Technology, Learning, Corruption, and the Development of Mind

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Abstract

In this brief paper I reflect on some of the work I have done to "reach the unreached," attending to people's learning needs through information and communication technologies (ICTs). I go back in history roughly 30 years. Consequently, I take a broad view of the concept "ICTs." Technologies to transmit, record, store, retrieve, and help process information, and those that allow people to enter into dialogue with each other, have existed for thousands of years. Every time a new technology emerged it was invariably called "new," raising the level of anxiety among both skeptics, who advocated caution, and enthusiasts, who advocated immediate adoption. My position is that one should neither be a technology skeptic nor a technology enthusiast, but rather that technology options should be contemplated in a critical manner based on considerations regarding how and why we learn. I start by raising questions about who are the unreached and express concerns about attitudes in the international community that lead to voicing development problems in terms of "reaching the unreached." My choice of options for the review of past experience will be biased towards one of my current interests, namely to promote the scientific mind. I thus end with a series of assumptions that currently motivate my work in this area.

Who are the unreached?

The Call for Papers specifies the following categories as examples of the unreached: "poor, illiterate, women, marginalized, disabled, remote areas, etc." Let me start out by saying that the people identified by those categories deserve special concern. However, calling them "unreached" suggests that we haven't yet got to encounter them. I

am of the opinion that we know them full well but that we haven't wanted, so far, to attend to their needs in the same way and to the same extent as we attend to our own needs and the needs of those who are close to us. The phrase "reaching the unreached" also expresses directionality. There are those who ought to reach out and those who need to be reached. In other words, this is a one-way process. As this paper is presented in a meeting about technologies for learning, I submit that human learning translates into a disposition to dialogue and that dialogue is a two-way process. As long as the process is one-way we remain all unreached. I will have been reached not because someone was talking to me, but only after someone was talking to me and I could talk back in a way that allowed the person who initiated the dialogue to change his or her mind. Community building is thus at the heart of developing human learning.

Cases in point

I have not always thought that community building is at the heart of developing human learning. It's something I had to learn through experience. The following cases reflect that experience. They all involved technologies of some sort, not necessarily what people would now immediately think of when the term ICTs is being invoked.

Improving primary education in Botswana

Botswana became an independent country in 1966. It had approximately 600 000 inhabitants, dispersed over a surface area the size of France or Kenya. Towns were the size of villages, mainly grouped around the North-South railway line, part of what had ever been planned to become the Cape to Cairo railway. The road that paralleled the railway line was a dirt road. So were all other roads in Botswana. At one of the northern entry points into the country there was a sign saying: "Beware! Dust all over Botswana." Botswana still has one of the lowest population densities in the world with people living in the Kalahari Desert and in the inaccessible swamp areas of the Okavango delta. They are "unreached" in the sense of the definition proposed in the Call for Papers. Around 1970, the *per capita* income in Botswana was among the lowest in the world; it took days by four-wheel drive vehicle to reach a person; electricity only existed in a scarce number of places; and most communities counted with a significant illiteracy rate. Against the

backdrop of the historical developments in the region, Botswana's inhabitants had reason to feel marginalized. South Africa, then still strongly in the grip of Apartheid, was a close neighbor and part of the Botswana citizenry worked in slave-like conditions in the South Africa dominated mining industry in the region. Like in many other countries, politics, at local and national level, was the business of men. Otherwise, women participated in the local cattle holding economies in accordance with traditionally evolved patterns of division of labor among the sexes.

Primary education has been invented to allow new generations to become acquainted with the foundational skills, knowledge, attitudes and values that the preceding generation deems important to allow the young to build on the heritage of the past, making their own contribution to enhancing human existence. Indigenous communities in non-industrial societies, like Botswana's, usually have well developed learning systems that prepare youngsters for and initiate them into adult life. They are often based on the technologies of story telling and other forms of oral communication, show-and-tell type of explanations, and guided practice, in addition to ceremonial events that mark a young person's induction into the adult community.

Such local learning systems, however, are not normally designated by the term "primary education." Rather, as a consequence of unbalanced cultural and socio-economic interaction during colonial history, most so-called developing countries aspire to primary education systems that resemble as closely as possible the models they have become familiar with from the western world, where these systems evolved along lines that are characteristic for industrial societies, in fact often reflecting the principles of mass production processes. While there is certainly a point to be made for primary schooling in addition to the traditionally developed educational practices in the local communities of developing countries, it is not likely that the most appropriate form for such schooling would resemble that of an industrialized country.

