

# إعطاء السلام صوتاً

## GIVING PEACE A VOICE

An initiative of the Institute for Democracy from Mathematics,  
Supported by the Qatar Foundation,  
At St George's House, Windsor Castle,  
28<sup>th</sup> - 29<sup>th</sup> January 2009\*

### FINAL REPORT

#### Grateful Acknowledgment:

With great gratitude my colleagues and I wish to acknowledge that this consultation could not have occurred without the support and understanding of Her Highness Sheikha Mozah Bint Nasser al Missned, the UNESCO Special Envoy for Basic and Higher Education, and of the Qatar Foundation.

#### The Aim:

The aim of our consultation was to examine the claim that an unfortunate result of mathematics instruction common in all Western education systems is to divide young people into three categories.

The first is that of the young people who may be expected to be creatively able in mathematics; the second of those who may be expected to be only functionally able; and, finally, a third of those who are considered likely always to be functionally inadequate.

These divisions are made in schools. Their intellectual, social, and moral effects are usually life-long.

Since mathematics is indeed culturally neutral, and since, in principle, mathematics requires no prior mental training, it is of course arguable that this form of selection is perfectly fair: that it only divides young people into those who will most benefit society and themselves by virtue of their superior intellect; those who will be less useful individually, but who, by virtue of their numbers alone, will be socially and politically more significant; and, finally, that it will winnow out those who will generally need special care and attention.

The contrary view, however, is that this use of mathematics education is not only socially unfair, but that it is highly questionable whether the results are useful at all: not least in its presumption that potential and eventual mathematical ability can be determined *a priori*.

It can be argued in addition that the process is only, and can only be, predictive of its own consequences: that, in other words, those predicted to be potentially mathematically creative will be given further incentives to prove that they are mathematically creative; whilst those who are categorized as only functionally able, or - even more seriously - functionally inadequate, will very rarely be allowed any opportunity to prove that these early diagnoses were made too soon, even less that they were wholly incorrect (*'Les mathématiques pures n'existent pas!'* Nordon 1981).

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\* It should be noted that all Consultations at St George's House are conducted under 'Chatham House Rules'. Other than the official participants, no speakers are identified by name or country.

The consultation heard the further argument that each of these categories will inevitably develop criteria of personal importance (and, correspondingly, of others' unimportance); that they will develop further criteria, of social inclusion and social exclusion; and that each one will incubate and develop entirely different moral codes.

It was then suggested that the individuals in these different categories will be largely obliged to accept these different moral codes, both in order to be accepted by the others and to survive academically, and to maintain their social importance. Each code will restrain its members from straying too far from its accepted norms; and all in general will encourage contempt for other categories, and will find apostasy, in all but the most exceptional cases, unacceptable. (Hannaford, Köhler 1998)

Whilst this explanation for the social and moral division of Western societies was first adduced to explain the appearance and initial success of extremely totalitarian societies - in which, in general, one category within an entire population encouraged another category to turn on and exterminate the third (Hannaford 1992), it was argued that in the majority of Western societies the same process has continued to lead to the abandonment of more and more socially cohesive values.

A very optimistic view will certainly be that the enormously costly conflict which finally saw the defeat of the most totalitarian regimes of the 20<sup>th</sup> century also saw the end of the process which allowed them to begin.

Unfortunately, all that has been abandoned are the political ideologies which justified a social minority (the Party) to direct a social majority (the People) to exterminate a mutually despised further minority (the Enemy). Despite the failure of these ideologies, even now there are university academics in Western universities celebrated for never renouncing their faith in this process of social evolution.\*

In fact, the new social mechanism of division introduced with universal education in the early 20<sup>th</sup> century - which then produced a self-styled 'intelligentsia' championing the rights of 'the workers' - has hardly been disturbed.

The prevailing notion then was that education could produce a new and classless society, one in which everyone has at least some degree of individual responsibility for others. The modern fashion is to declare that *no-one* has any individual responsibility for anyone else. In supposed support of this new fashion, Mrs Margaret Thatcher, when British Prime Minister, is famously reported to have said: "*And, you know, there is no such thing as society.*"

This statement is usually quoted as one single sentence. It is very rarely followed by the lines which immediately followed: "*There are individual men and women, and there are families. And no government can do anything except through people, and people must look to themselves first. It's our duty to look after ourselves and then, also to look after our neighbour.*" (Thatcher, 1987)

A society in which people have in general a sense of common values, common aims, common means and common ends, must provide its children - paradoxically, but we humans *are* paradoxical - with a system of education which accepts a wide diversity of ability and opinion, and yet somehow supports and encourages these common values.

*"If schools want to be places where students prepare to be highly literate individuals, they must be places where students are encouraged to be strong citizens, and that means engaging in healthy debate. Schools should be laboratories for democracy where issues are actively debated and every voice [is] encouraged to speak. It is in this culture of democracy that literacy flourishes as students work to*

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\* Nor is a political ideology essential: it is only more 'morally' satisfying.

