Meeting the information challenge: exploring partnerships with Africa

Book Section

Meeting the Information Challenge: exploring partnerships models with Africa

Abstract

Africa suffers from the disadvantages of marginality within in the global technical system and a legacy of externally driven infrastructure. Developments in information and communication technologies now offer the chance to redress these but the technologies require skills and capacities which are scarce. The technologies themselves can be used to leverage existing resources so that the necessary skills can be developed. However this process needs to take account of African priorities and requirements if the current inequitable situation is not to be reproduced in a new global infrastructure. The key to this is a balance between external partnership and internal collaboration. The African diaspora offers a means of moderating such relationships.

1 Introduction

Many regions occupy a marginal position within the new globalising economy. Neither developed nor developing countries are homogeneous and conditions may vary as widely within them as between them. Within the most developed core countries, there are marginal regions with declining industries which are falling behind better connected areas favoured by the investment needed to develop and acquire new technologies and industries. At these margins, the development of the necessary capacities and capabilities is problematic and the by-passed or excluded areas gain little benefit from the new relationship of global production and consumption.

Many African countries face a task made even harder by a colonial past as contributors of raw materials, whether from primary and extractive industry, or through migration of labour. Infrastructure, both for physical transport (Headrick, 1981) and for science and technology, has been developed around the needs of the external consumers of locally produced resources, rather than for coherent and balanced internal development. Such legacies limit the capacity to absorb or develop the capabilities necessary to negotiate a national space within an emerging global order. This international order is increasingly dependent upon information and communication technologies (ICTs) and the term "digital divide" has come to encapsulate the imbalance of infrastructure and capability between the developed and less developed regions. However, the divide is equally one of knowledge and power. Science and technological capabilities lie at the centre of the knowledge divide described by Chataway et al (2003).

At independence, the African universities represented a key development resource to the new national governments. However, in common with universities on other continents, they have seen a reduction in direct government resources and a less central role in government policy. With 11-13 percent of the global population, Africa spends around 1 percent of the global education budget (Mutula, 2003). As the nature of the knowledge and capability divide separating Africa from development pathways becomes clearer, the need to re-establish a sustainable key developmental role for the universities of the continent becomes obvious.

This chapter examines how, in the face of severely limited resources, the strategic use of available information and communication technologies can assist in the development of African capabilities by facilitating partnerships for this key resource within and beyond the continent.

2 Beyond colonial models: new technical opportunities

The infrastructure of global communication is a diverse and heterogeneous assembly of technologies, and the adoption of particular sub-sets of technologies and practices allows the development of distinctly African forms.

Across the African continent, there is considerable variation in infrastructure conditions. In some areas, for example in urban South Africa, patterns of access to and use of mobile communications are close to those found in the most developed regions. The use of mobile phones by sole traders within the Johannesburg conurbation cited by the *Economist* (2005), for example, is little different from that in Los Angeles, London or Sydney.

Elsewhere on the continent, however, the community use of broadcast radio or of mobile telephony reflects a need to leverage limited resources. Patterns are closer to those seen in South Asia, as exemplified by Grameen Phone (see www.grammenphone.com). Individual cell phones may offer connectivity to absent members for a whole community, while providing a livelihood for one or more families within that community. The village scribe is being superseded by the villager relaying SMS messages for payment (Gough and Grezo, 2005). A single radio may travel around a community with or without its nominal owner, providing information and entertainment for an extended family (Spitulnik, 2000).

Clearly Africa's technical trajectory for information and communication technologies has been and continues to be different from that of the West and of more developed areas. In the latter, digital technologies have been introduced over well-established and well developed analogue infrastructures. In contrast, in many parts of Africa digital technologies represent a leapfrogging over under or un-developed analogue resources directly to wireless and satellite communications. In the Kalahari, for example, the deployment of Cybertracker, a solar powered digital data collection device developed at the University of Cape Town, by non-literate San people in order to capture information on local environmental conditions and to communicate instantaneously beyond their physical location provides a demonstration of such "leap-frogging" (Little, Holmes and Grieco, 2001).

