 Sharing Development Objectives</p>
1830-1930	<b>BREAK</b>	
1930-2200	<b>RECEPTION AND DINNER: AFTER DINNER TALK by Adam Hart-Davis</b>	

# Course Programme Wednesday 1st July

TIME	SCIENCE	MATHS
0900-1000	Lecture <b>Dr Paul Barker</b> Does interdisciplinary research require interdisciplinary teaching?	Lecture <b>Prof David Spiegelhalter</b> Understanding Uncertainty
1000-1100	Lecture <b>Dr Bill O'Neill</b> Ultra fast interactions: working at the speed of light	Lecture <b>Prof Chris Budd</b> How to amaze your friends
1100-1130	<b>BREAK</b>	
1130-1230	Plenary discussion <b>Michael Gove MP</b>	
1230-1330	<b>LUNCH</b>	
1330-1430	Reports on key themes Plenary discussion with Panel of Educationalists	
1430-1445	Evaluations	
1445-1530	Plenary Lecture <b>Prof John Barrow</b> Simplicity and Complexity	
1530	Attendance Certificates and Depart	



# Plenary Guests & Speakers

Queens' College, Cambridge 2009



Professor  
John Barrow

John Barrow is Professor of Mathematical Sciences at Cambridge University and Director of the Millennium Mathematics Project, a programme which aims to improve the teaching, learning and appreciation of Mathematics and its applications ([www.mmp.maths.org](http://www.mmp.maths.org)). He is a Fellow of Clare Hall, Cambridge and the current Gresham Professor of Geometry at Gresham College in London.

He has written more than 440 scientific papers in astrophysics and cosmology, and 20 books, translated into 28 languages, which explore the ramifications of developments in Astronomy, Physics, and Mathematics. The most recent are *Cosmic Imagery: key images in the History of Science* and *100 Essential Things You Didn't Know You Didn't Know*. His play, *Infinites*, directed by Luca Ronconi won the Premi Ubu for best play in the Italian theatre in 2002. He received the 2003 Italgas Prize, the 2006 Templeton Prize, and the Royal Society's Faraday Prize for science communication in 2008.



John Coles

John Coles has been Director General for Schools in the Department for Children Schools and Families since May 2008. Before then, he had spent three years as Director of 14-19 Reform, leading the drive to raise participation post-16 and attainment at 19, reduce NEET numbers, reform curriculum and qualifications and develop the new Diplomas. He also led work to raise the participation age and to develop a new planning and performance management system for post-16 education and training, through the transfer of funding for 16-19 year-olds from the LSC to local authorities. Previously, as Director for the London Challenge in the then Department for Education and Skills, he was responsible for developing and implementing the strategy to improve secondary education in London. Before that, Jon was responsible for taking the 2002 Education Act through Parliament, having written the White Paper which preceded it. A qualified secondary teacher, his previous jobs have included implementing the infant class size pledge, developing future strategy for ICT in schools and a strategy for e-government, on secondment to the Cabinet Office.





Liz Francis

Liz Francis is Director of Workforce Strategy at the Training and Development Agency for schools. After graduating she taught in London schools for 5 years prior to joining the School Curriculum Development Committee. She then worked for 14 years in a number of government agencies including the School Examinations and Assessment Council, the School Curriculum and Assessment Authority and the Qualifications and Curriculum Authority. At QCA Liz Francis led work on the new modular A-levels for Curriculum 2000, Business Studies, Economics and General Studies. During this time, Liz Francis worked for a number of senior figures in education including Lord Ron Dearing, Sir William Stubbs, Chris Woodhead and David Hargreaves.

Liz Francis left QCA to work as a 14-19 advisor, then senior advisor for Suffolk LEA, where she also worked as an Ofsted inspector. Her key responsibilities in Suffolk were the secondary national strategy, 14-19 education, specialist schools and commercial services to schools.