*hone their skills and become better readers and writers, speakers and listeners.* (O'Brien, 2003: cited by Lathi Jotia, 'Democracy and Education', 2007)

These are the principles which teachers who are passionately engaged with the lives of their pupils are trying to see incorporated in many societies into their education system.

In general they are failing. Why are they failing? Where is the difficulty? What are the obstacles? Why do governments spend vast sums of money on endless research projects, on armies of academic consultants - all without seeing any general improvement, often the reverse - and yet refuse to listen to the experience and advice of those who see generations of children being abandoned?

The most striking evidence of this abandonment is the widespread rejection in many modern Western societies of personal responsibility; in increasingly common indifference to professional and financial malfeasance (often excused with a shrug as having been *obviously* necessary for success); in the grotesque rewards claimed, as if their right, by the few held to be successful, together with the appearance, at the other social extreme, of an increasing population of permanently or semi-permanently dependent victims of their supposed genetic misfortune; by the general concept that 'what I do is right, because it's right for me'; by the increasingly incoherent social norms being accepted by different sectors of society; and - finally - by the increasingly frantic efforts of governments to slow down this moral and social disintegration by the use of increasingly intrusive methods of surveillance, regulation, inspection, interference, restriction and control.

In happy contrast to this shabby picture of moral and social confusion, the consultation heard testimony from educationalists of very varied national origins reporting on their common discovery: that none of this has to happen.

It is time to change.

### **The Means:**

For change to happen nationally, the national aim of education has to change. Given the extreme inertia of national bureaucracies, it is most unlikely that even the most endangered Western society will take the required initiative. It is more likely to be necessary for one nation to prove the value of its leadership in beginning this change.

This, of course, is why Qatar, in close collaboration with other enlightened Muslim countries as Turkey and Jordan, could become a new Athens to the world!

The consultation heard the suggestion that the most appropriate key to change in a controlled and systematic manner is through mathematics lessons. Primarily the emphasis should be at the secondary school level, but usually this will only necessitate continuing a practice already begun in primary schools. Lessons can then continue in which '*literacy flourishes as students work to hone their skills and become better readers and writers, speakers and listeners*' (Jotia, op.cit.).

### **The Methods:**

#### **a. General observation:**

A previous request by the Qatar Foundation produced the outline of a plan to convert the teaching of mathematics primarily via instruction (or via IT) to the learning of mathematics through directed critical, constructive and receptive discourse

(‘*Evaluating Change*’, Hannaford, for Innovations in Education, Second Symposium, Doha, 2006.) This can be achieved in a four to five year period, without serious disruption or confusion, but with considerable benefit to pupils and teachers.

This is what the ‘Socratic Methodology’ is all about.

It must not be supposed, however, that the intention is to recommend that instruction be abandoned in mathematics, or the other sciences, or in any other subject. There will always be occasions when ideas are best communicated through instruction: even occasions when they can *only* be delivered by instruction. Good instruction can illuminate, enliven, inspire, delight, challenge. The best instruction can change lives.

## **Entracte**

The reader may be tiring of these long tracts of dry text. Allow me to offer a different reason for more courage in teaching.

In the last ten minutes of the Consultation - the culmination of nearly two years’ work, almost all of it alone; of thousands of hours of work, of countless emails and letters, of dealing as patiently as possible with endless details, some important, many trivial, many disappointing - someone asked a question which seemed to be of the nature: “Well, this is all very well; but why should we change?”

At which point - I apologise, and I confess - I snapped.

“Have any of you,” I bawled, turning from the questioner to confront instead my blameless audience, “heard of the White Rose Society?”

They all looked astonished. I cannot blame them. With hindsight, their surprise is not at all surprising. But my intention was honourable, and the question was - and is - respectful. There was also a reason for it.

“The Society of the White Rose,” I explained - I hope a little more calmly - “was formed by young German students in Munich during the Second World War. In 1943, after learning of the loss of over 350,000 German soldiers in the battle for Stalingrad, three of these young people decided on a truly suicidal action. A brother and sister, Hans and Sophie Scholl, entered their university with a bag of leaflets, climbed to the roof and threw them onto the university gardens. They demanded that the German people renounce Hitler and refuse to obey his government.

They and their friend, Christof Probst, were arrested almost at once. During their trial young Sophie was asked: How dared she and her friends defy the wishes of the Führer! To which Sophie replied: “*Someone has to make a start!*”

There was no appeal. All three were executed by guillotine.” \*

And then I took up one of the old mathematics textbooks which I had used to teach my pupils how to read explanations of mathematics for themselves. According to the name inside the cover, this particular book had once belonged to Agnès Lambert in her first year of secondary school. Whilst looking in the index at the back I had found that someone - presumably also Agnès - had inscribed the NATO phonetic alphabet - alpha, bravo ... yankee, zulu - which I had always taught to all my classes to help them, and me, with my deafness.

I think I remember Agnès, a little slip of a girl. Now I held the book - her book - on high, and my audience may have supposed that I was about to hurl it at them. “*Someone has to make a start!*” I repeated. There are teachers in these books,

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\* Sophie and her friends only knew what the Nazi propaganda machine confessed at that time. The true loss on the German side was about 850,000 men. The total on both sides approached 2 million.

teachers who are also expert and fluent, and who have the special skills of writing. We must teach our children to converse with these teachers, to learn their language, to carry their books home, and to learn from their explanations and their demonstrations wherever they want to take them. *We* are destroying the lives of hundreds of thousands of young people every year on the scale of a major war. *This* is what we can do to stop it!”

