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Globalisation, digital societies and school reform: realising the potential of new technologies to enhance the knowledge, understanding and dignity of teachers

Jenny Leach and Bob Moon
Centre for Research and Development in Teacher Education,
Faculty of Education and Language Studies, The Open University,
12 Cofferidge Close, Milton Keynes, MK11 1BY, United Kingdom

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To the memory of Adi Kwelemtini – inkanyezi[i].

Tel: **+ 44 (0)1908 652391**
Fax: **+ 44 (0)1908 652218**
E-mail: **J.LEACH@OPEN.AC.UK**
E-mail: **R.E.MOON@OPEN.AC.UK**

The challenge for teacher education

In the small teachers' room of a primary school on the edge of Maseru, the capital of Lesotho, is the visible evidence of the global challenge to provide universal, primary education. The school roll, neatly printed by hand, shows the first and second grade classes with 210 and 212 children. The third grade has 97. Three years ago Lesotho introduced free primary education, and enrolments doubled. The school continues to await for extra classrooms. The 212 six-year-olds in grade 2 cram into a space that would, uncomfortably, take 40 in many parts of the world. Two teachers are allocated to the grade, neither is qualified.

Two and a half thousand miles to the north, in Rwanda, enrolment in primary education barely tops fifty per cent in many parts of the country. The buildings are poor and the classrooms crowded. Children sit five or six on a bench designed for three. They have no shoes. There are no books. Dog-eared cardboard 'slates' serve as writing paper. The teacher has no qualifications. Her education finished at the end of primary school.

Only 7% of the Rwandan population goes on to secondary school. Sister Josephine, the headteacher of a girls secondary school in Rwamgna, sixty kilometres from the capital Kigali, speaks quietly. She has 230 girls in her school. Half of them are orphans. Many saw their parents killed by machete in the genocide that ripped through Rwanda in just 100 days in 1994. Some of the girls were raped. 'We watch the girls carefully', she says, 'sometimes the memories become too much. But our support has to be on an individual basis. Every girl responds in a different way. And now we have HIV/AIDS. On top of everything, some of the girls are testing positive.'

In a stuffy, dim classroom twenty miles north of the luxurious Luxor Hilton on the Nile in Egypt, three nine year old girls sharing a single desk, excitedly answer questions about the time, working with small clocks they have each constructed out of scraps of cardboard carefully saved by their young teacher. Her teaching has encouraged more pupils than usual to attend classes at the school this term. Egypt's population is 71.1m; it is one of nine high-population countries targeted for improving literacy under an international initiative. More than 30 million of its adults are non-literate and 1 million girls are estimated to be out of school. Although the official net enrolment rate is 80% for boys and girls, household surveys tell a different story. In Upper Egypt school attendance rates vary between 67% in Assuit /Sohag and less than 55% in the surrounding rural areas[ii].

In the East End of London, George Green secondary school has 800 pupils and amongst them over a hundred different mother tongues. Many have just arrived in the country; from Somalia and Kosovo. A few from the refugee camps in France have made perilous trips to gain entry to the United Kingdom. Twelve-year-olds study eleven or twelve different subjects through a curriculum prescribed by national laws.

Only two of their teachers are permanently based in the school. The remainder come and go, sometimes on only a daily basis.

Four schools in four places, places rich, poor and very poor, places of political and social instability, in Europe, in the Middle East, and in sub Saharan Africa. Places like this exist across the globe in rich and poor nations, in rural and urban communities. And these places have teachers, usually poorly paid, often unqualified, and frequently without any form of support to grapple with the huge challenges they face. This paper is about those teachers and millions of others who, on a daily basis, carry out their work in, often, undignified circumstances. In looking at these teachers we have three arguments to make.

First, the importance of seeing the worldwide challenge to educate all our children is a challenge for us all, not just a mission for those in the so-called 'developing world', or those working in the urban inner city areas of London, Los Angeles, New York, or the 'banlieu', of Paris or Marseilles.

Second, if we are to educate all our children, then we also need to educate all our teachers. More attention, we suggest, needs to be given to this complementary challenge to providing universal primary education. And, to do this, we argue, it is necessary to formulate models and practices that are conceptually strong, confident, and, whilst sensitive to the inevitable complexity and contrariness of local circumstances are capable of establishing discourse across and between communities. To this end we point to the enormous significance of communication technologies for transforming the models and processes of teacher development and professional support.

Finally we want, in the context of education and teacher education in particular, to suggest that inaction is not an option if we wish to see the sort of justice and freedom emerge that will improve our world. A central purpose of this paper, therefore, is to contribute to the establishment of a global debate around educational futures, a debate central to all the significant educational communities of practitioners, policy-makers, researchers, and politicians.

The global challenge

The examples we chose in our introduction deliberately ranged across richer and poorer countries but all represented highly challenging contexts. Many of us may be more familiar, if not comfortable, with the urban challenge of London, Marseilles, Los Angeles or Madrid. But many of the pressures that constrain the work of teachers (social deprivation, economic inequity, political disempowerment) exist in so many communities, in Lesotho, Rwanda and Upper Egypt.

In Thailand, of 16.4 million children and young people between the ages of three and seventeen, only 12 million attend school (Rangsitpol, 1997) and recent estimates are that only 48% of boys aged twelve to fourteen are enrolled in secondary school, since poverty often compels them to enter the workforce (Tongpian, 1997). As Forrest Parkay has shown, the problem of access to education in rural Thailand is enormous.

Only 10-15% of children in rural areas move from primary to secondary schools (Parkay et al, 1999).

In SE Asia, as well as in Latin America and Africa, large disparities in opportunity exist that challenge the quest for common forms of social solidarity. Amongst the specialised communities of educators addressing these challenges, the facts are well known. It was political will that created the Dakar resolution, signed up by 180 nations, that set 2015 as a target date for providing every child in the world with a primary education. The previous decade had laid the ground for this. In 1990 delegates from 155 countries agreed at a World Conference on Education for All in Jomtier, Thailand, to universalise primary education and massively reduce illiteracy. The Dakar World Education Forum held in 2000 was able to reveal both the progress made since 1990 and the substantial distance still to travel. By 1998 globally there were 80 million more children in school than there had been in 1990. The number out of school fell from 127 million to 113 million, but 60% of children out of school were girls.

In many areas of education policy and research debate the Dakar challenge goes unnoticed. We do not want to suggest indifference, however. Far from it. At a general level of commitment, the vast majority of the educational community appears to have sympathy and a political willingness to address these issues. What we do want to point to, and will return to in the conclusion of this paper, is the absence of these issues from the mainstream debates that surround issues such as learning, pedagogy, curriculum, teacher and school development. A cursory scrutiny of the leading journals we use, for practice, policy and research shows that despite the common structural forces, the concerns of large parts of the world are passed by and relegated to a relatively small group of journals that specialise in 'development'. It is important to gain an understanding of the scale and nature of the challenge to raise the level of provision of education. Issues relating to the quality of that provision we will return to later in the paper.

Sub-Saharan Africa is one of the most educationally challenged parts of the world. An analysis of some of the statistics for the region indicates the scale of what has to be achieved. In almost all respects, the challenge of providing universal primary education is greatest in Sub-Saharan Africa. A news release from UNESCO's Institute of Statistics (12 April, 2002) states that four out of every ten primary-age children in sub-Saharan Africa do not go to school. Of those who do, only a small proportion reach a basic level of skills. The number of primary school-age children in the region grew from over 82 million in 1990 to 106 million by 2000. It is projected to rise to 139 million by 2015 (UNESCO, 2000).

The number of children out of school in Sub-Saharan Africa also rose in the 1990s. In 1998, there were 42 million out of school. In almost one third of countries, 60 per cent or more of children were out of school, and in more than half of countries, at least 30 per cent were out of school. Added to this the poor quality of much schooling leads to children leaving school with inadequate skills, and results in repetition and completion rates such that a World Bank evaluation has shown many

countries must devote as much as 50 per cent more resources than others to produce a primary school graduate (World Bank, 2000).

Nearly ten years ago, UNESCO forecast that Africa needed to expand its teaching force at a rate of 5.6 per cent per annum during the 1990s. In fact, it has not managed to achieve anything like this rate. In Africa as a whole, over the last fifteen years the teaching force has grown at 3.4 per cent, slightly ahead of the growth in the number of children in school, but at nothing like the rate needed to provide enough teachers for education for all (Perraton, 2001).

