CHAPTER 1.7

ICTs in Schools: Why Focusing Policy and Resources on Educators, Not Children, Will Improve Educational Outcomes

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Information and communication technologies (ICTs) have long been perceived as having the potential to transform education and student learning, especially in developing countries. The underlying belief of many initiatives has been that learning will happen if students and learners are provided direct access to ICTs. However, despite years of research, there is little evidence of the value of these approaches. Ideas such as the massive open online course (MOOC) and One Laptop Per Child (OLPC) project were initially hailed as the "next big thing" in education because they were seen as a way to offer access to education to all. But most studies show that these initiatives are failing to deliver: course completion rates on MOOCs are usually less than 7 percent, often because of a lack of personal contact.[1] A similar cycle of hype and then disappointment has been seen in the much-touted Hole-In-The-Wall project. Although a well-intentioned attempt to deal with the problems of access and other constraints in developing areas, it has not been successful in making any lasting or meaningful educational change.

The main reason for the lack of success of these highly promoted projects is that they have ignored the single most important person in the education and learning experience of the child: the teacher. Decades of research have shown us that the most important contributor to raising educational outcomes in schools is clear: we need better educators. The single most important determinant of the educational outcomes for a child within a school is the capacity of his or her teacher, so it is on the teacher that we need to focus our attention. Outside the school, other factors such as socioeconomic opportunities also have significant impact, but that is beyond the scope of this chapter.

TEACHER CAPACITY DEVELOPMENT

Teacher education and teacher professional development should be the overriding priority for education policymakers—rather than the current fashion of investing in technology that appears to offer a shortcut to higher school standards. This lack of emphasis on the teacher (sometimes to the point of ignoring the teacher's role altogether) is the main reason that the much-hyped investments in educational technology that seek to go directly to the learner have not paid off.

Given the scant empirical evidence supporting any improved educational outcomes based on technology alone (and the sound theoretical explanation for the lack of better outcomes), we argue that the most productive way to use ICTs to help deliver better and more equitable education at the primary and secondary levels is to concentrate resources on educating teachers. This should encompass both those who have yet to qualify and those already in service, helping to develop their capacities and knowledge base. In making this argument, the chapter will focus in particular on the example of India, looking at how investment and

policymaking attention could be redirected to deliver improved educational outcomes.

The idea that ICTs provide easy answers to the challenges of providing all children with better educational opportunities is an attractive one. ICT equipment is increasingly affordable and accessible to education systems, even in low-income countries. It is quicker and easier to deploy this equipment than to recruit high-quality people or develop such qualities across large numbers of people where they are needed. And it appears to solve the problem of how to provide education in remote areas spread across diverse geographies.

Unfortunately, there is little evidence to suggest that investment in classroom ICTs delivers substantive returns. The World Bank published the first definitive study of the efficacy of classroom ICTs in 2005, concluding that "the positive impact of ICT use in education has not been proven."[2] In the years since then, no major study has conclusively delivered that proof. For example, a comprehensive study published in 2013 by the Inter-American Development Bank (IADB) on the impact of laptop distribution programs in Peru found that, while children's competence in computer use had increased, there was no sign of better educational outcomes. "We found no evidence of effects on standardized tests in Math and Language or on enrolment," the IADB concluded.[3]

WHY ICTS HAVE NOT DELIVERED IN EDUCATION

So why has investment in ICTs failed to deliver? A wide range of reasons contribute to this failure.

The first is fundamental. The natural processes of child development and learning—especially for children at grade eight level or under (aged 14 or younger)—are such that ICTs have very limited use. Instead, effective education requires a sound anchoring in human relationships and engagement with the world of people, ideas, and things. This is most effectively achieved by a teacher, who both anchors the human relationship *and* mediates the learner's connection to the world of ideas and learning. It also demands that the child's social context, the nature of knowledge, and the aims of education are appropriately factored in. So, in the context of education—which by its very nature has specific curricular goals—greater use of ICTs may not in itself improve learning.

A second issue is that in most cases where ICTs have been put to work in schools, education policymakers and technology advocates have tended to focus on the technology itself to the exclusion of the educational reason for it. Their approach has been either to provide the technology and then to think about how it might be applied, or to assume that the natural curiosity of the child together with access to information would automatically lead to higher learning outcomes. However, this perspective unfortunately ignores years of educational research on teaching and learning that show different outcomes.

