

Computers for Secondary Schoolchildren: A Busted Flush?



World Computer Congress 2010

*Brisbane, Australia
20-23 September 2010*

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Abstract

Vendor hype says that computers can transform secondary education. If true, this would be a blessing for the 400 million children in developing countries aged between 12 and 17 who are not in school. But evidence from introducing computers in developing world schools shows that the hype is far from the reality. The paper looks at three projects. *One Laptop per Child* has been a failure when measured against its original ambitions. The *NEPAD eSchools Demonstration Project* in Africa never got beyond the demonstration stage. Only India's *Hole-in-the-Wall* project achieved success – by avoiding putting computers in schools! Finally, a brand-new project with a \$65 laptop in Maldives seems to have achieved something new – using computers in small isolated primary schools as a substitute for unaffordable teachers.

Introduction

My title today is Computers for *Secondary Schoolchildren: A busted flush?*

For years I thought that a busted flush was a defective toilet. But although the meaning is similar, the term comes from poker and refers to a potential flush of cards which ultimately was not fulfilled. The idiomatic meaning of a 'busted flush' is anything that ends up being worthless despite great potential. But I must watch my language and unpack two of these words.

I referred to a flush that *ultimately* was not fulfilled. Ultimately can be a long time! I mean potential that has not been fulfilled *yet*. What will happen in the future is an open question. A busted flush turns out to be worthless despite its potential. Computers are not worthless; they are worth too much. They are still so expensive that in developing countries there is often more value in investing in people.

I am happy that CEMCA the Commonwealth of Learning's Commonwealth Educational Media Centre for Asia, in Delhi has now helped to get the price of a multifunctional educational computing device

down to around \$65, which begins to change the game. CEMCA is not in the hardware sales business and we have put the specifications in the public domain so that others can develop it further.

The Commonwealth of Learning

I shall first describe the Commonwealth of Learning so you know where I am coming from. The Commonwealth of Learning, COL, is a small intergovernmental organisation of the Commonwealth located in Vancouver and New Delhi. Our mission is to help governments and institutions in developing countries use new approaches, based on technology, to expand and improve education, training and learning generally. We are pro technology – but we expect technology to deliver development benefits.

At all levels the challenge of expanding learning is so massive that traditional educational methods cannot cope. Using technology is now essential.

Expanding and improving formal education

COL promotes technology for learning on two fronts. We help countries expand formal education in four areas.

The first is expanding secondary schooling. 400 million children between 12 and 17 are not in secondary school. That is now the world's most pressing educational challenge.

The second is to expand teacher education. 10 million new teachers are needed to complete the drive to universal primary education, expand secondary schooling and cope with a massive wave of retirements.

The third is to improve the quality of higher education, especially where it uses ICTs and open and distance learning or ODL.

And fourth, to help the Commonwealth's 32 Small States acquire postsecondary skills. Small states are vulnerable and lack the critical mass of population and expertise to engage with the eWorld as bigger countries do.

This exciting programme, the Virtual University for Small States of the Commonwealth, is run by those 32 countries.

Promoting informal learning

On the second front we help to expand informal learning to improve livelihoods and health. That also has four areas:

First, we seek informal approaches to skills development. Another very critical development challenge is help many millions of young and not-so-young people secure adequate livelihoods. One successful manifestation of this is our Lifelong Learning for Farmers model.

We also help communities improve health through their local media. They need good information; preferably delivered through the voices of local people. Health challenges change constantly. The

HIV/AIDS pandemic is not over, but diabetes is now a massive problem and infant and maternal mortality is still shockingly high in some countries.

The final initiative guided from Vancouver integrating eLearning wherever appropriate. The demands for help with this are insatiable.

Finally, our tiny unit in New Delhi, CEMCA, does exciting things, including a programme of computers in a primary school on one of the atolls of the Maldives to which I shall return.

So my stance on technology in education is positive but demanding. Here is the plan for this address.

First I shall look at the surge in demand for secondary schooling. This is an area where technology could really help by ramping up open schooling. Second, I shall urge that computers must facilitate education generally and not just the teaching of IT. Third, I shall look at three high-profile projects that have put computers in front of children in developing countries. Fourth, I shall comment briefly on the [EduFrame](#) computer initiative in the Maldives.

Expanding Secondary Schooling

I start with secondary schooling. The secondary surge is today's biggest educational challenge. For 20 years absolute priority has been given to the campaign for universal primary schooling, to the neglect of other levels of education. Now, thanks to the success of that campaign, a tidal wave of youngsters is seeking secondary schooling. One estimate indicates there are some 400 million children aged between 12 and 17 worldwide who are not in secondary school. Most have no chance of experiencing traditional secondary schooling because in most developing countries the unit costs of secondary education are too high.

Expanding secondary education is important, not least because it is the best weapon against climate change. Increasing population is the most powerful driver of climate change, so slowing population growth will limit it. On average, women with secondary education have 1.5 fewer children than those without. A difference of one child per woman means 3 billion more or fewer people on the planet by 2050. Secondary education for girls *must* be a priority.