Teacher supply in Africa now also has to reckon with the consequences of the HIV/AIDS epidemic. It is estimated that there are more than 23 million adults living with HIV/AIDS in sub-Saharan Africa. 36 per cent of Botswana's 15- to 49-year-olds live with the disease. In Lesotho, Swaziland, and Zimbabwe, approximately 25 per cent of adults in these prime ages have HIV. Namibia, South Africa, and Zambia each have prevalence rates of 20 per cent among adults ages 15 to 49. In another nine sub-Saharan African countries, more than 10 per cent of adults aged 15 to 49 are infected. Teachers are not exempted from the pandemic. UNICEF estimates that 860,000 children in sub-Saharan Africa lost their teachers to AIDS in 1999 (UNICEF, 2000).

It is clear that the conventional college-based teacher education systems in Africa and other parts of the world, will not be able to cope with the scale of the task. Indeed, in many countries, quite apart from the challenge of training enough new teachers, the existing teaching force is under-qualified, whether in academic or professional terms, or both. 15 out of 45 Sub-Saharan countries supplied data on primary teacher qualifications to the Education for All Assessment 2000. These countries reported a median 90 per cent of primary teachers with the minimum academic qualifications required to teach, but with a range from 25 to 100 per cent in individual countries. The number of primary teachers who have been trained as teachers was lower, at a median 73 per cent. Here the range was even larger, from 14 to 100 per cent. This partial data may create misleading optimism. UNESCO has reported (UNESCO, 1998) that the percentage of the world's teachers who have received at least a secondary education is almost certainly higher than thirty years ago, but there are still many countries where significant numbers of teachers have received less. In Togo, for example, over one third of primary-school teachers themselves possess only a primary-school-leavers' certificate, which is probably representative of the situation in a number of other sub-Saharan African countries. The situation as regards teacher preparation or training, as distinct from teachers' general educational backgrounds, is hardly any better, because most countries, whatever their level of development, have at one time or another temporarily waived pre-service training requirements in order to fill urgent gaps in the teaching force.

There is therefore a major challenge for many countries in training enough teachers, and developing their academic knowledge and professional skills to the level required to ensure effective primary education. This challenge must be seen against the backdrop of widespread concern about the cost, quality and relevance of teacher

education systems in many countries. Teacher training can be surprisingly expensive. Orthodox, pre-career full time residential training in some countries has costs per student which can average several times the costs of conventional higher education. If teacher training is comparatively expensive, and if demand for newly trained teachers is high, simple expansion of existing modes of training may be unrealistic (Lewin, 1999).

The concern gains in significance given that in many countries there is a considerable overlap between the academic content of teacher education programmes and secondary education. One study (Lockheed and Verspoor, 1991) estimated that the annual cost of teacher education often exceeds three times the annual cost of secondary education.

At the same time, there are recurrent concerns about the quality of teacher education. In many countries, teacher education received a lower priority for development than many other elements of the education system. Many still depend on training systems based on full time conventional residential training colleges that are often isolated from the rest of the education system.

If initial teacher training is a neglected area, inservice training is commonly even more under-developed. Although there is wide recognition that teacher education, training and professional development need to be integrated, in ways that operationalise lifelong learning for teachers, the resources allocated to it are usually inadequate and the opportunities too few. On average, countries spend around one per cent of their annual education expenditure on the continuing professional development of teachers, business and industry typically spend 6 per cent on staff development (UNESCO, 2001).

New forms of teacher education

What is clear from this analysis is that the institutions of teacher education created in the twentieth century will be unable to cope with the scale and urgency of demand required in the twenty-first (Moon, 2000). These were mostly 'bricks and mortar' institutions, heavily modelled on the universities of the nineteenth century, and relatively resource rich. These institutions did, and do, concentrate on pre-service, initial training with only limited involvement in the career-long development of teachers (many of whom, in many parts of the world, have received no initial education and training). In making this point we are not suggesting the redundancy of such institutions. We want to suggest, however, if they have a role to play in meeting the development challenge, they will have to change their role and function. Teacher educators, whatever their institutional base, will need to address the needs of teachers throughout their working lives. It is inevitable that provision will become more school based, the resources just do not exist to take millions of teachers away from their classes. Provision, therefore, will also need to be more flexible with teachers acquiring the knowledge and skills, individually and with others, to develop their own professional learning. In responding to these needs teacher educators can exploit the potential offered by contemporary understandings of the learning process and the new

forms of communication technologies that can assist us in our learning. We are achieving greater understanding of that age-old interrelation between learning and teaching. Most importantly we are trying to appreciate the social context of learning and that has significant implications for professional communities such as teachers.

There is, of course, a vast literature around this theme. Our purpose here is to point up its significance for teacher learning and development. We want to point to the connections that have to be made about these new insights and the new tools that extend, to use a Brunerian concept (Bruner, 1996), the toolkit of meaning making and reality construction which allows us to better adapt to the world in which we find ourselves. And that is as true for the unqualified teacher in Sowetho or Lesotho as the highly qualified teacher in Bonn or Boston. As Alison Gopnick (Gopnick, 1999) has so eloquently suggested, the history of education in the twenty-first century may turn out to be like the history of medicine in the nineteenth century. Both medicine and education have great moral urgency. Passing on what we know to our children is, after all, one of the few ways we have of genuinely defying death; medicine just postpones it. Both medicine and education invoke knowledge to justify their authority. Doctors have always justified their practices by claiming that they understand how our bodies work. Educators have always justified theirs by claiming that they understand how our minds work. But for most of history those claims were based on scarcely any systematic research. At best, they were pragmatic generalizations, the outcome of a long process of empirical tinkering.

In the last thirty years, Gopnick suggests, we have begun to develop a science of the mind. This new research might be the equivalent of the scientific physiology that has transformed medicine. Together with recent research into the socially situated and distributed nature of cognition , educators now have access to far broader understandings of the process of learning itself – a good 'theory of mind' as Bruner (1996) puts it. We know that learning is never a discrete, abstract process of cognition, a one way accumulation of skills and information, taking place exclusively in the physical brain [Greenfield, 2000]. It is a dynamic, sometimes delicate, but always highly creative interaction between mind, body, people, their activities – together with the tools and technologies available to them [e.g. Chaiklin and Lave, 1993; Wertsch, 1995; Bransford et al, 1999].

Such creativity in learning is as true of teacher learning as it is for children, students or any other learners. The curriculum of teacher education therefore, needs to be imaginative and open-ended and capable of being accessed in a variety of ways. In this context we believe strongly that the moment is timely to argue that emergent technologies, interactive and multi-media in forms hitherto unthought of, are providing an opportunity to revolutionise both access to, and the quality of, professional learning.

We are aware in making such an assertion of past disappointments with technologies. However, the reach of the new forms of communication, as we will try to demonstrate is enormous. When before have teachers had the opportunity to interact with other teachers and experts on a literally daily, even hourly, basis? Above all, the new

interactive forms of communication allow us to build into our models of teacher education the characteristics we know contribute hugely to the establishment of an effective learning and teaching setting, 'pedagogic settings' (Leach and Moon, 1999), that build identity, personal dignity and above all self-esteem. As Jerome Bruner (1996) has said:

> Only two things can be said for certain and in general: the management of self-esteem is never simple and never settled, and its state is affected powerfully by the availability of supports provided from the outside. These supports are hardly mysterious or exotic. They include such homely reports as a second chance, honour for a good if unsuccessful try, but above all the chance to discourse that permits one to find out why or how things didn't work out as planned.
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> (p. 37)

The new tools of communication expand hugely the availability of support for teachers and the opportunities for discourse, as well as access to new kinds of knowledge and ways of learning.

Reconceptualising the digital divide

There are many who will argue that the technologies are not in place to achieve the sea change in support we seek. As South African President, Thabo Mbeki, has more than once reminded international conferences espousing the wonders of information technology, we need to remember that half the grown-up world has never made a phone call[iii]. You might establish access and connectivity in the economically deprived parts of the richer countries. Technologies might have a role in London and Los Angeles. But can this be argued for Maseru or Rwamgna?

In responding to this we argue that the common sense notion of the digital divide which appears to have emerged across the world, takes on a reality that has begun to sanction as much as describe inequality. It conceptualises, rationalises and then determines division rather than illuminating ways in which such divisions can be breached. We would argue that not only is the so called digital divide far more multi-faceted than conventional formulations suggests, but that the concept legitimates a variety of western assumptions and long held prejudices about the developing world that pre date ICT.

