IMPACT OF NEW INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) ON SOCIOECONOMIC AND EDUCATIONAL DEVELOPMENT OF AFRICA AND THE ASIA-PACIFIC: A PILOT STUDY

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EXECUTIVE SUMMARY

This preliminary research on ICT adoption in Africa and the Asia-Pacific suggests that there are serious barriers to their use in educational and socioeconomic development, such as issues of infrastructure support, access to the ICTs, training and skills development, and hierarchical social relations which determine who has access to ICTs. Generally ICTs are considered appropriate, even though there remain concerns over economic priorities, basic needs or computers.

However, the implementation of ICTs is occurring in a context where the cultural and institutional barriers are not well addressed. The assumption often made is that if one just purchases a few computers and modems, a post-industrial society can magically result. Africans and those in the Asia-Pacific are generally in the position of consumers and thus in a position where they cannot yet define the media in their terms.

At the same time, conservative attitudes entrenched in Asia-Pacific countries and concern over basic needs inhibit appreciation of the importance of new ICTs. For example, in Fiji and the Philippines, people believe ICTs are not the most important needs in their societies and that people can always find a way to get along if ICT use becomes a matter of "life and death".

Basic education, equipping schools with enough texts and reducing the teacher-student ratio, and seeing culturally relevant programs on television seem to be the major concerns of most of the respondents. There is also fear that the Internet could corrupt the morals of their society through easy access to pornography and other culturally "reprehensible" material. The use of ICTs for interactive education, for pedagogy that leads to communication and information richness is not yet adequately understood or developed.

ICTS AS APPROPRIATE

However, even with these words of caution, in Africa and Asia-Pacific, almost every interviewee considered ICTs as appropriate to their society for various reasons, even in the face of poverty. The reasons were as follows: for Africa,

- ICTs were generally seen as the basic tool for survival in the next century;
- ICTs were seen to enhance efficiency in the workplace;
- there was a high belief in ICT ability to increase the ease and speed of social communication and at the same time obviate the problem of transportation;
- ICTs help solve socio-economic problems;
- among university academics, ICTs help them reach out to colleagues in other parts of the world and keep them up to date with developments in their disciplines;
- there was the belief that ICTs help to monitor crime in society, and
- there was the ultimate belief that ICT usage will make Africa to become part of the global trend.

As one respondent commented:

They help to do things better, they show a measure of development. And if we're going to be plugged into the world, particularly in the next century, on the continent of Africa and..., we necessarily must be part and parcel of the information age. And information technology is an imperative that Africa would miss at its own risk.

In the Asia –Pacific countries studied, specific reasons for the use of ICTs included:

- online technology enables local doctors to consult with their international colleagues and other doctors in the scattered island communities;
- the most appropriate technologies were seen as the ones that enabled the communities and organisations to communicate more efficiently (example was given of e-mail);
- ICTs promote distance education at all levels;
- instantaneous availability of data through ICTs;
- the future of education is heavily dependent on ICTs;
- Internet access helps productivity, innovation and entrepreneurship to flourish;
- ICTs are useful for job search by youths; and
- ICTs are essential for the knowledge era.

As respondents said:

… we can't deny that the next century would be a knowledge century and the world is developing towards becoming more and more knowledge-intensive, and IT will be the technology for development of four aspects of man's activities: industry; manufacturing services; farming, agriculture and fisheries; and health services. (Phil/WP)

I'd say it's appropriate. I'd like to be in touch with the world pretty much instantaneously… I think the Internet is the most appropriate new ICT to develop because it's information as you require, when you require it. (Fiji/TP)

INHIBITING FACTORS

Against the background of the perceived appropriateness of ICTs to Africa and Asia-Pacific, the crucial research question was: why are these technologies, given their usefulness, not yet commonplace in all the countries we studied? Among the African respondents, a wide range of factors inhibit the widespread introduction and use of the new technologies. These factors include:

- ignorance about the importance of and need for ICTs which makes even those rich enough to acquire them apathetic to ICTs;

- general poverty which leads to the perception of computers, for example, as alien and luxury acquisitions;

- poor maintenance and repair culture in which spare parts and technical 'experts' from the manufacturers are imported whenever the technologies break down; this leads to waste of resources, time and money;

- poor infrastructural support base; examples include inefficient electricity and telephone systems;

- lack of support from the government leading to underfunding of science and technology programmes in tertiary institutions;

- illiteracy and lack of basic computing skills; these two points are closely related -- in the African countries studied, tertiary institutions are funded by government and it follows that where government is apathetic to the need for ICTs, the educational institutions will not be provided with adequate funds to acquire and teach these technologies;

- lack of a science and technology policy; this has consequences at two levels – lack of policy impedes the growth and development of a culture of science and technology, and also, at the educational level, downplays the significance of science and technology in the perception of students); and

- the absence of democracy which feeds political unrest and the unwillingness of foreign investors to invest in the area of ICTs.

- perception of the technologies (example, computer) as a status symbol or statement of one's hierarchy in society.

Thus in Africa, ignorance is far more major obstacle and those aware, mostly the educated and literate people in the private sector, say as much as they appreciate the need and importance of ICTs, the economic situation in their countries and general poverty make it difficult for people who need these ICTs to acquire them. In Ghana, for example, the per capita income is US$400 and the average cost of a computer (plus modem and telephone line, etc) is US$1500. Also in Nigeria, to acquire a computer/modem, ISP subscription and telephone line would require the total annual income of a graduate. Compared to the Asia-Pacific countries studied, more people in Africa see the need for these ICTs inspite of traditional ways of doing things but are hampered by poverty.

What are the reasons for their lack of diffusion in the Asia-Pacific? A range of factors were seen as inhibiting the use of new ICTs.

- high cost of the ICTs leading to restriction of access to the new technologies;
- conservative attitudes – people are comfortable maintaining the status quo, doing things the way they are used to;
- lack of deregulation and government legislation which gives monopoly to a few information technology companies;
- poverty and harsh economic climate;
- infrastructural problems such as inadequate telephone lines and lines cutting off when someone is logged onto the Internet;
- health and social welfare commitments undercutting attention to ICTs;
- lack of basic education and computing skills;
- political culture which discourages open sharing of information (Philippines)

On the whole, in all the countries and regions we studied, we found that ICT growth and development are being driven by the private sector – private businesses -- with token support from the government. Many saw the future of ICTs as positive and believed that their use in health and education could be quite dramatic. Mind-boggling, with only our imagination as limits was the type of language used by participants.

Developing African and Asia-Pacific countries are caught in a Catch-22 situation: without using these new technologies, their future generations will further lag behind and will find themselves further impoverished. If they use these technologies without addressing some of the concerns and needs of their societies, they could be placing their carts before their horses. What is needed most is effective and efficient, not to mention wise, telecommunications and culture policy, as well as research that informs such policy.

The new communication technologies have their strengths and drawbacks, they should not merely be seen as apolitical tools but as embedded in culture, politics and our mutual futures.

IMPLEMENTATION RECOMMENDATIONS

Moving this research to the implementation phase, we recommend the following:

- Implementation must be linked to local problems, specifically to poverty alleviation. This linkage must be direct, showing stakeholders the benefits of using ICTs for economic growth.
- Implementation must also show how ICTs can transform education, making it far more interactive and empowering for students and professors/teachers. CD-ROMS and access to the web must not only be inexpensive, but as much as possible be locally driven, based on local content.
- Implementation must help transform users of ICTs in Africa and the Asia-Pacific region from consumers to producers of new knowledge and wealth. Dissemination of hardware must include software support, institutional linkages, and servicing. This must be done in the context of local cultural practices including those that inhibit ICT use (hierarchical institutional practices).
- Implementation must occur within a policy context guided by participatory action research, where all stakeholders in an iterative manner define their needs, goals and concerns.

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Preamble

This is a report of a UNESCO-sponsored study of four African countries and two Asia-Pacific countries. The countries in which this study was conducted are Cote d'Ivoire, Ghana, Nigeria, Uganda (Africa), Fiji and the Philippines (Asia-Pacific). The study was conducted over the period January 1998 and April 1999.

Aims

The study aimed to determine the:

- specific ICT needs of Africa and Asia-Pacific regions;

- current status of the emerging technologies and plans for their diffusion;

- appropriateness of ICTs to cultural, regional and national contexts and their replicability across geography and culture; and

- problems and opportunities associated with ICT diffusion in the two regions

- perceptions of the likely futures of ICT diffusion.

Research Methodology

This study adopted an interpretive research strategy which allows a researcher to interact with a social group being studied as well as enable the researcher to observe and record the processes of decision-making and social practices. According to Fetterman (1989), "the ethnographer conducts research in the native environment to see people and their behaviour given all the real-world incentives and constraints... Understanding the world -- or some small fragment of it -- requires studying it in all its wonder and complexity" (pp. 41-42). Patton (1990) vividly describes the situation thus: "The neutral investigator enters the research arena with no axe to grind, no theory to prove, and no predetermined results to support. Rather, the investigator's commitment is to understand the world as it is, to be true to complexities and multiple perspectives as they emerge, and to be balanced in reporting both confirming and disconfirming evidence" (p. 55).

The four African and two Asia-Pacific countries selected for the study were chosen purposively. Owing to funding problems, we could not conduct the study in as many Asia-Pacific countries

as we did in Africa.

Despite its political problems, Nigeria is regarded as a major economic and military power not only in the West African sub-region but also in the whole of Africa. It is also regarded as the most populous country in Africa. It was thus chosen for inclusion in this study. Our question was: To what extent have the ICTs impacted on the country's sociopolitical and economic development?

Ghana is one of the emerging economic success stories in Africa and it was thus considered appropriate to investigate the status and impact of the new ICTs in such a country. Similarly, Uganda is regarded as one of Africa's economic success stories under the leadership of President Yoweri Museveni and thus it was included in the investigation of new ICTs have impacted or are impacting Uganda's economic development. Cote d'Ivoire -- formerly known as Ivory Coast -- is a major French-speaking country in the West African sub-region and was included as well. The Philippines was included because of its strong non-governmental organization culture, in the hope of better understanding of how ngos view ICT use and diffusion. Fiji was chosen, both for its multicultural mix, as well as for its housing of the University of South Pacific, the premiere university in the Pacific.