Difference in technology trajectories within Africa has allowed the development of distinctive characteristics which offer new possibilities. The selective adoption of ICTs, while a response to lack of resources, has created pathways around the limitations of post colonial infrastructures. The connections created under colonialism generally retain the characteristics of an agenda of connection between resources and export routes rather than internal linkage to facilitate endogenous development. Railways, roads and land-line phones were originally mapped around the needs of the former colonial centres. However, the newer communication technologies allow a

break with this model, just as a new generation of African airlines is breaking with the colonially determined hub and spoke model which took Africans through a sequence of European capitals in order to reach their neighbours.

Nevertheless, much infrastructure investment is still driven by external criteria similar to those described by Headrick (1981) in his description of railway development in Africa. The key twenty-first century communication technologies are in some danger of mirroring the uneven development of the key nineteenth century transport technology, with the extreme case of the internationalised enclave of the Free Trade Zone mimicking the trading fort of the nineteenth century (Little, 2004).

In overcoming the burden of colonial legacy infrastructure the ability of smaller and marginal actors to influence a dominant "techno-economic paradigm" (Dosi, 1986) becomes central. One perspective is represented by the nineteen-seventies "intermediate technology" movement where technologies which had been superseded in the most developed areas were shown to be of value elsewhere. In Africa the key issue is the distinction between fixed line communications dependent upon a fixed power grid and wireless technologies capable of utilizing ambient energy, whether wind, solar or human/animal. Realignment of the new standard technical configurations to suit African conditions may involve the selection of components from nineteenth, twentieth or twenty-first century repertoires, as with the blended technology of the wind-up radio. The moped may be as appropriate a tool to bridge the gap between internet access point and end user as a standard wireless router with modified antenna[1].

The divide between technology rich and technology poor environments is also less relevant when collective skilling through partnership can be achieved largely through the communication links provided by intelligent and selective use of ICTs.

The key issue for the development of understanding and capability is the connectivity and the virtual adjacency which connectivity delivers. However, the collective management of such adjacencies is critical if partnerships facilitated by the new forms of internet connectivity are not to replicate older models of dominance. The next section examines the balance between partnership and autonomy necessary to avoid the replication of earlier unequal relationships.

Autonomy versus partnership

The scale and scope of the key technologies which underpin the global economy make the pursuit of a fully independent technological path problematic for all but the most developed economies. Even then, the imperative for interoperability within the global system makes full autonomy undesirable.

Indeed, in the global economy autonomous technical development becomes the ground for suspicion. Within the continent of Africa, the history of technical autonomy in the Republic of South Africa reflects the response to sanctions under apartheid. In the post apartheid era the institutional centres of skills and capability

[1] See for example the mix of physical and electronic connectivity developed by Wizzy Digital Courier in South Africa http://wizzy.org.za. See also Alan Levy's comments on the adaptability of standard WiFi equipment at http://www.bytesforall.org/9th/html/matching_wifi.htm

created in pursuit of strategic technological autonomy are re-aligning with their more collaborative and networked equivalents in other countries. Historically, the Southern African Development Community (SADC at http://www.sadc.int/) represented the response of nine neighbouring majority ruled states to coordinate development projects intended to lessen economic dependence on apartheid South Africa. It now aims to improve connectivity between the countries of southern Africa

Partnerships offer the prospect of hybrid forms learning from experience at both ends of the relationship. British Commonwealth governments share experience with open distance learning through the Commonwealth of Learning (COL) http://www.col.org which aims to support publicly funded institutions in developing Commonwealth countries in the provision of affordable education to larger numbers of citizens.

The African Centre for Technology Studies (ACTS http://www.acts.or.ke/index.html) is an African intergovernmental initiative to generate scientific and technical capacity and policy relevant to African countries. Partners and networks include academic and research institutions inside and outside of Africa, national governments, UN bodies and NGOs.