In the literature in general we have found four common perspectives on the divide. The first is *a technological perspective*. Venezky (OECD, 2000)[iv] has identified three aspects of this, equipment and connectivity, the languages of software, and the technological alienation felt predominantly he argues, by women and girls. These are the digital dividers most people are familiar with. But the issue is more complex. Kirkwood (2001) among others (e.g. Castells, 2000) forcefully articulates an *economic and political* perspective. In comparison, he suggests, to the urban elites of the developed and developing world, most of whom now have technological access, the poor remain on the margins, resigned to spending hours each day walking to

collect water or food, struggling to tune their transistor radios to poor quality transmitters in search of news. He points up the, now well documented, division within as well as between countries, particularly between urban and rural communities. In all countries of the world, the statistics show, urban communities are better served than rural areas, whilst in the whole of Africa there are fewer telephone lines than there are in Tokyo or New York. 95% of the world's computers are in the North; forty-nine countries have fewer than one telephone for every 100 people and, at a global level, 80% of the world's population still lacks the most basic telecommunication facilities and resources. Such statistics can also mask other gender and class inequalities. For example a recent industry forecast in the UK predicted that by 2003 there would be Internet access by personal computer in 34 per cent of households in the U.K.; by digital TV in 37 per cent and by WAP phone in 21 per cent. However, this accounted for only 55 per cent of UK households being reached, due to the high level of multi-device, media-rich households. An affluent minority will therefore have multiple means by which to access the Internet, whilst very many households will remain without access. Research also shows that home computers are more likely to be bought for the use of men and boys, and even when a machine is acquired as a family resource, the main users are very infrequently reported to be female.

An aspect of the economic and political manifestation of the digital world is what could be termed the *ownership* perspective. In a comprehensive research review of domain names Castells (2000) has demonstrated how internet content providers are concentrated in metropolitan areas and even specific neighbourhoods with San Francisco, New York and Los Angeles currently dominating with London in fourth place. Those who come first, he argues, own a potentially powerful environment and shape the medium itself and its content. The marginalisation of those for whom internet content remains unrelated to their own purposes, experiences or context is inevitable. Gultig et al (1997) cite evidence from countries as different as Australia, South Korea, Canada and South Africa in arguing that access to digital information generally means access as consumers to ideas and information that reflect an image of the world, and the interests of a small and unrepresentative minority which is largely western, white, middle-class and male.

The *technological* perspective that focuses on equipment and connectivity provides many policy-makers with a rationale for suggesting that information and communication technologies are inappropriate in many parts of the world. But we would make a different argument, one that takes account of global equity rather than technology, and one that also provides an effective and practical response to the challenge of educating the world's teachers.

Let us suppose that teachers in the poorest contexts had access to computers and digital information and maintained and used that access. Would it enhance their own learning and that of their learners? Would they be able to make informed choices about the best ways of using technology? Would they feel able to contribute to building and shaping that information for their own purposes and futures? Would they feel the technology had any real value for their own and other learners? Research,

including the case studies presented in this paper, confirms that indeed this would be the case.

Amartya Sen (2001) provides us with another perspective on the divide which we call the *social justice perspective,* although he does not focus on ICT specifically. His work critiques the belief, dominant in many policy circles, that 'some forms of human development and progress are a kind of luxury that only rich countries can afford'. Since freedom requires knowledge and educational skills, denying the opportunities of these to any group is immediately contrary to the basic conditions of such freedom and implies for such a group an 'unfreedom'. The question, therefore, is not whether or not to use new forms of communication, but rather how, and how quickly?

To stimulate discussion around these questions we want to present four case studies that, for us, provide contrasting models of practice. The different contexts [South Africa, Albania, Paraguay and Northern Ireland, U.K] each, we suggest, demonstrate important aspects of the 'how and how quickly' questions surrounding the reform of teacher education.

Future Directions for Teacher Reform

Crossing the digital divide: Inkanyezi[v]

Setting:South Africa

Population: 41.4million Size in sq.km: 1,221,040 GNP per capita: $3,310

Internet use: 2,400,000 (5.53% of population)[vi]

'Inkanyezi has raised my standards and my dignity'

(School Principal Emjanyana SP School)

Dongwe School is perched on top of rolling hills, on the outskirts of a sizeable village, 15 kilometres from King Willamstown, Eastern Cape, comprising five classrooms and over two hundred learners. Across a scrubby path in a separate classroom, with views across the valley, a meeting of teachers from a cluster group of primary schools is working on the Inkanyezi project. Seated on low pupil benches they share battery powered lap-tops with their project partner; each teacher is also working with a state of the art hand held computer[vii]. The purpose of the meeting is to evaluate their progress on the project, as well as to share ideas about pupil achievement and progress. A young teacher from Dongwe shows an animated intsomi (folk tale) he has created in Xhosa and English to support literacy work, whilst his colleague discusses issues of classroom organisation when using a single lap top with a large class. Colleagues from a nearby school demonstrate power point presentations, spreadsheet on animals classification, and illustrated poems produced by their pupils in literacy and science lessons.

Inkanyezi [glow worm] is the Xhosa name for the research and development project in which these teachers are participating. It is part of DEEP [the Digital Education Enhancement Project], funded by the Department for International Development [DFID], UK, which focuses on the use of Information and Communications Technology (ICT) in primary schools. Jointly co-ordinated by three partner institutions [viii], the DEEP project is currently working in twenty four schools across Egypt and South Africa. All twelve of the South African project schools are situated in Eastern Cape Province, one of the former homelands, where poverty is at its severest[ix]. Two thirds of the schools are in rural locations, including two without telephone connectivity [one has no electricity].

The project is particularly focusing on the ways in which new forms of ICT can improve teaching and learning in literacy, numeracy and science in the 9–13 age range. The DEEP study materials [including Study Guide, Professional Activity Cards, web site and other electronic resources], focus on the theme of endangered animals and the local environment. They incorporate lively case studies in local settings, of the way ICT can scaffold a variety of subject concepts and facilitate a range of graduated classroom activities[e.g.from simple web search activities on local animals to e-mailing findings to pupils in other schools]. A web environment links the research sites, and the teachers, so they where they have internet access, they can share experiences, resource difficulties, ask questions, or discuss pupil outcomes.

The majority of the 24 project teachers [two project partners per school] had never used computers prior to the project. After only a few months they are already integrating them into their work:

- to provide resources to support pupil learning;
- to access a far wider variety of texts than otherwise possible from their remote locations;
- to stimulate pupil creativity;
- to enable collaborative work amongst pupils;
- to develop literacy and scientific research skills- both their own and their learners.

Structures for professional support - Kualida

Setting: Albania, Eastern Europe

Population: 3.5m Size in sq.km: 28,750 GNP per capita: $810

Internet use: 12,000 (. 34% of population)[x]

Ice has hardened in patches in the playground of Luigj Gurakuqi Secondary School, and snow covers the peaks of the Skandenburg mountains glimpsed in the distance, in the regional capital of Elbasan, Albania,. The temperature is -2°C. No

means of heating has been installed in the school and little glass exists in the windows. Fifty sixteen-year-olds in the classroom are wearing two, sometimes three, threadbare coats. Everyone has a scarf. It is a class studying English and French. Today's subject is a comparison of the work of Moliere and Shakespeare. The girls excitedly ask questions about the characters in Romeo and Juliet. Further south still, in a primary school in Gjirokastra, a UNESCO heritage city, a primary teacher works with her pupils on a play that they are planning to enact in the town's castle grounds. As soon as spring arrives, taking cardboard swords, a cloth doll and other props, the class will walk to the castle and have fun retelling a story from Albanian history.

Both teachers are working on Kualida (Lita and Leach, 1998; Lita unpublished), an in-service teacher development Programme, co-ordinated by an Albanian NGO in response to the urgent need for teacher retraining in Albania. Until a decade ago, following the fall of the devastating regime of Enver Hoxha, enforced political and geographical isolation, meant that Albanian educators were unable to keep abreast of contemporary research and development in learning and pedagogy. Most learners' day to day experience of school was of an impoverished, highly censored curriculum, with 'red threads', learned by rote. Kualida's main focus is the development of new 'pedagogic' knowledge and one of its innovatory components, the use of television. New teaching approaches were filmed in Albanian classrooms and programmes analysing and discussing these were screened on mainstream television, at peak viewing hours. In this way new classroom practices were introduced, not only to teachers, but also to parents and local communities. The programmes fuelled debate nationwide, as well as introducing hitherto unknown concepts such as problem solving, questioning and critical thinking more widely. High quality self study materials of a sort not seen in the country before, and Veprimtari (Activities), provided participating teachers with further exemplar material. These materials were devised and written locally in Albanian, rather than the more usual poor translations from American, or other borrowed texts. In professional development terms, the Activities were also unique in being school based, carrying the expectation that teachers should try out and evaluate the new approaches for themselves as an integral part of the Kualida Programme,

Living together across cultural boundaries – WorLD[xi]

Setting: Paraguay

Population: 5.2m Size in sq m. 406,750 GNP per capita $1,760[xii]

Convivience Pluricultural is an interdisciplinary project designed so that students between the ages of 12 and 18 can learn how culture shapes a people and how people from different cultures learn to coexist with and accommodate other cultures sharing their territory. Drawing on social studies, communications, literature, music and information technology, the project encourages students across the world to collaborate with students in Paraguayan schools to design research projects on their respective countries. Using the internet and other ICT, students in each country share

insights and findings with peers in another. Project activities include group projects, exchange of data and files between schools and the preparation of a web page with various group's research results.