People interviewed in the African countries included Internet Service Providers (ISPs), communication and computer science academics in leading universities, computer and telecommunications equipment retailers, government policy makers in ministries and agencies, and editors of major newspapers. In Fiji, we also interviewed an official of Telecom Fiji Ltd., an information technology official of the University of the South Pacific, a manager of Fiji TV Ltd., a managing director of a technological company, five secondary school teachers, five postgraduate students and five business women. In the Philippines, we interviewed a former secretary of science and technology in the previous Philippines government, an official of the Philippine Greens, a program manager in a United Nations agency in Manila, president of one of the local universities, and an official of the national computer centre. As a condition for agreeing to be interviewed, some of the respondents in all the countries requested anonymity either due to the sensitive positions they occupied in government offices or because they did not want to be identified. We have tried to protect the identities of the respondents by referring only to their country of origin and not by their real names whenever a comment is reproduced in the analysis section of this report. A total of 47 people were interviewed in the four African countries while 24 people were interviewed in Fiji and the Philippines.

Methods of data collection

The methods used in collecting data for this study consisted of semi-structured personal interviews, focused group interviews, examination of historical documents and personal observation. The adoption of multiple methods or triangulation in social research has been endorsed by various researchers because they help to overcome flaws inherent in the use of one method. For example, Patton (1990) argues that "Combinations of interviewing, observation, and document analysis are expected in much social science field work." He argues that studies which adopt only one method "are more vulnerable to errors linked to that particular method... than studies that use multiple methods in which different types of data provide cross-data validity checks" (Patton, 1990: 187-188).

Research questions

The major questions that underpinned this study were:

- Do ICTs transform the debate on educational and development theories and practice? In other words, do they challenge or reinforce the old paradigms of development?

- What are the ICT needs of Africa and Asia-Pacific countries?

- What is the current status of the emerging technologies and plans for their diffusion in these regions?

- How appropriate are ICTs to cultural, regional and national contexts and their replicability across geography and culture;

- What sociocultural and economic factors enhance or inhibit the use and adoption of new ICTs? and

- What are the problems and opportunities associated with ICT diffusion in Africa and the Asia-Pacific?

- What are the futures of ICTs in Africa and the Asia-Pacific, and are there differences between preferred and likely futures of ICT development?

Literature: overview

This review examines current arguments and debates concerning the impact, real and imagined, of the new information and communication technologies in developing societies, in particular Africa and the Asia-Pacific region. Given the rapid changes in the nature and structure of the ICTs as well as the claims and counter claims about the impact of ICTs on socioeconomic development, a review of this nature is important to help policy makers and organisations committed to the development of Africa and the Asia-Pacific region to separate fact from wishful thinking and to focus on the most useful and practical strategies and technologies. While there is evidence of the usefulness of ICTs in many developed societies, questions of their appropriateness in a range of situations remain. In other words, are the new ICTs appropriate for every developing society, in particular Asia-Pacific region and Africa? If they are, which strategies and which particular ICTs are more effective for educational purposes and for socioeconomic development?

The new information and communication technologies (ICTs) are widely perceived as major tools for kickstarting ailing economies and consequently assist developing societies `catch up' with the developed world, including those groups that have lost out of the mainstream of development. To what extent do the new ICTs facilitate the education of the mass of people in Asia-Pacific region and Africa, and uplift the conditions of disadvantaged groups in these

societies? Do ICTs allow them to empower themselves without having to lose their unique cultures, that is, without having to develop? Indeed, are the new technologies appropriate for the development of traditional societies? Do they (ICTs) fit the local indigenous cultures? In essence, will the new ICTs launch these societies and communities thereof on the path of socioeconomic development or will they subject them to further dependence? For example, it has often been argued that, without the successful adoption and implementation of the new ICTs in the developing world, future generations in these societies will further lag behind. However, research is yet to inform on the problems and opportunities of ICTs adoption. These questions are examined in this review essay.

The emergence of the new information and communication technologies (ICTs) -- examples include the Internet, computers, interactive multimedia systems, and digital telecommunications -- has dramatically altered theoretical and practical assumptions about the role of communication technologies in development. Today, the role of the ICTs in developed and developing societies has become the subject of academic focus and research, regional and international seminars and conferences. As the new millennium approaches and as we contend with the expanded uses of the information superhighway, the interface between communication and development calls for serious reconsideration. While advocates are hopeful that the new technologies would provide urgent solutions to present and future problems, pessimists disagree, pointing to the dangers and pitfalls of the new communication technologies, such as: (1) the marketing of pornographic products on the Internet; (2) the damage to children in terms of creating a virtual world divorced from nature; (3) the perpetration of organised crimes; (3) the likelihood that they may widen the existing gap between the `information rich' and the `information poor', and; (4) further cultural impoverishment by continuing the one-way communication between North and South. More centrally is that ICTs create an information based economy and not a communicative society (Inayatullah and Leggett, 1999).

Background

Long before the emergence of the new information and communication technologies (ICTs), communication and development scholars had argued that there was a strong link between communication technologies -- especially mass media technologies -- and level of socioeconomic development in a country. Hence, the mass media of radio, television, newspapers and magazines were regarded as the drivers of socioeconomic development. Leading this campaign were communication scholars such as Everett Rogers, Wilbur Schramm, Lucian Pye, and Daniel Lerner among others. According to their views, a certain number of mass media channels were required in every developing country that wished to be developed. This argument was based on the assumption that the mass media carried within them elements of modernity. As early as 1958, Daniel Lerner had argued in his seminal book -- *The Passing of Traditional Societies* -- "No modern society functions efficiently without a developed system of mass media" (p. 55). In a similar tone, Lucian Pye stated:

> It was the pressure of communications which brought about the downfall of traditional societies. And in the future, it will be the creation of new channels of communication and the ready acceptance of new content of communications which will be decisive in determining the prospects of nation-building (Pye, 1963: 3)

As a reflection of the mood of the era, the United Nations Educational, Scientific and Cultural Organization (UNESCO) recommended, in 1961, a minimum mass media target for developing countries. According to UNESCO, "Every country should aim to provide for every 100 of its inhabitants at least 10 copies of daily newspapers, five radio receivers, two cinema seats and two television receivers" (quoted in Yu, 1977: 177). A major assumption underlying this view is that mass media messages reach all segments of a society and that messages, once received, will impact on the greater population in the same way as was intended by the mass media. However, research evidence has shown that there are factors which limit access to mass media in the rural communities. There are also social and cultural factors which mass media messages must overcome before such messages are accepted or rejected in traditional societies (see, as examples, Grunig, 1971; and Reddi, 1989).

Against this background, it was widely assumed that the mere presence of the mass media led to the transformation of societies and individuals. According to Shore (1980), what was needed in this perspective was to "change the attitudes, values and aspirations of the individuals in the population; from that would result the benefits of modernization with which such change was identified" (p. 20).

It did not take long, however, for communication scholars and world leaders to realise that the link between mass media presence and socioeconomic development could also often be negative, especially in developing societies. According to Lerner and Schramm:

> Throughout the less developed regions, people have been led to want more than they can get. This can be attributed in part to the spread of the mass media, which inevitably show and tell people about the good things of life that are available elsewhere ... As people in the poor countries were being shown and told about "goodies" available in developed countries, they were also being taught about their own inferiority -- at least in terms of wealth and well-being. Recognition of the disparities between the rich and poor countries produced among some a sense of hopelessness, among others a sense of aggressiveness. Both apathy and aggression usually are counterproductive to genuine development efforts (Lerner and Schramm, 1976: 341-342).

Despite the weaknesses in the earlier theoretical assumptions, compelling arguments remained for assuming that new communication technologies hold the key to socioeconomic development of many societies. For instance, advocates of ICTs point to how the Western world experienced the impact of industrial technology and found it to be an indispensable tool of development. The belief then was that if industrial technology aided the socioeconomic growth and development of Western nations, it should also propel socioeconomic growth in developing nations. As Ashby *et al* (1980) explained: "Industry, especially capital goods industry, was viewed as the leading growth sector of the economy. Rural society in low-income countries was viewed as economically stagnant and culturally tradition bound" (p. 154). As the rural individual was perceived to be traditional, it followed, according to the dominant Western perspective, that the first objective in any program of development will be to transform traditional societies to `modern' ones. Against this background, a major question arises: do new ICTs hold the key to the transformation of developing societies? In other words, do they (ICTs) challenge or

reinforce the old paradigms of development?

It is not everyone that is overly captivated by the magical effects of the new ICTs. Some have counselled caution over expectations from the new communication technologies. For instance, Kryish (1994) cautions that current predictions for the information superhighway are distinctively similar to predictions made about Cable television in the USA two and a half decades ago. In each era, Kryish argues, advocates depicted the technology as `revolutionary', predicting that traditional methods of work, play, learning, and commerce would be transformed; that people would carry out their activities in the comfort of their homes, and that the new technologies would provide answers to all problems (Kryish, 1994). Kryish contends that as US Cable TV did not develop as expected, people should not rely too heavily on arguments which promote new technologies as autonomous, revolutionary and utopian. New technologies exist in certain political and social frameworks, they are embedded, and thus the ways in which they change society are based on these cultural codes. New technologies might make it easier, for example, to work from home, however, this ignores the social function of work, of a place where individuals meet, make friends, find identity. Telecommuting, thus, while transport efficient, may continue the cultural impoverishment, the anomie, that individuals face in large cities (Inayatullah, 1998)

In an analysis of the technological adaptation process of the Maori of New Zealand, Schaniel (1988) explains that new technology may create change in society, and that the direction of change is determined by the nature and function (use) of that technology in the adopting culture (1988: 493-498).

Uses of the new technologies

Tehranian (1990) argues that the new technologies, like the old, should be viewed neither as technologies of freedom nor of tyranny, but basically as technologies of power that lock into existing or emerging technostructures of power. He believes that information technologies play a dual role in society. On one hand, they open up opportunities for centralisation of authority, control and communication typical of the modern industrial state, and on the other hand, they supply alternative channels of cultural resistance and ideological mobilization for opposition forces. The `Big Media' (such as national press, broadcasting and mainframe computers) are identified with the centralising forces while the `Small Media' (such as the alternative press, small scale audio visual production and transmission facilities and personal computer networking) provide the avenues for community resistance and mobilization. On this basis, one can argue that the new communication technologies serve the interests of both the privileged and the underprivileged classes in society.

In a related sense, Stevenson, Burkett and Myint (1993) argue that the new communication and information technologies can strengthen the centralised industrial, command economy or decentralise empowerment for finding creative solutions to local and global problems through new social technologies. Increasing globalisation, facilitated by the new technologies, has brought about changes which flow through to local communities. Paradoxically, however, these local communities are forced to make international connections in order to solve local problems.

Technologies and development

The link between technological growth and socioeconomic development is hinged on various arguments. McQuail (1987), for instance, contends that "One clear promise of the new technologies is an increase in communication of all kinds, between individuals and also between persons..." But this argument overlooks the fact that before increased communication can take place, the communicators must have access to the new technologies or must possess the werewithal to purchase the communication tools.