Although both these issues are present in classrooms and schools all around the world, their impact is greatest in developing economies. This is because these are the education systems where dependency on ICTs, to the exclusion of teaching capacity, is increasing most rapidly. There *are* ways for ICTs to help in education, but greater use of technology alone will not automatically deliver this result—and most evidence suggests it rarely does. Instead, what children urgently need are better teachers, not more gadgets in the classroom, particularly when funding and resources are limited. Giving every child a device or setting up open online classes makes for good headlines, but these interventions do little to deliver better educational outcomes. Moreover, de-emphasizing the role of the teacher further marginalizes the most important person in a learner's world.

Teacher quality and its effect on educational outcomes is difficult to evaluate or measure, mainly because most studies capture only a narrow slice of the richness of the education process, and thus underestimate the importance of the teacher. Despite this limitation, the evidence in favor of our argument is clear. Numerous studies have demonstrated the significant effect on educational outcomes of having high-quality teachers: for example, as one UK study highlights, during one year with a very effective math teacher, pupils gain 40 percent more in their learning than they would with a teacher who does not have the same capacity.[4]

MAXIMIZING THE POTENTIAL OF ICTS

It is not that ICTs do not have any role to play in the educational process: an emphasis on developing the capacity of the teacher, rather than the student, is what will yield the greatest dividends. This approach leverages another fundamental characteristic of human learning and development: adults learn differently from children, and adult learning is more suited to digital channels than children's learning is. Of course, even here, ICTs comprise one tool among many that can further the process of teacher education and capacity development, which has to be both broad and based on a sound vision of education and its processes.

Developing newly qualified teachers with an increased capacity, or improving the capacity of teachers already in service, will be no mean feat. Teaching is an extremely sophisticated and demanding activity that requires a complex, multi-modal approach to its development. Moreover, this is a problem of scale. In India, for example, 200,000 new teachers qualify each year, and 7.2 million existing teachers are in need of support and development. Of course, this is already an order of magnitude simpler than targeting the 210 million

children across 1.6 million schools currently within the Indian educational system.

To achieve this goal, though, educational policymakers must change course. This chapter considers three crucial challenges that must be addressed if we are to maximize the potential of ICTs in education:

- **Reforming telecommunications,** which must include a drive to ensure that teachers and student teachers accessing ICT support have stable and high-speed network connectivity, however remote their locations may be.
- **Delivering quality digital educational content,** which must provide in-depth focus on the quality and availability in multiple languages, especially targeted at educators.
- **Embracing collaboration,** which must take advantage of networked collaboration tools and social networking in order to develop mechanisms that bring educators of teachers together to pool expertise and share content.

Reforming telecommunications

Citizens in developed economies, including participants in the education system, take access to stable, high-speed communications networks for granted. In many of these countries today, broadband Internet connectivity is now seen as a basic utility on a par with energy or water. In developing countries, however, neither stability nor speed can be relied upon. If ICTs are to become a reliable support in the process of teacher education, this will need to change.

That said, the improvements required may be much more modest than might be assumed. In India and other developing economies, the mobile revolution—in which the rapid development of a mobile phone network did not wait for a landline rollout—is already having an impact on many social issues and endeavors. This development is providing access to communications technology for the great majority of Indians for the first time, with the networks now reaching even some of the most remote parts of the country. The impact of this should not be underestimated, despite the fact that in many areas networks support only voice calls. Without this connectivity, even some basic things used to be difficult to do. To take a very simple example, until teachers could be reached by phone, it was hard to simply call a meeting of all the teachers in a particular area.

The challenge now is to build on the mobile revolution with a network that is fast enough to cope with data and, just as importantly, to deliver reliable stability. Basic smartphones will be the devices through which teachers receive and access training and development material—rather than laptops or personal computers—but they will depend on networks that are sufficiently robust to cope.

It is possible to envisage an approach where individual teachers routinely and regularly receive material on their handheld devices. In addition, clusters of Indian schools might link up to operate a shared facility capable of hosting, say, basic video-conferencing, so that all the teachers in a given area could come together on occasion to participate in a training seminar delivered through such a channel. The network would need to be sufficiently robust for a group of teachers gathering in a single place to hear such a seminar to be confident that they will not be frustrated by an outage. But it needs to be only sophisticated enough to deliver basic audio or video connectivity.

This network would not require public-sector investment. The installation of mobile phone network infrastructure across India was completed without any government intervention because there was a compelling commercial case for private companies. The case for telecommunications companies to provide a network capable of supporting data is just as compelling, particularly as ICT costs continue to fall and large-scale rollout plans deliver economies of scale.

