21st Century Schools in Developing Nations – Distance, Technological Change and Resourcing Using Hajj Funds or Other Non-Traditional Investors

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Abstract

This document primarily addresses a way of funding schooling systems in developing nations through the rapid technological changes ahead.

City schooling in a developing nation

My wife's schooling – from childhood until her last day of high school – was in what was then a **developing Islamic nation just recovering from a devastating time of civil unrest**. I was surprised to find that in many ways[1] her education covered a broader range of relevant topics, which were covered in more depth, and to a higher standard than mine had. To put it in context, I studied at what was then the most expensive private school in one of the wealthiest countries in the world[2]. The school she attended handled a double student population because there were both morning and afternoon schools using the same buildings.

There are *already* extraordinary educational institutions in developing nations developing citizens ready for the future. But they are mostly in cities.

Models for regional schooling

Outback Australia has lower population densities than the Saharan desert – with vast distances between schools – but a strong ethic of educating children. As the effects of peak oil in the next decades make travel more expensive, and developing nations try to bring their children to a developed-nation status, schools outside of the big cities are likely to begin to look a lot like regional Australian ones.

So the model I am proposing for such schools is the tecnological evolution of a combination of:

The Northern Territory's School of the Air
Schooling via 2-way radio for the last

[1] She chose to study bookkeeping and accounting, which was not available to me. Her school's choice of languages reflected the up-coming great powers (such as China), not the great powers of the 1st and 19th centuries. She also had lessons in how to make a telephone call (recognition of a new foreign technology which needed to be mastered) and how to polish brass and silverware (because jobs as a servant in wealthy house were valuable). She also studied linear algebra, which in Australia is covered in first-year mathematics at university.

[2] As a counterpoint, I also attended two local government-(under)funded schools. Same story.

fifty years[3].

The New South Wales regional model
Students spend one day a week at a big-town school for courses which require "complicated" infrastructure – such as science labs. They spend the rest of their week at their local school. Boarding in-town for intensive sessions can happen as well.

Mapping out the future

We will call the 2020s the decade of videoconferencing. This year (2010) it has become possible to link several classrooms for little more than the cost of a mobile phone and a TV or laptop with a projector[4]. Mobile phones with projectors built-in will be available soon[5], to bring the price down further. Mobile phone infrastructure in developing countries can sometimes move much faster than in developed countries[6]. 10 years is not unreasonable for this to trickle down into educational practice.

So we will see videoconferencing (either directly using mobile phones, or as a data service carried over mobile infrastructure) explode in popularity – as it drops in cost to become affordable – in developing nations in the next ten years. Videoconferencing will be used:

- To give teachers in smaller schools relief time. For example, teachers in neighbouring schools might choose to teach their strongest subjects to both classes, and let their weakest be taught by the other teacher. Even if they have to stay present in the classroom, this still saves teacher effort and gives a better experience for students.
- To deliver specialist subjects for which there isn't sufficient demand, or for which the resources are elsewhere[7].
- For students isolated by location[8], religion, danger of violence[9], disability or any number of other causes who cannot attend school.
- When recorded, to provide catch-up lessons for students who have missed a day, or as advanced lessons for students who want to accelerate themselves.

We will call the 2030s the decade of semi-avatars. With real-time, automatically-generated feedback of student comprehension (e.g. through monitoring eye flicker, facial reactions and so-on), computer programs will trawl through classroom lessons to identify the ones which have and haven't worked…to produce optimised lessons which appear to come from the student's regular teacher. Initially this would be manual – teachers could review their lessons and splice together video which was known to be effective – but very rapidly this could be automated. This will evolve from extensive

[3] They have started trialling a few other technologies lately.

[4] It has been possible somewhat cheaply before with (for example) Apple iChat – and expensively with specialist equipment for many years – but now it can be done with Skype without requiring any kind of paid-for subscription, and nothing beyond the most basic of infrastructure.

[5] You can use a phone with a TV-out and an existing projector already.

[6] Witness Uganda, where air-time has become a currency, and the phrase "mobile banking" is a tautology.

[7] This is essentially the NSW regional model.

[8] The School-of-the-Air model.