Some researchers have also indicated the need for the new ICTs to address problems of human needs. For instance, while highlighting the significance of telecommunications technology for "some new means of bringing people together", Stevenson (1991) wonders if the new telecommunications technologies, monopolised by the privileged industrialized world, will be "enough to address the world's most serious problems of poverty, hunger and alienation." The implication is that new communication technologies which do not address immediate human needs are not quite useful to human society no matter how effective they may be in increasing communication among people.

Africa's dilemma

In Africa and elsewhere, arguments as to whether the continent should acquire the new communication technologies have assumed robust dimension. The major issues centre around the question of priorities. Is it appropriate for African leaders to ignore the basic needs of their people and hop onto the bandwagon of the new communication technologies? Will acquisition of new communication technologies transform African economies, lead to greater food production and improved quality of life, health and housing, overcome poverty and illiteracy, and end internecine civil strifes? Indeed, can Africa thus afford not to adopt new ICTs?

In a world in which the developed and developing countries pursue different goals and priorities based on the different levels of their technological endowments, the new communication technologies are bound to be viewed with both optimism and suspicion. Indeed, it was former president Julius Nyerere of Tanzania who painted a grim picture of the African scene when he reportedly said that while the industrialised world may be travelling to the moon with ease -- as a result of their technological advancement -- African leaders are still grappling with the problem of how to reach their people in the villages.

Taking the Internet and other emerging electronic networks as an example, Jegede (1995) doubts their ability to accelerate Africa's development even as he recognizes the need for Africa to share information and ideas with the rest of the world.

> If we had everyone in Africa electronically networked today, it would not necessarily develop Africa. In fact, what it would do, and appears to be doing at the moment, is divert attention from all other problems of development making people believe that getting hooked to the superhighway is the panacea for Africa's problems (p. 221).

Jegede strengthens his case by citing some disturbing statistics about Africa. According to him:

Three quarters of Africa's population is illiterate (so hooking them to the Internet is out of the question); three quarters of Africa is rural without basic facilities of electricity and telephone (so hooking up to the Internet can only be restricted to the urban areas); three quarters of universities in Africa have depleted library resources, have overworked academics and run computer science departments without computers ... and there are currently 200 million personal computers world-wide but less than one percent of them are located in Africa... (Jegede, 1995: 221).

Although Jegede's views may sound grim or irredeemable, they present an idea of the scale of problems facing Africa in the sphere of communication technologies alone.

Nonetheless, there are individuals who do not share Jegede's pessimism. Djamen *et al* (1995) have argued that "Electronic networking will not only enable Africans access global data but will also help the entire world to access information on Africa in Africa. Thus, the present situation in which Africans do not directly control their own data would be reversed" (pp. 228-233).

Beyond the question of data generation and security/protection, Odedra-Straub (1995) argues that electronic wiring of Africa and the subsequent easy access of Africans to various networks, including the Internet, would not "necessarily mean that the technology and easy access to information will automatically have a positive impact on the development process of Africa" (pp. 225-227). She points out that the adoption of the new technologies in Africa would not be simple and would require "skilled human and financial resources, ... in addition to changes in the social, cultural, managerial, political and organisational `environments'" (p. 227).

Perspectives from Asia-Pacific region

With particular reference to the Philippines, de Ayala (1996) foresees changes to large and small scale business processes brought about by the new technologies. Not only will consumers be in closer contact with suppliers and producers, the new technologies will also eventually lead to better educated, more knowledgeable, more critical but less loyal customers. The downside of this development, in a developing economy such as the Philippines, is that the fledgling domestic national markets may be stifled by regional trading blocs and international markets which promote intense competition. On a similar note, Chin (1995) believes that the development of information technology infrastructure in the Philippines rests on the national plan (NITP 2000 program), the objective of which is to create a well-informed computer literate society capable of using information technology as an everyday tool to enhance work and living.

While outlining the enormous potential of the Internet to promote Pacific Islands products and tourism in a global market, Lomas (1995) states that very few people in the Pacific Islands have access to the Internet. Access, availability and efficient services are the telecommunications concerns for widely scattered islands of the Pacific region, some of them with rugged terrain.

Regulating the new communication technologies

Although many governments may be giving top priority to acquisition of the new technologies

because they are perceived as pivotal to overall development, there is however a growing anxiety or unease among these governments to curtail the use of the technologies by groups engaging in unauthorised conduct or groups which challenge the authority of various regimes. "Many Asian governments share the dilemma of desiring to control the distribution of information whilst recognising... that national economic and technological development requires increasing access to broadband networks and the information they provide" (Lambert, 1996). However, these same governments "feel profoundly threatened by the concept of a medium in which they cannot control access to information..."

The question of controlling access to the new technologies is not peculiar to Asia alone. An attempt in 1996 by the United States government to ban "indecent" materials on the Internet was rejected by a US federal judge who ruled that the Internet deserved protection from government legislation. The US government however indicated it would appeal the ruling. At issue here is the challenge posed to individual freedom to communicate as against the desire of various governments to control the moral content or `political correctness' of what is communicated.

Questions of access

Whatever may be the advantages of the new technologies, the problem of access remains a major concern. Just as access to the mass media is limited in rural areas of developing countries, so too will access to the new technologies be limited to a few affluent people, due mainly to the high costs of the new communication technologies. Take for example a developed country such as Australia where the question of access to the new technologies has resurfaced following the emergence of digital video communication (DVC). On this, Lennie (1993) observes that potential questions about its use as a new form of interactive television and associated home information services have arisen as a result of the anticipated high cost of DVC for domestic consumption and the increasing privatisation of such services. These imply that disadvantaged groups could have reduced access to information and other needed essential services. At stake here are questions concerning access to and uses of the new technologies, the ability or inability of average citizens to acquire them vis-a-vis the high cost of the new technologies, and their broader impact on socioeconomic development.

Apart from the question of access, fears also exist about the impact of the new technologies (especially satellite technology) on authentic local cultures and national sovereignty. This worry is based on the ground that the new communication technologies are not value-free because they come packaged with the value orientations of their manufacturers (see, for examples, Moran, 1994; Oliver, 1994).

Nature of work and living

Beyond these issues, uncertainty still surrounds the extent to which the new technologies are able to address problems of society. Goodloe (1991) adopts a positive attitude to the new technologies, believing, for instance, that a proliferation of computers will lead to efficient operation of government departments in developing countries and also assist in information democratisation as the new technologies become more accessible to a greater number of people. He however fears that the new communication technologies could lead to massive loss of jobs. Geyer (1992) echoes the same view, pointing out that, although computers have revolutionised

the mode of education and training, health and medicine, transport, agriculture, sport, and entertainment, certain fundamental and worrying questions remain. For example, what would happen if fewer people produced more goods and services due to the impact of new communication technologies? Furthermore, if people work from the comfort of their homes (telecommuting) with the aid of the new technologies, how would this affect family and work relationships? (Geyer, 1992). Certainly, these questions touch on how the new communications technologies will affect the nature of work and living.

Gender and new technologies

While examining the role of gender in the new communication technologies, Lennie (1993) argues that, although research into communication and information technologies has largely ignored or marginalised gender issues, the active involvement of women in the design of the new technologies may lead to creative and empowering uses for emerging communication technologies. Inayatullah and Milojevic (1999) agree that even though the Net comes to us a language in which woman are generally silenced, women can develop new software that is more woman friendly, as well change the policy priorities of development, to help the Net move away from its toolcentric approach. Also, Stevenson and Lennie (1995) analyzed emerging 'Communicative Age' designs in the context of competing pressures to continue the current technology-driven systems, and to replace nature entirely through new technologies. Among the strategies they developed for creating a `Communicative Age' are the greater involvement of women in creating alternative designs for communication and information technology, relearning the art of conversation, and using action learning and foresight.

Superhighway and public expectations

One aspect of the new communication technologies which has raised and perhaps dampened expectations is the information superhighway. Nowhere is the desire to develop the highway more urgent than in Southeast Asia where many of the governments are now investing in high technology industries. These countries perceive broadband telecommunications and interactive multimedia as pivotal to the restructuring of their societies (Langdale, 1995). For countries with major export-oriented telecommunications equipment industries (examples include Japan, Taiwan and South Korea), Langdale states that the need for an innovative domestic telecommunications services industry cannot be overstated. The objective is to open up markets for their national equipment manufacturers. Langdale (1995) also believes that interactive multimedia is likely to provide a major global market for equipment manufacturers in the future.

A report by an expert group in Australia (Broadband Services Expert Group, 1994) states that multimedia and new communication technologies offer opportunities to expand access to cultural collections and events by creating new cultural products and services. According to the report, the new technologies will, over the years, benefit humankind, in museums and galleries, health centres, homes, offices, factories and classrooms. Japanese authors Esaki and Kaneko (1993) echo a similar view, predicting that, in the coming century, new technologies such as digital computers and digital TV will become common household communication tools, making multimedia interaction easy.

Mandeville (1995) reports that while the information superhighway consisting of new

telecommunications infrastructure is gaining widespread usage among businesses and households in urban Australia, the rural areas are yet to be serviced by or introduced to the superhighway. The implication is that the regional and rural areas which produce a significant percentage of state GDP "could increasingly be left out of information age developments." Of what use therefore is the information superhighway if it ignores the needs of the rural and regional people who generate about 40 per cent of the state's gross domestic product? In a related study, Hearn *et al* (1995) observe that Australia's telephone system which is moving away from the old analog based service to one that involves computer processing, software and databases, as well as digital switching and signalling, is raising a groundswell of concerns about issues relating to privacy and consumer protection from the misuse or unauthorised use of personal information made possible by the network's capacity for information storage and retrieval.

Melody *et al* (1992) argue that technological improvements to the telecommunications network have opened up new opportunities for the provision of services that can make callers more informed and allow many services to be provided more efficiently. However, the new developments also raise questions about inappropriate use and misuse of personal information, privacy and censorship, consumer protection and competition. These questions are: Who owns the valuable information about the calling habits of individual customers? Who should get access to it? How should it be used? Should it be restricted? If so, how? (Melody *et al*, 1992). The authors believe that the resolution of these issues will help shape the future information society.

ICTs and national sovereignty, language and culture

In an analysis of international satellite television broadcasting, Sinclair (1995) notes that satellite distribution is purely an 'international' means by which signals are spilled across national and international borders. In this connection, he believes that the concerns raised by various countries about national sovereignty and the subsequent attempt to control reception are mooted by the fact that dishes and cable systems flourish beyond their control. In this new satellite business, language and culture have become powerful forces in making and breaking international markets. According to Sinclair, service providers in Asia have found that they have to take account of linguistic, religious and other cultural factors in establishing their markets.