This project is part of the World Links for Development (WorLD) program which provides Internet connectivity and training for teachers, teacher trainers and students in developing countries in the uses of technology in education. WorLD then links students and teachers in secondary schools in developing countries with schools in industrialized countries for collaborative learning via the Internet. Paraguay is one of the original four World Links pilot countries in Latin America and the programme is being developed within the framework of the country's National Policy on New Technologies in Education. In the initial phase of the project, 12 schools were selected from various administrative zones of Asuncion. Building on the success of this initial phase of the project, World Links recently partnered with Schools Online to add 10 new schools. 545 teachers in Paraguay have received World Links training, and 315 of these are participating in leading over 3000 students in 30 collaborative projects.

Going to scale- the Learning Schools Programme

Setting: Northern Ireland, United Kingdom

Population 1,694,800m Size in sq.km. GNP per capita $21,410

Internet use 55.32% of population[xiii]

' our children are now able to decide for themselves when ICT can help – or not- in their learning' ; School Principal, Bushmills School, Northern Ireland

Bushmills Primary School has 168 pupils, aged from 3-11 yrs. The school is situated in the village of Bushmills, just a few miles southwest of the Giant's Causeway, drawing its children from farm, town and seaside communities. Together with colleagues at St. Patrick's and St. Bridgid's Primary School, the staff have planned a collaborative, cross curricular project, which crosses all areas of the curriculum and aims to increase the self-confidence and self-esteem of all their young students. Pupils work closely with members of their own class, but also across the sectarian (Catholic/ Protestant) divide, collaborating with children from a different community on a range of activities based on field trips to the seashore. Their absorbing and fascinating research among the rock pools and on the shore, using notebooks and digital cameras, requires them to discuss, give opinions, and draw conclusions in an atmosphere of co-operation and friendship.

Two years ago none of the teachers involved in this coastal project would have been able to work in this way. The project depended, both for its planning and implementation, on the use of ICT. The teachers have directly attributed this new approach to teaching and pedagogy to their involvement in the Learning Schools Programme (LSP: http://www.open.ac.uk/lsp). LSP is part of a U.K. wide, government funded professional development training initiative available for all teachers and librarians, which focuses on developing a more deep-seated pedagogic knowledge and understanding of how new technologies can be used in teaching and learning. Such a national initiative is ambitious in scale and scope and at an international level, probably unique. In Northern Ireland alone, LSP is being used for whole school professional development by the majority [98%] of schools [1,134] – some 16,295 teachers (across the U.K. as a whole 166,000 teachers participate in LSP).

In common with DEEP and Kualida, the Programme provides supported, school based self study, incorporating a range of CD, web and print resources focused on case studies of classroom activities. All staff in a school are invited to undertake the training together using a common self assessment framework, and encouraged to see the professional development process as integral to the development of the school overall. Teachers share a common framework or e-curriculum of professional, classroom based tasks. There is also a common entitlement to face to face support,

provided by local advisers and a web site customised by country and subject specialism. The Learning Schools Programme's (LSP) virtual community is widely used by a variety of those working and studying on the Programme.

Bushmill's own school web site, which has been created by one of the staff members together with the pupils, presents the outcomes of the work done on the field trip, as well as interactive follow-up activities for pupils and their own photo gallery (see http://www.lsp.open.ac.uk/spotlightarcv/dec01.htm;http://www.bushmillsps.org.uk/MYWEB77/Index.htm). The site provides evidence of the way in which both teachers and learners in these schools see ICT as integral to the work they do:

- as a resource to support learning;
- as a medium for the publication of work;
- to make learning interactive;
- to encourage and enable communication in different ways;
- to engage the imagination in a powerful way.

Conditions for programme success

What can we learn from these models taken as a whole, as well as from other similar innovations, such as the Enlaces project in Chile (Potashnik, forthcoming; http://enlaces.ufro.cl) which links teachers through a virtual environment across mountain villages and other rural communities? Below we set out four cross cutting themes to explore this question in more detail. But first we enumerate eight factors that have made these development projects successful, and which, in the case of LSP, have enabled it to go to scale effectively.

- V*ision and sustained commitment on the part of government, educational leaders and policy makers, to professional development, including ensuring effective technological infrastructures that can support ICT components.*

This was a strong factor in the effectiveness of LSP in Northern Ireland, as well as in many of the projects reported by WorLD. Potashnik [ibid] has identified it as critical to the success of the Enlaces project in Chile.

- *Clearly identified Outcomes for teachers, linked closely to their individual, as well as school's, ongoing professional need.s*
- *A curriculum of school based professional activities, adaptable to local context, progressively structured and providing a common framework and discourse within and across school.*

LSP teachers view the Professional Development Record activities, which outlines expected outcomes and associated Professional Tasks as the 'spine' or heart of the project, affording shape and purpose to their activity. It is consistently rated most

highly of all the Programme elements. In South Africa the Outcomes Based Education (OBE) aspect of educational reform has enriched the perceptions of the teachers working on the DEEP project.

- *Access to high quality multi media resources that utilise ICT, use teachers'own language(s) and which integrate exemplars that reflect local culture, education and practices.*

Somekh (2001) has noted that 'it is still much more difficult to design high-quality learning materials for electronic delivery than paper based materials (p.85)'. We agree, but suggest that many effective models are emerging in different parts of the world, not only in education, but also in architecture [Eddy Spicer and Huang, 2002]; art and design [Bennett, 2001; http://www.open.ac.uk/eci/omnium/omniset.html]and medicine [http://www.pitt.edu/~super1/].

- *Clarity of roles, responsibilities and modes of communication between different actors whether at school, regional or national level.*

- *Strong support, that is rooted in local contexts and existing structures,which is closely monitored to ensure its effectiveness for teachers in differing settings.*

Potashnik (op.cit.) has argued that the fostering of local initiative and self- reliance was a key factor of success in the Enlaces project. Teacher support was also crucial to the success of the Kualida which included regular tutorials within existing regional networks of eformatori support. At the end of the pilot this formal support was rated more highly than any other element of the programme, indicating the value of the sessions in stimulating new dialogue and debate, and also keeping teachers confidence and enthusiasm high. Establishing school based support within Kualida was also seen as essential, but no form of mentoring existed in Albania. The programme explicitly encouraged teachers to build on traditional practices, by meeting with colleagues from neighbouring schools in cluster groups, as well as visiting each others' classrooms. As the project developed, as many as twelve adults might be found at the back of a classroom observing the lesson of a peer.

- *Provision of carefully planned, well managed online environments, allowing for the collaborative development of professional knowledge.*

- *Rigorous quality assurance processes, operating at every level and dimension of practice, seen to be responsive to teacher feedback and external evaluation.*

In this respect Somekh's (op.cit.) work has provided a wide ranging outline of the critical role that evaluation can play specifically in ICT initiatives. Experience on LSP has shown that ongoing quality assurance processes are essential when working to scale. This permits equality of entitlement across all schools as well as allowing the dissemination of effective and creative practices.

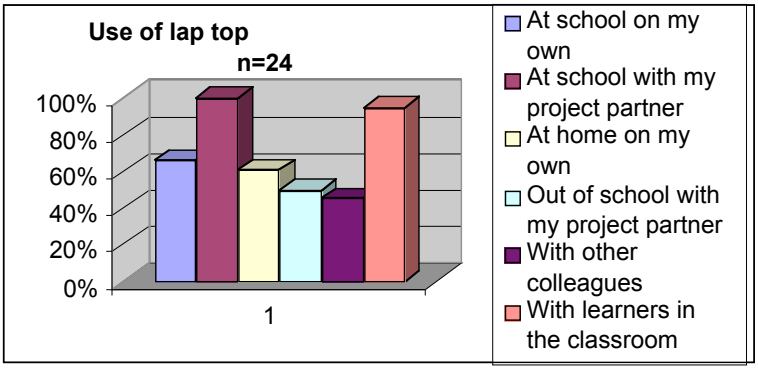
In concluding this section we would also point to Potashnik's view of the benefits that can be obtained by starting a national complex program as a pilot project. This allows

approaches to be monitored and solutions identified to possible problems. This is a point which we would wholeheartedly endorse. DEEP is a pilot programme, linked to two much larger scale in-service projects[xiv] in Egypt and South Africa [Moon, ibid] that grew out of similar small scale pilots; Kualida began with 815 teachers and over a three year period gradually became part of national in-service provision. Many of the WorLD projects were initially smallscale. More work needs to be done in drawing together the scoping, piloting, and implementation experience of projects of this sort..