Michael Gove MP

Michael Gove is Shadow Secretary of State for Children, Schools and Families. He was born in Edinburgh in 1967 and educated at Robert Gordon's College, Aberdeen, and Oxford University. He enjoyed a fifteen year career in journalism, working for local and national newspapers, radio and TV, including his position as Assistant Editor at The Times. He appeared regularly as a panelist on Radio Four's "The Moral Maze" and BBC 2's "Newsnight Review" and a guest on Channel Four News, Any Questions and Question Time. Michael Gove is a former Chairman of Policy Exchange, a centre-right think-tank. He is also a published author, and his latest book *Celsius 7/7* deals with fundamentalism and the West's policy towards it. He was elected to Parliament for Surrey Heath in 2005 and served as Shadow Minister for Housing and Planning, before joining the Shadow Cabinet in 2007.



Adam Hart-Davis

Adam Hart-Davis is a freelance photographer, writer, and broadcaster – presenter on television of *Local Heroes*, *Tomorrow's World*, *What the Romans, Victorians, Tudors & Stuarts, Greeks, Egyptians, and others did for us*, *Science Shack*, *Come to your Senses*, *Stardate*, *Just Another Day*, and *The cosmos – a beginner's guide*. Before presenting, He spent 5 years in publishing and 17 years at Yorkshire Television, first as researcher, and then as producer of such series as *Scientific Eye* and *Arthur C Clarke's World of Strange Powers*.

He has read several books, and written about 25, including *World's weirdest 'true' ghost stories* and *Thunder, flush, & Thomas Crapper (an encycLOOpedia)*. He is an Honorary Fellow of the Royal Photographic Society, the Royal Society of Chemistry, the Society of Dyers and Colourists, and Merton College Oxford, and patron of a dozen charitable organizations.



Professor  
Dame Julia Higgins  
DBE

Julia Higgins is Emeritus Professor of Polymer Science in the Department of Chemical Engineering at Imperial College, London. Her research career has focussed on the application of scattering techniques, notably neutron scattering, to the understanding of polymer behaviour. She has explored the way that molecular organisation and motion controls material behaviour, most recently in polymer blends and mixtures. From 2006 to 2007 she was the Principal of the Faculty of Engineering at Imperial College, and President of the Association for Science Education. Currently she chairs ACME (Advisory Committee for Mathematics Education). is a Trustee of the National Gallery, Fellow of the Royal Society and of the Royal Academy of Engineering and a foreign member of the National Academy of Engineering of the USA. She was made a Dame of the British Empire in 2002 and a Chevalier de la Legion d'Honneur in 2003.

# Plenary Guests & Speakers

Queens' College, Cambridge 2009



Professor  
John Holman

After studying Natural Sciences at Cambridge, John Holman became a teacher of Chemistry. He taught in a number of secondary schools, and between 1984 and 1994 he also worked as a writer and curriculum development specialist.

John Holman has played a leading role in most of the major UK Science curriculum developments of the last 20 years, including the development of the National Curriculum and the Nuffield and Salters curricula. He is author of over 15 textbooks from key stage 3 to undergraduate level, with several overseas adaptations, and has been an invited speaker and expert across six continents.

In 1994 John Holman became Headteacher of Watford Grammar School for Boys, an all-ability, multi-ethnic Science specialist school, where he continued to teach Chemistry. In 2000 he left Watford to become Salters Professor of Chemical Education and Director of the Science Curriculum Centre at the University of York, where he teaches Chemistry at undergraduate level and has a specialist interest in the teaching of Chemical Thermodynamics.

Since 2004, John Holman has been Director of the National Science Learning Centre in York, and since 2006 he has also acted as the government's National STEM Director.



Professor  
Celia Hoyles OBE

Celia Hoyles has been Professor of Mathematics Education at the Institute of Education, University of London since 1984, following teaching in London secondary schools. She co-presented a popular TV Mathematics quiz show, *Fun and Games*, shown at prime time on Yorkshire TV 1987-90. Celia Hoyles was awarded an OBE in the New Year's Honours list 2004 for services to Mathematics education and was chosen as the first recipient of the Hans Freudenthal medal, in recognition of her cumulative programme of research. In December 2004 she took up the position of the U.K. Government's Chief Adviser for Mathematics (75% of her time), a position she held until November 2007. In June 2007, Celia Hoyles was appointed as Director of the National Centre for Excellence in the Teaching of Mathematics.