On the subject of language, Lambert (1996) observes that "access to the Internet depends not only on ready access to terminals, efficient phone lines and telecoms infrastructure but also a working command of English, the language of cyberspace... Without this, negotiating one's way through all the various interfaces on the Internet and accessing information is very difficult." He noted how lack of familiarity with English, the major language of the Internet, has affected the extent to which the Japanese use the Internet compared to the massive use of the Internet in Singapore -- "where English is an official language". Abidi (1991) has argued that by use of the dominant languages not only in the Internet but also in the mass media, indigenous languages are suppressed and hence local cultures and traditions are rendered subordinate to the cultural images that are depicted in powerful foreign media. In this context, the media audience in developing societies are turned into passive participants. Of course, there is considerably more freedom in ICTs since the Net is decentralized, allowing individuals from all over the world to have a web site. However, having a web site should not been as a replacement for structural

inequity in the world system.

The relevant question at this point is: do modern mass media promote multiculturalism or the predominance of one culture? There is a wide range of views representing the concerns of the developing and the developed worlds. From the perspective of developing countries, what audiences receive from the mass media are merely what the western world, the network owners, want the people to get. For instance, Plange (1993) argues that television and video tend to be laden with foreign (western) values and that greater consumption of broadcast and taped (recorded) programming affect societal attitudes, family, and employment routines. Ogden (1993) however argues that in the Pacific Islands, assessing TV and video to help analyse social and cultural impacts of new technologies is very difficult in countries undergoing rapid change and subject to massive foreign influences. But Varan (1993) believes that television has widened the economic gap between the rich and the poor. For Stewart (1993), transnational consumerism is encouraged and strengthened as the media (TV) advertise mostly imported products. A similar view is held by Dunleavy, Hearn and Burkett (1994). They argue that the mass media are deeply interwoven with the consumer economy through the shaping of recreational tastes and activities and these in turn feed into patterns of consumption.

Fundamental change is thus needed, argue many theorists. Inayatullah and Milojevic (1999) have argued that we need to search for ways to transform information to communication (going far beyond the interactivity of the web) creating not a knowledge economy but a communicative economy, where differences are explored (and sililoquy posing as connection with the other is exposed). This is a vision of a future where conversations help create a gaia of civilizations. Central to this challenge is rethinking "information", moving it outside its limited rationalist discourse and entering other ways of knowing, primarily those of women and other cultures. This means not merely the traditional map of data-information-knowledge and wisdom but the inclusion of social transformation or a new world order and transcendence, the metacultural dimension of the spiritual. It is the latter which gives space and foundation to the creation of a new collective consciousness; a creation which the Net can possibly play a role in birthing.

Virtual reality and challenges of the new technologies

Modern communication technologies affect not only grand issues of civilisation, of meaning, as well as cultural values and consumption habits, but also specific arenas such as our sense of travel and tourism. For example, virtual reality, facilitated by new communication technologies, promises to transform tourism, creating a virtual self in which "there is no longer any place" (Inayatullah, 1993). Indeed, it is virtuality that is one of the drivers of the Information Era. In the age of information superhighway, it is now possible for people to visualise themselves in more than two locations simultaneously without physically being there. Thus, more and more people seem to be asking, "why travel, when reality and imagination are blurred anyway." Inayatullah believes that globalisation through communication technologies and deterritorialisation will create the possibility wherein "we could all become perpetual immigrants, forever travelling and never fearing deportation." These new technologies which promote virtual reality promise to dramatically change the structure, the nature and the futures of tourism. He wonders what life would be like when we travel without worrying about all sorts of official documents, visas, passports, innoculation certificates and so on. Already, new nations are being built on the web, even offering passports for their citizens. Beyond virtual reality,

advances in genetic technologies may also create two global societies, a society of people who are genetically created and another society populated by people who are born through the natural, traditional methods. Both virtuality and genetics, as they create new forms of self, silence billions of people who live in traditional "real" and "natural" worlds. ICTs thus should be seen as among a host of new technologies which are dramatically changing how we self and other.

Cheong (1995) observes also that new communication technologies have made travel systems more efficient. Many hotels now have the World Wide Web sites in the Internet to advertise their products and services. Internet advertising grows exponentially as do the values of Internet stocks on world equity markets. There is however a downside to this new development because through virtual reality, people can now realistically tour the world, experience romance and danger all in the safety of their homes or virtual reality centre. Cheong however states that virtual reality is still undeveloped as it lacks the features of smell, touch and taste and warns: "the threat of virtual reality becoming a substitute for travel is not unfounded and should not be ignored." The good side of virtual reality is that it helps to safeguard and protect local tourism ecology and landscape. The negative side is that it safeguards us from the other, from other ways of knowing, since virtual worlds are being created by software designers from one particular culture, largely from the West. There is no two way flow of design. Moreover, virtuality continues the fragmentation of the self, leading to a possible world where information and communication technologies do not help us connect and relate to others, but create further distances, seeing the other as merely a net consumer (Sardar and Ravetz, 1996; Sardar, 1998).

ICTs role in training educators in Africa

Across American higher education, for example, the lure of the new information technologies remains as uncertain as it is unsettling (Inayatullah and Gidley, 2000, in press). While few doubt that they have the potential to enhance teaching and learning, there is no agreement on how the technologies should be used to boost academic productivity (Massy and Zemsky, 1997). Indeed, generally, they are being used partly for new courseware – courses on the Net as well as the new Universities on the Net – but as well to reduce the financial bargaining power of faculty, in some ways eliminating the lecturer. There is a subtle but profound shift from pedagogy as face-to-face learning based often on information transfer but as well as the communication between professor and student to pedagogy qua distant learning. One possible future is that the professor becomes mentor with rote information based learning done through the Net. This scenario would free the professor to focus on communication and learning. Alternatively, boring lecture notes may lead to even more boring Net learning, with the Net used merely as cost-cutting. A third scenario would see a shift away from teaching to courseware development. In any case, information search and transfer abilities of the Net are dramatically changing the nature of the university, of education. They are also changing the political relationships between faculty and management.

However, the presence of ICTs in the developing world in education and business, though not as widespread, holds greater promise, considering policy decisions and investments by various governments (Birhanu). This is because these policy makers not only have tremendous faith in the emancipator capacity of ICTs, but also because they believe that unless they become part of the global high-tech information network and system the world will pass them by (Haque, 1991:

220).

The question as to whether ICTs can really help to train educators or promote education in developing economies does not have a ready answer. There are several perspectives in the literature.

Drivers for the appropriation of ICTs

Many developing countries are increasingly cognizant of the strong and mutual dependence between economic development and telecommunications infrastructure (Birhanu). In a developing country such as India, for example, even though 10% of the workers are employed in service and information-related jobs, they account for 42% of the country's GNP, suggesting that ICTs are helping the country to progress towards becoming an information society, even if slowly (Haque, 1991: 220). Elsewhere, ICTs have been perceived as an employment creator, as in South Africa (Louw, 1996) so much so that people are being retrained and re-deployed in ICT-related jobs. Beyond the economic factors, there are several more that support the case of ICTs in development and education.

From an educational perspective, ICTs in the developing world often refer to satellite-based television, telephony, video cassette recorders, computer-based interactive technologies such as electronic messaging systems, teletext and videotext (Haque,1991: 224). Additionally, telecommunications technologies have been identified as powerful tools for helping teachers with all the different aspects of their job: enhancing instruction, simplifying administrative tasks, fostering professional growth and in some cases, their own personal productivity (Abi-Raad, 1997: 207-208). Some teachers find that using various technologies allow them to teach in entirely different ways (Abi-Raad, 1997). In the information age which has led to a complex social and institutional structure in modern society, one has to be a global citizen to operate successfully. This requires an awareness of information, as well as access and management of it for the purposes of basic survival (Fairer-Wessels, 1997: 5-6).

Telecommunications technologies must become an enabler of change through innovative uses in education (Abi-Raad, 1997: 211). Owing to their nature, coupled with the non-threatening environment for mistakes, ICTs in themselves offer immense benefits to students because they motivate them to study what happened, to understand what went wrong and, through understanding, to fix it. Teachers then could leverage on this strength to educate or re-train themselves, in a continual manner, even as technology keeps changing or advancing.

Other advantages of adopting ICTs in the training of teachers include, as evidenced in other related projects by IDRC (the International Development Research Council), a sense of empowerment and a new culture of communication (Graham, 1997). ICTs help promote a culture that is inclusive of diversity and collaboration, drawing on individual creativity and distinct faculties, opening 'new worlds to teachers who seek new ways to help students go beyond the classroom, their school, their community and their culture' (Justice and Espinoza, SITE 96, 1996). In Africa, emerging electronic messaging and educational technologies also provide a greater number of people with instruction and also offer an opportunity for various types and levels of co-operation between various institutions (Dzidonu and Reddy, 1997).

De Voogd (1996) believes that ICTs make collaborative learning and sharing of power and control that allows learners to learn in accordance with their own cultural style (De Voogd, SITE 96, 1996). In teacher training in the West, ICTs' application to open and distance learning seem to be an international trend (Haugen and Ask, in Willis and Isleib, SITE, 1996). Teacher trainers have a responsibility to investigate and be open-minded with respect to these new possibilities in the developing societies, to the extent that these may be transferable.

For Africa, the information revolution offers a dramatic opportunity to leapfrog into the future, breaking out of decades of stagnation or decline (Hegener; and Grebreysus). Hegener has highlighted, in particular, the role of e-mail through a feasibility study and the conclusion was that for African universities, e-mail was the mode of telecommunication of the future. In recent years, the speed and efficiency of communication and access to information via e-mail has significantly improved in certain countries like Ethiopia. Application of this technology in teacher training in Africa cannot be ruled out. It might well serve as a starting point. Most importantly though, as the literature suggests, the opportunity to adopt communication technologies must be seized by African educators and universities to avoid being marginalised.

Barriers to the appropriation of ICTs

Currently, the barriers to adoption of ICTs both in business and education are overwhelming. However, there is hope in that measures to overcome these have been identified as well, though a lot of them have to do with developing 'cultures' and tailoring tools to fit in with the needs of the same (Abi-Raad, 1997: 211-212; Birhanu), particularly in the developing world.

In a broader view of the developing world, an added barrier to the appropriation of ICTs in business or otherwise is the limited access to and use of the media, except for radio (Haque, 1991: 220). Most countries are poor and also suffer from extreme disparity in income distribution, with a variety of reasons for income inequality such as highly unequal ownership of and access to land, a social structure that has excluded people from employment or other means of production either due to their colour, caste, religion or ethnic background, worsened by the brain drain in an intra, inter-regional and international scale of their talented or skilled workforce (Haque, 1991).

Further to this is the naive faith of policy makers in the developing countries in the efficacy of media technologies. They do not take into account nor consider the 'macro-level contextual dimensions' of their societies. There are important differences between the conditions and configurations in which the technologies are developed in the West and the conditions in which these technologies are transplanted (Haque, 1991: 222).