I stopped. I was exhausted.

But then His Excellency Mr Yigit Alpogon, the Turkish Ambassador, walked across the great red-carpeted expanse of the Vicar’s Hall to shake my hand and invited me to revive my connection with his country, beginning with the Bogaçizi University in Istanbul, at which I had been invited to lecture in 1997. I believe that His Excellency understood what we had tried to say. I was soon to discover that there are others who understand us just as well!

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### **The Methods (continued):**

The real problem is not so much that instruction cannot be effective. All the participants of the consultation made their presentations via instruction. The audience responded in kind. The real problem is entirely other than the actual effectiveness of instruction. In my preliminary report - produced immediately after the consultation, but which not everyone will have seen - I described it as ‘The Mathematics Problem’.

Of course it is not actually a mathematical problem. It is just called that in every department and ministry of education in the West. It is the problem of finding enough competent teachers able and willing to teach mathematics: especially via instruction, and especially in modern classes!

This is no joke. This dearth of pedagogical talent - and also what a modern author has called, tellingly, ‘the courage to teach’<sup>1</sup> - is already a real threat to the continued prosperity and stability of all Western societies.

But then we are also exporting our problem to other countries! European and American schools and universities are not producing enough graduates in mathematics and the sciences to replace the teachers to teach the next generations of pupils in schools. Education authorities are increasingly recruiting from other countries: immediately reducing the number of the most able teachers in those countries.

This is reverse colonialism - with a vengeance!

The domestic supply of teachers in Britain and the United States is insufficient. In Britain in 2008 thirty percent of mathematics teachers in secondary schools had only the same qualification as that provided by the A-Level examination they were preparing their pupils to pass!

Not unnaturally, these teachers are not very likely to inspire enthusiasm or confidence - ‘to light many fires’ - in their pupils. Their lack of confidence is just one aspect of the problem that the various approaches recommended in the consultation are intended to overcome.

Another aspect of the same problem is the need to deal with reality.

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<sup>1</sup> ‘*The Courage to Teach*’, Parker J. Palmer, 1998 (given to me by Dr Tom Kail of Mercer University after my visit of 2005.)

For example, on the second day of our meeting we were given a brilliant demonstration by Mrs Jackie Fairchild in the use of geometry to prove algebraic equations to her classes.

This was a most impressive example of innovative pedagogy. Most of our audience will have understood, however, that what Mrs Fairchild was demonstrating were standards of mathematical knowledge and pedagogical spontaneity which the majority of mathematics teachers, either in Britain or in other countries, *cannot* emulate.<sup>2</sup>

To deal with this reality - and not with what we wish the reality might be - we have to help teachers who are far less knowledgeable, less confident and less able. To suppose that every class of children in Europe or the United States can be provided with a well-qualified mathematics graduate who is also a first-rate teacher may be well-meant, but it is simply unrealistic. To ignore other possibilities which are far more helpful to children in order to concentrate on this impossible goal is more than unrealistic. It is irresponsible.

And finally, as Professor Vászrhelyi and Katalin Fried pointed out, this approach is simply inappropriate in modern multi-ethnic, multi-lingual classes, in which the majority of children may possibly be incapable of following the teacher's language.

In the modern multi-cultural classroom - in other words - it matters less how well a teacher can teach. It matters far more whether the pupils are enabled *to learn*.

#### **b. National contributions:**

Where possible, all the participants' texts will be made available, together with this final report of the Windsor Consultation, in the IDM website [www.gardenofdemocracy.org](http://www.gardenofdemocracy.org). In the following, the attempt has been made to reduce the whole to the most salient or provocative points.

#### **UK: Colin Hannaford.**

*“The basis of a civil society is trust in the honesty of the majority. But what if a system of education persuades the majority that it is better to be dishonest?”*

(In 1996 Colin Hannaford won the Oxford Philosophical Society Chadwick prize for his thesis that ‘the development of a rational, innovative society, internally harmonious and tolerant of dissent, depends on understanding the original connection between mathematics and democracy’. He was recently awarded a 2008 Upton Sinclair prize for educational innovation. As the organiser and host of the consultation, he spoke on the first and the second day. In the first presentation he described the inevitable division of any class addressed primarily through instruction into the three divisions. These divisions are characterised by entirely different and aversive personal, social, and moral criteria. They are mutually aversive to each other. Hannaford first described these divisions for a conference of religion and ethics teachers organised in Westminster College, Oxford, by the SAPERE organisation (included in the appendices). The founding president of SAPERE, Mr Roger Sutcliffe, was amongst the consultation audience and spoke in his support.)

