

# *Technology and Education: Adventures in the Eternal Triangle*

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*Presented at:  
IGNOU / COL Workshop on Interactive Media in Distance  
Education*

*9 November 2004*

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## **Introduction**

Professor Dikshit, Esteemed Vice-Chancellors of the State Open Universities, Colleagues, Ladies and Gentlemen:

It is a pleasure to be here at IGNOU on the last leg of a most fruitful visit to India that has already taken me to Chennai and Bangalore. I am delighted that CEMCA and the Distance Education Council have put on this workshop together in the name of the South Asia Consortium of Distance Learning (SACODIL).

Today we are often told that we live in a hi-tech world and the press is full of the term 'new technologies'. This term is used primarily to refer to information and communications technologies, but also sometimes to designate biotechnology, nano-technology and various other new developments.

Changing technology is the main force behind globalisation, another term the press is very fond of. Globalisation unites the world, as its name implies, but it also divides the world. Those who disapprove of globalisation stress the increasing disparities of wealth that it brings, both between countries and within countries. Even those who believe that globalisation is a force for good worry about some of the gaps that it is creating within humankind. The digital divide is of particular concern.

My first point is that all the world's citizens, whether they are on the rich or the poor side of the digital divide, are affected by changing technology. In all parts of the world evolving technology is the main force that is changing society. In industrialised countries it may be the move from fixed telephones to

cell-phones while in the developing world it may be the switch from bullock carts to motor vehicles. In both cases technology is changing society, notably by destroying old jobs and creating new ones. Changing technology affects nearly all aspects of life except, say many critics, the world of education.

Why is this? Is technology inherently unsuited to education? Is it because teachers are reluctant to use it? It is because no one has found out how to use it well? How do you answer this question?

My aim today is to help you think about the use of technology in education, that is to say in learning and teaching, by exploring some simple questions.

Why should we want to use technology? How should we use technology for learning and teaching? What are the basic principles? Who can benefit most from educational technology? Where should we apply it? Which technologies are best?

## Why use technology?

Before we assume that technology is the answer we should ask what is the question that it answers. People who develop new technologies for computers or cars have some simple aims. They want to make them faster, more powerful, more efficient, more user friendly and more attractive. What are the equivalents in education?

Today ordinary people and their governments have many concerns about education. They boil down to three key issues. The first is access, the second is quality and the third is cost. I think of the tensions between these vectors as the eternal triangle of education. Let me say a word about each.

The major problem in education today is that hundreds of millions of the world's citizens do not receive it. Many more do not get enough of it. My main preoccupation, as president of the Commonwealth of Learning, is to use technology to facilitate the massive amount of learning that must take place if the world is to achieve the Millennium Development Goals, especially those related to education. Over 100 million children never see the inside of a school. As many more do not stay in school long enough to gain useful skills. 800 million adults have their lives blighted by illiteracy. The problem is particularly dire in the developing countries but it is not only a developing country problem. Drop-out is rampant in the industrialised world as well. The world needs more access to education. The question is can technology help to provide it?

A related issue, one that worries many parents whose children do go to school, is the quality of education that their offspring receive. Countries that have invested heavily in getting more children into school now worry about the quality of their learning. Parents in poor countries, whose children can augment the family income by working in carpet factories or suchlike, want to be sure that the financial sacrifice of sending them to school will be worthwhile. At the other end of the educational spectrum you all know how quality assurance has become an issue in higher education.

What do we mean by quality? The standard definition of quality is simply 'fitness for purpose at minimum

cost to society'. So what is the purpose? I suggest we should have two aims, to create human capital and to create social capital.

Human capital means the individual knowledge and skills that make a person more autonomous, more flexible and more productive. It is the personal capital that you or I can invest in finding fulfilment in our lives. But human capital is not enough by itself. No man is an island. We also need social capital, which is trust in other people, networks of contacts, the coming together of people for a common goal that creates communities.

The third side of my triangle is cost. High cost limits access and, if quality is fitness for purpose at minimum cost to society, then high cost is bad for quality.

When you express the basic challenge of education in terms of this triangle of forces then one uncomfortable fact is clear. Traditional methods of teaching and learning cannot produce the changes required. Try putting more students in each class. Access may go up, cost may go down, but everyone will accuse you of lowering quality. Traditional ways of improving quality tend to reduce access and raise costs. There is clearly a problem. Throughout history education has made an insidious link between quality and exclusivity. You can only have high quality if you exclude many people from access to it.

The challenge is clear. The question is can technology do anything about it? Can technology really increase access, improve quality and lower cost all at the same time. The evidence shows that it can. How does it do it?

## How to use technology?

Let us first be clear about what we mean by technology. My preferred definition is simply that technology is the application of scientific and other organized knowledge to practical tasks by organizations consisting of people and machines. I emphasise two parts of this definition. First, we are not engaged in a futile search for the perfect method of learning. We are applying 'scientific and other organised knowledge'. That can mean tacit knowledge, crafts and organisational experience, not to mention a good dose of common sense.

Second, we are living in a world of people and machines. Good use of technology always involves people and their social system. A simple and useful way to think about how to combine people and technology in education emerges when we reflect that learning involves two types of activity.

Learning is a mixture of two types of activities. First, there are activities that the learner conducts independently, such as reading a book, viewing a TV programme, listening to a lecture or an audio-cassette, writing an essay and doing mathematical calculations. These activities constitute the bulk of the student's learning, at least in higher education. They are also - and this is the key - the activities that allow you to use technology to increase access, improve quality and cut costs. That is because the basic tools of independent learning such as print, audio material and TV programmes cost relatively little to reproduce in volume once you've made the investment in the first copy. Volume helps to increase access and cut

costs. It also allows you to improve quality, because once you are producing materials at scale you can afford to invest in making them excellent.