For now, let us consider the problems in African industry. In the employment sector in Sub-Saharan Africa, full Internet capabilities have become available in Ghana, Nigeria, Kenya, Mauritius, Mozambique and six other countries. The Ntsika Enterprise Promotion Agency has begun negotiations with various parties that could provide ICT services, and policies are slowly beginning to emerge (Louw, 1996). The problems are many. In brief, delays are caused by a lack of funding. Other factors include governmental regulatory policies, expensive telecommunications services, expensive equipment for smaller business firms, little technical support and under-serviced rural areas (Louw, 1996). Others include the unavailability of

experienced and talented software personnel, management personnel trained in modern business management, a small and parochial private sector, a small and weak middle class with very low purchasing power, the lack of appreciation of the power of information by the state, failure to treat information as a critical element in any major economic objective, uninformed resistance in government circles against investing in computers and peripherals (Gebreysus).

Peter Knight (1995) adds that in many countries in Africa inefficient monopoly state telecommunications companies are preventing further flow of information (quoted in Gebreyesus). Generally, telephone and fax are the principal communication facilities in organisations while telex and radio are available to private individuals and in international and non-governmental organisations. Home computers and e-mail facilities at home are not common in Africa.

Most of the barriers outlined above affect the role of ICTs in African education and the training of the educators. If distance education were be to be a starting point in training teachers in a highly disconnected Africa, the governance of higher education institutions and cost stand out as the biggest impediments. Additionally, there are impediments such as absence of dedicated technology champions to initiate the case of electronic distance education, resistance of faculty members to the implementation of new technologies for fear of job loss or job security and a non-existent or inadequate telecommunications infrastructure (Dzidonu and Reddy, 1997).

The choice of technology depends on the needs of students as well as the availability of resources. Any effort to transmit educational material through distance learning technologies should be realistic both technically and financially in terms of what volunteers will be able to support and deliver.

Globally, a fairly negative picture has emerged of student primary teachers' use of ICT (Robertson, 1997: 170). In the developed countries, there are many teaching aids and the very diversity of telecommunications facilities is bewildering, thus inhibiting their appropriation (Abi-Raad, 1997: 208). In Africa, despite investments in Ghana and Egypt, users are afraid to do more than send e-mail (Owen Jr., 1995).

Furthermore, technology changes more rapidly than predicted, but people change more slowly (Owen, 1995). From a cultural perspective, a major inhibitor of the adoption of new ICTs is the presence of legacy or traditional teaching approaches (Abi-Raad., 1997: 211). Also in public organisations as in educational institutions, adherence to procedures ahead of initiative and innovation, and delays in legislation and policy result in an abundance of opportunities for improvement, but a culture that makes promotion of ideas difficult (Abi-Raad, 1997). This culture needs to change. Information is not independent of the development process but dependent upon other factors in a larger political and economic context of society. One needs to examine what prior limitations exist and what preconditions are necessary for information to make a difference (Shore, 1980: 45) in the making of an ICT change conducive to culture.

Even as the above factors translate to the African educational scenario, dwindling resources which result in inability to stock libraries, laboratories, fund research, pay overworked staff who are unable to keep up with developments in their fields (Gebreysus, 1997) add to the 'lack of motivation to adapt' syndrome among teachers. A very real statement which teacher trainers

often hear is, "Why should I learn how to use this technology when I don't have the technology in my classroom, school, district, country? "(Suares, 1996).

As identified earlier, the bottomline is that African educators, ICT providers and national policy makers need to see common ground before embarking on training programmes. The literature pre-empts the need to identify a compatible culture or mindset among these people to make headway.

Significant arguments

Here two major factors can be identified: (a) The haves versus the have nots; and (b) traditional versus technological approaches to education.

The literature suggests the coexistence of both factions or forces. There is an interplay between the two, in both cases, with no one faction or force dominating the other. It may be that ICTs could help industry or educators gain from such tension by offering a facilitatory/interventionist approach in the management of continual change.

The "have vs. have nots" issue carries itself across the boundaries of the developing nations' issues to the African educational scenario. For now, let us consider this as a position relevant to the developing world. Here, the illiterate segment, mainly contained within the agrarian and industrial spheres, represent the information illiterate, poor and "have nots". They are pitted against the "information rich/haves" segment (Fairer-Wessels, 1997: 2).

Other representations of the same are the free market forces versus centralised planning, increasing number of university graduates versus increasing number of illiterates (Haque, 1991: 227). Most economically developed nations have not only achieved universal diffusion of radio and televisual media with most homes owning multiple sets, they are also adopting the other new communication technologies at an accelerated pace. Most developing or underdeveloped countries on the other hand, are struggling with the problem of how to provide the basic telecommunications services to their citizens (Haque, 1991). On this, we recall the words of Julius Nyerere on the problems African leaders are facing just to reach their people in the villages.

In Sub-Saharan Africa, it is common knowledge that by every measure, the situation is worsening. Education is no exception. The net result is an ever widening knowledge gap between the developed countries and Sub-Saharan Africa (Gebreyesus, 1997: 1).

To further carry the case, in the realms of educational methods, Abi-Raad (1997: 213) states that a tension exists between traditional and technology-based education. Although ICTs play an important role in these interactions, traditional communications continue to play an important complementary role (Graham, 1997).

An inference could be that ICTs might take on a complementary and yet interventionist role in the management of rapid change in educational institutions. It may thus both be defined by a continually changing 'culture' or mindset of educators and train the teacher through eventual appropriation. This raises the question of culture examined in the following subsection.

Implications for development policy and implementation issues

There appears to be a trend requiring every teacher to know how to use the Internet. The real problem of the impact of Internet on education is elsewhere -- giving students increasingly powerful tools is going to have an increasingly large impact on the very content of curricula (Abi-Raad, 1997: 207). The assumption that the only tools teachers have to solve problems are a pencil and a paper is going to change or will have to (Abi-Raad, 1997). It is a mindshift that is being pre-empted.

Other changes required to ease the adoption of ICTs in education would be the curricula's ability to exploit the dynamic and visual character of multimedia, classes where students can learn at different rates, schools that are more virtual places than physical buildings and a governance system that regulates new providers of distance learning services while at the same time permitting them to compete or combine with more traditional public schools.

Ideally, courseware could be designed that included many levels of interaction (Inayatullah and Wildman, 1998). Students could have access to the editor of the cdrom or the net course, as well as to authors whose works are selected, as well as to fellow students through an internet listserve. Finally, they could have direct access to the professor teaching the course. New media thus allow numerous levels of interaction. Of course, this would require the technology to use CD-ROMs and the internet, as well as editors and authors who were willing to engage with students, instead of believing that pedagogy was finished once their textbook was published.

In Africa, it might be advantageous to have a joint technical group that will assess the existing situation pertaining to telecommunications, assess forthcoming alternative technologies, architect telecommunications infrastructure, formulate standards and conduct a cost-benefit analysis to promote and show the viability of the architecture (Birhanu). Some other important criteria to abide by are access, costs, kinds of learning/instructional approaches that would best meet the learners' needs and background, appropriate technology, sustainability of such projects, transference of skills thus imparted from one trainer to another (Gebreyesus, 1997: 2).

If proper architecture, technology and policy are devised and adopted, African nations and educators can make a beginning with better training of teachers through ICTs that fit their culture or mindsets.

The Internet is an alternative; its viability ought to be checked in Africa in both business and education. Whereas previous infrastructures for information sharing stressed conduits between Africa and other continents, Internet access can enhance intra-regional collaboration among African organisations.

Evaluation frameworks

Literature suggests that projects may have several years to produce concrete results or influence policies, and it is only through evaluation that information can be obtained on the impacts (Graham, 1997). Here, a case seems to be established in favour of setting up evaluative frameworks for the impact of ICTs in teacher education. It is held that such evaluation would

help to set up periodic retraining of teachers, as well, considering growing demands for employees with diverse and continually evolving skills, unlike the industrial era when the skills needed for jobs were relatively fixed (Toffler, 1990, in Dzidonu and Reddy, 1997).

Graham adds that evaluations should be part of project design and should be conducted both to allow for on-going feedback and mid-course corrections during the life of the project and to allow for information gathering at a later date (Graham, 1997). It takes concerted effort to learn about impact.

Critiques of evaluations framed for information technology-related change in education state that the issue is a complex and challenging task (McDougall and Squires, 1997: 115). Evaluation in this area is difficult. Many traditional evaluation models are simplistic and inadequate, even misleading or even failing to capture the richness of the problems associated with the introduction, integration and institutionalisation of IT in any platform of education.

McDougall and Squires suggest an alternative model -- the perspectives interaction paradigm (McDougall and Squires: 118) for evaluation of information technology in education, which has already been successfully used in formal teacher education courses (McDougall and Squires, 1997). They have argued for a wider application of the paradigm in an IT teacher professional development context.

A limitation though is that an application of the paradigm has shown that analysis of IT teacher professional development programmes must be school-focused. However, one might consider this as a starting point for further research, in the context of issues discussed by the paper.

Alternatively, VOLN (Victoria Open Learning Network), Australia, suggests evaluation of a project by measuring it against pre-determined performance indicators, which could include the following:

- the increase in the number of learners, or the level of their satisfaction

- the increase in the number of satisfied employers, or the level of their satisfaction

- the decrease in cost of training provided

- a measurable improvement in access to the particular type of training

- increased levels of staff skills

- increased enrolment levels, measured by surveys or statistical measures

- statistics indicating that different types of clients are enrolling, and

- increased number of staff who wished to be seconded to the area (From Chalkface to Interface)

A number of the above factors are transferable to the focus of evaluating ICTs efficacy in

training educators. With respect to the African scenario, it seems from the literature that similar studies have not been undertaken till date.

Future research questions

Very little research has been written on how the use of the Internet in the classroom has affected the role/perceptions of the classroom teacher (Abi-Raad, 1997: 206). This could be a beginning to assess how close an attempt to evaluate the impact of ICTs in educating teachers is to the cutting edge of research issues in the field. Additionally, some other major questions that may be considered for investigation are:

- How are teachers dealing with the influx of telecommunications technologies in educational institutions?

- How and why do teachers use these technologies?

- In what ways, if any, can technology help teachers perform their multi-faceted tasks?

Graham cautions that evaluations should look at the role and effectiveness of ICTs but should not be founded on evaluating the impact of projects on development (1997).

Most importantly, Abi-Raad confirms that practically all research about educational technology has focused on the impact of these on students; little attention has been given to its impact on teachers (1997, p. 206). This validates the relevance of this particular project.