If conventional approaches to secondary schooling cannot deliver, what are the alternatives? COL is promoting open schooling, which is the application of open and distance learning, or ODL, at this level.

Mention ODL to computer folk and they automatically assume you mean web-based learning systems with broadband Internet, but distance learning began long before computers and the Internet. Today most distance learners still use the well-proven media of print and audio, and that is true of open schools. For example, very few of the 1.6 million pupils enrolled in India's National Institute for Open Schooling have computers or internet connections at home although nearly half of them register online.

How can Computers Help?

The question is whether computers can help to expand secondary schooling at low cost. In part two of these remarks I simply make two caveats.

First, we are not asking how computers can teach children about information technology. We take that for granted. However, people make bigger claims for the use of computers in education: they can not only inculcate IT, but can also help children learn better in all subjects.

Second, let me promote the work of another speaker at this conference. I am referring to Nicholas Carr's new book, *The Shallows: What the Internet is doing to our brains*. Mr Carr spoke here earlier so it would be superfluous for me to summarise his ideas. But I note that one of his key themes is that we should not think of computers and the Internet as replacements for human memory. He argues, for example, that a habit of surfing hampers the brain's ability to distil experience into useful memories.

Children and Computers: Three Projects

So I move to the third part of this address. Our interest at COL is the developing world. It is there that computers will have the most impact if they can expand secondary schooling at low cost. Examining projects in the developing world where computers have been put in front of children is the best way to answer this question.

I shall summarize three projects that I examined in more detail in my recent book *Mega-Schools, Technology and Teachers: Achieving Education for All*. I refer you there for detailed arguments and references.

The first project is the One Laptop per Child (OLPC) project. Nicholas Negroponte initiated it in the MIT Media Lab, but it was always intended for developing countries.

Second is the eSchools Demonstration Project conducted by the New Partnership for African Development, NEPAD, a few years ago. COL was involved in the evaluation of this project.

Third is the Indian 'Hole in the Wall' experiment. This differs from the other two in that it put computers in public playgrounds rather than schools.

My summaries of these projects will be very telegraphic, so I am sure to give offence, for which I apologise in advance.

One Laptop per Child

OLPC is the very personal project of Nicolas Negroponte, who believes that if children can learn the very skill of learning, education will be a force to eliminate global poverty. He wants children in the developing world to 'learn learning' through a methodology called "constructivism" in which the learners construct new knowledge from their experiences.

The Media Lab built the XO-1 laptop to enable constructivist learning in the dusty, hot, un-electrified schools of poor countries. It was intended to be cheap enough to be purchased in massive quantities for one-to-one distribution.

Launched at the 2005 World Economic Forum in Davos, the “\$100 laptop” was an instant international sensation. Developing world presidents attending the Forum were ‘captivated by Negroponte’s dream that they could revolutionize education with an inexpensive yet rugged laptop, specifically designed for children, which negated the need to construct schools or hire teachers’.

Sadly, with the benefit of hindsight the Davos launch now seems to have been the high point of the project. It has failed to achieve its potential in four ways.

First, the price of the XO-1 machine never reached the \$100 figure. However, the project did spur other computer manufacturers to produce reliable cheap laptops, leading directly to the \$65 machine I mentioned and maybe heralding the \$10 laptop that is a gleam in the eye of the Indian Minister of Human Resource Development.

Second, the penetration of the XO laptop has fallen short of Negroponte’s ambition to place 150 million annually by 2007. A total of around one million have been distributed to date.

Third, the discourse has shifted. Negroponte used to insist that, as a generative technology to foster constructivist learning, the OLPC initiative was about ‘learning not laptops’. But today’s focus is on selling the XO in a market that is replete with cheap laptops that make no claim to promote constructivism.

Finally, to the chagrin of academics following the project, there is little focus on educational outcomes. There were no plans to measure usage of the laptops, or to correlate changes in test scores with their use. Instead, the idea was to create a simple and generative infrastructure, stand back, and see what happens.

NEPAD eSchools Demonstration Project

I now summarise a second project, the NEPAD eSchools Demonstration Project. Since Africa is the laggard in education at every level, it is a promising place to explore the potential of computers to expand schooling at low cost. The Commonwealth of Learning surveyed the use of computers in African education in 2007 and later evaluated the NEPAD eSchools Demonstration Project. What did we learn?

The survey noted that African adoption of ICT was in transition from a decade of experimentation to ‘a new phase of systemic integration informed by national government policies and multi-stakeholder-led implementation processes’. Most African countries now have national ICT policies in place and most have ICT policies for the education sector.

The researchers concluded that the progress being made in the adoption and diffusion of ICT in education throughout Africa is remarkable. The formal schools sector has led the way in ICT in education in most African countries, often before national policies have been adopted with much of the emphasis being on secondary school access.

