

## DINNER/DISCUSSION SUMMARY

### Improving the teaching of mathematics and reading skills in primary education

Held at The Royal Society on 23rd April, 2008

We are grateful to the  
Association of Science Education, Institute of Physics, KPMG LLP and  
the London Mathematical Society  
for supporting this event

**Chair:** **The Earl of Selborne KBE FRS**  
Chairman, The Foundation for Science and Technology

**Speakers:** **Sir Peter Williams CBE FRS FREng**  
Chair, Department for Children, Schools and Families Review of Primary and Early Years  
Mathematics Teaching and Vice-President and Treasurer, The Royal Society

**Sir Jim Rose CBE FRSA**  
Leader, Independent Review of the Primary Curriculum for the Department for Children, Schools  
and Families and former Director of Inspection at OFSTED

**David Fann**  
Chair, National Association of Head Teachers Primary Committee and  
Head, Sherwood Primary School, Preston

SIR PETER WILLIAMS outlined the remit he had been given for his report on the teaching of mathematics in primary schools, emphasizing the request that he consider the needs and effects of early intervention with five to seven year olds who were failing to master the basic elements of mathematics - a 30,000 strong cohort. He described the National Numeracy Strategy, with Wave 1 (high quality class teaching), Wave 2 (additional support), and Wave 3 (individual intervention). Undoubtedly the most effective means of countering innumeracy was through Wave 1. But out of 10,000 annual entrants to primary school teaching, only 227 had STEM qualifications; thus Continuing Professional Development (CPD) was crucial. Why did 6% of pupils continued to fail to reach Level 3 at Stage 2? Was it dyscalculia (cf. dyslexia); attitude to learning; social deprivation; class size; or the genuine challenge in learning mathematics? Or a mixture? Intervention on a 1:1 basis works, but is highly resource intensive. Does 1:3 work as well? Or intervention on 3 days a week, not 5? Important factors are the linkage with literacy intervention; the effects of the child's classroom absence while intervening; the expertise of the teacher; the length of time of the intervention session - 20 minutes, or more or less -; parental involvement and the commitment of the child. His interim report was now out for consultation; he hoped some light could be shed on these problems.

SIR JIM ROSE outlined the elements of the sector - 41m children in primary schools; 197,100 teachers; average class size 26.2; average size of school 300; 27% ethnic minority; 13% English second language; 10% in deprived urban areas. There was much in common between mathematics and language failures; in both research shows that early intervention works. The Government had belatedly recognized that failure or success at primary school is the best indicator of failure or success in later life, and had, since 1997, through increased funding and the direction of the national curriculum, succeeded in raising literacy achievement from 65% to 80%. But there was still a long tail of underachievers - the UK had more than other OECD

countries (although it also had more at the top). Although the National Curriculum had been successful in prescribing what should be taught, it was only more recently that direction had been established on how literacy should be taught. Word recognition and language comprehension were complementary and reading and writing fed off speaking and listening. The need was for high quality phonic work with the good comprehension when learning to read changed to reading to learn. He agreed with Sir Peter that Wave 1 - high quality class room teaching - was the most effective means of combating learning problems - using alphabetical principles in direct teaching with clear sequences in discrete, enjoyable, short sessions. At age seven the pattern should be set so that the child can decode and encode writing.

MR FANN described the changes in primary school teaching since he had started to teach in 1983. Then he could teach his class what he wanted to teach; there was no structure or subject division. The introduction of the National Curriculum in 1988 had changed all that. For the first time, teachers had to instil specific skills and knowledge into pupils and in 1993, there came the discipline of scrutinizing the levels of achievement. In 1998/9 the literacy and numeracy strategies developed, with the adoption of the 3 part lesson (introduction- interaction - plenary). The strategies were working - in 1998 only 67% of children got to Level 4 in reading; in 2007 it was 84%; in writing it was 53% in 1998; 67% in 2007. He was impressed by the skilled use by teachers of IT and the ability of 11 year olds to understand and dissect complex texts. His concern was that teachers might become over directed, and fail to look "outside the box" and respond with sufficient flexibility to the enthusiasms of individual children. He did not want children to spend too much of their time "sitting on the carpet" listening. But the backlog in society was large - 16% of adults were functionally illiterate; 1 in 4 adults had fundamental problems with numeracy. He fully agreed with Sir Jim. Performance in primary school was the marker for future life; society must ensure failure there was kept to a minimum.