Research findings

The interview questions were designed to elicit specific responses with regard to the status of ICTs, the usefulness of ICTs, level of awareness and level of usage of ICTs, and the obstacles to the introduction and wider usage of ICTs, among others. With regard to the status of the ICTs in Africa (whether they are in existence or not), there was a general opinion that the ICTs are in existence and that a majority of the people are aware, although access remains a problem. The following quotations exemplify this view.

> There is awareness but, you know, awareness is just a part of the game. If you are aware of something and you don't have access to it, it's a problem. (Nig/NO)

> I think they exist here and it's like it's exploding. People are using them, stores are computerising... There are business centres all over the place doing typesetting, typing letters. (Gha/AK)

> I think all the basic facilities in the new communications technologies have been introduced in the country in the last decade. Faxes exist, electronic mailing systems and operations, the Internet is in town, several offices, private companies, government agencies, non-governmental organisations, private individuals and groups are using computers and computer-based technologies. (Gha/KK)

> There are a few installations, obviously not as much as you would find in the developed world. People are getting to it, to know them. I think, with time, they will be largely acceptable in the society. (CIv/FD)

In Fiji and the Philippines however, opinions were divided about the status of the new ICTs. While some respondents stated that ICTs have advanced in their country, others said the ICTs

are available but only to a minor segment of the population who can afford computers, who are educated enough to use computers or those who are computer literate. The following views illustrate these points.

> Internet I think like anywhere in the Pacific is only available to those who can afford a computer and who know how to use them, which is a minority. (Fiji/CM)

> ICTs are relatively well advanced in Fiji… But if you measure that against the Pacific rim countries, we're well advanced but we're obviously not up to the standards that you have say in Australia and New Zealand. (Fiji/MB)

> I see them as very limited, quite ancient in terms of, for example, the level of Internet service access we have in Fiji. We are limited to only one ISP who offers a very poor service in terms of reliability and speed, at a very high cost. (Fiji/AC)

> At the moment we are very very close to whatever is available in markets overseas… I've just been to Australia and New Zealand and some of our technologies are more advanced than theirs. I'm referring to some of the universities there. (Fiji/KF)

Similar sentiments were expressed by interviewees in the Philippines.

> The development of ICT is very uneven. It is moving and expanding more rapidly in the private sector… Government seems to be lagging behind. (Phil/PV)

> Usage is at a low level with private sector dominating the use of ICT… Usage is very low and that means two things: that market growth has great potential or that we will remain economically handicapped in terms of computers. (Phil/WP)

> We are relatively advanced compared to Singapore and Malaysia since we have Internet Service Providers (ISPs)… ICT should be introduced outside the academe and private sector. (Phil/NN)

A few issues arise from these views. In both Fiji and the Philippines: ICT growth is being driven by the private sector; outside the private sector, only a few people, those with the relevant education and money are able to buy and use the technologies.

These findings are not too different from the situation in Africa. For example, although a majority of people in Africa are aware of ICTs, there was a marked difference between the level of awareness and the level of usage. Thus, while there was evidence of awareness and presence of the ICTs in the African countries we visited, there was also evidence of low usage of the new technologies. In other words, while we found the level of awareness about ICTs to be high (many people knew about the new technologies), there was a corresponding (albeit disturbing) low level of usage of ICTs even in universities. A majority of people who said they were aware also reported that they were not in a position to use such technologies. Hence, access to the technologies was identified as one of the problems. Some may not even have seen these technologies for the first time.

> In terms of awareness, generally, I would say people are aware... if you mention anything about computing or IT, people know what it is about. But if you talk in terms of being literate, apart from the awareness,... I would say the literacy level is, maybe, let's say 50-50... Then if you move to the level of usage, that is, what is the percentage of those who are literate who now use the technology, ...that seems to be where the problem is currently. The level of usage is very low, still very low... this has to do with the fact that the technology itself is alien and we're really consumers of the technology... (Nig/CU)

> I can say that the status of information technology is barely existent. The need for it is there but the awareness isn't quite widespread enough. There are still a lot of people who are ignorant of it. There are still a lot of people who are unwilling to try it out. And there are still a lot of people who do not have the resources even when they need to try it out. (Nig/EI)

Although a majority of respondents in all African countries stated that the technologies were in existence and that people were aware, there were other views which deviated from the general trend. These stated that the people are still not aware of the technologies.

> I think in terms of awareness, it's still very poor and you can extend that also to usage and application. It's very poor. For a population of 100 million and with more than three dozen universities, you'll be amazed the total email subscription in Nigeria. It's very very appalling. At some point last year, it was only a hundred. That's a clear reflection of how poor it is. (Nig/CU)

> We're still in the dark ages; still far, far behind. Still much to be done... As at now, people have them in their homes or in their offices but in institutions where we should have them, we don't have them. Nobody knows even how to use them; the students don't know how to use them. That's basically because they don't have them. (Nig/FN)

> They are in existence but they're not technologies that are used at their optimal level. They are used for low level things: word processing, Excel, simple, simple things. (Gha/SB)

> Ghana, I think, has a dichotomy as far as these technologies are concerned. At one level..., a large number of organisations are at the cutting edge of technology. At the same time, you see a lot of organisations at the rudimentary level. So, it's very difficult to say whether Ghana is moving forward or not. (Gha/SK)

Given the level of awareness about these technologies vis-à-vis the level of poverty in all the countries that we visited, we tried to find out whether the respondents considered the use of these technologies as appropriate to their environment. There was a clear unanimity of opinion on this issue. In Africa and Asia-Pacific, almost every interviewee considered ICTs as appropriate to their society for various reasons, even in the face of poverty. The reasons were as follows: for Africa,

- ICTs were generally seen as the basic tool for survival in the next century;

- ICTs were seen to enhance efficiency in the workplace;

- there was a high belief in ICT ability to increase the ease and speed of social communication and at the same time obviate the problem of transportation;

- ICTs help solve socio-economic problems;

- among university academics, ICTs help them reach out to colleagues in other parts of the world and keep them up to date with developments in their disciplines;

- there was the belief that ICTs help to monitor crime in society, and

- there was the ultimate belief that ICT usage will make Africa to become part of the global trend.

> They help to do things better, they show a measure of development. And if we're going to be plugged into

the world, particularly in the next century, on the continent of Africa and..., we necessarily must be part and parcel of the information age. And information technology is an imperative that Africa would miss at its own risk. (Nig/EI)

Well, there is only one world and we don't have different worlds... So, we cannot stay in one corner of the globe and isolate ourselves from what is happening elsewhere... Apart from that, we also need this technology. (Gha/TM)

We cannot because, a majority of the people are poor,... forget to join the global trend. It is, in fact, to our detriment that we ignore this very important tool of modern living. There is no way we are going to remove ourselves from the global community because we are part and parcel of this world... development has gotten to a stage where info tech is the basic tool for survival in the coming century. (Nig/BO)

I believe business... needs more of these technologies because... transportation is a problem. People waste a lot of time just trying to get from one point to the other...if we are to put these technologies into place, business could move faster, people can do business much easier and make more money. (Gha/WACSI)

I think it is a relevant technology for us even in the midst of the poverty that we are in. Don't forget that increasingly the world is like a global village today and people are evolving the best ways of doing things... (Nig/NO)

I think, as technologies that facilitate communication of all sorts, they are appropriate... in terms of social communications, it is extremely useful. So, my mother doesn't have to come here any time to talk to me. She walks to a phone about a kilometre away and talks to me. So, I think that in that sense, it is useful... because they facilitate all kinds of social interaction and economic activity. In terms of education, it is useful but it is only a potential as at now. (Gha/KK)

Primarily, I'm looking at it from the point of scholarship. It is very important. You need to be current to know what is happening in the field... to be current so you don't duplicate studies; so you can also improve upon what has been done already. And that is one way to keep current. We need to reach out. (Nig/YE)

Networking is also a very key area for us because...it's important for us to be able to network. I think we... find that the information technology helps us to report better because then we are able to survey our environment better if we have a good network, and know, for instance, if there is an instance of child abuse in the north and I can pick it up on my system, then it helps me to open my eyes and see if it actually exists around this part as well. So, it helps us to monitor society better. (CIv/GA)

However, not every respondent considered the use of ICTs as appropriate to Africa, in view of the problem of illiteracy. According to one respondent, ICTs are

... not too appropriate because you're talking of high percentage of the population being illiterate. Some have not even seen, there are university students who have not even seen what a computer is like. (Gha/PR)

This point bears some resemblance to the core arguments of Jegede (1995) cited earlier in this report. According to Jegede:

Three quarters of Africa's population is illiterate (so hooking them to the Internet is out of the question); three quarters of Africa is rural without basic facilities of electricity and telephone (so hooking up to the Internet can only be restricted to the urban areas); three quarters of universities in Africa have depleted library resources, have overworked academics and run computer science departments without computers ... and there are currently 200 million personal computers world-wide but less than one percent of them are located in Africa... (p. 221).

In the Asia-Pacific countries studied, there was an unequivocal response about the

appropriateness of the ICTs. The prominent issues highlighted include:

- online technology enables local doctors to consult with their international colleagues and other doctors in the scattered island communities;

- the most appropriate technologies were seen as the ones that enabled the communities and organisations to communicate more efficiently (example was given of e-mail);

- ICTs promote distance education at all levels;

- instantaneous availability of data through ICTs;

- the future of education is heavily dependent on ICTs;

- Internet access helps productivity, innovation and entrepreneurship to flourish;

- ICTs are useful for job search by youths; and

- ICTs are essential for the knowledge era.

> … we can't deny that the next century would be a knowledge century and the world is developing towards becoming more and more knowledge-intensive, and IT will be the technology for development of four aspects of man's activities: industry; manufacturing services; farming, agriculture and fisheries; and health services. (Phil/WP)

> I'd say it's appropriate. I'd like to be in touch with the world pretty much instantaneously… I think the Internet is the most appropriate new ICT to develop because it's information as you require, when you require it. (Fij/TP)

> If ICT means having national information network, it is very appropriate considering we are an archipelagic nation with seven thousand-plus islands… (Phil/PV)

> The technologies that we are using are appropriate because we've got scattered islands and some steeper areas and the cost of cabling these areas relative to the consumer basis … is not warranted.(Fij/MB)

> … development of our Internet capacity and usage is the only way countries in this region will become more developed. I believe the infrastructure for Internet access is the number one priority for a country like Fiji. (Fij/AC)

> I think information technology now is probably the backbone for any business, education and so on… The most appropriate in terms of communication are the ones that allow the community and organisations to communicate more efficiently – for example, e-mail. (Fij/KF)

Although ICTs were generally seen as appropriate in the different sociocultural contexts, there were views which argued that ICTs were not appropriate and that focus should be on meeting the basic needs of their society. Here are some of these views which were prevalent in the Philippines:

> We are being razzle-dazzled with the technology. We need to balance that with other dimensions including the human element of technology… We should have a solid foot on the ground and know what is important. (Phil/RIS).