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<sup>2</sup> Mrs Fairchild is currently an Assistant Headteacher at Gosford Hill School, Oxfordshire, UK, which has specialist status in mathematics and computing,

**Qatar: Dr. Shaikha Bint Jabor Al-Thani, Academic Vice President, Qatar University.**

Dr Al-Thani gave a detailed and illustrated overview of the founding and current aims of the University. Most striking was that nearly two thirds of the total student body are young women. Dr Al-Thani's explanation of this was that the majority of young women in Qatar are especially motivated to prove their intelligence and worth. She has introduced new mathematics topics at all levels, presenting novel and exciting materials that enhance the imaginations of young people in ways that only mathematics can do. The challenges are great, but the promise of a new approach to the content of mathematics teaching is very compelling.

**United States: Dr Duane E. Davis, Professor Emeritus, Mercer University, Georgia.**

“The mission of St George’s House issues both a challenge and an invitation. ‘We want people,’ it says, ‘to think the unthinkable.’... but is it not unthinkable to think that what we do in our classrooms might actually change things? ... Education at its very best can change a person’s life. ... Dare we hope, in addition, that it might also change the world?”

**France: M. Didier Nordon, University of Bordeaux.**

“When I suggested to my students that they should think about the above mentioned issues, I suspect my colleagues to have told them not to do so! Was that an important battle? I don’t know. ...

A democrat has to admit that people are diverse. A democratic mathematician has to admit that some people hate mathematics. These people lose their time and waste their energy when they are obliged to study mathematics. Mathematics is just one way of interpreting the world among many other ways and has no superiority over them. A democratic mathematician should not try to impose mathematics on people who will gain nothing but tears in studying it.”

**Dr Hani Khoury, Associate Professor, Mercer University, USA (video presentation)**

Hani Khoury was born in Nablus, Palestine. He was diagnosed with Spinal Atrophy as a boy and was sent to the United States in the hope of being cured. There is no cure. Despite this crippling disability, Dr Khoury has become an Associate Professor of Mathematics at Mercer University, Georgia, USA. He spoke in his presentation of the absolute necessity to create a classroom climate in which mathematics is learnt through collective discussion. A copy of the video can be made available on request. It will also be possible to see it soon on the Institute’s website [www.gardenofdemocracy.org](http://www.gardenofdemocracy.org)

**Hungary: Professor Dr E. Vásárhelyi, Eötvös Lorand University, Hungary and University of Salzburg, Austria, supported by Ms Katalin Fried, Eötvös Lorand University:**

“We often teach children from ethnic minorities whose language simply does not contain the words that we teachers are using in our lessons. When this happens we allow the children to discuss together in their own language what the words first may mean to them, and then, possibly, may mean something different to the teacher. In this way they learn to work together collectively. Mathematics lessons become a social activity in which all share the work of learning.”

“Our aim is to teach what we call ‘*Lernkompetenz*’: meaning an ability they can take away from the classroom and apply in other situations - in and outside school.”

**Germany: Herr Wolfgang Ringkowsky, representing Dr Hartmut Köhler, Stuttgart Landesinstitut für Schulentwicklung:**

“Modern societies are dominated by the power of mathematical, scientific, and technological economies. To control this power, democratically, citizens need a sufficient understanding of mathematical arguments. ... Some German politicians want all our children to go to the same kind of school, where they will all be taught in the same way. I would like to illustrate the reality of this with a little story. ...

*‘Once upon a time the animals had a school, and all animals were taught the same lessons. The lessons were running, climbing, flying, and swimming.*

*The duck was very good in swimming ... but was hopeless at running. This meant bad grades, and a lot of extra training in running. The duck then became only average in swimming. No-one thought anything strange about this: except the duck.*

*The eagle was a real problem pupil. He insisted on reaching the tops of tree in his very own way. Although this meant he was always first to reach the tops of the trees, he could not run very well, and an eagle cannot swim at all.*

*The rabbit was always first in running, but had a nervous breakdown because of extra training at swimming. Finally the rabbit had to leave the school.*

*The squirrel was best in climbing, but the teacher insisted that all flying must start from the ground, even for squirrels. Its grades got worse and worse.*

*The dogs, meanwhile, gave their children to the badger to be taught how to dig. But the government did not include digging in the curriculum, and the dogs could never fly.’*

... The assessment of pupils’ abilities should not just depend on test marks, but on their ability to discover, develop, and articulate ideas. They can find the explanations for these ideas in their textbooks.

**UK: Dr Jerome Ravetz, Institute for Science and Civilization, Oxford University.**

On Socrates: *“to follow the pedagogic Socrates to the exclusion of the subversive Socrates is to betray his own vision of dialogue as a means to awareness of ignorance and hence of self-knowledge.”*

On ‘Faith and Reason in the Mathematics of the Credit Crunch’ (from the Oxford Magazine): *“There was [eventually] absolutely no limit to the complexity,*



*artificiality and obscurity of the products that were created and exchanged, quite legitimately in the eyes of the practitioners and regulators. By this point the game came to depend entirely on the mathematics.”*

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### **Responses:**

**From Professor Dr Michael Savage, Department of Physics and Astronomy, University of Leeds, UK:**

*“I came to Windsor somewhat ill-prepared - not knowing what to expect, knowing little about most of the delegates and having little idea of where you (Colin) would be coming from! In fact, it turned out to be one of the most unexpectedly interesting and inspirational meetings I have attended for many years!*

