Exploring the Role of ICTs in Addressing Educational Needs: Identifying the Myths and the Miracles

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Introduction

Thank you for the honour of addressing this meeting of the National Association of Distance Education of South Africa. On behalf of the Commonwealth of Learning I congratulate you warmly on your tenth anniversary. We believe that national and regional associations like NADEOSA play a very important role in increasing the professionalism and effectiveness of distance education around the world.

It is also pleasure to be in South Africa again.

In order to give this keynote address stronger intellectual muscle and root it more firmly in your own context I have prepared it with two of my South African colleagues at COL, Paul West and Wayne Mackintosh, whom many of you know. They cannot be here today because they are busy in Mauritius organising a very significant event; the first course development session of the Virtual University for Small States of the Commonwealth.

Our title is *Exploring the role of ICTs in addressing educational needs: identifying the myths and the miracles*. Persistent myths have lessened the impact of ICTs on education. Fortunately they are balanced by miracles of theory and practice that are gradually gaining the upper hand.

We shall start by dismissing the pernicious myth that innovation in the application of ICTs is the preserve of industrialised countries by listing innovations from southern Africa that are global trendsetters.

We argue that developing countries have two advantages over industrialised countries in exploiting of the fundamental miracle of educational technology, which is its ability to provide higher quality learning to increasing numbers at lower costs. The power of this miracle increases with every new generation of

technology. The current trends to social software and open educational resources will benefit more and more South Africans as connectivity steadily improves. In Africa you have the advantage of scale and the habit of leapfrogging into new technologies.

But things are not always what they seem. We warn you of a difficult, but important section later on in the talk when we shall explode the myth that all open content is truly open and show how to restore the miracle of a global intellectual commons that cannot suffer the tragedy of the commons.

Big Myths and Little Myths

Let us start by dismissing the pernicious myth that innovation in ICTs, and the use of educational technology more generally, is the preserve of the rich developed countries. Rather than argue the case against this myth and then give examples; we shall first give the examples and then buttress the argument.

UNISA

Our first example is the University of South Africa, UNISA. Most people agree that the most impressive application of educational technology in the 20th century was the creation of the large distance-teaching universities - often called open universities. In 1995 I coined the term mega-university for distance teaching universities with more than 100,000 students. There were eleven of them at that time.

UNISA is the world's oldest mega-university. It began providing distance education to off-campus students in 1946, long before open universities were even a gleam in the eye in other countries. And, of course, UNISA's history goes back still further: to its beginnings as the University of the Cape of Good Hope in 1873 and its move to Pretoria as UNISA in 1916. Early on it was the examining body for affiliated colleges and later assumed the guardianship of the black university colleges until they in turn became independent.

UNISA has a century-old history of innovation in higher education. When I described it as the first mega-university in 1995, people of African descent were already its largest group of students. Since then, after merging with Technikon SA and Vista it is one of the world's largest universities. UNISA pioneered the innovation that we now call the open university. When we talk about miracles we shall explain the significance of this development. But first let us note that through its operations UNISA has exploded three other myths.

First, there is a myth that developing countries are poor at administration and logistics. UNISA gives the lie to that. It has constructed truly impressive administrative systems - well symbolised by the scale and solidity of the UNISA building that greets you as you come over the hill from Johannesburg to Pretoria. UNISA's commitment to provide an examination venue to every registered student within reasonable reach of their place of residence, wherever they are in the world, is just one example of that.

Second, there is the myth in distance education that you can't lend library books to students because you won't get them back. UNISA has a huge lending operation and gets very nearly all its books back. It also hosts the African Digital Library which serves the whole continent. This is a library of digital, full-text books that any internet user in Africa can access.

Third, there is a myth that mobile phones aren't really helpful for distance education because you wouldn't want to read *War and Peace* off the screen on your cell phone! But UNISA has done an experiment, with a little help from COL, which shows that mobiles can be very effective for sending mass reminders of assignment and exam dates. Students reminded of their assignment deadlines have a higher submission rate. The University of Pretoria and, in the private sector, the International Colleges Group, now make extensive use of SMS text messages to cell phones in its student administration system.

Schoolnet

Our second example of brilliant innovation in a developing country comes from your neighbour. It is SchoolNet Namibia. Since February, 2000, some 450 schools in Namibia have received free hardware, free training on the OpenLab operating system and subsidized telephone service, to help get the nation's young people and teachers online.