ICT has a secondary role. It has some use but our priorities should be in meeting the basic needs of our people…
ICT is a toy for the rich. We make it appear as if we are (being) left behind and we are poor if we do not have
ICT. (Phil/RV)

Against the background of the perceived appropriateness of ICTs to Africa and Asia-Pacific, an impulsive question would be: why are these technologies, given their usefulness, not yet commonplace in all the countries we studied. Among the African respondents, a wide range of factors inhibit the widespread introduction and use of the new technologies. These factors include:

- ignorance about the importance of and need for ICTs which makes even those rich enough to acquire them apathetic to ICTs;

- general poverty which leads to the perception of computers, for example, as alien and luxury acquisitions;

- poor maintenance and repair culture in which spare parts and technical 'experts' from the manufacturers are imported whenever the technologies break down; this leads to waste of resources, time and money;

- poor infrastructural support base; examples include inefficient electricity and telephone systems;

- lack of support from the government leading to underfunding of science and technology programmes in tertiary institutions;

- illiteracy and lack of basic computing skills; these two points are closely related -- in the African countries studied, tertiary institutions are funded by government and it follows that where government is apathetic to the need for ICTs, the educational institutions will not be provided with adequate funds to acquire and teach these technologies;

- lack of a science and technology policy; this has consequences at two levels – lack of policy impedes the growth and development of a culture of science and technology, and also, at the educational level, downplays the significance of science and technology in the perception of students); and

- the absence of democracy which feeds political unrest and the unwillingness of foreign investors to invest in the area of ICTs.

- perception of the technologies (example, computer) as a status symbol or statement of one's hierarchy in society.

IGNORANCE:

Ignorance is the first and foremost obstacle. Ignorance about the importance of these. Ignorance about the
need for these. When people fail to see the need, they are unlikely to do anything to get it. (Nig/EI)

I think the problem is, most people... have a magical view of the computer. They think the computer solves the problem... Basically, people are not knowledgeable enough about what a computer is supposed to do. (Gha/PA)

COST AND AFFORDABILITY:

This society still does not look at IT as being useful where you would take, say, a vehicle or say a piece of calculator. Things which are commonplace... So, people still see IT tools as luxury tools and we need to really break that barrier. (Nig/CU)

... you'll find that computers are still a luxury. It's a question of scale of preference: if you have to feed and if you have to think of having a PC, I am sure you will have to feed first, because if you don't feed, you're not going to stay. (Nig/NO)

The main obstacle is the level of wealth in the country... Most computers are more expensive than the annual income of the average person. Ghana has a per capita income of about $400 a year; an average computer costs around $1,500. (Gha/DO)

For anybody in this country to be able to put a computer together, the telephone, modem and what it is, you'll be looking at perhaps the annual income, total annual income of a graduate. And that's a lot,... It's cash and carry. (Nig/FA)

LACK OF INFRASTRUCTURAL SUPPORT:

The first barrier is the inadequate supply of power, the electricity, it fluctuates, it's very epileptic... (Nig/RA)

You want to look at simple telecommunications lines or links. They are not there. Where they are, my area for example, since Monday (interview taking place on a Thursday) our telephone system has gone down. No calls are coming in. (Gha/PR)

You want to look at electricity which is not too reliable. In the country now, we have the problem of having to ration. Sometimes you'll be on your PC and the lights just go off or fluctuating. It could even affect your PC. (Uga/JO)

MAINTENANCE AND REPAIR:

Again, part of the problem of Third World countries especially Nigeria in the use of gadgets is maintenance, servicing, keeping them in working order... whilst we're pursuing government policy, pursuing privatisation, pursuing accelerated education in computer appreciation, we should also look at maintenance of equipment and revive our trade schools... (Nig/BO)

The other difficulty we have is this constant procurement option. At the moment, we know we cannot manufacture all these information tech in Nigeria. And ...what we do is to procure outright purchase of these info tech -- and when they do breakdown, you have to wait until when you import the spare parts from the manufacturer or in some cases you actually bring the manufacturers here to come and do it for you. It takes time, it wastes human resources and it is expensive. (Nig/RA)

LACK OF SCIENCE AND TECHNOLOGY POLICY:

For me, ... all the questions we are raising arise precisely because, at least in Ghana, our govt does not have a clear, doesn't even have a policy of industrialisation, a policy on science and technology. (Gha/AK)

There is no policy on IT education at the different levels. By now there should be policies, at least curriculum, at the various levels of education -- kindergaten, nursery, primary, secondary and tertiary... you don't teach IT or computing as a subject, the way you teach mathematics or English language or any other... And yet these are supposed to be the basic levels of building up people who are going to become practitioners in the profession. (Nig/CU)

LACK OF DEMOCRACY:

The second predicament is incessant problem of political unrest in this country. The country is politically unstable at the moment. And investors may not want to come and invest when they are not so sure of the stability of the country. (Nig/RA)

LACK OF GOVERNMENT SUPPORT:

Then, a major factor has to do with the fact that government itself is actually not doing what is required. IT is not being adequately promoted. It might interest you to note that, as at now, we do not actually have a national policy on IT in Nigeria... (Nig/CU)

LACK OF SUPPORT FOR UNIVERSITIES:

... the universities and educational environment are grossly underfunded. In fact, this is where I believe that interest in IT can actually start developing IT, the users, evolve the IT environment, develop the IT culture. It's a culture of its own. (Nig/VA)

HIERARCHY/MYTH OF THE COMPUTER:

... in terms of technological application, there are cases where people like me, in an executive position like this, limit the use of these facilities by junior staff and others because like every technology has a myth around it. You could still see in some offices, even in this university, where it is in the director's office and it's covered, that sort of thing. (Nig/CU)

In the Asia-Pacific countries studied, a range of factors were seen as inhibiting the use of new ICTs. These factors include:

- high cost of the ICTs leading to restriction of access to the new technologies;

- conservative attitudes – people are comfortable maintaining the status quo, doing things the way they are used to;

- lack of deregulation and government legislation which gives monopoly to a few information technology companies;

- poverty and harsh economic climate;

- infrastructural problems such as inadequate telephone lines and lines cutting off when someone is logged onto the Internet;

- health and social welfare commitments undercutting attention to ICTs;

- lack of basic education and computing skills;

- political culture which discourages open sharing of information (Philippines)

    …people here need social contact, they can't just be locked up in a room communicating on the Internet. It's not their style or their culture. (Fij/FG)

    Most communication between businesses is done by phone or fax. People in Fiji are obsessed with faxes. They want everything in writing so it can be filed. (Fij/FG)

… the mentality is still very much about having things recorded on paper… Mentality is part of it. Expense is the other part…people feel more secure sending messages by traditional means because with the non-computer mentality, you're not sure whether people check their email regularly. (Fij/FG)

The barrier is still the cost of putting up the physical infrastructure. Second is the lack of a predictable legal framework for dealing with ICT. We have no laws on electronic commerce. (Phil/WP)

Lack of training and education is one barrier. The people should be further educated about ICT. The political culture of the Philippines is such that it discourages the open sharing of information. (Phil/PV)

Respondents were also asked to suggest ways in which ICTs could be widely promoted and used in their society. In other words, how can a science and technology culture be entrenched in their countries? In Africa and Asia-Pacific, almost all respondents pointed to early education and familiarisation with computers as the fundamental step toward popularisation of ICTs in the society. Tin Africa, there were diverse views and opinions, ranging from suggestions such as the establishment of computer clubs in primary schools, to early exposure of the population to computers through the establishment of computer centres in local government headquarters (to replace the present television viewing centres), and incorporation of computer courses in school curriculum at an early age.

EARLY EXPOSURE TO COMPUTERS:

We should have a curriculum in school that makes it compulsory that every primary, secondary and tertiary institution offer some basic course in computer appreciation. These are the things we should be thinking of now... (Nig/BO)

One area would be to make them readily available to educational institutions, so that the young students who are coming up can be exposed to them at their school... So, if there can be a strategy put in place to make computers part of the educational process, to make it available to the students, that would go a long way in exposing the population and enhancing the utilisation of computers. (Civ/AG)

We go to schools -- primary, secondary and tertiary -- organise clubs for a start. We can call them computer clubs in which we teach people the fundamentals of computer appreciation, even how to use a telephone properly because... many people don't know how to use them. (Uga/AS)

We need to go to secondary schools, institutions, set up a computer club or Internet club. Before they come out of science school or into the university or into the world, about 70 per cent of them could have gotten knowledge of some of these things. (Gha/PR)

Maybe we should just start basically from the educational sector. Primary schools, junior secondary schools, tertiary schools, there should be massive investment in that area. And once investment is made in that area, then it will catch up. (CIv/HD)

GRASSROOTS PROGRAM ON COMPUTER APPRECIATION:

If you have a computer, a PC or whatever, in the headquarters of a local government and the local people can use it, they will even, if you tax them and say pay levy for this. They will pay. The utility value becomes evident and they will support it and they will popularise it. Let the local governments start installing one instead of public TV viewing centres where they just sit down and are shown crap. (Nig/BO)

NEED FOR POLICY:

I think there must be national policy, there must be that national goal or desire that we have to get there because if these policies are not in place, well,... (Gha/PR)

> Everybody needs to be educated about IT. So we need policies geared towards people acquiring basic IT knowledge at every level... Then there is also need to tackle the issue of acquisition of the technology itself. Currently, we are just users. (Gha/AK)

In Fiji and the Philippines, there were similar recommendations. Government should subsidise the cost of these technologies (such as computers) so educational institutions can afford to buy them; deregulation or opening up of the information technology market; provision of computers to schools by governments and non-governmental organisations (NGOs); workshops and training course on computer literacy organised by NGOs; media campaign to promote ICT use in all facets of life; broader awareness of world events through introduction of major world newspapers, TV news programmes; and greater private sector initiatives to promote and popularise ICTs.

To what extent are governments committed to the introduction and widespread use of ICTs? Responses vary and this could be attributed to the system of government in each country. Nevertheless, respondents in African and Asia-Pacific countries were of the view that the use of ICTs is more of a private-sector led initiative rather than government-backed activity. During the Sanni Abacha-led military dictatorship in Nigeria when this research was conducted, respondents stated the government was apathetic to promoting ICTs at all levels of society. Using the Internet as an example, some respondents attributed government's unwillingness to promote ICTs to a fear that radical/dissident groups within and outside the country could use the Internet to promote subversive activities against the government. Against this background, it could be argued therefore that government's indifference to the promotion of ICTs in Nigeria during the Abacha regime could be linked to the lack of a science and technology policy in the country. This view however flies in the face of general perception in other parts of the world, including Africa, where the general opinion was that ICTs held the key to socioeconomic development. It is worrying that whereas ICTs were associated with the democratization of information and communication in other parts of the world, in Nigeria, however, ICTs were perceived in government circles as a dangerous weapon which should, as much as possible, be kept away from the larger segment of the population.