*“In your opening session I was hooked once you asserted that ‘instruction (in mathematics) never works’ and then proceeded to explain why with reference to your 3-division model.’*

*“My ‘Eureka Moment’ on the way [home] was realising that the **cause of the Maths problem in Higher Education has arisen precisely because of the 3-division problem in schools!**”*

Referring to his experience in attempting to provide first year undergraduates with the foundation of mathematical understanding that they had not gained in their schools (*“There were clearly three divisions and the third exhibited anger, frustration, dislike for mathematics and for me”*), Professor Savage concludes (this time with my emphasis):

*“A further realisation is that **almost every university department of mathematics, physics and engineering (and others besides)** are having to cope with the consequences of the 3-division problem in schools - and, are then making things worse perhaps, by trying to instruct them in mathematics in year 1!*

*Finally I am led to the conclusion that **what is at stake is the future of mathematics education in both schools and universities**; and that, as a first step, we might explore how we might work together to bring this key issue to the attention of the mathematics community- and into national focus!*

**Professor Nancy G. Nagel, Graduate School of Education, Lewis and Clark College, Oregon, USA; editor of ‘Democracy and Education’:**

*“What I might add ... to the report is the importance of identifying the problem (which you clearly did with your presentation of the three divisions in math) and how to address this problem. If we want students to understand mathematics, they need experiences and ways to construct their own meanings in math. Most often, teachers “tell” students how to do the math, and there is rarely room for students to discuss ideas and concepts as they make their own meaning.*

*I also think there is a cultural context for teaching and learning, and that a school must take the time to think of “their” students and how teachers can construct learning environments that support thoughtful discourse in mathematics.”*

**Dr Chee Wen Chong, Head of Research Partnerships, Qatar Foundation:**

*“[Thank you] for the wonderful consultation at Windsor. It had never occurred to me to view the different divisions in a classroom setting as the possible creation of different fragments in the society. It was very straight-forward for me to think of cultivating creativity and critical thinking in younger generations, but the very fundamental softer factors - or democratic values - like honesty, self-respect and respect for others, can escape the attention of responsible bodies including some teachers who were very much influenced by their past system as a result of instruction-based learning ... there is much room for research in terms of societal developments and finding a path for building responsible citizens.*

*The consultation has enriched my experience in thinking about societal developments and to gain a whole new perspective on how Qatar can move forward on the back of new inspirations through a transformed set of values.”*

**Professor Dr Humam Ghassib, Jordan University, representing HRH Prince El Hassan of Jordan:**

*“It was a well-organized consultation. Not a single minute was wasted. The participants constituted a very dynamic and interactive group. It was a model meeting to be emulated by others.*

*The Socratic methodology is sublime; it is one of humanity's finest achievements. However, one has to work very hard on oneself so as to master it and use it effectively. I wonder whether it is possible to start thinking of preparing a series of **practical** booklets/CDs on this methodology.*

*Mathematics is an ocean. It is not just a universal language and a set of compelling arguments and mental processes. It is both 'pure' and 'applied'; 'abstract' and 'concrete'. It is intimately related to music, architecture and even the sacred. (Recall, for example: Bach; the great cathedrals; the holy Ka'ba [the name derived from the Arabic word for 'cube']...)*

*We can think of countless examples in this respect. With some imagination and lateral (or nonlinear) thinking, one may revolutionize the teaching of mathematics and allied disciplines. Such examples will add substance and wonder to the Socratic methodology. “*

**Dr Margit Hosseini, Cultural Attaché, German Embassy, London:**

*“Your conference was informative and truly uplifting and gave food for thoughts - not just to teachers. I have taken back to the Embassy a lot of new and unusual teaching ideas which speakers put forward to us the participants. I just hope that the present education systems in Britain and Germany (the two systems I have some knowledge of) are flexible enough to accommodate this new view. Thank you for inviting this Embassy to this most interesting event.”*

**Mr Stuart Tester, representing HRH, The Prince of Wales:**

*“I am glad that the event has generated so many positive responses from attendees. I wish you continuing success with your initiative.”*

**Professor Yury Morozov, Counsellor, Russian Embassy, London:**

*“I wish you future success!”*

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**Consolidation:**

**a. Comments:**

Island people are said to know that a hurricane or tsunami is coming when they see sea birds flying inland. I have felt like one of those birds ever since I began warning of the dangers of conditioning large numbers of Western children to be systematically dishonest through their mathematics education.

In the past two years we have been overtaken by the equivalent of both a hurricane and a tsunami. In reality the first sign detectable in either case by human senses, would be a distant rumble, moving closer.

For decades now in the West there has been a constant and growing rumble of discontent coming from our schools - then, ever louder and in tones of increasing alarm, from Western industrialists, scientists and bankers.

There is a need for Western societies to recognise and confront our own demons. They are not, as in so many classic horror stories, in the basement, behind the walls, or in the roof space. Our demons we are actively nurturing in our classrooms. They appear in the despair of those discarded by our education systems, in the moral confusion of the majority, in the indifference of our social elite.