The supporting role which can be delivered from the better resourced centre reverses the accepted logic of outsourcing and off-shoring. The value of such relationships resides in local and relevant content which is supported by the technology transferred into the target region. In "normal" off-shoring relationships the technology is used to deliver lower value activities to relatively low cost locations, here it facilitates access to the locally produced high value element. The globalisation of communication has opened new pathways to partnership for Africa, but as in all other locations, the need for interoperability reduces the ground for autonomy.

States of the art – Mapping technology in Africa

The visible and exemplary use of key available technologies is a source of inspiration for end-users and policy developers alike. The available resources and use patterns of information and information technology have been mapped at a number of points[2]. Ploghoft (1995) describes the initial deployment of ICTs in support of information exchange between African universities. Levey and Young (2002) provide a chronology of the adoption of ICTs across Africa from the nineteen eighties onwards. A recent Vodafone report focuses on the economic impact of access to mobile telephony and the patterns of use presently evident in Africa (Vodafone 2005)

Hafkin (2002) identifies three components of the ICT resource deficit in Africa: firstly the lack of capacity, with African universities offering only very limited internet connectivity to students via their main libraries, secondly the deterrent cost which accompanies even this limited level of technical support and finally the problem of content which is both relevant and under local control. For Hafkin the point of connectivity is to become a producer of content and not simply a consumer. Myers (2000) attributes much of the effectiveness of regional radio broadcasting in Francophone Africa to the critical role of locally appropriate content.

[2] A 1998 overview of African internet-based resources is available at http://www3.sn.apc.org/africa/projects.htm

All of the limitations identified by Hafkin have an added gender dimension, with female students often dissuaded from engagement with the technology and the underpinning skill development.

Given that levels of connectivity for many African universities are a fraction of those available to individual households in Europe and the USA (Holmes 2004), many externally funded support initiatives focus on only one of these dimensions – the quality of access. Such technologically driven approaches have been taken with earlier generations of promising technology. In the 1980s the Centre Mondial Informatique et Ressources Humaines in Paris promoted the use of state-of-the-art computing technology in Saharan and sub-Saharan Africa (Roper, 1983). The current incarnation is the $100 laptop project which aims to deliver an affordable and viable computer to the most remote locations. Other specialised devices include the Indian Simputer, a robust low-cost hand-held solar powered device suitable for non-literate users, which incorporates commercial smart card technology to provide a cheap and securely storage of individual data separately from the device likely to be shared among a number of different users. While such devices can incorporate wireless networking technology, they require some form of internet node with which to connect, and this can require a very different order of investment.

The emergence of satellite-based technologies which can provide high levels of connectivity at almost any point has underpinned initiatives such as the African Virtual University (AVU). VSAT (very small aperture terminal) satellite ground stations have been deployed with the intention of delivering high grade and reliable internet and communication links, but the cost to end users means they are more likely to be of value in attracting foreign inward investors than in directly supporting indigenous capacities and that of fibre-optic options. In contrast, the SAT-3/WASC/SAFE fibre-optic was developed to link Africa with Europe and South and South East Asia[3].

Telkom South Africa, was a key champion of the project, with support from a number of state-owned national carriers. The provision of a high quality link designed to service a significant proportion of African nations and to provide connection between them represents a significant break with the colonially inspired connections it replaced. However, pricing and access policies within individual African countries discourage the majority of potential users. Under-utilisation means that the objective of retrieving some US$600 million repatriation annually to telecommunications companies based outside Africa is not being achieved (Daily Champion, 2006).

In the six years since the SAT-3 fibre optic cable was commissioned, costs have reduced significantly. However, the connectivity problem then shifts from the linkage to the high quality nodes to the points at which the connectivity is needed by end-users. The U.K. Open University commissioned the South African Institute for Distance Education (SAIDE) to undertake a desktop study focussing on South Africa, Tanzania, Kenya and Nigeria to inform its Teacher Education in Sub-Saharan Africa (TESSA) project Consortium of the current (2005) and potential future (2005-2010) access of primary teachers to online resources.