The aim is to empower youth through internet access. The young people who receive training on how to setup and support these systems gain work experience through SchoolNet Namibia and are so well prepared that they are all absorbed into the private sector workforce. That alone is a wonderful achievement. I met some of these people last year and was amazed by their sophistication and confidence.

SchoolNet Namibia is a great collective effort of Joris Komen and the youngsters who work with him. This is a great example of quality when quality is defined as fitness for purpose *at minimum cost to society*. Sadly, we fear that the Namibian Government still believes the myth that quality innovation cannot be home grown. If it were fully to recognise the amazing achievement of SchoolNet Namibia and support it financially, it could provide greater sustainable benefits to Namibia from ICTs at lower cost than in investing in commercial computer labs.

Let us also pay tribute here to SchoolNet Africa, which was founded here in South Africa and has spurred the creation of SchoolNets across the continent for the benefit of thousands of youngsters.

MindSet Network

For example number three we return to South Africa and the Mindset Network. Among other things, Mindset dispels the myth that in the era of the Internet the mass media are old hat.

Mindset creates, sources and delivers quality educational materials on a mass scale through appropriate media to the primary and secondary school communities and the health community. It uses the latest technology to reach even the remotest communities through an offline, on-demand, satellite-based technology platform. Training in the use of the technology is also an integral part of the three elements of its mission.

First is Mindset Learn, which provides educational content for students and educators for grades 10 -12. Receiving equipment has been installed in 1 000 schools and content also reaches a million homes through satellite broadcast. Second is Mindset Cabanga, which provides educational content for students and educators for primary grades R - 7. Receiving equipment is now in 50 schools as a first phase. Finally, Mindset Health updates healthcare workers with up-to-date content and provides health education to patients in waiting rooms at 130 public hospitals and clinics.

AVOIR - Free Open Source Software Code Programming

Our fourth example is AVOIR, a collaborative project that began at the University of the Western Cape and now links universities across Africa to bring together a core of Free Open Source Software developers. Through their software development activities they create educational and business opportunities that contribute to Africa's development. This extraordinary network of African code programmers kills stone dead the idea that the rich world has a monopoly on technological innovation. We shall come back to the Free Open Source Software movement and its manifestation as Open Educational Resources, at the end of the talk.

Cellphones

We could list many more South African success stories like Wildlife Campus and Gauteng Online. However, our final example is a phenomenon rather than an institution.

It is the cellphone.   This is the most visible techie miracle in Africa and the South African 3G systems are amongst the most advanced in the world.

We read in the international press that tele-density, or cellphone ownership in South Africa is around 10%. But the real revolution is that your access to telephones is well over 90%. This has been achieved through the expansion of second and third generation GSM cellphones.

The third generation cellphones also have the ability to provide low cost access to internet, which may be from community telecentres, but enables learners to receive and send information cost effectively, including text messages and emails. Globally text messaging and low cost e-mails to cellphones are still a neglected technology for supporting teaching and learning, so the pioneering work of UNISA, the University of Pretoria and the International Colleges Group is particularly notable.

The cellphone revolution explodes another persistent myth about educational media, which is that a magic medium will appear and solve all teaching and learning problems. Over the last 200 years the blackboard, radio, film, TV, computers, programmed learning, laptop computers and the Internet have all been hailed as that magic medium.

There is no magic medium and never will be. Each new medium adds extra value to the existing media mix. That is what cellphones are doing in Africa, showing that they can contribute far more to the development of Africa than the laptop, which was the most recent candidate to be hailed as the magic medium. Laptops are great. I never leave home without mine. But they are part of an increasingly rich media environment, not a magic solution.

Big Miracles and Little Miracles

So much for myths! We hope that we have debunked one big myth - that innovation is the monopoly of the rich world - by listing UNISA, the University of Pretoria, SchoolNet Namibia, the MindSet and

AVOIR networks and other little miracles of innovation. These institutions have, in turn dispelled several little myths that the big myth carries in its baggage.

Let us now turn to the miracles. We shall explain one big miracle and then explore some smaller miracles that have followed it. But first, we need another definition.

A moment ago we defined quality as fitness for purpose at minimum cost to society. The last part of that definition is important if we are serious about sustainable development. If you spend more than necessary to make a product or process fit for purpose you are wasting resources.

To explore the role of ICTs - Information and Communications Technologies - we need a definition of technology. We define it simply the application of scientific and other organized knowledge to practical tasks by organizations consisting of people and machines.