These are the demons which are all too obvious to many of our friends. In our enemies they arouse anger and contempt. They motivate the actions of extremists and justify their actions to many in their societies.

For the United States, the first thunderclap and lightning strike was the terrifying trauma of 9/11. But then the heavens opened. The sea swept in over the land. The United States, the world's most powerful democracy, has been humiliated by careless and inept government. Britain has been accused of its obedient lap-dog. Both fact and accusation are exquisitely painful to those who believe in the ultimate decency of the people of both countries, and who recognise the human costs of their governments' adventures. The collapse of the West's financial industry, the bursting of a huge bubble of deceit and malfeasance, which wiser heads have warned eventually must burst, has afflicted billions of people globally.

Against this background of unprecedented international humiliation, this Windsor Consultation has been an historic event.

The connection between mathematics teaching and democratic education was the subject of a study for the European Union Education Commission in Germany in 1996-98. We exhibited during the Consultation an important consequence to which this study undoubtedly contributed: the production of new teaching material on massive scale to prompt the mathematical discussion in German classrooms.

For the first time, at Windsor, these same proposals were presented to a truly international audience. The responses published above indicate that this connection has been well understood. The explanation of why Western schools are generally failing, especially in mathematics education, has been accepted with acclaim by Professor M. Savage, one of the foremost British authorities in this field.

We have also heard of the growing realisation in Europe and America that more and more testing of pupils and their teachers is making matters worse, not better.

The solution we have proposed is to teach children how to learn independently; for their teachers to be their directors and their guides, not first their tormentors, and not finally complicit in their need to be dishonest.

This report will be forwarded to Dr Fathy Saoud, President of the Qatar Foundation, to be presented to Her Highness Sheikha Mozah.

It will be published in the United States in the nationally distributed journal '*Democracy and Education*'. It will also be published, with all the participants' texts and supporting appendices, in the website of the Institute for Democracy from Mathematics: [www.gardenofdemocracy.org](http://www.gardenofdemocracy.org).

#### **b. Recommendations**

- i) That there should be initiated as soon as possible a new teacher training module in mathematics education with the view to introducing the programme 'Evaluating Change' produced for the Second Innovations in Education symposium in 2006.
- ii) That the predominantly Muslim countries which have shown an interest in this project should be invited to join in the creation of a new international educational initiative to train young teachers to teach the basis of democratic values through mathematics lessons.

I thank my colleagues and the officers of the Qatar Foundation once again for their support. It should be understood, however, that whilst this Consultation could not have been realised without their help, these recommendations are my responsibility alone.

Sincerely,



Colin Hannaford,  
Oxford, 17<sup>th</sup> February 2009,  
Editors: Dr D. Davis; Dr J. Ravetz.

Appendix A: 'Democracy from mathematics', Dr Jerome Ravetz.

Appendix A:

## **Democracy from mathematics: Co-learning through critical study of explanatory texts**

There is no doubt that mathematics teaching, at all levels, is in crisis; the corps of teachers, already depleted and diluted, is now threatened with falling below the minimum size for training the next generation of mathematicians and scientists. As Professor Mike Savage has said, ‘what is at stake is the future of mathematical education in both schools and universities.’ The great insight of Colin Hannaford is that the key to reform is (in the words of Dr Chee Wen Chong), fostering ‘the very fundamental softer factors – or democratic values – like honesty, self-respect and respect for others’. The Socratic Methodology can be developed and expanded so that teachers and learners worldwide can benefit from it. All that is required is a change in our inherited notions of mathematics, and that will be less difficult than it might seem.

Our traditional image of mathematics is of a system of accomplished knowledge that uniquely conveys truth. It also provides great power through science; but that is not our concern here. As a system of knowledge, mathematics is rather strange, for it is expressed in an alien language, describing concepts and operations that have only a tenuous relation to ordinary experience and that can also be quite counterintuitive and paradoxical.

There are many sorts of activities associated with mathematics. There are those who advance it through new research, those who apply it through science, those who popularize it for a broader public or study its history and philosophy, and finally those who teach and those who learn. This last class might appear to be passive and less significant; for they don’t know it and hence need to be taught! But they are quite crucial for the life of mathematics. In the absence of learners, within a generation mathematics would start to die, and its texts would soon become meaningless, a new sort of hieroglyphs. Science would also die; and, in less extreme cases, those cultures with insufficient learners of mathematics are doomed to fail in the science-centred world economy.

The working partnership of teachers and learners requires a different conception of its object. The focus is not so much on appreciating the rigid, abstract truths of mathematics, as in translating them into ordinary experience and gaining a working understanding of the concepts and procedures. Learning mathematics is not merely a logical process, it can also be visual, aesthetic, even kinaesthetic, involving the whole person in their community. There is great scope for imagination and creativity in the teaching task, so that learning becomes a joy and not a penance. Unfortunately this happens all too infrequently, and so (as Colin Hannaford has shown) the society of the mathematics classroom all too often becomes one of cynicism, dishonesty, frustration and embitterment, a breeding-ground for anti-democratic attitudes and practices.