[3] See http://www.safe-sat3.co.za/Configuration/Configuration.asp for a map of these connections

The study found that radio, followed by television, remains the most accessible media on the Africa continent. For example, in 2003, in Sub-Saharan Africa on average there were 198 radios per 1000 people statistics indicated that 250 in 1000 people had a radio while 69 in 1000 had a television set. Both South Africa (336) and Tanzania (406) exceeded the average density of radios while South Africa (177) and Nigeria (103) exceeded the average density of television.

The study also found that mobile phone penetration at 6.2 per cent in Africa as a whole was double the 3 per cent for fixed lines the end of 2003. In Nigeria, mobile subscribers were expected to grow by 75 per cent between 2003 and 2004. While close to 60 per cent of the population in Kenya had cellular signal coverage. A study conducted by Vodafone in Tanzania found that 97 per cent of the people surveyed could access a mobile phone. In South Africa, 36 per cent of the population were mobile subscribers in 2003, and there were reportedly 19 million mobile users in 2004.

For both academics and the wider user community the initial connection and its support is critical to the exploitation of the wider connectivity, whatever its quality. The success of the mobile phone reflects the simplicity of its use and its general robustness.

Overall Internet penetration in Africa was around 1.5 per cent. While 7.4 per cent of the population in South Africa has access to the Internet, only 0.7 per cent has access to the Internet in Tanzania. 3.3 per 1000 people had access to a personal computer in Tanzania in 2001, with 72.6 per 1000 people in South Africa having access to personal computers and 57 per cent of students and staff in higher education were Internet users in 2002[4]

These disparities reflected limited infrastructure, lack of competent manpower, high cost of hardware, software and connectivity, lack of awareness of appropriate use of technology in education, and apathy towards use of technology in education among academics.

Partnership within and without Africa

Partnership arrangements can range from bilateral cooperation with geographically close neighbours to participation in wide reaching networks of mentoring and collaborating institutions. Regional partnerships can support the development of regional approaches and solutions, wider partnerships can deliver capabilities not available locally. Both the Association of African Universities and the African Virtual University reflect the complementary relationship between these strategies

The Association of African Universities represents a strong regional partnership for sharing experience. It was established in 1967 by 34 universities as the apex organisation and principal forum for consultation, exchange of information and cooperation among universities in Africa with the following objectives:

- *To promote interchange, contact and cooperation among university institutions in Africa;*

[4] See www.tessaproject.org for the summary of the report and links to SAIDC.

- *To collect, classify and disseminate information on higher education and research, particularly in Africa;*
- *To promote cooperation among African Institutions in curriculum development, and in the determination of equivalence of degrees;*
- *To encourage increased contracts between its members and the international academic world;*
- *To study and make known the educational and related needs of African university institutions and, as far as practicable, to coordinate the means whereby those needs may be met;*
- *To encourage the development and wider use of African languages;*
- *To organise, encourage and support seminars and conferences between African university teachers, administrators and others dealing with problems of higher education in Africa.*

(http://www.aau.org/)

The African Virtual University (AVU) developed initially with World Bank support as a means of delivering quality learning material from outside Africa. Juma (2001) describes the initial pilot development of the AVU from Kenyan perspective. She points out that between 1970 and 1991 Kenyan tertiary education developed from a single university with a student population of 2,786 to a system of five public universities with a combined student population of 40,000 with consequences for capacity utilization, quality, instructional materials, facilities, and access to university education.

Mutula (2003) points out that the Kenyan government also encourages a significant number of students to pursue university education overseas. Currently around 12,000 students study in India, the USA, Britain, and Europe. Bilateral relationships have been established between Kenyan and European universities, for example that between Moi University and Delft University of Technology in the Netherlands focuses on the development of Kenyan management and IT infrastructure capabilities.

In this context the initial development of the AVU was aimed at the electronic delivery of high quality materials, particularly in science and technology, sourced from institutions outside Africa to provide additional capacity across Africa.