A major focus in the following discussion was on the causes of numeracy or literacy failure - there were both neurological and social factors. It could well be that there were genetic reasons why some families had children who had significant problems in certain areas of mental development - e.g. dyslexia, dyscalculia, or dysphasia (physical clumsiness). But undoubtedly there were sociological factors, notably where children had English as a second language and might not be literate even in their own first language. Participants endorsed the speakers' views on parental involvement and the commitment of children themselves and commented that perhaps more could be done by bringing parents into intervention sessions and emphasizing their role in helping children overcome their problems. The geographical distribution of failure had not been sufficiently stressed; was it not concentrated in certain areas, with high incidence of deprivation and concentration of ethnic minorities? If so, this raised the question, what do you do if the majority of an age group needs intervention? The answer could only be through instituting rolling programmes, understanding better how interventions on a 1:2 or 1:3 basis worked and interaction with families. Social attitudes and habits were highly significant. The effect of television could be both inspiring and damaging - it could promote interest in complex and difficult subjects, but it was not interactive. It was no substitute for family discussion and encouragement to read. Parents should use it as a basis for discussion on issues raised. It was known that many children regressed in school performance once they had entered secondary school; was this because parents no longer took such an interest in their child's performance? Or was it because secondary schools had neither the time nor specialist skills to cope with children coming from primaries without sufficient grounding? Was sufficient emphasis given to encouraging those families where English was a second language to make more efforts to learn and use English?

A number of questions were raised about the reasons for the strong performance of children in Scandinavian countries compared with the UK. It was noticeable that they started school at a later age and also appeared to enjoy school more than did UK children. Their first formal assessment was at age 18 and average class size was 10 to 15. But what was important was not the precise age at which a child started school, but the emphasis that was given in the first years to social interaction and practical skills. This could take place either in a nursery or a primary school; but if in the latter there was a danger that these actions and skills would be squeezed out or confined by the pressures to start conventional teaching. Good foundation programmes in primary schools could overcome this danger. Children had inquiring minds, individuals inquired into different things at different ages; the crucial factor was the teacher, who understood when an individual child was ready for inquiry into different areas, and how to use the inquiring mind. Scandinavian schools gave much greater status to primary school teachers than we did, and there were many more of them with STEM qualifications. That did not mean that teachers without such qualifications could not teach successfully (and it was noticeable that science teaching in primary schools was recognized as a success) but they might well lack the confidence to be outstanding unless they received adequate further help - i.e. continuous professional development (CPD). This was vital, not only to give them extra confidence, but also to show them how other teachers in different schools worked and what were good models to follow. But there were two problems - first resources, a day release for CPD cost a school £200 from its teaching budget; and second "programme drift" - as time passes programme impacts dimin-

ish and the sharp edges of them get rubbed off. Local authorities should help with resources, - which could soften the effect of a teacher leaving a school when he/she has gained an additional qualification at the cost to that school - but not at the expense of eroding the head teacher's responsibilities.

The fundamental responsibility of a primary school teacher was to teach pupils literacy and numeracy. Because of the shortage of STEM qualified teacher, more incentives needed to be given to teachers who would specialize in these subjects. But this did not mean that the teacher taught only in that subject; a good primary school teacher should cover a wide range; but the core of the NTQ should be giving the teacher the ability to teach mathematics and literacy. Greater help could be given to make wider use of IT - interactive whiteboards and also to more effective use of teaching assistants - they were an essential part of the teaching staff that should be considered as a whole - "curriculum led staffing". However, did we know where teaching assistants came from? Were they reducing the pool of those who might otherwise become fully qualified teachers?

Undoubtedly the overall direction of government policies - the National curriculum, the Numeracy and Literacy strategies and increased funding - had been successful in raising standards and achievements. But many government initiatives were wasteful, or pointless, because individual schools, particularly small ones, had to ignore them to get the day's work done. League tables, in particular, were a distraction and misleading. There were divergent views on Statutory Assessment Tests (SATs); it was too early to say what the effect of the Welsh abolition of SATs had been. Although confining and with a tendency to diminish flexibility in teaching, they were welcomed by many parents.

Sir Geoffrey Chipperfield KCB

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**Association of Science Education:**

[www.ase.org.uk](http://www.ase.org.uk)

**Institute of Physics:**

[www.iop.org](http://www.iop.org)

**KPMG LLP:**

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**London Mathematical Society:**

[www.lms.ac.uk](http://www.lms.ac.uk)

**Review of Mathematics Teaching in Early Years Settings and Primary Schools:**

[www.dcsf.gov.uk/consultations/conDetails.cfm?consultationId=1532](http://www.dcsf.gov.uk/consultations/conDetails.cfm?consultationId=1532)

**Review of the Primary Curriculum:**

[www.dcsf.gov.uk/consultations/conDetails.cfm?consultationId=1537](http://www.dcsf.gov.uk/consultations/conDetails.cfm?consultationId=1537)