[9] According to Michelle Dorey, Australian director of Mission without Borders, one of the leading causes of children missing schooling in Albania is inter-family fueding – children could be kidnapped or killed on their way to school, so they are kept at home.

video-conferencing, but also because the last great wave of demographic change[10] will force efficient use of the adult workforce, particularly in teaching.

We will call the 2040s the decade of tele-robotics. Instead of going in person to perform a lab experiment, or to work in a tech-shop with wood or steel, students will control robots to do this[11]. Supervising robots will be common enough for workers in industry[12], and it will be expected that students will need to learn these skills at school.

We will call the 2050s the decade of personalised instruction. With vast databases of effective schooling, correlated with knowledge about a student's past learning, genetic profiling and brain structure – each student could have their own automatically-generated curriculum. They could be merged in virtual classes with like-minded and like-abilitied children.

Trying to imagine what schools will be like in the 2060s and beyond becomes very hard. Will teachers be necessary? Would we even bother with classrooms or physical buildings?

Can developing nations absorb this kind of education system?

The above futuristic plans are nice dreams, but can it be done?

We are after all, talking about implementing schooling in regions where parents need children to work and earn money to meet basic family needs: food to eat, antibiotics, vaccines and the like. Even just having $USD0.10 per day scholarships paid to students attending high schools would lift educational attendance and attainment.

Is it absurd then to suggest that developing nations could afford to pay to record every video-conferenced class in every school?

For this reason, I have chosen to focus the remainder of this document on finding methods of funding.

Internal tax revenue, foreign aid budgets and developed-nation donations have not been sufficient to fully fund universal education in developing nation schools, and while Micah Challenge and other movements are pushing to increase developed-nation-to-developing-nation aid, it is unlikely to be sufficient even in the short-term[13].

Very long-term loans (where the principal does not even begin to be repaid until at least a generation later) pose a problem of inter-generational equity – if the first generation do not spend the money wisely, the second generation still has to repay the debt even though they gained nothing from it.

Non-ursurous investors

A new kind of financial product could fund

[10] We are nearing the last generation to be born in developing nations where the parents are expecting and needing to have large families. Soon the birth rate will drop, leaving a last "large" generation, similar to the baby-boomer generation in the West, only much, much bigger.

[11] This will reduce the use of the NSW regional model.

[12] Particularly in the textile industries of the developing world, which are about to face a robotics revolution which will affect them as profoundly as affected car manufacturing over the last two decades.

[13] Spending 5% of a developing nation's GDP on education can sometimes be just enough to deliver universal *primary* education. 5% of the combined GDP of the 106 poorest nations is roughly $USD450billion. This is around 0.9% of the GDP of the wealthiest 106 nations, which is higher even that the generous foreign aid budgets being advocated by Micah Challenge. Secondary education would cost yet more. (Data from the CIA factbook)

the education of the developing world[14].

What we need – in order to fund developing nation education – is a market for financial instruments where:

1. The risk and rewards are shared reasonably between the investor and investee, since these both may be passed down a generation.
2. The investor injects a steady stream of money into the investment for many, many years.
3. The investor is not expecting a return for a very long time.
4. The investor would like good returns, but does not require a guarantee of this.

At least two such markets exist[15]:

- Devout Muslims investing for their **Hajj fund** (to pay for their pilgrimage to Mecca) **do not want to see their money earning interest, since this is prohibited under Islamic rules of banking**. Investments must increase in value for some other reason.

  As the Islamic world increases in prosperity, the number of "able-bodied" who "have the means" to pursue their Hajj will increase, and there will be a **corresponding rise in investment funds needing to find Islamic-banking-compatible investments**.

- Many countries have compulsory retirement providence funds – known as 401k, superannuation, or many other names. Workers are obliged to hold – and continue to put money into – these kinds of funds for 30 or more years. There is a niche of investors who want to see their **money invested ethically** rather than to maximise profits at all costs. Investment into developing nation education programs ticks all the right boxes – environmentally friendly, poverty-reducing and supporting growth without increased resource consumption.

  According to several studies[16] roughly 30% of the workforce would like to have their retirement money invested in ethical investments.