Among the materials used for teaching are texts: written descriptions and explanations of the mathematical ideas. This work of interpretation is essential to the life of mathematics; in its absence, mathematical knowledge is nothing but squiggles on paper. The explanatory texts are thus an essential component of the teaching process. But they are on the other side of the great divide between simple, abstract scientific knowledge and complex, contextualised humanistic knowledge. Whereas a proof, or a solved problem, is either simply true or false, an explanation in prose has quality to varying degrees and in several dimensions, assessed informally and by judgements. (To be sure, a mathematical exercise can have considerable merit in spite of being incomplete or incorrect; but that is an assessment of a learning process rather

than of the mathematical knowledge). And in Colin's phrase, the work of interpretation of mathematics is an endless, creative argument.

Up to now, the explanatory texts have been used almost exclusively in an uncritical way. The learner is expected to read the textbook, or alternatively to copy and later study the teacher's dictated notes. Why does the teacher dictate notes and not save time by relying on the textbook? There is an implicit judgment here, that the textbook explanation is inadequate, and needs to be supplemented or substituted by the teacher's own synthesis. So whereas the content of mathematics itself is beyond debate, the quality of written expositions is, in practice, a matter for genuine disagreement.

In this implicit dialogue of quality-assessment of texts, the learners are passive. If the teacher prefers her/his version to the textbook, that's the one they struggle with. The learners cannot challenge an authoritative text, nor inquire into what (if anything) a particular passage means. In the society of the classroom, criticism of the text can appear only as a display of ignorance or incompetence. All the work of critical interpretation has already been done for the learners, by the teacher. In this enforced passivity of learners lies one of the main causes of the bad state of learning and teaching in mathematics. It might not be so harmful if they were learning nonsense-syllables in a psychology experiment; but when they are required to grapple with strange concepts in an alien language, the effects can be devastating. Once a student falls off the ladder of learning mathematical concepts, they are crippled for life in that respect.

Many students have an adverse reaction to the prevailing dogmatic instruction of scientific subjects. In modern societies, young people do not easily accept the imposition of doctrines or behaviour by authority alone. They contrast the one-sided instruction in science to the open, exploratory discussion of issues on the arts and social-science side. To some extent, this scientific dogmatism is forced by the subject-matter. Newton's Laws, and the factoring of quadratic equations, are not matters for democratic debate. But there is no barrier in principle to a free discussion of the *explanations* of any such topics. And after all, since the learners are the intended consumers of such explanations, they do have a privileged position in any work of quality-assessment. If they don't understand a text, in modern societies it's not necessarily something for which they should take the blame.

Once we appreciate that the explanatory texts of mathematics are literary productions, we can easily adjust our understanding of their proper use in the classroom. Colin Hannaford has shown how the Socratic approach, applied to the explanatory texts, can be creative and liberating. Teachers and learners become partners in an exploration of understandings, rather than the active and passive elements in the transmission of dry, frequently incomprehensible truths. The selective discussion of texts can supplement, and even enhance, all the techniques whereby dedicated teachers overcome the inbuilt obstacles to success in their work.

The concept of co-learning through the critical study of texts can be extended, and made less dependent on the special talents of teachers, by the use of Information Technology. On the internet there can be found numerous versions of explanations of any given topic. The class can have a project of collecting all the discussions of the point at issue. They can then compare them, and find and/or eventually create the best version for their purposes. The teacher will then have a well defined role in this context, that of a skilled helper, facilitating the dialogue and ensuring that it becomes an enriching experience for all. The slower students will have a special role, for their understanding is the most demanding test of the quality of a text. The focus of

discussion, and of mutual education, will not be on their supposed deficiencies but on the quality of the texts in relation to the needs of all, including them. And all will appreciate that the task will not be to arrive at The True Answer, but to achieve what is best for all in that group at that particular point in their development.

The result of their collective endeavour can then be posted on a special website, available to other groups engaged in the same enterprise. This collaborative effort can bring together different schools, in different nations, transcending the usual barriers, even those of poverty. The stronger will help the weaker, and will themselves be enriched in the process. All learners will become teachers, and gain awareness of their levels of understanding. The teachers' role will be valued and honoured; for they will be liberated from the failed authoritarian role and become partners in a great enterprise. The work will never end, for every group of learners and teachers has its own talents and perspectives. In such a way can democracy be practiced and fostered in the mathematics classroom.

Dr Jerome Ravetz,  
James Martin Institute,  
Oxford University, UK.

***A unique opportunity to participate in a  
groundbreaking debate at Windsor Castle, January 2009  
on using mathematics education in schools to***

***GIVE PEACE A VOICE***

The *Socratic Methodology* for teaching mathematics will be explained at a conference in St George's House, Windsor Castle, England in January 2009. Since this historic setting offers very limited space, only selected international representatives can be invited. They will be shown how mathematics can be taught to form models of peaceful interaction and positive cultural exchange.