That's fine, but the evidence shows that most learners do not succeed on independent activities alone.

Technology must involve people and their social systems. You also need interactive activities.

'Interactive' is a very slippery word that gets a lot of abuse. I use it to mean a situation where an activity by the student evokes a response by another human being - a teacher, a tutor, or another student - that is specifically tailored to that particular student.

Today is an obvious example. Right now, as you listen to me you are each involved in independent learning. When we finish and you ask me questions - especially if you take me aside over tea to tell me that I don't know what I am talking about - that will be an interactive event. Other interactive activities are events such as face-to-face sessions with other students or a tutor, having your assignment marked and commented on by a teacher, asking questions over the phone, getting a response to a query by e-mail, and so on.

These kinds of activities are important to the success of most students. However, they are also more expensive because they do not lend themselves to economies of scale in the same way as independent activities.

The world's open universities provide a good example of independent and interactive learning at work. The economics of blending independent and interactive activities can be imagined if you look at the cost curves of each, plotting total costs against student numbers. Depending on how you blend the two you can get a steeper or a flatter curve. In other words the marginal cost per additional student can be greater or smaller.

## Who can benefit from technology in education?

Who is technology-based learning for? My answer is that it is for everyone. The concept of blending independent and interactive activities leads naturally to the idea of blending technology and teachers in different ways for different purposes.

In terms of the criteria of access, quality and cost that I outlined technology has achieved its greatest successes, so far, in higher education. This is partly because university study naturally includes a larger proportion of independent learning than you would find in kindergarten. The story of the world's open universities is the greatest educational success story of our generation.

I have written a book about it but I shall not try to summarize it here. Suffice it to say that the open universities have successfully reconfigured my eternal triangle. Internationally the twelve largest open universities enrol over three million students, a massive increase in access. Perhaps the biggest surprise to the sceptics has been in the area of quality. Today the UK Open University ranks in the top five per cent of universities for the quality of its teaching programmes as evaluated by the national agency for quality assessment. The straitjacket of the eternal triangle has been broken open.

I shall not review the use of technology at all levels of education in turn. In some ways it is easy for the open universities because they operate at a distance. They have to use technology whether they like it or not. Despite - or maybe because of - the modest success of the home schooling movement, most people believe that kids should learn in a social context.

In principle it should be easier to develop the social capital that I referred to earlier if the school itself is a good social system that inculcates trust and co-operation. I say, 'in principle'. Children learn more about living together - or not living together - from the atmosphere, organisation and human relations in their school than they learn in class. Some parents take their children out of school and teach them at home precisely because school fails to create positive social capital. This means that we should not claim for technology more than it can deliver. The use of information and communications technology in schools is still in its infancy and we have much to learn.

However, it is clear that the patience of a computer, and the one-to-one relationship that a child can with it, can help children learn without the fear of failure. It can help to build human capital. Through properly designed exercises computers can help children learn the skills of co-operation and teamwork. They can help to build social capital. The web can allow students to discover other countries and other places in a colourful, hands-on way. It can help us to learn to live together.

## Where can we use technology in education?

Where should we use technology in distance learning? Once upon a time the main use of technology in education was for distance learning. But this did not mean it was a rural phenomenon.

Today technology is for everyone, everywhere. I have argued that modern education is not a simple choice, either technology or conventional teaching. Effective education combines people and technology. We must also have a broad view of technology. I invite you to reflect on this quotation from Edith Mhehe from her research on female students at the Open University of Tanzania:

"When I asked about the possible use of alternative learning technologies one woman suggested that her most pressing need was not for learning technologies but for other technologies such as washing machines, cookers and vacuum cleaners, which would help shorten the time she spent on housework and increase the time she needed for studying."

That takes us back to my definition of technology as the application of scientific and other organized knowledge to practical tasks by organizations consisting of people and machines. A key principle in using technology in education is to start from the learner's needs, not the teacher's needs.

## Which technologies?

My final question is which technologies should we use? I hope that the various principles that I have outlined will enable you to take those decisions. Let me recapitulate some of them.

First, start from the position of the learner. Our aim must be to use technology create an effective and stimulating environment for study where the learner is.

This means, second, that the availability of a particular technology is a pre-eminent consideration. For example, at UNESCO I was involved in the educational reconstruction of Afghanistan. It is futile to propose using the Internet in a country where only a tiny proportion of the population has access to either electricity or a telephone. However, radio is a popular and well-used medium.

Availability is linked to the third principle, which is cost. The best way to reach learners is to use technology that the learner already has. Depending on the country this will be more or less sophisticated. Cost is linked to the fourth principle, which is the quality of the teaching that can be delivered using the technology. The best media are those that are easy to use and do not rely on the skills of a limited number of programmers or designers with sophisticated skills. For example, one of the reasons that audio-cassettes are a popular technology with both students and teachers is that they are easy to produce and easy to use.

Finally, of course, I hope that you will bear in mind my distinction between independent learning activities and interactive learning activities. Using these principles will help you develop an effective blend of technology and people and allow you to join the modern revolution in education. You will find that you can increase access, improve quality and reduce costs all at the same time. I wish you well in that vital endeavour and hope that this workshop on Interactive Multi-media in Distance Education will equip you to operate with more confidence as you use technology in education.