As we explore the role of ICTs in addressing educational needs we stress two aspects of that 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 systems. What are people's educational needs?

Three aspects of education are important here in South Africa and around the world. First, education must be widely accessible. So far we have failed to make education accessible. In 1990 the Jomtien forum set 2000 as the target for education for all. The target was missed, so at the Dakar Forum in 2000 it was pushed forward to 2015. On present trends that target will be missed too. Yet education for all is a vital goal. It is the key to both personal freedom and national development.

Second and third, people want education of good quality, bearing in mind our definition, which requires education to be fit for purpose at minimum cost to society. We observe that as countries begin to achieve the goal of getting all children into primary school, they start to worry about the quality of the education the children are getting, especially where enrolments have increased rapidly and dramatically as primary education became free.

These three criteria for education: wide accessibility; good quality and low cost are universal. We like think of access, quality and cost as three vectors defining a triangle.

When you do this you realise the limitations of conventional methods of teaching and learning - and why education for all is so difficult to achieve. Suppose that you want to increase access, as some counties in Africa have done recently by making primary education really free. Much larger numbers of children come to school but the recruitment and training of teachers cannot keep pace. Class sizes increase and people think that the quality of learning has gone down.

Suppose that you want to increase quality by providing more books and learning materials. The cost of schooling will go up which may mean that it can be offered to fewer people so access goes down. Our general point is that if you try to improve one side of this triangle your action usually changes the other

two sides in undesirable ways. For this reason we refer to it as the iron triangle. It has been a straitjacket on the expansion of education throughout history.

The revolutionary feature of educational technology in general - and of open and distance learning and ICTs in particular - is that it can break open the iron triangle. You can increase access, improve quality and cut costs - all at the same time. This is because of the economies of scale and consistency of quality that come with using media. That is the big miracle.

The little miracles are that these advantages seem to grow with every new generation of media. CD-ROMS and DVDs cost less to print than books. Distributing material on the Internet costs almost nothing once networks and computers are in place. Social software and the collaborative development of open educational resources are particularly promising developments for Africa. Let us unpack those last sentences.

Independent and interactive learning

You can explain the impact of technology on the iron triangle by noting that learning takes place in two ways. First there is independent learning: learning that you do by listening, watching, reading, surfing the Internet and so on. Most of our learning is of this type - and more so as we get older. People sometimes say that learning in a classroom or lecture hall is interactive, because there is a teacher present, but in reality most of the time in the classroom is spent in a one-way flow of information and you are learning independently.

Real learning requires more interaction than that. By interactive learning I mean a situation where another human being, who might be a fellow student, a teacher or a tutor, reacts directly to a comment or a question that you make. Moments of interaction can be very important. Asking a question can enable the teacher to clarify a misunderstanding. Even more valuable is when the teacher comments on or corrects something that you have done as a learner to demonstrate your understanding of a topic.

In the early years of distance education, for example the first phase of UNISA, its great strength was to concentrate on the independent component of learning by producing quality self-instructional materials, almost always in print form. What did this do for the iron triangle?

First, printing has economies of scale - and that was even truer in the days before computers made it possible for us all to be printers. Once you have printed a thousand copies, the marginal cost of printing a few more is small, so that acts on the first two sides of the triangle. By getting the cost down you make it possible to increase access, because you can provide learning materials to more people.

The potential effect on the third side of the triangle, namely quality, flows from these two. If you are producing in volume you can make the initial investment necessary to ensure that the materials are of high quality in both content and pedagogy. Printing was the big miracle and it is interesting to note that even today, when people are talking about the wonderful properties of a new medium they compare it to Gutenberg and the printing press, not to the media in between!

These principles apply even more strongly to later forms of media, particularly the mass media. Once you are broadcasting a TV or radio programme it costs you nothing when extra people tune it. Provided that they have a TV or radio, it costs them very little too, just a little electricity. These mass media are another miracle and their economies of scale are the foundation of the success of the MindSet Network and the many open universities around the world that have done so much to put open and distance learning on the policy agenda of governments.

But the more successful distance learning institutions did more than produce excellent print, audio and video for materials for independent study. Understanding that the possibly of interaction with teachers and the institution is vital if most learners are to achieve their goals, they set up systems for interactive learning, usually by making part-time tutors available to mark and comment on students' work, to answer questions, and sometimes to hold face-to-face meetings. Such arrangements are inherently more expensive per student than the independent learning media, but if the institution organises itself well there can be economies of scale here too.