Juma (2001) describes how the AVU pilot programmes were conducted in three phases: a prototype pilot phase, from 1997-98 followed by undergraduate degree programmes from universities worldwide, and finally the offering of science and technology curricula by one or more partner institutions in Sub-Saharan Africa. She lists 27 institutions across Africa that had started AVU courses during the 1998-99 academic year. Seminars were organized for the business community, sometimes transmitted via video-conference live from the Virginia Technological Institute in the United States, in addition to those facilitated by the Economic Development Institute of the World Bank.

Juma describes the AVU's initial achievements in terms of the provision of educational resources, introduction of new courses, capacity building, income generation, increases in enrolment, and the digital library. She acknowledges the task facing university lecturers in developing proficiency in new virtual teaching

strategies, in the face of variable infrastructure quality and equally variable national communication policies.

The use of external accreditation was seen as a mean to reduce the outward drain of the most qualified students to overseas institutions while the use of centres across the continent allowed cross-country student collaboration in addition to access to out of professors outside Africa.

After a successful pilot phase, AVU has shifted from its role as free-standing institution to a support and capacity building role for established institutions. It has changed from a World Bank project to an independent inter-governmental organization based in Nairobi, Kenya and supporting some 57 Learning Centers in 27 African countries and acts as a broker between institutions within Africa with identified needs and institutions elsewhere with relevant skills and programmes.

The AVU identifies its current context as follows:

> *The African Virtual University (AVU) is an innovative educational organization established to serve the countries of Africa. The objective of the AVU is to build capacity and support economic development by leveraging the power of modern telecommunications technology to provide world-class quality education and training programs to students and professionals in Africa*
> *Rationale for the AVU*
> *Africa is an enormous continent with 53 countries and a population of over 700 million people, over fifty per cent of whom are under 20 years of age. There is a high demand for quality education at tertiary level on the continent. This demand is driven by the following five main factors:*
>
> - *a large percentage of high school leavers ready for university education are unable to enrol in university due to limited resources*
> - *overstretched government budgets owing to competing imperatives*
> - *an expensive and overly subscribed private education sector at tertiary level*
> - *a large labour force that directly requires the upgrading of skills and*
> - *the growing isolation of Africa from the Global Knowledge Society*
>
> http://www.avu.org/about.asp

Both AAU and AVU demonstrate partnerships which increase the capabilities and capacities of African institutions and individual through forms of interconnectivity. However, a third and less formal set of connections between the more and less developed spheres also exists. The African diaspora is an additional resource which can monitor and mentor from outside and provide an alternative channel of communication and capability. Alongside the strategic view provided by a top-down approach, the grassroots experience of external technical and economic environments can assist the development of appropriate tactical engagements with the enabling technologies.

Autonomy and connectivity: the diasporic dimension –

The capacities of developing nations have long been limited by the loss of skilled and economically active individuals to locations offering greater opportunity and rewards. Across Africa the migration of professionals is a continuing concern with an estimated 60,000 professionals (doctors, scientists, engineers, etc.) leaving between 1985 and 1990.

Both India and China have seen similar outflows of talent and capability in the past. Recently, however, movement of scientists and engineers between these Asian locations and technologically advanced countries has not been simply one way. A growing range of diasporic communities have assimilated the key technologies and this has a skills transfer role in raising both awareness and capability levels within the home community.

In recent years the concept of 'brain drain'; implying a one-way, definitive and permanent migration of skilled labours has been replaced by an understanding of brain circulation has gained wide importance in the context of a global knowledge-based economy.

While the monetary contribution of overseas workers to economic development and poverty reduction in their home countries through financial remittances is well understood, the remittance of intellectual capacity and capability is less widely acknowledged. Saxenian (2002) describes the critical role played by U.S. based Indian scientists and engineers to the stunning growth of India's software industry. which has created 400,000 new jobs and led economic growth in regions such as Bangalore.