Non-ursurous returns from a long-term educational bond

Investments in education deliver some of the best returns-on-investment of anything on which money can be spent[17], even if the returns do take a long time to materialise. Working from a lower base, investing in education in the developing world would be expected to deliver better returns than investing in the developed world.

[14] Which is difficult to say after the global financial crisis.

[15] And there is possibly a third of unknown size: angels and venture capitalists who invest, not with a view to an exit within 5 years, but who invest with a view to owning a long-term stake in a valuable company.

[16] Tabled in South Australian parliament: `http://markparnell.org.au/speech.php?speech=356`

[17] The Joint Economic Committee Study from 2000 entitled "Investment in Education: Private and Public Returns" (found at `http://www.house.gov/jec/educ.htm`) estimated that $USD1.2 trillion dollars of the GDP increase between 1959 to 1997 was attributable to increased education. According to the US National Center for Education Statistics, the USA spent around $USD15 trillion (inflation adjusted) in those 4 decades; if they had kept the 1959 budget it would only have been around $USD6 trillion. So the investment of an extra $USD9 trillion over 40 years was repaid in the following 7-8 years. Note that this may over-estimate the repayment time since much of the increased education budget may have been due to population increases.

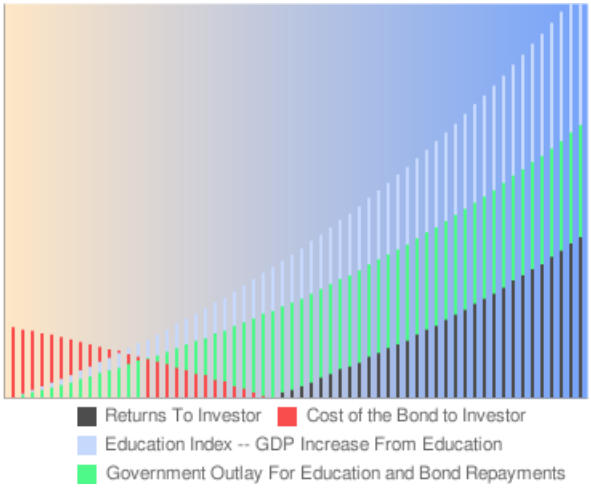

Figure 1: Expected costs and returns

Initially, the investor is funding a large portion of the increased education budget. After a number of years, the growth in GDP due to the improved education starts letting the country's government make larger contributions. After a few decades there is enough wealth to repay the original investor, carry a growing education budget and still leave some to spare. (Modeled on USA historical data.)

The main challenge is finding a way of returning the increased wealth of the investee back to the original investor which would meet the non-ursurous requirements of the investment, but still grows in value.

For optional higher education, this has been done[18], but this has never been applied to compulsory (primary and secondary) education.

It is possible calculate a likely figure for the increased wealth attributable to increased educational spending, and this can be done by an independant third party, such as UNESCO.

This **increased wealth could be used as the index for a financial derivative product** backed by the country's reserves. Anyone holding this long-term educational bond would receive money from that country in proportion to the amount of increased wealth that that bond created.

The long-term educational bond would be paid for by the investor in dimishing installments over a long period of time, but eventually – as the benefits of the better-funded education system began to take effect – the returns would become greater than the outlays.

Figure 1 illustrates what this would look like.

It does not need to operate at a national level: state, provincial or even regional educational administrations could be funded in this way.

Summary

There appear to be several untapped sources of funding for education in the developed world, using a **newly-proposed financial instrument**. The quantities of money available look to be more than enough to fund good quality education in the developing world.

About the Author

Greg Baker runs the Institute for Open Systems Technologies Pty Ltd, an innovation, consulting and training company based in Sydney, Australia. Greg's developing nation work has included helping the Vanuatu Reserve Bank and Ministry of Finance, Solomon Islands Fisheries and several organisations in Papua New Guinea; he also started work on localising the Linux operating system to function in Bislama. He previously worked for Google.

[18] Students pursuing higher education in the 1990s and 2000s in Australia pay higher tax rates once their income passes a certain threshold They pay nothing if they do not earn a higher income as a result of their studies.