The evidence shows that the combination of high-quality materials for independent study and effective arrangements for interactive tutoring is the basis for successful open and distance learning whatever media are used.

As you know I spent nearly 20 years in open universities, including a decade at the UK Open University which had dramatically increased access to higher education in the UK as well as cutting its cost. But the greatest surprise to most observers was on the quality front. By 2003 the UK Open University had risen to fifth place in national rankings of the quality of teaching in English universities. Note also that when students were asked which aspects of the University's distance-teaching system were most helpful to them, the printed materials and the tutors consistently gained the highest ratings - and this was at a time when 150,000 of the university's 200,000 students were already communicating with the university online from home.

The problem with all this is that the big miracle of busting open the iron triangle depended on the economies of scale of print and the mass media. To bust open the triangle you had to be big. UNISA and the UKOU each have over 200,000 students whilst India's Indira Gandhi National Open University has over a million. Which raises the question: is it still possible to get wide access, high quality and low cost by conducting distance learning on a smaller scale?

The good news is that the two latest miracles do make this possible. I refer to social software and open educational resources.

The Latest Miracles: Social Software and Open Educational Resources

Social Software

Let's start with social software. We noted earlier that for most students successful distance learning requires interaction. Traditionally this has been provided by tutors and however efficiently they are organised they do not have the economies of scale of independent study with the mass media.

One attempt to get around this has been to try to make computer systems genuinely interactive so that they respond to you as you; remembering your previous interactions, your learning style and so on. Research on this continues, but it has not yet produced any systems that work at scale.

The more promising approach is social software, which uses ICTs to enable people to work together easily as individuals or in groups. This multiplies the impact of the teachers and tutors but also, perhaps even more importantly, makes it easier for students to learn from and coach each other. For example, some social software used by the UK Open University is called Buddy Space, which gives the flavour. Irrespective of your status, background, position - you can participate in this collaborative social movement - it represents democracy in action.

Social software helps create the learning communities that are the basis of good education and good distance education.

Open Educational Resources

The final miracle we shall explore - and we are coming to the difficult bit that I warned you about - is open educational resources. One reason that successful distant learning organisations are big is that developing good learning materials is an expensive, labour intensive process. You can only afford the investment if you have economies of scale in their use.

Long ago, of course, people had the idea of sharing learning materials between institutions so that everyone didn't have to re-invent the wheel. But that was difficult so long as those materials were in physical formats, such as print on paper. If you use materials developed elsewhere you always want to adapt them to your particular needs. With the old formats that meant starting the printing process or the TV recording process all over again.

The miracle of open educational resources is that sharing and adaptation are now easy because everything is held electronically. It also helps that the World Wide Web and miraculous tools like Google have made it psychologically OK to share materials. We used to be suspicious of what was not invented here, but today we are grateful for the wonderful intellectual resources that the Web allows us to share.

To simplify considerably, we can distinguish three phases - or generations - in the development of open educational resources (OER). All of them have been supported by the Hewlett Foundation, which has shown a strong and consistent commitment to creating a global intellectual commons in this way.

In 2001 MIT the Massachusetts Institute of Technology (MIT) caused a stir by making the course notes of its faculty available on the web for all to see. This launched the OER movement with all the prestige of MIT, although the material on display is information on course curricula rather than self-learning materials.

Later this year, at COL's 4 [th] Pan-Commonwealth Forum on Open Learning in Jamaica, the UK Open University will announce the next generation of OERs when it launches its Open Content Initiative. This will make educational resources freely available on the Internet, with state of the art learning support and collaboration tools to connect students and educators. These collaboration tools are the social software we referred to earlier.

If the MIT initiative shared information and the UKOU project will share learning, the next phase will share course development. This is what COL and its 25 country partners are aiming to do through the Virtual University for Small States of the Commonwealth, on which my co-authors Paul West and Wayne Mackintosh have been working this month.

People from many developing countries are working collaboratively to prepare learning materials on Tourism and Entrepreneurship that will be suitable for use in the many small states of the Commonwealth. The materials they produce will need to be adapted and fine tuned for each country but that is a simple matter when the open educational resource of the basic course is truly open.