Encouragingly, African policies now try to integrate ICT into education, rather than treating it just as a subject to be taught. Furthermore, ‘unlike in many parts of the developed world, African staff and teachers appear to be more welcoming to the prospect of ICT in education’.

This was the promising background for NEPAD eSchools Demonstration Project. It was the first step in a multi-country, multi-stakeholder continental initiative intended to teach ICT skills to young Africans in primary and secondary schools, and to improve the provision of education in schools through ICT applications and the use of the Internet.

The Project involved six diverse schools in each of 16 countries through partnerships that included private sector consortia, the country government and the eAfrica Commission. The consortia were to provide an eSchool model that included equipment, networking, connectivity, training and curriculum relevant learning materials. The aim was to identify working models for the large scale implementation of the initiative, which aimed to equip 550,000 African schools with ICT and connect them to the Internet by 2020.

Many lessons were learned. I list six:

First the project made a slow start because all parties underestimated its complexity.

Second, as in the OLPC initiative, there were criticisms of limp management and a *laissez-faire* approach.

Third, it did not build on previous projects and draw on the experience of local civil-society organisations.

Fourth, there was little use of technologies to enhance pedagogy across the curriculum and create student-centred learning environments, even though the ability of pupils and teachers to use basic computer programmes improved significantly.

Fifth, the project had a major impact in making governments aware of the importance of adopting ICT in their strategic educational plans. Also the impact of the Demo school in each community was greater than anticipated, drawing in teachers from other schools and involving community groups.

Sixth, the failure even to attempt cost-benefit analyses was a weakness.

I should add that, tellingly, there has been no attempt so far to roll out the wider project.

The Hole in the Wall

The third project is India's Hole-in-the-Wall experiment. Its initiator, Sugata Mitra, has spoken about it engagingly at many conferences and is now known affectionately as the 'slumdog professor' because the HITW project inspired the novel that led to the Oscar-winning film *Slumdog Millionaire*.

Mitra intentionally put computers in public places rather than schools, with interesting results. He began a decade ago with a single computer embedded in the brick wall of a playground next to a Delhi slum. The results surprised everyone: 'Slum children were able to use the computer to browse, play games, create documents and paint pictures within a few days'. The press called the experiment the "Hole in the Wall" while researchers called it "Minimally Invasive Education" – a euphemism for dispensing with teachers!

Realising that he had a tiger by the tail, Mitra initiated a research programme. It focused first on observing the behaviour of the children, then on examining what they were learning and finally the impact on their performance in school.

The most fundamental finding is that learning happens in groups. Negroponte held that every child must have a laptop, whereas Mitra has found that having numbers of children working on the same computer is the key to success as well as being less expensive.

Learning at the HITW occurs in stages. The starting point is intense excitement. All children reported that they liked working with computers, using the words ‘fun, enjoyment, pleasure, and feeling good’. This nurtures the emotions and motivation needed for learning. But getting started is a challenge: ‘during the first week the computer hangs because all the children are pressing on the keyboard simultaneously. But gradually a fluid and flexible group emerges that operates on the computer and learns through... trial and error’.

Membership of the group changes constantly, which has the effect of making each child both a learner and a teacher at different times. The gap between experts and learners disappears because all participants are considered experts in some capacity. It is the sharing of knowledge by everyone that drives evolutionary development and continuous progress. Children prefer to learn from their peer group because peers represent a more helpful and attainable competence model than adults or teachers.

What is the impact on the wider learning agenda? Is HITW an option for expanding schooling at low cost? Obviously children can use computers to learn about computing, but what about other subjects?

Research indicates that involvement in the HITW does develop intellectual maturity, although without improving the capacity for rote learning favoured by Indian schools. It also shows that communities believe that HITW computers are good for children – an important finding given that parents are usually sceptical about educational technology. Another significant result is that out-of-school children benefit from the HITW.

EduFrame in Maldiv

I conclude with a few words about the deployment of the \$65 EduFrame computer on an atoll school in the Maldives. It is far too early to draw any but the most preliminary lessons from this but I make four comments.

First, getting the price down to well below \$100 per machine is helpful. A donation of \$3,000 from Australia allowed all children in the school on one atoll to have one.

Second, it allows the Maldives to use its own curriculum by putting in on the computers.

Third, it does reduce costs. The school chosen was too small to afford the usual complement of teachers, so technology is acting as a substitute for labour.

Fourth, everyone seems very happy so far – but these are early days.

Conclusion

My time is up and I shall let you draw your own conclusions from what I have said.

As always in education there is good news and bad news. However, I hope that as the price of useful educational computing devices drops towards India's ambitious \$10 figure we shall see such widespread experimentation that technology will *ultimately* achieve in education the revolution it has achieved in other areas of life: offering wider access, higher quality and lower costs – *all at the same time*.

Right now, however, the honest assessment must be that computers for secondary schoolchildren are a busted flush.