India is at an early stage in testing some initiatives that are enabled by ICTs in the teacher education sphere. Some small-scale projects provide some encouraging signals for what might be possible. In Uttarakhand state, for example, those District Institutes of Education and Training (DIETs) that have sufficient confidence in network connectivity have used web resources online for professional development efforts. The Government of the State of Bihar is investing in better connectivity for its DIETs and other teacher education institutions.

The experience of other countries testing similar initiatives is also encouraging. A project in Bangladesh, for example, saw the Asian Development Bank fund a project in which teachers in 10 schools in the Barisal region of the country were given smartphones and enrolled in a six-week distance learning program designed specifically for delivery via this technology. The phones utilized video, speakerphone, and conference call facilities rather than more sophisticated data services, but this was sufficient to deliver a wide range of material, as well as to facilitate both one-to-one and group learning. The trial, though limited, prompted positive feedback from trainers and teachers alike, with non-participating teachers and schools eager to take part in future initiatives.[5]

These are tiny examples of what might be possible if India's telecommunications networks can be upgraded to support delivery, but they are nonetheless important. They provide a glimpse of how better connectivity—even at a far more basic level than what is taken for granted

in wealthier countries—is the first step for ICT initiatives aimed at helping develop more and better teachers.

Delivering digital content

If the network connectivity is of sufficient speed and stability to be relied upon for the delivery of teacher education materials, of what might those materials consist? Herein lies the next major ICT challenge: for while there is now an opportunity to use digital channels to distribute content, the availability of content is patchy at best, even in physical form. In India in particular, better teacher education and professional development requires the development of a great deal of contemporary material. And given India's vast linguistic diversity, this material will need to be available in more than 20 different languages in order to reach all trainees and teachers.

Some content will be universal. Teachers learning about advances in neuroscience, for example, will receive the same material wherever they are in the world. In other cases, however, content will need to be contextual—education policies, for instance, vary from country to country, or even at the local level. But what is crucial is that these materials are developed in a digital format. There are many reasons for this.

First, and most obviously, the spread and development of telecommunications networks across the country provide a means to distribute this material for the first time, and one that is far less daunting or costly than the logistics of distributing physical books throughout the country. Second, there is greater scope to provide a richer learning experience using digital channels. As well as the basic texts required, there will be the option of providing more accessible and visual materials: more pictures, voiceovers covering the key points of a given topic, even video or animated content. Related to this, it is easier to convert digital materials into a range of formats (including print), depending on what might be most suitable in a local context. Finally, it is far easier to convert digital content into many languages once the core materials are in place.

For developing economies in general, however, the first step is to actually develop this content. This will require significant public investment, as well as a collaborative effort among schools of education, other academic institutions, and policymakers. However, the opportunity is enormous. Take the example of neuroscience, a field where there is little if any content for trainee teachers. This is not an isolated example: the same point applies in almost every area of the curriculum for teachers, where the material on offer today is often generalized and superficial. Furthermore, any content, if available, is often provided just in English rather than in the more accessible local languages.

A related part of the content challenge will be to develop better materials to help teachers make better use of the ICT equipment that is already in place. Although adding more new gadgets to the classroom is not the most productive route toward improved educational outcomes, the reality is that many schools in developing countries, including India, have implemented a lot of this equipment. However, teachers have rarely been given sufficient training on how to use it effectively.

This must now change. There is no point in teachers having access to ICT equipment unless they understand how to incorporate it in their pedagogy. Moreover, the focus needs to be on integration of ICTs as enablers across the curriculum, where relevant, rather than purely on technology as a standalone discipline. Of course, the ability of the teacher to integrate ICTs (or any other tools) is entirely dependent on his or her capacity as an educator.

There are various examples that highlight potential ways forward in this area, and a number of developing countries have recognized the need to train their teachers to make good use of the equipment with which they have been provided. In Africa, for example, the International Institute for Capacity Building in Africa has run a series of initiatives aimed at doing exactly that, with encouraging results so far.[6] Other initiatives have focused on teacher education. In Bhutan, for instance, the Singapore International Foundation has funded the development of a new ICT module in teacher training courses at the country's two teacher training facilities.[7] Importantly, this module covers both basic ICT use and the concept of computer technology as a medium for teaching and learning. Separately, Microsoft's Partners in Learning (PiL) program has run initiatives in five members of the Association of Southeast Asian Nations aimed at helping teachers better integrate ICTs into the wider curriculum. This has had a significant impact on the quality of teaching and learning.