Creating a climate of change

Each of the initiatives we have explored have had a substantial impact on the development of teacher knowledge, albeit at different levels and scales of magnitude. Appendix 2-4 shows some of the self reported Outcomes of some 12,000 teachers on the Learning Schools Programme, as well as from the teachers in DEEP and WorLD. Of particular interest is the way in which such projects create a groundswell of change, because of the role that ICT can have in facilitating discourse, collaboration and knowledge sharing. In the case study with the smallest number of participants, DEEP, only 12 pairs of educators are involved in S.A. However, because of the project's strong emphasis on school and community, significant numbers of other educators and members of the community have developed an interest in - and even expertise through the sharing of experience. The table below, shows the range of settings in which the teachers are using their lap tops.

Table 1 *Teachers' use of lap top*



Feedback in semi structured interviews provided evidence of the remarkably wide use of these 12 small computers outside of their school and classroom - by school principals, other colleagues, friends, children, local organisations, sisters, girlfriends, husbands: '*I've helped other teachers, made agendas for meetings and even typed an assignment for a colleague'; 'we had to ask my 6 year old son's friends what word he might have used as a password to lock us out of the computer[laughter]'; 'of course we use solitaire, we want to get more games, everyone likes them'.* Artefacts on the 12 computers added to this catalogue of activity: personalised screen savers created by teenagers; CVs of colleagues; minutes and agendas of a community council; newly created e-mail accounts for a variety of users; bookmarked web sites with a range of

interests; folders full of pupils' work; school development plans; powerpoints made by and for a variety of groups and audiences.

In Kualida, we referred to the 'context of discovery' (Lita and Leach, 1998) within which a comparable groundswell of interest grew, particularly around the TV programmes, in local video centres and teachers' classrooms. A similar climate of change is tangible in Northern Ireland. Of the 2,000 or more teachers who have already completed and evaluated the Programme, 78% report that they now feel *confident* or *very confident* in using ICT within the curriculum, 83.0% feel motivated to use ICT in the future. At school level, 95% of School Principals from the wide range of schools visited by members of the Programme research team across the NI Provinces have reported on the impact the Programme has had on the ethos of the school as a whole [e.g. *'I feel that LSP training has enhanced the professional development of our staff who have increased confidence and enthusiasm'; 'The school has taken this on very whole heartedly, it has strengthened departmental ethos and collegiality'].* At country level, external evaluators and educationists have reported that a national outcome of the training overall 'has been the growth of a highly developed professional knowledge base across the country, across sectors and subjects about the use of ICT for professional development, subject application and administration' (TTA, 2002).

Exploiting distributed expertise

Another important feature of these case studies is the distributed knowledge underlying the international project teams. In order that the projects are successful, teams with wide ranging expertise have been drawn upon: local teachers, software developers, ICT trainers, subject specialists, administrators, evaluators, writers, film makers, for example. The physical base of this expertise quickly becomes irrelevant once the job has begun, since so much of the planning, discussion, writing, redrafting is best facilitated electronically. The DEEP web resources have been drafted and redrafted within and between the country teams of teachers and subject specialists in UK, Egypt and South Africa over a 12 month period. Software developers in Cairo, Egypt have liaised with web designers in Milton Keynes, in the U.K. via e-mail to build an Arabic interface for the DEEP web site. Experts in California, Syria and Germany have contributed to discussion about the production of e-books in Arabic script. Within LSP, whilst great attention is paid to the significant numbers of teachers on the Programme now using e-mail and conferencing, the minute by minute e-communication between the thousands of other staff working on the Programme U.K.wide - advisers, regional managers, Programme team staff in the partner organisations (including secretaries, web teams, software communications experts, help desk personnel), consultants, internal and external QA folk, goes quietly unremarked. Protocols such as written frameworks, clear specifications for web based documents, Memorandums of Understanding for exchange of data for example, and sometimes translators and interpreters, are needed to facilitate such activities if they are to operate effectively. Forums to share this experience and expertise need to be created.

Developing professional networks

Only six years ago Raj Dhanarajan (1996) argued that '*for the first time we have the means to reach almost every single community on the planet and to create societies of lifelong learners. Well designed and facilitated virtual environments will provide places capable of establishing professional discourse across and between communities'*. Many such environments now exist and are beginning to be sustained across time (Leach, 2002) including in most of the case studies we have outlined. Dhanarajan's (2001) own organisation, the Commonwealth of Learning, has hosted regular, highly successfully on line professional forums for the debating of key issues such as Empowerment through Knowledge and Technology since 1999 (see http://www.open.ac.uk/eci/forum/forset.html). The Learning Schools Programme's virtual community for teachers and librarians is of particular interest to us, because although this aspect of the Programme is optional, take up has been high and has been successfully sustained across time [to date for over two years]. With over 43,000 participants[xv]since its inception, it has been one of the largest elearning environments of its kind, enabling a wide range of educators to communicate and collaborate as a professional community. Teachers can choose to operate in a variety of (mainly subject specific) areas, some local, some country specific, and some national. The very high number of teachers logging into the conferences on a regular, and it seems, increasing basis [see Table 2 , Appendix 1] across subjects indicates tremendous interest in subject related discourse. Teachers can exchange ideas, resources, debate problems, arrange collaborative projects such as instanced by Bushmills school. Or simply use e-mail to contact their local adviser for personal assistance. Vigorous curriculum discussions take place through the medium of the Welsh language, as well as Gaelic. Some 79% of those who completed a web based questionnaires see the environment 'extending their sense of being part of a professional learning community', whilst 86% wish to maintain a link with the professional development environment at the end of the Programme.

Teacher Identity

Those of us working on the LSP and DEEP virtual conferences, like those on WorLD links, still get excited when we read a 'first' message 'I've arrived- is anyone there?' or 'Hello Glow Worms, I'm now deep in the use of ICT! Its fun to be involved in this educational transformation. Warm wishes D____'. What seems to be the smallest step for one teacher in a new aspect of knowledge, we know can represent an enormously symbolic achievement. We also know that small steps can lead to tremendous leaps forward in learning. Teacher learning is always a process of developing identity. It can transform who we are, what we can do – and what we as teachers believe we are capable of doing in the future. Social context and the analysis of technology for learning are often separately considered. These programmes recognise that simple causal models of the impact of ICT on learning are insufficient. New models of teaching and learning using ICT need to acknowledge that is not technology of itself, but a 'whole cloud of correlated variables – technology, activity, goal, setting, teachers' role, culture – exerting their combined effect' (Salamon, 1991). We have noted the different roles and identities of teachers as they participate in a range of

practices: as subject experts; as teachers, and as a member of different work and home communities. In all the case studies, project teachers provide testimony to the way in which their self esteem, dignity and professionalism has been raised. The Ikanyezi teachers' recent comments provide some illustration: **'***At first I knew nothing. She [project partner] is cleverer than me. Now I know how to […reels off long list..]. I'm doing well. At the end of the year I'll be a master! [everyone laughs]; 'I have grown up as a teacher' ; 'It has enhanced and developed my way of thinking. I'm exploring [Inkanyezi]a lot- I'm always using it- each time I learn a lot; I know something more than before.'; 'I'm not quite perfect! I'm developing myself at my own pace.'*

Teachers expressed the view that they were no longer 'in the shadow' of the 'model school' in the town or city. '*There are a lot of computers in the model schools. It's appropriate technology. It's good we have one. Even other parents now want their children to come to our school'.*

Others feel they have become experts, to whom other colleagues can turn '*I've made certificates with borders; school sports timetable, agendas for meetings and even typed an assignment for a colleague',* whilst two of the participants [one male, one female] who are school principals said the project it had dignified and extended their role '*I have used it as part of the process of developing our institution'.'It helps me in my role. I use it at school to help me in my work. I've experimented, it's opened up new avenues' [P- school Principal].*

Three teachers have found the confidence to enrol on other courses for their own development. The project team at one school decided to involve parents in decision making: *We had a parents' evening- there was a proposal from the parents that we use it with Grade 7, as they are going to leave school soon, as a resources for their learning. 8 learners have been trained first to use the computers. They will facilitate small groups of peers.*

This building of identity and raising of esteem has also spread beyond the school, to family and community:'*My family were very happy, they knew it was a great achievement. They honoured what I did'; 'We are working to develop our schools- everyone wants to know more.'; 'This computer promotes the school- even the community know about it'. We have called the community…we explained how the educators gave up their time in their holidays, they sacrificed….we do it for the learners. It has raised my standards and dignity. Our school enrolment has increased'[Principal]*

The South African national curriculum, like that of many countries world-wide, requires learners to evaluate and understand different technologies. We have watched the indignity of teachers, who have never seen or used a computer, write notes on chalk boards with stubs of chalk for their learners to copy on scraps of paper, or slates, outlining the advantages of computer technology in the global economy. Inkanyezi is predicated on the view that this is not appropriate for any teacher in the 21st century, whatever their setting.