In their examination of the Ghanaian diaspora Henry and Mohan (2003) suggest that the links to home may promote cultural stasis as much as it provides cultural stimulation. However the constant communication provided by ICTs enables a closer alignment and synergy between the home and overseas communities than previously. Both connectivity and physical movement between locations are needed for active engagement in a global discourse

The Digital Diaspora Network – Africa represents an attempt to mobilise the technological, entrepreneurial, and professional expertise and resources of the African Diaspora[5]. Experiential learning by members of a diaspora, bridging the territories of potential partners provides a key safeguard to ensure that formerly dependent relationships can become truly interdependent.

3 Closing the digital divide – a multi media technical menu

The AVU was premised on the use of the most advance ICTs available in order to deliver a distance learning product of the highest technical quality. However, Wolff (2002) suggests that the initial choice of satellite based broadcast television, while perhaps reasonable in 1997, has become relatively expensive and inflexible as the cost and availability of alternatives has improved. The subsequent shift from a free-

[5] See http://www.ddn-africa.org/join.html

standing university to a technology broker and facilitator to some degree is an acknowledgement of this. In order to benefit from these changes African institutions are faced with a range of critical choices in both technology and its configuration and use. The AVU is assessing technologies such as wireless and cellular mobile systems and their convergence with the Internet.

Selecting from a range of technologies

A study of current African conditions Commissioned by the British Open University led to the identification of some key features of ICT access in African context.

- *Mobile devices (notebook computers and handheld devices) have such low penetration into African schools that it would not be advisable to build content based on these as meaningful forms of access. However in South Africa in a profile of over 1000 primary school teachers less than 20 per cent claimed any access to the Internet.*
- *Broadband Internet access is not accessible in most schools across the continent at affordable rates. Thus very few schools even in bigger rollout projects such as Gauteng Online (in South Africa) have access to broadband Internet connections*

SAIDC 2005 p.60

Three possible but linked sets of technical scenarios were developed

- *A single computer where the best option of distributing content is likely to be CD-ROM.*
- *A PC mini-cluster. As with option one, distribution of content through CD-ROM is likely to be the best option. However, option exists for data-casting as an alternative form of content distribution.*
- *A computer laboratory. This remains the dominant model for providing learners access to ICTs and digital content across Africa. Distribution of content is through the Internet. However, Internet access speed remains constrained as many of these projects have not been able to afford to roll out meaningful broadband connectivity. Again, in this scenario, option does exist for use of data-casting as an alternative form of content distribution.*

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The use of SMS on mobile devices to alert teachers to available resources was considered a practical possibility for each of these scenarios.

Public and private sector roles

The *Economist* magazine has recently entered the debate over whether the development of internet-based digital services is as significant for African development as the diffusion of mobile telephony. In the same vein a Vodaphone report demonstrates the association between the penetration of mobile telephony and economic development in a number of African countries. These newer technologies reside in the private sector and they effectively bypass the institutional rent-seeking around state monopoly based on the existing systems.

The high costs associated with monopolistic behaviour, whether by governments of state monopolies, are as great a barrier to development as their physical limitations. In

Nigeria the countries second telecom operator announced plans to replicate the SAT-3 fibre optic cable with its own infrastructure having failed to negotiate satisfactory access, diverting resources which might otherwise have improved internal connectivity. However, governments can play a positive role in the extension of the newer technologies to the population beyond the existing wired world. The South African requirement of GSM network licensees to provide subsidised GSM payphones in low income areas is one example of the policies that are possible, while Uganda has committed resources to the development of regional internet access[6].

Balancing the load: high capacity links and the final kilometre

In some respects the development of high capacity internet links mirrors the focus on high profile flagship projects in early post-independence development. The critical connectivity between end users and the nearest quality connection has been tackled by a variety of imaginative grass-roots initiatives. The imaginative blending of technologies and the sharing of resources has significantly extended the reach of the internet in Africa and elsewhere. The success of top down flagship projects ultimately depends upon bottom-up ingenuity which delivers cooperative use of limited resources and hybrid solutions. The successful reconciliation of top down and bottom up approaches depends on the effective use of selected technology through social learning across distributed communities.