Educational policymakers can learn a great deal from these initiatives. As they seek to develop content for digital delivery, their focus needs to be broad and wide-ranging. And given the investments already made on classroom ICT equipment, it is important that part of this new content covers the effective use of such tools.

Embracing collaboration

In preparing for creative and complex roles, peer dialogue and peer experience is very often the most important and productive type of learning. Teaching is no exception: where trainee teachers or established professionals are able to meet and interact with one another in order to share experiences, approaches, and best practice, learning can be a very rich experience. The development of these peer learning networks is therefore crucial as we seek to improve training and continuing professional development.

The vibrancy and value of these networks, however, depends on the level of engagement of their members. In a country such as India, where trainees (or established teachers) may be located far from their peers or isolated

in remote locations, getting these networks to operate effectively, particularly at scale, is challenging.

Over time, though, ICTs can help to tackle this problem in ever-more sophisticated ways. As connectivity improves, new mechanisms emerge that enable educators of teachers to deliver group learning experiences, share richer content with many people simultaneously, and encourage trainees and established teachers to work more closely together, especially those in remote locations.

In short, technology—for those who have access to reliable networks of sufficient speed—offers a constant opportunity for communal experience and peer dialogue. Social networks provide one good illustration of what is possible. A Facebook group of trainee teachers, for example, is a perfect forum for individuals to share experiences and offer solutions to individuals' problems.

This is not to say that peer learning networks will be effective *without* physical, face-to-face meetings between their members. These meetings are actually vital, and no meaningful network can be developed without them. But building on a platform of such meetings, technology now offers an opportunity to connect far more frequently than ever before. These peer groups provide important social support as well as intellectual or cognitive stimulation. Teachers or trainees who have previously had to cope with difficult and unsettling issues on their own now have the option of seeking support from peer groups that have been connected by ICTs, even if this takes the form of just a simple Facebook user group.

Where teachers and trainees have access to social media, these collaborations may develop independently, but it will also be possible for educationalists to encourage such interactions. The Azim Premji Foundation has worked with multiple networks of teachers across six Indian states, which together involve a few thousand teachers, some of which use technology in a relevant and useful manner. Another project launched in Kerala, for example, facilitated the participation of around 100 trainee teachers in a study of the benefits of the use of social networks. The project was built on the TakingITGlobal community and rapidly became popular with trainee teachers, who were able to build regular contact with online peers as part of their learning process.[8]

CONCLUSIONS

Let us end where we began. Our best hope of improving the educational outcomes our children achieve—wherever in the world they may live—lies in improving the capacity of their teachers. The priority for policymakers, therefore, should be to look for solutions that will develop higher capacity teachers. This is true for both those who are just starting out in the profession and those who already teaching.

The focus in recent years on installing ever more ICT tools in classrooms is understandable, but misguided. Policymakers hoped ICTs in schools would facilitate more effective delivery of education, but the results have been disappointing. Children may have learned more computer skills, but the positive impact on more fundamental educational needs and curricular goals has been minimal.

It may yet be possible to achieve more with ICTs in the classroom, particularly if we begin by focusing on the educational problems we hope to solve with these technologies rather than installing tools and then looking for ways to use them. But the fundamental issue here is that ICT-centered teaching practices are poorly suited to the way in which younger children in particular learn and develop.

The shift that is really needed, therefore, lies in accepting the limitations of ICTs in education and in realizing that they are tools useful for certain kinds of things and not a fundamental educational approach. Instead, ICT-related efforts should be focused on where they can have greatest impact: teacher education, harnessing the power of faster and more reliable network connectivity in order to deliver smarter and more comprehensive content to trainees and teachers, and facilitating greater collaboration between them.

It will take time for such a shift to produce tangible results at a systemic level—definitely more than a decade. That said, we may well be able to see the effects on some teaching groups more rapidly than that. The current approach—centered on ICTs in the classroom—has had even longer to begin paying dividends, yet has failed to do so. It is time for a change in focus.

NOTES

1 Parr 2013.

2 Trucano 2005.

3 Cristia 2013.

4 The Sutton Trust 2011.

5 UNESCO 2007.

6 IICBA, no date.

7 UNESCO 2007.

8 Nayar 2012.

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