Although ICTs were predominantly a private sector-led activity in Ghana, government input in the promotion of these technologies has been widely hailed.

> Well, the government on their part have done very well to the extent that they took off sales tax from people bringing in computers. The idea is to bring in more computers at reduced rates. The only thing is that we're being let down, we don't develop software here. (Gha/AK)

> To make it easier for everybody, in our Customs tariffs, computers are duty-free. So, increasingly it's going to be a bare affordable gadget. (Gha/Director)

> In about 140 of our educational institutions, we have established science resource centres which are also being given computer facilities which, hopefully, will also allow them increasingly to have access to educational programs, thus opening the way for, if you like, systems learning. (Gha/PR)

> ... we ourselves in this ministry have a homepage on the Internet -- www.ghanagov.gh -- which allows us to put out information on Ghana for investors, for tourists, for students and whoever is interested in getting information on Ghana and it's an interactive facility where we respond to the questions and so on. (Gha/Director)

Respondents in Cote d'Ivoire stated that there was some level of government support for the

growth of ICTs in the country, although government was more prone to lean toward programmes aimed at poverty alleviation rather than direct funding of ICTs.

Inherent in these findings is the relationship/influence of system of government on the promotion of ICTs in each country. In more stable democracies such as Ghana and Cote d'Ivoire, ICTs were seen as tools that aid development and were being actively promoted by the government. However, in a military dictatorship such as Nigeria, the study found the government was unwilling to support the use of ICTs because it feared for the inherent dangers to which dissident groups could put these technologies. One can therefore argue that the fear of ICTs in Nigeria emanated from the ability of ICTs to make available divergent views on any subject. Thus, ICTs at all levels of society and particularly lower levels of society encourage self-empowerment. It is important to point out that Nigeria returned to a democracy on the 29 May 1999. The findings reported here were collected during January/February 1998 when interviews were conducted in Nigeria.

Another significant finding of this study is that, useful as ICTs are to the development of Africa and Asia-Pacific, they also leave in their wake certain consequences which the respondents were quick to point out. In other words, ICTs have their drawbacks as well. For example, some respondents in Fiji and the Philippines noted that ICTs were not all that appropriate to their cultural context.

> The Internet opened everything for anybody who wants information. Our concern is that it could be contrary to our customs. For example, pornography now is open and students and staff members can access this… It could cause some social problems. (Fij/KF)

> ICTs will create new wants and will result in waste. I think we need to step back and study what is good for us and how we can make use of these technologies given our limited resources. (Phil/RV)

What are the issues of concern regarding ICTs in fledgling African economies? Much as ICTs enhance efficiency at work, there are genuine fears that they could also engender unemployment in various ways and promote cultural imperialism.

UNEMPLOYMENT:

> ... how does an economy like this sustain so many typists, so many printing presses that could go out of business because of ordinary desktop publishing activities. Whilst it facilitates, it also kills some labour intensive sectors of the economy. How do we deal with that? (Gha/AK)

> If you look at the postal system also, I do not know its impact, but certainly faxes, telephones are minimising postage and so on. Email is minimising all that. Whilst it facilitates communication, what about people who would be thrown off employment? (Gha/KK)

CULTURAL CONCERNS:

> If you look at their application in some areas like film animation, these are very useful for cartoon animation but nobody has put on our television African image cartoons and so on. And there are so many other cultural implications that we haven't yet looked at. (Gha/AK)

> … look at the computers we use. Nobody has sat down to introduce on the keyboards, the alphabets of the Ghanaian language. Some of these basic cultural things..., we're still using the same software that are culturally bound. ... if you go to places like Ethiopia or Eritrea, they have their alphabets on their computers. So what are we doing in West Africa about inputting, developing, and inputting our software. (Gha/Kari)

LOCAL PRODUCTION:

> I'm more concerned, anytime we talk about new technologies, is how are we going to be involved in the production of the hardware. Are we going to be allowed to produce certain parts? (Civ/FE)

> I believe simply acquiring these things to use is not going to be enough. It could help a lot in changing things, in helping us improve upon our living conditions but as far as I am concerned, this is only on condition that we are going to be able to produce some of the hardware and software that would be involved in the usage. Gha/AK)

Futures of ICTs in Africa and Asia-Pacific

There were certain recurrent themes about the envisaged futures of ICTs in Africa and Asia-Pacific. These include:

- greater education of the population to achieve computer literacy;

- deregulation of the telecommunications industry to promote competition and price reduction;

- greater dependence on the new technologies and the consequent displacement of human services;

- popularisation of ICTs in all human activities and government intervention to ensure that marginalised members of society have access to the new technologies; leadership to be provided by businesses such as banks because the new technologies will impact on their activities;

- continuation of the struggle to dispel the prevailing notion that one is poor if one does not have ICTs and that anyone thinking of becoming rich must acquire ICTs;

- Use of ICTs in distance education (through web-based studies) and distance medicine.

In general, however, there was quite a bit of divergence when it came to discussion on the likely and preferred futures of ICTs.

Respondents felt that while the future was "mind boggling" a measured pace was needed. The wider community needed to be taken along. Some believed that telecommunication giants would create the future, and others felt that consumers would lead the way. In the Philippines, government was seen as a regulator, in Fiji, NGOs and the private sector were seen as more important in creating the future, while in Africa, government was seen as a benign force.

> Consumers will always hold the preferred future of anything. (Fiji, TP)

> Developments should be at a measured pace …to develop the wider community good with a need to keep pace with world developments and take advantage. (Fiji/MB)

> I can foresee things like telehealth and distance learning but it'll need assistance from NGOS. They're not things that the private sector will take on because their bottom line is money. (Fiji/CM)

> Public facilities – ICTs – [should be] made accessible to everybody… the government should not … turn

the country into one huge market for foreign ICT products. (Philippines/RV)

Government should come in seriously … let government invite specific investors for ICTs (Uganda/ZM).

The most important dimension of the future was education. ICTs, it was believed, could fundamentally transform education.

Discussion

Certain issues have emerged from this study. The first concerns the level of awareness and usage of ICTs. While awareness level may be high, only a few people have access to these technologies in Africa and Asia-Pacific regions. The reasons for this situation are many. These include ignorance, general poverty in society, poor culture of maintenance and repair, poor infrastructural support base (inefficiency in electricity and telephone systems), lack of support from government, illiteracy and lack of basic computing skills, absence of science and technology policy, and unstable political systems (mostly in Africa) which lead to low foreign investment in science and technology development. Although optimism was high about the usefulness of ICTs, there were also concerns about the social consequences of ICTs such as their potential to exacerbate unemployment even as they help society to do things better and faster; concern about ICTs helping to 'corrupt' local traditions and cultures through provision of easy access to pornography; stifling of local languages through consistent use of the language of the Internet -- English; as well as worries about non-local input into software production

The impact on education and socioeconomic development of new communication technologies such as computers, interactive multimedia systems, digital telecommunications and the Internet will remain the subject of arguments among communication scholars in developed and developing societies. As noted in the early part of this report, the new communication technologies have their strengths and drawbacks. McQuail (1987) and Pool (1975) have argued, from the perspective of the developed world, that rather than pose a threat to the developing countries, the new technologies carry numerous advantages which should be utilised to enhance telecommunications services and to ensure the democratization of information.

Although McQuail (1987) pointed to "an increase in communication of all kinds", it must be pointed out, on the basis of the findings of this study, that developing African and Asia-Pacific societies will enjoy the increase in communication only when the question of access to the new technologies has been sorted out. If access to the new technologies is limited to a small segment of the population, it follows that the impact of the new ICTs will also be limited to the few members of society. Just as access to the mass media is limited in rural areas of developing countries, so too will access to the new technologies be limited to a few individuals who can afford to acquire the new technologies. Addressing the more immediate and basic needs of African and Asia-Pacific countries along with acquisition of the new technologies appears to be the more appropriate approach to adopt. As some of the respondents pointed out, the world waits for no one and so too are developments in ICT.

Addressing the more immediate and basic needs of Africa, along with acquisition of appropriate technologies appears to be the more reasonable approach to adopt. As some of the respondents pointed out, the world waits for no one and so too are developments in ICT.

Conclusion

This preliminary research on ICT adoption in Africa and the Asia-Pacific suggests that there are serious barriers to their use in educational and socioeconomic development, such as issues of infrastructure support, access to the ICTs, training and skills development, and hierarchical social relations which determine who has access to ICTs.

We are concerned that the implementation of ICTs is occurring in a context where the cultural and institutional barriers are not well addressed. The assumption often made is that if one just purchases a few computers and modems, a post-industrial society can magically result.

Developing African and Asia-Pacific countries are caught in a Catch-22 situation: without using these new technologies, their future generations will further lag behind and will find themselves further impoverished. If they use these technologies without addressing some of the concerns and needs of their societies, they could be placing their carts before their horses. We believe that what is needed most is effective and efficient, not to mention wise, telecommunications and culture policy, as well as research that informs such policy. As noted in the early part of this report, the new communication technologies have their strengths and drawbacks, they should not merely be seen as apolitical tools but as embedded in culture, politics and our mutual futures. This means that their transference must not only be about the hardware transfer but about software transfer, institutional support, servicing, and in the long run, about facilitating the transformation of users in Africa and the Asia-Pacific from consumers to producers of knowledgeware.

Implementation recommendations

What is needed now are experiments/practices/plans in which ICTs are understood, engaged in, and developed in local and historical contexts. This means a development approach based on anticipatory action learning, where the users frame their needs, and where future needs are explored. Doing so means not so much an overall strategy but a framework of communication between different parties, users, the private sector, business, government, and large telecommunication corporations.

Moving this research to the implementation phase, we recommend the following:

- Implementation must be linked to local problems, specifically to poverty alleviation. This linkage must be direct, showing stakeholders the benefits of using ICTs for economic growth.

- Implementation must also show how ICTs can transform education, making it far more interactive and empowering for students and professors/teachers. CD-ROMs and access to the web must not only be inexpensive, but as much as possible be locally driven, based on local content.

- Implementation must help transform users of ICTs in Africa and the Asia-Pacific region from consumers to producers of new knowledge and wealth. Dissemination of hardware must include software support, institutional linkages, and servicing. This must be done in

the context of local cultural practices including those that inhibit ICT use (hierarchical institutional practices).

- Implementation must occur with a policy context guided by participatory action research, where all stakeholders in an iterative manner define their needs, goals and concerns.

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