Towards a professional entitlement for teachers

These case studies, in their very different places and cultures, underline that context is never a static, stable 'given'. In all common-sense uses of the term, context refers to an empty slot, a container, into which other things are placed. This static sense of context delivers a stable, comfortable view of the world. Latour has commented that when most people talk about context, they sketch in the air a shell about the size of a pumpkin. It is precisely this static sense of context that we have argued legitimates the view that ICT is a luxury for some teachers, indispensible for others [e.g.'Teachers should not be denied the tools that other professions take for granted', Blair, 1997]. For several years now we have been researching the diverse, but also the common dimensions of what we have come to call the 'pedagogic setting' (Leach and Moon, 1999). Our view is that if we are able to agree on the enduring, essential features of teaching and learning environments, this might enable us to be able to talk more precisely about the comparative nature and effectiveness of different pedagogies, regardless of context. It would also tell us what a 'professional toolkit' needs to contain, if a common entitlement is to be provided for all teachers, whatever their setting. Whilst remaining broadly constant, we have modified these 'pedagogic dimensions' set out in Figure 1 below, in the light of our ongoing research. 'Tools and artefacts', have been added as a result of our work on the LSP, where we have come to realise that tools of many kinds are integral to any human setting, creating and mediating thinking and activity as powerfully as the 'primary tool' of language (Vygotsky, 1962).

Figure 1

Three of the pedagogic dimensions we argue are observable:

- learning activities; assessment activities; roles and relationships.

These in turn are mediated by two other observable dimensions:

- language and tools/ other artefacts.

All of these are implicitly, or explicitly, informed by:

- goals and purposes; views of learning; views of what counts as knowledge.

Each inter related dimension is framed and constantly modified by the interactions of the participants of the setting, their communities and the wider context. At the heart, or on the periphery, of the pedagogic setting – or somewhere in between depending on individual experience - lie participants' personal identities.

We have been looking at teachers, in the wide variety of pedagogic settings in which they live and work, developing in relation to each of these key dimensions. Accessing new 'subject' and 'pedagogic' knowledge; trying out new learning activities; using new tools and artefacts and creating a new discourse. We have also seen many of them taking the opportunity to re- evaluate in their local – but also within wider communities - their goals and purposes for education, their roles and relationships with each other and with their learners. Collectively they are developing, practicing and evaluating 'good theories' of mind and learning.

An architecture for teacher development

This is not the first time that rapid changes in forms of communication have had a significant impact on our ambitions for educational and social progress. The printing press, the telegraph, the telephone all, in an earlier age, changed conceptions of the world. The end of the nineteenth century, for example, was a moment of rapid change. Not only was the world in the nineteenth century coming to be united in a net of steel, telegraph wires, and ideologies of progress, but also, and perhaps more significant, for the first time in history growing numbers of people in societies around the world – societies that differed greatly in structure, cultural practice, and historical experience – were coming to the realisation that their daily experience and the structural conditions of that experience were drifting apart. It was in the nineteenth century that, for the first time, self and society were beginning to be interrelated in a global milieu, one in which people's understanding of themselves and sense of the social world could no longer be identified as exclusively tied to only one place, only one tradition (Erlmann, 1999). Such changes in everyday perceptions of time, place and identity were so sweeping that Robertson (1992) speaks of it as a 'take-off phase' of globalisation in which the 'globalising tendencies' of earlier ages gave way to 'a single inexorable form'. On the ground, however, Erlmann (1999) has suggested that

emergence of a singular conception of something called humankind and an increasingly interconnected world, was beyond the conceptual grasp of any one individual living under its sway. In the individual's imagination, wherever they were located, this 'global' system' took a wide range of forms of symbolic meanings. Thus emerged a new form of sociospatial, imagination that inscribed itself in the very syntax of language itself, the 'intersections of absence and presence' as Giddens (1991) has called them.

Into these new spaces created by rapid changes of technology came, in Pierre Bourdieu's terms, 'new cultural intermediaries' and new roles for intellectuals and artists. This is a process that we suggest is also characterising the new revolution in communications today. Within our modern forms of consciousness, however, Erlmann (op. cit.) has pointed to the way in which contemporary changes in turn engender and are expressed in a mirror dance between both Europe and Africa's images of the 'other', each retaining many of the legacies of the 'global imagination' that developed during the late nineteenth century. Most notable among these is the intertwined, persistence of fantasies of an abused and defenceless Africa and, inextricably, symbiotically linked with these, a certain heroic image of Europe and the individual.

If we detect something of this view of 'otherness' in the way the issue of developing teachers to meet the challenge of providing universal education is both perceived and framed, then the new forms of communication and our capacity to reconceptualise traditional divides and new practices, in turn offers an opportunity to think in new, and more realistic ways about what is humanly possible. In this paper we have made a number of propositions:

- ♣ that the worldwide challenge of UPE has a concomitant challenge to provide teachers and teacher education to make the experience of schooling meaningful and productive;

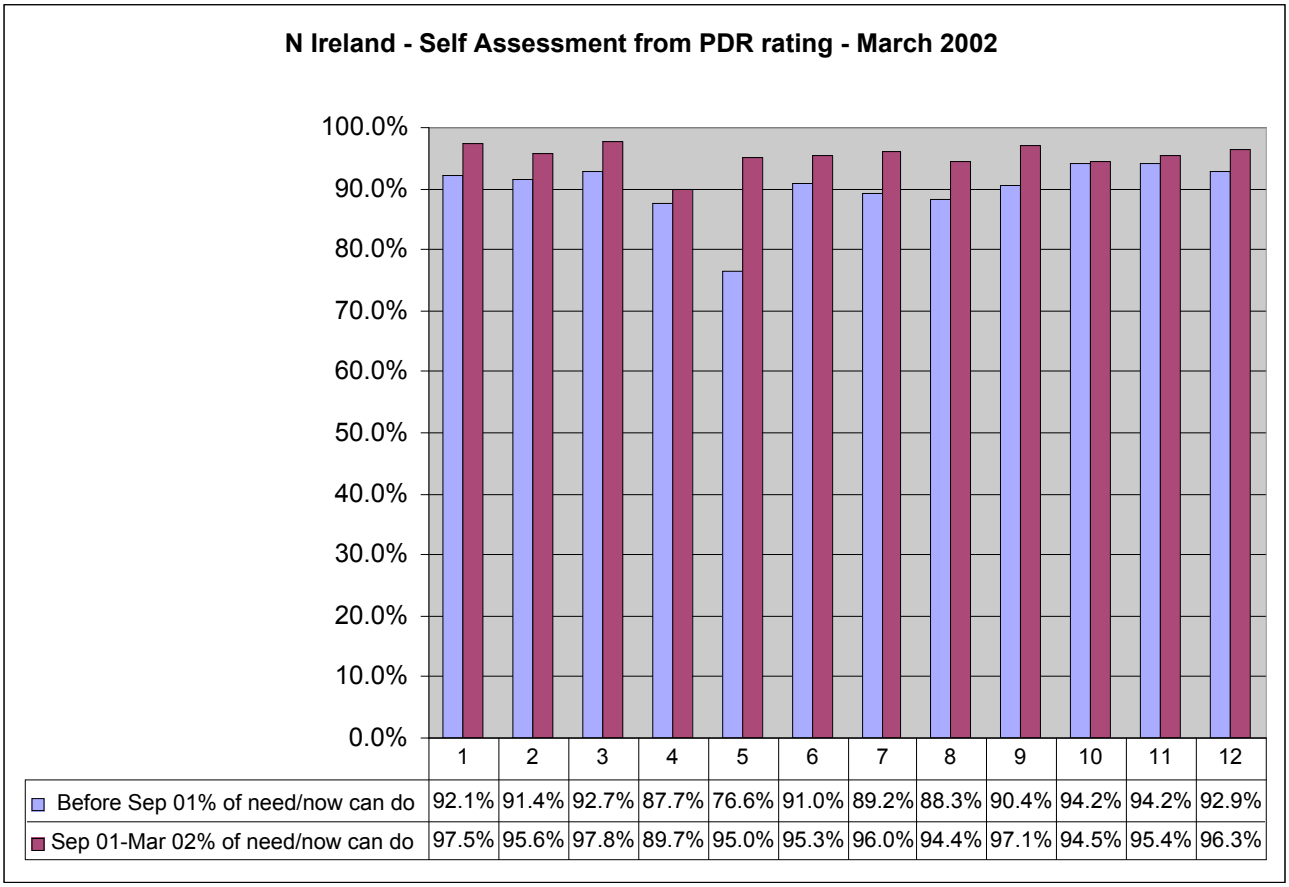
- ♣ that there is a need to build new, flexible, effective, school based forms of teacher education at a reach hitherto undreamt of;

- ♣ that to do this emergent models of development that exploit new forms of technology, need to be examined, in order that new practices of teacher education might be shared, experienced and evaluated globally.

