India - technology in education
Some reflections on a recent seminar tour of Western India
by Douglas Butler (Director, iCT Training Centre, Oundle School, UK)
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India - the world's largest democracy, is bursting at the seems. It is a nation of separate states and separate languages, held together by a bureaucracy that simply loves paperwork. The population, just topping out at around a billion, was being counted while I was there; with nearly half the population illiterate the only practical way to count them was to send people round to every home and ask how many live there. It took 2 million people to do this (many of them mathematics teachers, in the mistaken belief that they can count!) With the population of Mumbai (Bombay) estimated to be rising at 2000 per day, this whole exercise was somewhat tricky.

Indians love education, they love mathematics and they love ICT, so it was a perfect place for me to visit! Working partly through the Commonwealth Conference on Science and Mathematics Education in Goa and the British Council, I visited and ran sessions in many schools, both for teachers and pupils. Class sizes of 50, 60, 70 were quite common, and a typical classroom consists of rows and rows of immaculately turned out children, all eager to learn, and a simple chalk board on the wall at one end.

I kept wondering if technology had a role here, and came to the conclusion that we must all wait for the cheap hang-on-the-wall screens that are being developed in the UK and by Kodak. Nothing currently available (involving a data projector) is affordable. Many schools in India are installing modern computer labs, but with the large number of students, exposure to ICT training must be limited.

One rural school I visited in Goa had 3 half dead 386 computers, the administration office had 3 wonderful old type-writers, still in fine order, and there was no phone line to the school. Despite this, the kids were brilliant, learning not much science, but one lesson I visited they were studying the constitution very effectively; all had huge smiles and beautiful hand writing. Who needs technology?

India's IT industry is booming; they have 12 Satellites in orbit, and the software industry is expanding by 60% per year.

Mumbai, 18 million population (and rising!) has only one radio station. The much prefer the television, and of course the cinema.

Although the Indians invented the decimal system, they have their own variation when it comes to big numbers, and space their commas in pairs:

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1 "Arab"  = 1,00,00,00,000 =   1 billion Rupees  = £15m
1 "Crore" =    1,00,00,000 =  10 million Rupees  = £150,000
1 "Lak"   =       1,00,000 = 100 thousand Rupees = £1500
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There are 200 million 6-13 year old children in India. Compulsory schooling ends at 14, secondary at 16, then senior secondary (years 11 and 12). English is the medium of instruction in the majority of schools, which does not favour those from homes where English is not spoken. Parents are ambitious for their children and think that an English language education is the best way forward. Many schools are private.

Impediments to the use of technology in schools in India
- power supply: this is OK in Mumbai, but elsewhere is very unreliable
- cost of hardware. A recent Budget put in an objective of one computer per school
- internet use still very patchy, and if it does exist it is very slow. This will improve, but rural schools may have to wait a long time.

Reaction to TSM training sessions
I conducted 11 TSM (Technology for Secondary Mathematics) training workshops in Goa, Mumbai, Indore and Pune, some for teachers, and some for secondary pupils. There was widespread delight amongst teachers and students at finding out what is possible using standard tools such as Word, Excel and the Internet (through the Oundle site www.argonet.co.uk/oundlesch), and using software - some downloadable free of the net, others, eg Geometer's Sketchpad and Autograph, to be purchased.

Vendors cannot sell software to India at Western prices (although Microsoft tries) as there is very little respect for intellectual property.

Incidentally, The Sunday Times of India gave me a fabulous write-up in their Mumbai edition, capturing the essence of what I was trying to achieve far more eloquently that I could have done - I invited the corespondent to give my talk next time!

Training implications
Hopefully this series will have identified some teachers who are well advanced with technology, and who could then form the core of a team of trainers for the next round, and to help spread the programme to other areas. The British Council, who arranged this tour, want to widen the application to science teachers as many of the skills overlap, and a return visit is also being negotiated with the aim of establishing a team of teacher trainers to carry on this work.

The Homi Bhabha Centre for Science Education in Mumbai (part of the Tata Institute of Fundamental Research) is interested in researching the impact of using technology to visualise mathematics and hence improve motivation and understanding, and I am keeping in touch with them.

USEFUL LINKS

Educational resources (especially Maths and Music)
www.argonet.co.uk/oundlesch
Next TSM training day
www.argonet.co.uk/oundlesch/tsm-tyne.html
Autograph mathematics resources
www.autograph-maths.com

INDIA LINKS

British Council, Mumbai, India
via: www.britishcouncil.org
ZEE Interactive Learning Systems Ltd, India
www.zeelearn.com
SCHOOLNET INDIA Ltd
www.schoolnetindia.com
Tata Institute of Fundamental Research, Mumbai
www.tifr.res.in
Homi Bhabha Centre for Science Education
www.tifr.res.in/sns.html