4 Experiencing Partnerships with Africa

The African Virtual University represents a sustained attempt to link African and external resources though ICTs in order to build capacity for economic development. The initial pilot tested the viability of a trans-national African vehicle for the delivery of externally source high quality material to support African students and the revised structure links African and external resources around identified problems.

The UK-based Open University is collaborating with AVU on one key programme to deliver open content to African institutions: TESSA – Teacher Education in Sub-Saharan Africa. This partnership represents the transfer of externally developed distance learning skill into an African context, albeit following a number of separate partnerships with more limited objectives. It represents an opportunity for both ends of the relationship as the OU's delivery methods are shifting from broadcast model to interactive and internet based modes.

The OU has both a history of collaborative activities and partnerships in Africa and an African Vice Chancellor. OU learning methods have their-origins in broadcast open access learning in a developed context. Despite the shift from broadcast to internet supported interactive mode, both print and broadcast elements still have a place in delivery.

OU DEEP programme

The DEEP: programme (www.open.ac.uk/deep) represents an externally driven partnership to deliver electronic support to education, initially funded by the U.K. Department for International Development (DFID). The title reflects the digital enhancement of education programmes. It is intended to address the demand for

[6] See http://allafrica.com/stories/200411221610.html

teachers in the context of the Millennium Development Goal of Universal Primary Education in the context of more than 40 million children of primary school age in sub- Saharan Africa without school.

Originally funded by the U.K. Department for International Development (DFID), DEEP is a partnership between the Open University (UK) and several project partners:

- University of Fort Hare (UFH) and the Nelson Mandela Foundation's Unit of Rural Schooling and Development in Eastern Cape South Africa;
- Programme, Planning and Monitoring Unit (PPMU) in Egypt;
- Open University, Tanzania;
- Relief International-Schools-Online (RI-SOL), Bangladesh

In addition to its technical exploration, DEEP attempts to engage with the aspects of the digital divide beyond the technical infrastructure itself. These include economic and political, in terms of level of provision and the issue of ownership and control of the key infrastructure resources.

Most importantly it is an exploration of a social justice perspective on technology:

> *We critique the belief, dominant in many policy circles that some forms of human development and progress are a luxury that only rich countries can afford.*
>
> *We know that human freedom requires contemporary knowledge and contemporary educational skills, denying the opportunities of these to any group is contrary to the basic conditions of such freedom. The question, we would argue, is not whether or not to use the new forms of communication but rather how and how quickly.*
>
> DEEP presentation 2002 available at http://www.open.ac.uk/deep/Public/web/why/why.html

AVU, /OU and TESSA

The key to the TESSA programme is the mobilisation of a range of African and international knowledge, skills and expertise to research and develop contexts, processes and resources. TESSA addresses the issue of the provision of high quality resources and support systems to improve teacher education. TESSA is an 'open content' programme, free at the point of use. Phase 1 of the TESSA programme is aimed at improving classroom practice in basic education with a particular focus on literacy, numeracy, science, life skills, social science and the arts. The TESSA programme is planned to support a wide range of courses and qualifications including accredited courses and in-service professional development programmes. It is anticipated that the most effective use of the TESSA resources will involve support systems provided by colleges, universities or local education district staff. TESSA will provide advice on the range of models of successful support available.

The TESSA the Consortium Partners have a history of more than ten years co-operation. Partners have also worked collaboratively with international organisations

such as UNESCO and the World Bank and reference to this wider work (see www.tessaprogramme.org)

Two modes have been identified: downloadable materials for direct use by training institutions and organisations fully online resources where adequate connectivity is available. TESSA members expect the second mode to become more significant over time.