Lord Wilson  
of Dinton GCB

Lord (Richard) Wilson was born in Glamorgan and educated at Radley (1956-60) and Clare College Cambridge (1961-65). He was called to the Bar but, rather than practise, entered the Civil Service as an assistant principal in the Board of Trade in 1966.

He subsequently served in a number of departments including 12 years in the Department of Energy where his responsibilities included nuclear power policy, the privatisation of Britoil, personnel and finance. He headed the Economic Secretariat in the Cabinet Office under Mrs Thatcher from 1987-90 and after two years in the Treasury was appointed Permanent Secretary of the Department of the Environment in 1992. He became Permanent Under Secretary of the Home Office in 1994 and Secretary of the Cabinet and Head of the Home Civil Service in January 1998. Since his retirement in September 2002 he has been Master of Emmanuel College, Cambridge and has been President of the Chartered Institute of Personnel and Development from 2004 – 2006.



# Keeping in Touch

## Schools Programme

As you have attended this Summer School, your school 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 at Queens', and allows you to continue to promote the spirit of the Summer School 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 members of your department access to the Prince's Teaching Institute Staffroom on the PTI website, discounts on Continuing Professional Development and, after a year, the opportunity to use a PTI logo on your school's stationery and website.

Membership is obtained by discussing and agreeing your departmental objectives with a teacher leader, and requires the agreement of the school's Head and Chair of Governors. For further details please talk to any member of the PTI team at the residential, or e-mail:

**[jane.mccallum@princes-ti.org.uk](mailto:jane.mccallum@princes-ti.org.uk)**

## Continuing Professional Development

The Prince's Teaching Institute provides one day subject-based Continuing Professional Development courses. Combining academic lectures and teacher workshops, the courses are similar to a day of the residential, but are usually focused on a particular area of syllabus, such as Energy or Charles Darwin. The days are devised and led by practising teachers who have been to a Summer School. The PTI office provides all logistical support and will invite speakers. Past speakers include Dr David Starkey CBE, Dr David Bainbridge and Prof Sir Gordon Conway KCMG.