We have looked in some detail at the building of new programmes, analysed the conditions of their success and explored the conditions under which identity, self esteem and dignity could characterise future directions for teacher reform.

Across the world, many internationally recognised institutions and groups drive the improvement of teacher education, attracting scholars and ideas from every part of the globe. Few of these are situated in the developing world. Few are driven by the real agendas of the poor and the dispossessed. We believe that a task for teacher education, in parallel with UPE, is to create a new and imaginative 'architecture' for discourse and debate that is truly international, drawing on wide ranging practices and scholarship, and one that embraces the challenge set out in this paper. The form of that architecture, the roles of individuals in creating and working together in this, as well as its many globally and varied related communities, provides an agenda for the next stage of development.

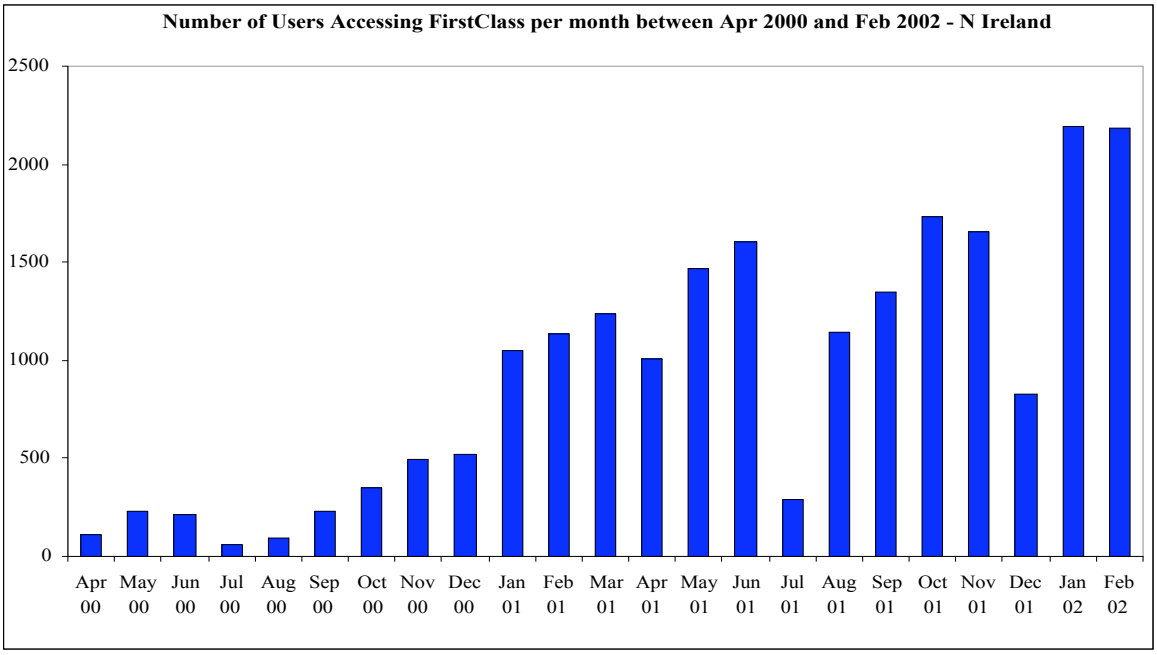
APPENDIX 1
Table 1 Teacher Outcomes, Learning Schools Programme, Northern Ireland, April 2002



	1	2	3	4	5	6	7	8	9	10	11	12
Before Sep 01% of need/now can do	92.1%	91.4%	92.7%	87.7%	76.6%	91.0%	89.2%	88.3%	90.4%	94.2%	94.2%	92.9%
Sep 01-Mar 02% of need/now can do	97.5%	95.6%	97.8%	89.7%	95.0%	95.3%	96.0%	94.4%	97.1%	94.5%	95.4%	96.3%

Self Assessment Description
Incorporate ICT appropriately and effectively in setting of objectives for all subject teaching
Exploit ICT appropriately and effectively in establishing expectations of what all learners can achieve
Select and create ICT resources and identify effective forms of classroom organization
Take full advantage of ICT to extend your range of teaching strategies and enrich the classroom environment
Use ICT appropriately and effectively to ensure learner engagement and sufficient pace and depth of learning
Stimulate appropriately and effectively learners' personal and cooperative use of ICT
Recognise, acknowledge and monitor/record attainment in all the teaching and learning contexts in which you are using ICT
Take full advantage of ICT in developing appropriate and effective strategies for assessment by yourself and learners
Evaluate the appropriateness and effectiveness of ICT against your teaching objectives
Use ICT appropriately and effectively to extend subject and curriculum-related professional knowledge
Demonstrate an appropriate level of ICT skills to maximise professional administrative efficiency
Effectively use ICT to search research and inspection evidence for professional practice

Table 2 E-Conference users, Northern Ireland April 2000 - February 2002



APPENDIX 2. Interim Outcomes, Inkanyezi

Table 1 Teachers' view of the importance of ICT for learning

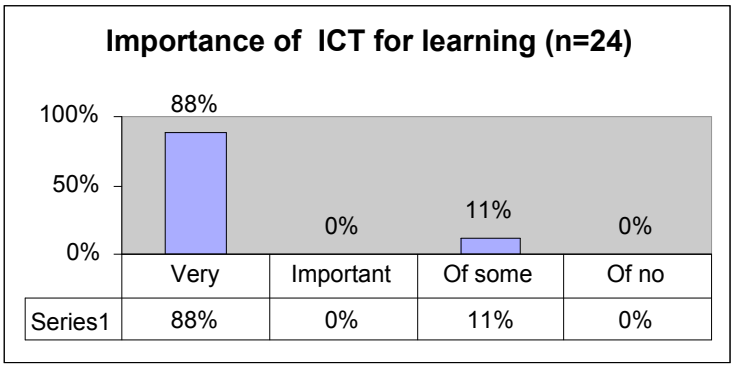
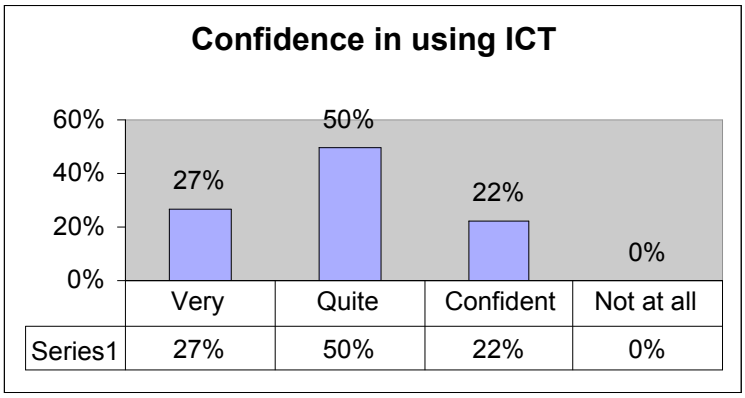


Table 2 Teacher confidence in using ICT



References

Bennett, R (2001) Om'nium: a research initiative proposing strategies for quality, collaborative on-line teaching and learning in *Education, Communication and Information*, Volume 1 Issue 1, page 103 ; http://www.open.ac.uk/eci/omnium/omniset.html

Blair, T (1997) Foreward to *Connecting the Learning Society.* DfEE 1997.

Bransford, J.D; Brown, A.L.and Cocking, R.C. *eds.* (1999) *How People Learn: Brain, Mind, Experience, and School ,* Committee on Developments in the Science of Learning , National Research Council, National Academic Press.