No expensive training is required for this approach. Although actually extremely simple, the *Socratic Methodology* offers a fully developed approach to progressive mathematics education with consistent empirical and moral aims. Qualitative and quantitative skills are developed in the early years. Literacy and numeracy are later combined, allowing pupils to learn an honest understanding of mathematics from collective discussion of expert texts, rather than pretended understanding of imperfectly given or received instruction.

This practice also makes easier the usually difficult transition from primary to secondary education. The ultimate aim, openly shared with pupils, is the attainment of their intellectual and moral maturity, strengthening their preference for ***critical, constructive, receptive discourse*** rather than anger and violence.

The philosophy of this approach has already resulted in government-funded development in Germany. It is also being taught in an important student teacher programme in the United States as the basis of democratic citizenship education.

***The Consultation***

St George's House, Windsor Castle, 28<sup>th</sup>-29<sup>th</sup> January 2009

***Adopting the Socrates Method for teaching mathematics:  
encouraging a culture of democratic behaviour to foster inter-cultural  
and inter-faith understanding and tolerance***

**Day 1 (28<sup>th</sup> afternoon)** Supported by the Qatar Foundation (Its Chair, H.H. Sheikha Mozah, consort of the Emir of Qatar, is UNESCO Special Envoy for Basic and Higher Education and winner of the 2007 Chatham House prize). The Foundation will share in inviting international specialists in education to this opening forum. HRH Prince Charles, The Prince of Wales, will be represented, as will HRH Prince El Hassan of Jordan, Chair of the Global Commons Conference.

**Day 2 (29<sup>th</sup>)** Participants will learn about the development of this new approach through the original two-year study directed in Germany for the EU Education Commission; through university research in Hungary; government sponsored development and the production of new textbooks in Germany; and its application in student teacher courses in the United States. Papers by participants will be distributed and further global academic collaboration will be invited.



Appendix A (as at 24<sup>th</sup> January 2009)

**The Consultation**  
**GIVING PEACE A VOICE**  
**St George's House, Windsor,**  
**28<sup>th</sup>-29<sup>th</sup> January 2009**

**Participants**, or their representatives:

1. Dr. Shaikha Bint Jabor Al-Thani, Vice President, Qatar University;
2. Professor Nancy Nagel, Lewis and Clark College, USA;
3. Professor Dr E. Vásárhelyi, Eötvös Lorand University, Hungary;
4. Ms Hayfa Malaeb, Head of Maths Education Development, Qatar;
5. Ms Julia Strong, Deputy-Director, National Literacy Trust, UK;
6. Dr. Mahmoud Boutefnouchet, Head, Department of Mathematics and Physics, Qatar University;
7. Dr Chee Wen Chong, Head, Research Partnerships, Qatar Foundation;
8. Emeritus Professor Dr Duane Davis, Mercer University, USA;
9. Mrs Jackie Fairchild, Assistant Head, Gosford School, Oxfordshire, UK;
10. Ms Katalin Fried, assistant to Professor Vásárhelyi;
11. Professor Dr Humam Ghassib, Jordan University, for HRH Prince El Hassan;
12. Mr Colin Hannaford, IDM, Oxford, UK;
13. Dr. Gregory Hedger, Director, Qatar Academy;
14. Mr. Michael Hitchman, Head of Senior School, Qatar Academy;
15. Professor Dr Hani Khoury, Mercer University, USA (video presentation);
16. M. Didier Nordon, University of Bordeaux, France;
17. Mrs Veronica Morris, for Mr William Morris, Next Century Foundation, London;
18. Dr Jerome Ravetz, James Martin Institute, Oxford University, UK;
19. Herr Wolfgang Ringkowski, representing Dr Hartmut Köhler, Stuttgart Landesinstitut für Schulentwicklung, Germany;
20. Professor Dr Michael Savage, University of Leeds, UK;
21. Mr. Adel Al Sayed, Director, Evaluation Institute, Qatar Supreme Education Council;
22. Mr Roger Sutcliffe, founding President of SAPERE ( Society for the Advancement of Philosophical Enquiry and Reflection in Education), UK;
23. Mr Stuart Tester, for TRH the Prince of Wales and Duchess of Cornwall.  
(One single bedroom free, one reserved for Baroness Nicholson MEP.)

**Visitors** (confirmed):

1. H.E. Mr Yigit Alpogan, Ambassador of the Republic of Turkey.
2. H.E. Ms. Borbála Czakó, Ambassador of the Republic of Hungary.
3. H.E. Mr Georg Boomgaarden, Ambassador of the Federal Republic of Germany will be represented by Mrs Margit Hosseini, Education Attachée.
4. H.E. Mrs Barbara Tuge-Erecińska. Ambassador of the Republic of Poland, will be represented by Mr Emil Pietras, First Secretary (Science and Education).
5. H.E. Yury V. Fedotov, Ambassador of the Russian Federation will be represented by Dr Y. Morozov, Science and Technology Counsellor.
6. Professor Dr Anne Watson, Department of Education, University of Oxford.
7. Ms Elizabeth Durnford, Next Century Foundation, London.

**St George's House:**

1. Rev. Dr Hueston Finlay, Warden;
2. Mr Gary McKeone, Programmes Director;
3. Ms Catherine Pryer, Supervisor.