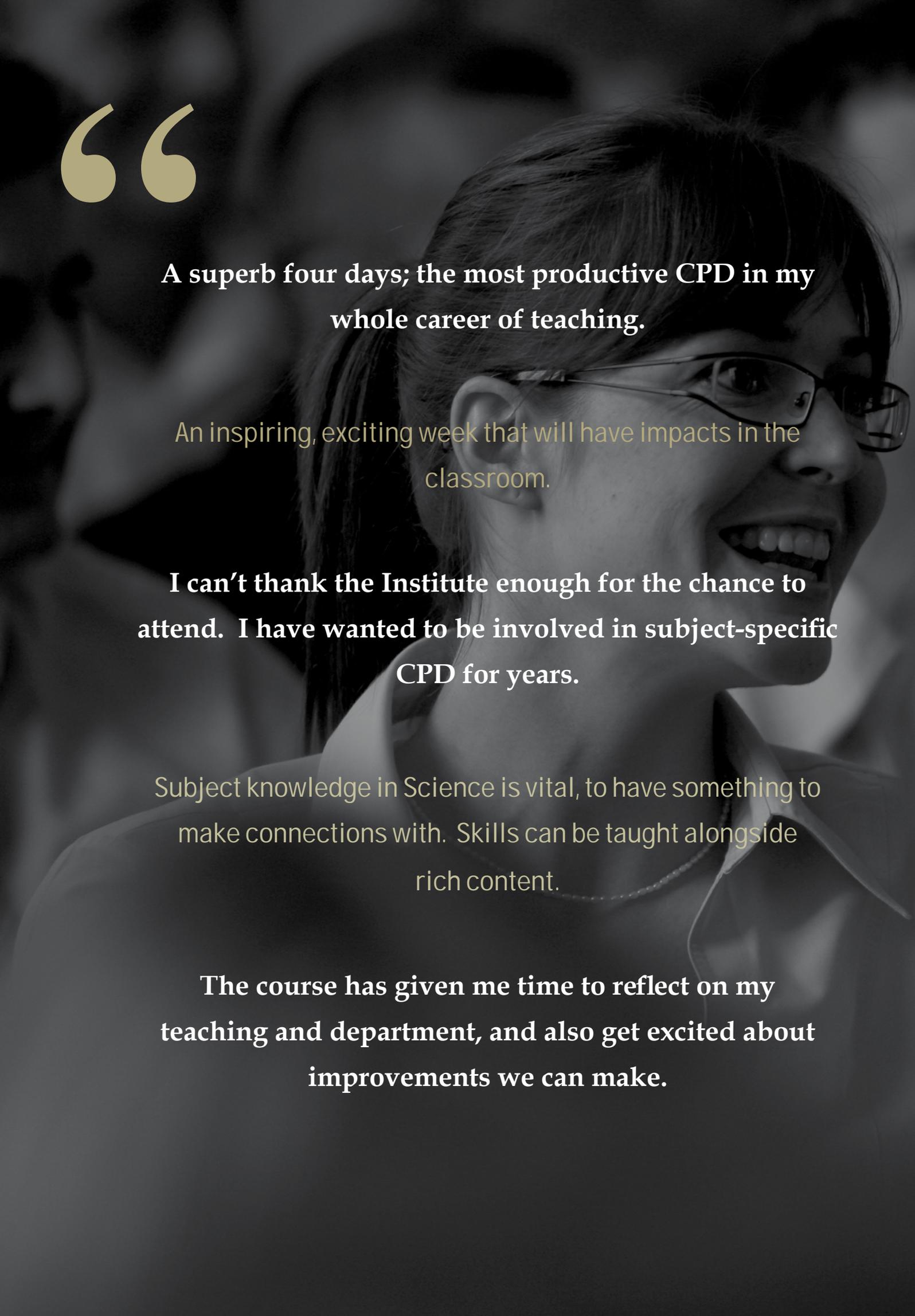
Details of forthcoming events can be found at **[www.princes-ti.org.uk](http://www.princes-ti.org.uk)**

We welcome offers to run an event, and if you are interested, please contact:

**[chris.pope@princes-ti.org.uk](mailto:chris.pope@princes-ti.org.uk)**

## Website

The public pages of **[www.princes-ti.org.uk](http://www.princes-ti.org.uk)** contain 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 Summer School, you will be able to hear podcasts of speakers from previous Prince's Teaching Institute events, and also access presentation materials. Should your department join the PTI Schools Programme, all members of your department will gain access to these resources.



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**A superb four days; the most productive CPD in my whole career of teaching.**

An inspiring, exciting week that will have impacts in the classroom.

**I can't thank the Institute enough for the chance to attend. I have wanted to be involved in subject-specific CPD for years.**

Subject knowledge in Science is vital, to have something to make connections with. Skills can be taught alongside rich content.

**The course has given me time to reflect on my teaching and department, and also get excited about improvements we can make.**

I feel refreshed and reinvigorated in my ability to teach **confidently and enrich the learning of my students.**

Before going on this course, I wasn't sure if teaching was the profession for me... Now I feel inspired and can't wait to get back in the classroom.

**It was wonderful to be treated like a professional. I have left this course knowing why I went into teaching – a love of my subject, enthusiasm, zest, and a desire to change young people's lives. This week has allowed me to rediscover all of these.**

A course that is not about targets and results but about teaching the subject that stimulates and excites us.