Bruner, J. (1996) *The Culture of Education*, Cambridge, MA, Harvard University Press.

Castells, M. (2000) *Oxford Clarendon Lectures*, Oxford, June 2000

Chaiklin, S and Lave, J. (1993) *Understanding Practice: Perspectives on activity and context,* Cambridge, Cambridge University Press

Dhanarajan, R. (1996) Paper presented to the International Extension College's *'Anniversary Symposium'* in 1996

Dhanarajan, R. (2001) Learning Technologies: where is the challenge? In *Education, Communication and Information,* Volume 1 Issue 1 pp.133-139

Eddy Spicer, D. and Huang, J. (2001) Of Gurus and Godfathers: learning design in the networked age in *Education, Communication and Information,* Volume 1 Issue 3 pp.325-358

Erlmann, V. (1999) *Music, Modernity and the Global Imagination*, Oxford, Oxford University Press.

Giddens, A. ((1991) *Modernity and Self identity: Self and Society in the Late Modern Age.* Cambridge, Cambridge Review of Books.

Gopnik, A. (2000) Review of Howard Gardner's The Disciplined Mind:what all students should understand. *New York Review of Books*, 6 May, pp 33-35

Greenfield, S. (2000) *Brain Story,* London, BBC Publications

Gultig, J. and Glennie, J. *Educational Technology and Social Issues: Realising the Promise, Diminishing the Threat* Plenary Address, Commonwealth of Ministers' Conference 1997, Gaberone, Botswana

Jameson, F. (1992) Postmodernism, Or:The Cultural Logic of Late Capitalism, Durham NC, Duke University Press.

Kirkwood, A. (2001) 'Shanty Towns around the Global Village? Reducing Distance, but Widening Gaps with ICT*'. Education, Communication and Information,* Volume 1 Issue 2, pp 213-228

Leach, J. (2002) 'The curriculum knowledge of teachers: a review of the potential of large-scale, electronic conference environments for professional development', *Curriculum Journal,* **13:1**, Spring 2002, pp. 105–120.

Lita, Z. and Leach, J.(1998) *Teacher Education in Adversity: Albania's Kualida Project, 1994-1998,* paper presented to the American Educational Research Association Conference (AERA), San Diego, April 12th-17th, 1998

Lita Z, unpublished PhD thesis

Mandela, N (1994) *Long Walk to Freedom*, Boston, MA, Little Brown & Co

Leach, J. & Moon, R.E.(1999) Recreating Pedagogy in *Learners & Pedagogy*, London, Paul Chapman

Lewin, K. (1999) *Counting the Cost of Teacher Education: cost and quality issues, Discussion Paper 1*, MUSTER Project, Centre for International Education, University of Sussex Institute of Education

Lockheed. M. E. and Verspoor, A. (1991*) Improving Primary Education in Developing Countries,* Oxford, Oxford University Press

Mayne, C. (1891) *Review of Reviews*, **4:2** (September) p. 256.

Moon, B. (2000) 'The Open Learning Environment: a new paradigm for international developments in teacher education' in Moon, B., Brown, S. and Ben-Peretz, M. *The Routledge International Companion to Education*, London, Routledge.

Parkay, F. W., Potisook, P., Chantharasakid, A. and Chunsahorn, P. (1999) 'Transforming the profession of teaching in Thailand', *International Journal of Educational Reform*, **8(1)**, pp. 60–73.

Perraton, H. (2001) *Teaching the Teachers*, IMFUNDO Briefing Paper

Potashnik, M (forthcoming) *Chile's Learning Network*

Rangritpol, S. (1997) 'Education for life', *Bangkok Post* (April 3, http:/www.bkpost.samart.co.th/newsBParchive/BP970617/1706_outl.html)

Robertson, R (1992) *Globalisation,: Social Theory and Global Culture*. London, Sage

Sen, A (1999) *Development as Freedom,* Oxford, Oxford University Press

Somekh, B (2001) The Role of Evaluation in Ensuring Excellence in Communications and Information Technology Initiatives, *Education, Communication and Information,* Volume 1 Issue 1 pp.75-101

TTA (2002) *The New Opportunities Fund ICT training for teachers and school librarians Progress review lessons learned through the central quality assurance process in England,* London, Teacher Training Agency

UNESCO (1998) *World Education Report: Teachers and Teaching in a Changing World*, Paris, UNESCO

UNESCO (2000) *Statistical Document: Education for All 2000 Assessment*,

UNESCO (2001) *Teacher Education Through Distance Learning*, Paris UNESCO

UNICEF, 2000 *The Progress of Nations 2000*

Venezky, R.L. (2000) The Digital Divide Within Formal School Education: Causes and Consequences in OECD (2000) *Schooling for Tomorrow: learning to bridge the digital divide,* OECD, Paris

Vygotsky, L (1962) *Thought and Language,* translated by Hanfmann and Vakar, Cambridge, Mass. M.I.T.Press

Wertsch, J.V. (1995) *Vygotsky and the Social Formation of Mind,* London: Harvard University Press

World Bank (2000) *Can Africa Claim the 21st Century?*

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[i] Adi, friend and colleague, co- coordinator of the DEEP project. He died, aged 35, whilst the paper was in preparation. We would like to record the very great contribution that he made to the work and ideas of this paper.

[ii] The data is drawn from Watkins, W. [2000] *The Oxfam Education Report,* Oxfam International

[iii] We drew this reference from John Gultig and Jennifer Glennie's *Educational Technology and Social IssuesRealising the Promise, Diminishing the Threat Plenary Address*, Commonwealth of Ministers' Conference 1997, Gaberone, Botswana

[iv] He terms these 'the *missing link'*; *the wasteland'* and the '*foreign language'*.

[v] ***Inkanyezi*** *sisinambuzane esincinane, esikholisa ukuqapheleka ebusuku ngenxa yokudanya-danyaza kwaso. Udanya-cimi esiye simenze uthi "Ndileq' undibambe!". Kokukukhanya okuye kubenomtsalane ebantwaneni. Ayibobungakanani bayo obubalulekileyo, koko ligalelo layo ekukhanyiseni nakwintsunguzi yobusuku. Umntu ongaziyo kuye kuthiwe usebumnyameni. Nantsi inkanyezi engu-DEEP isiza nolwazi lwe Computer ebantwaneni. Masiyileqe siyibambe ingekathi "swaka!"*
A glowworm is a small insect that is noticeable at night by flashing. It is the flashing that makes it attractive especially to children. Somehow you are drawn to chase and catch it because you want to

capture the glow. It is not its size that is important, but it's impact in illuminating even the darkest nights. In our culture, a person lacking in knowledge is said to be in the darkness. This glowworm (DEEP), is enhancing the use of computers in learning to children. Let us catch it before it disappears. (e-mail from Adi Kwelemtini, DEEP/ Inkanyezi Co-ordinator)

[vi] Source:2000 World Development Indicators http://www.worldbank.org/data/

[vii] One lap top per school has been provided for Inkanyezi by Microsoft SA's division of social responsibility. The laptops, manufactured in South Africa, are the latest XP models. Each teacher has also been provided with a state of the art, colour 32MB PDA with 206 MHz processor, funded in part by the research project and in part by Hewlett Packard.

[viii] Fort Hare Institute of Government, Eastern Cape, SA; Programme, Planning and Monitoring Unit, Cairo, Egypt; Centre for Research and Development in Teacher Education, Open University, U.K.

[ix] Data shows that the provincial share of the poverty gap [i.e. the combined measure of numbers in poverty and their depth below the poverty line] nationally is greatest by far in Eastern Cape . The comparative provincial data is: Gauteng 4%, Northern Province 16.5% Kwa Zulu Natal 19.9%; Western Cape 3.4% Northern Cape 1.9% Free State 9.9%; Eastern Cape 24.9%

[x] Source: 2000 World Development Indicators http://www.worldbank.org/data/

[xi] This case study is drawn from the report, McGhee, R and Kozma, R. (2000) *WORLD Links for Development: Accomplishments and Challenges Monitoring and Evaluation Annual Report, 1999-2000,* SRI International Paper 10533 and the WorLD web site

[xii] Source:2000 World Development Indicators http://www.worldbank.org/data/

[xiii] Source:2000 World Development Indicators http://www.worldbank.org/data/

[xiv] Distance Education Project (DEP), Fort Hare Institute of Government; Education Enhancement Project (EEP), Programme, Planning and Monitoring Unit, Cairo.

[xv] Over 88,000 have accessed the conferences, but we identify 'participants' as those who revisit, contribute and access resources