> *The TESSA programme is planned for the period 2005 to 2015. Phase 1, focussing on basic education, will take place between 2005 and 2008. The consortium's first tasks will be:*
>
> - *to research and develop the TESSA framework of modules and version these to at least nine national contexts (See TESSA Consortium Partners). Versions of the resources will be made in Arabic, English French, isiXhosa and Kiswahili. In South Africa TESSA will be located within the Nelson Mandela Foundation's Unit for Rural Schooling and Development (based at the University of Fort Hare) and will be used by teachers in the Foundation's rural schools network. In Tanzania TESSA will be used by the OU Tanzania to create a new Diploma in Primary Teacher Education.*
>
> - *to carry out a number of research enquiries that will provide a knowledge and analysis to inform the development of the programme (studies of future ICT patterns in Sub-Saharan Africa and a comparative study of teacher education curricula have been commissioned)*
>
> - *to engage in a dialogue with teacher educators across the region with a view to parallel or subsequent take-up of the TESSA programme*
>
> www.tessaprogramme.org

The projects described in this section focus on the development and support of the human infrastructure necessary for local capability development and for the identification of emerging opportunities at their point of potential application. They also demonstrate an understanding of the mutual benefit of interdependent relationships.

5 Conclusion: Creating and locating content and resources for Africa

Africa needs to derive benefit from an increasing range of information and communication technologies with potential for application to African problems. There is ample evidence of ingenious use of mainstream technology to solve local deficiencies and problems. These often take advantage of the change in relative costs of the components of ICTs.

Where adequate connectivity exists, the central hosting of open education materials, linked through locally developed portals has been promoted by the Development Gateway project (http://www.developmentgateway.org/). Material is drawn from AVU and elsewhere. The eGranary Digital Library reverts to the mature but now

relatively cheap technology of the computer hard drive to deliver digital resources to institutions lacking adequate Internet access. Material archived from the web is delivered on drives that can be mounted in servers for use where a local area network exists, but where internet connectivity is limited or non-existent. The approach requires release of the intellectual property by its originators, but depends ultimately on a reliable incremental update approach which allows for a range of delivery mechanisms that ensure that materials maintain their currency.

Such radical reframing of mainstream technologies for non-standard circumstances can provide inspiration for potential users. In the west the particular ingenuity of a minority of users led to the emergence of the "road-warrior" concept of highly mobile working which then influenced the direction of mainstream development of mobile technologies, The development and demonstration of equivalent systems within African contexts could influence the direction of mainstream development to some degree, but more significantly, would articulate demands for access to resources which were created for other purposes.

The main issue, however, is the development of a distinctive voice and presence in the new medium. Radio and broadcasting offers an example of how an African identity can be voiced in an externally developed medium. The development of radio in Africa has followed the wider trajectory, beginning with, government controlled broadcasting, generally on AM, then moving to FM in the 1970s and 1980s for local or regional stations. However, a combination of regulatory liberalisation and technical development has allowed a range of distinctive and vibrant radio broadcast cultures to develop across Africa. An Africa approach to digital satellite radio has allowed a large number of stations at an acceptable quality from the bandwith used elsewhere to deliver high fidelity sound (Mytton 2000). Stations such as Joy FM in Accra, Ghana, have developed both a wide domestic and external audience through utilisation of internet broadcasting[7].

The members of the African diaspora have a role to play in the selection of technology and development of culturally appropriate electronic forms for the internet. For example, diasporic experience triggered the creation of CawdNet (http://www.cawd.info/home/about.html) by a Nigerian IT professional working in the UK concerned with effective strategies to link individuals and groups in "bandwidth poor" rural Nigeria with individuals and groups in the "bandwidth rich" . The diaspora has already been enlisted to tackle the gender dimension of access to IT for development: http://www.wougnet.org/Events/UNIFEM/ddi_ug.html

Partnership models will not become new models of dominance if this resource is harnessed. The diasporic perspective offers a form of metagovernance which can reconcile and solve the top down aspect of external input by vetting and filtering such content with a grass-roots African sensibility. African universities and the African diaspora have a potential for connectivity and development which has been greatly under-recognised and, indeed, under-recorded.

[7] See http://www.joy997fm.com.gh/. For a regional overview of the full range of African broadcast media see http://www.ellenhume.com/articles/missionaries9_africa1.html

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