The Open Educational Resources movement has clearly come a long way in five years and holds enormous promise for Africa, with the proviso we just made, that open content is genuinely open. This is where we come to the final and difficult part of these remarks. Please bear with us because this basic question of openness is important and not widely understood.

What kind of Creative Commons licence?

Conventional copyrighting is clearly inappropriate for open educational resources but so is leaving the field for copying completely open.

The solution, invented by Larry Lessig, is the Creative Commons license, which is designed to promote and protect the freedoms of creative works within the educational commons. This license does not negate the property rights of the creator; it simply regulates the use of the creator's efforts.

So far, so good, but things then get more complicated because a range of "protections" can be applied to the license. One is attribution (BY), which simply means acknowledging the source of the OER. Another is share-alike (SA) which means that if you adapt my OER you must share your adaptation with me in a reciprocal manner.

These two restrictions do not pose problems. The difficulty arises with the non-commercial (NC) restriction which is intended to restrict use to non-commercial activities. Intuitively this non-commercial restriction seems like a sensible condition to put on the use of OERs developed in the public sector. There is an understandable fear within universities that naked capitalism could monopolise and consume the well-intended efforts of open content creators.

Unfortunately, however, the non-commercial restriction can have the effect of closing open educational resources to just the type of use that the originators would like to see, especially in developing countries. It does this in two main ways.

First, you may prevent the distribution of free content to people who need it most. The non-commercial restriction would not, for example, legally permit a local community institution to package a print version of your online OER for resale on a cost recovery basis for printing, packaging and overheads.

Second, and even more serious, the NC license is incompatible with other free content projects. You cannot mix material with a free content license with material that has a Creative Commons license with the NC restriction. This prevents you getting economies of scale by taking advantage of the explosive growth of free content from other open projects like Wikipedia. If your project uses a NC restriction you cannot use any of the images, sound files or video files of the Wikicommons project which now has more than 600 000 free content resources.

What is the downside of dropping the NC restriction? It is highly unlikely that an entrepreneur will be able to make a substantial profit from an OER, simply because the original version of the OER will remain open. Why would you pay good money for a commercial version of open content, when you can get the original version for nothing? The commercial sector used to have the advantage of better distribution networks, but today large scale distribution can be done by anyone with an Internet connection or a DVD burner.

Even the low risk of commercial exploitation is better addressed by the "share-alike" protection, which means that any published revisions and derivative works must always be released with a share-alike protection, which ensuring the future freedom of the resource by encouraging community participation - since all contributions will remain within the commons.

This all sounds very arcane but it is very important. If people regularly place non-commercial restrictions on open educational resources the latest miracle of educational technology will not be able to work its wonders in creating a global intellectual commons. Open educational resources will not be open.

My colleagues and I at the Commonwealth of Learning would be pleased to take this matter further with any individual or institution active in the field of OERs. Meanwhile, our very strong advice is that OER creators should avoid the non-commercial restriction and use a license that meets the requirements of the free content definition (http://freedomdefined.org/Definition). This is what COL and the 25 participating countries are doing for the course materials produced in the framework of the Virtual University for Small States of the Commonwealth that Paul and Wayne are closely involved with.

If you choose a Creative Commons License, the content should at the very least be made available under attribution with a share-alike protection under version 2.5 of the license (i.e. CC-BY-SA-2.5). The secret is to use 'share-alike' rather than 'non-commercial' licenses under the provisions of Creative Commons. Otherwise the great promise of the open educational resources may peter out and the investments of educational philanthropists will yield nil returns as OERs with non-commercial restrictions lie unused and unusable for all practical purposes.

Conclusion

It is time to wrap up. We have argued by example that South Africa is and can continue to be a leader in applying ICTs to educational needs. We have explained the fundamental miracle of educational technology, which is to improve access, raise quality and cut costs all at the same time. Then we have shown how the latest phenomena in ICTs, namely social software and open educational resources, give small institutions many of the same advantages as the big ones. There are terrific opportunities in front of you.

Finally, we hope that you will also embrace a wider vision. In the lively debates about globalisation at UNESCO your former Education Minister Kader Asmal argued passionately that we must not let globalisation mean the privatisation of knowledge.

We urge you to espouse another vision of globalisation, which is to use open and distance learning, ICTs, social software and open educational resources to create a global intellectual commons. The miracle of a global intellectual commons is that it cannot suffer the tragedy of the commons. That is because when you give your knowledge to someone you still have it to use yourself.