**I feel like a flower that can now go away and bloom fully in the sun, that had previously been in the shade.**

””

## Bernice McCabe COURSE DIRECTOR

Educated at Clifton High School and Bristol University, she taught for 16 years in mixed comprehensives in Bristol and London, including 5 years as Head of English and 4 years as Deputy Head of The Heathland School, Hounslow. Since 1990 she has been a Headmistress: for 7 years of Chelmsford County High School, a girls' grammar, and since 1997 of North London Collegiate School, a large 4-18 independent school. She has served on national education committees in the maintained and independent sectors, including the National Grammar Schools Association and the GSA/HMC Universities Committee, since 2002 has directed The Prince of Wales Education Summer School, and since 2006 has also Co-directed the Prince's Teaching Institute.

### Dr Kay Nicholson



Physics Teacher and Academic Tutor at North London Collegiate School, Kay Nicholson died suddenly and unexpectedly on December 21st 2008. Kay was a key part of The Prince's Teaching Institute team, designing with Alastair Cuthbertson our Science Summer School streams since the inaugural Science Summer School in 2007. Her passing has robbed the Science teaching community of a talented and passionate advocate for Science, and she is sorely missed. We are very grateful to Professor Dame Julia Higgins DBE, who knew Kay personally, for giving the opening keynote speech of this conference, which is dedicated to Kay's memory.

## Acknowledgements

The Summer School would not have been possible without the very generous sponsorship provided by Harvey McGrath, The Prince of Wales Charitable Foundation, the Clore Duffield Foundation, The Steel Charitable Trust, The National Centre for Excellence in the Teaching of Mathematics, RM plc, N M Rothschild, Nord Anglia Education Ltd, Mr and Mrs Tager, a number of anonymous donors, and by the Training and Development Agency for Schools.

The Prince's Teaching Institute ("the PTI") was formed in 2006 to organise The Prince of Wales Education Summer Schools, to expand the programme of continuing professional development for teachers and to develop support for alumni and their schools. Since its inception, the PTI trustees have been chaired by The Lord Wilson of Dinton, Master of Emmanuel College, Cambridge, and this Summer School is the last event being held under his chairmanship. All of the PTI staff, executive, trustees and supporters would like to thank him for his energy and expertise in bringing the organisation into being. We are delighted to welcome Harvey McGrath, Chairman of Prudential plc and Chairman of the London Development Agency who will be taking over as Chairman of the PTI in July 2009. The PTI has two co-Directors, Christopher Pope and Bernice McCabe.

The design of the Summer School course was led by Oliver Blond, Headteacher, Henrietta Barnett School. Alastair Cuthbertson, Ivybridge Community College and Eric Nicol, North London Collegiate School have designed the Science stream and Robert Ferguson, North London Collegiate School and Janet Wright, Birley Community College have designed the Mathematics stream. The PTI would like to thank the following people for their support and assistance in organising the Summer School: Professor John Barrow, Director of the Millennium Mathematics Project at the University of Cambridge; Nicola Buckley, University of Cambridge; Dr Lisa Jardine-Wright, University of Cambridge; Julia Hawkins, Deputy Director of the Millennium Mathematics Project; Dr Jennifer Piggott, NRIC Project Director; Professor Celia Hoyles, Director of the National Centre for Excellence in Teaching Mathematics; Mark Leishman, Senior Deputy Private Secretary to TRH The Prince of Wales and The Duchess of Cornwall; Stephen Miles, Bath Spa University; Martin Roberts, former Headteacher of The Cherwell School, Oxford; James Sabben-Clare, former Headmaster of Winchester College.

The PTI would like to thank Robina Newman for her design work for the organisation, including this brochure and Benjamin Ealovega for the photography. All photographs in this brochure except for biography portraits and where otherwise indicated, are © Benjamin Ealovega.

The Trustees would like to acknowledge the support and assistance received from Nadia Carter (PA to Bernice McCabe, North London Collegiate School), Jane McCallum and Patrick Wigg (PTI) as well as Katie Vaughan, Jo Jameson (HRH The Prince of Wales's Office) and the conference organisers, Jenny Wilde Associates.





The PTI is constituted as a registered charity (1116224) and a company limited by guarantee (5910443).

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