As Botswana had been a British protectorate, its primary education system modeled that of the UK. Shortly after independence the effectiveness of the system was assessed by international experts and found to be insufficient. One of the major problems was poor teacher preparation. Around 600 teachers, i.e. the larger part of the teaching personnel at that level, were heavily underqualified. A program was proposed and

executed by UNESCO to upgrade the qualification of all those teachers without interrupting the teaching service. The program ran from 1968 to 1973 and was highly successful. So successful even that it was later replicated in other countries, again with success.

According to Rogers (1995), a technology is "a design for instrumental action that reduces the uncertainty in the cause-effect relationships involved in achieving a desired outcome" (p. 12). In that sense, the program involved the following technologies:

- Scheduling of teaching duties and learning activities in such a way that both learning and teaching could adequately take place, ensuring that the practice of teaching itself could serve important learning purposes.
- Face-to face interaction between teacher trainees among themselves and with members of the teacher training faculty during dedicated six-week residential class periods every year for three consecutive years, involving the technologies of lecturing, laboratory exercises, and project-based work.
- Interaction at a distance through self-instructional printed course materials, assignments, feedback on assignments, and occasional correspondence via formal postal services as well as through services based on network-based knowledge about who in the country was traveling where at any particular moment, much like nowadays information packets travel between Internet nodes.
- Face-to-face interaction involving travel every two months by members of the teacher training faculty and dedicated so-called field tutors to the schools where the teacher trainees were teaching, involving use of the technology of transport mainly through all-terrain vehicles.
- Design of curricula and instructional materials in accordance – to an extent – with the local reality. (I was involved in this specifically for the science area, which had a strong focus on rural science and agricultural practices.)
- Educational radio broadcasts. They functioned for part of the duration of the five-year program and were later dropped because they were found to have little effect, probably because of poor programming quality.

It is difficult to single out one specific technology as the one that was responsible for the success of the program. Robustness of any complex operation depends on the

possibility that one component of the system can compensate for poor performance or failure of another component. The diversity of technologies applied in the program discussed above is likely to have been the reason that poor functioning of the educational radio broadcast component had hardly any effect on the overall performance of the system, which had to function under the incredibly difficult infrastructural circumstances that characterized Botswana during those years. (Botswana has since undergone dramatic change, now often referred to as a model of development, owing its progress to a combination of wise leadership and the discovery of diamonds shortly after independence.) The ongoing interaction between trainees and training faculty was another important factor. It allowed the program to shape itself in accordance with the needs as perceived by both learners and facilitators of learning.

Science in impossible circumstances

During the first half of the nineteen-eighties I was working in Mozambique, training the country's first cadre of secondary school physics teachers. This was during a time of civil war, largely fueled by external interests rooted in the conflict between former cold war rivals. Colonialism had left Mozambique virtually without trained human resources (the country had, for instance, less than five university graduates at the doctoral level). Building up the infrastructure that would allow people to acquire the most needed knowledge and skills, was thus an urgent task. It was also an impossible task. Nothing was there to help do it. The civil war, which would last for 13 years, had brought promising initial post-independence development to a grinding stop. In 1984 we were at a very deep point. Food had become extremely scarce and so had food containers like cans and bottles.

The latter observation is relevant as I was training physics teachers. Physics is not a matter of knowing the facts about nature. Rather, it involves attitudes and skills such as those of inquiry; critical thinking; imagination; collaboration; creativity; building on prior knowledge; problem solving; and the quest for beauty, harmony, and unity. Such skills and attitudes are important for everyone, not just physicists. It so happens that studying physics is a good way to acquire them, which, therefore, is a good reason to include the proper study of nature in the general school curriculum. To develop such skills and

attitudes as mentioned above, one must actually *do* physics, inquiring into nature by actively interacting with it. To do so one needs means, simple ones and sometimes also sophisticated ones. Much can be learned, though, through simple means, often simpler than the ones with which school laboratories in most industrialized countries are equipped. Mozambique didn't have such basic equipment or school laboratories; worse even, it didn't have either such means as discarded food cans and empty bottles, which can play a useful role in constructing from scratch – or rather from garbage – the instruments required for elementary and powerful investigation of natural phenomena.

The young Mozambicans who would eventually benefit from the action of the teachers I was training were in every respect "unreached" in terms of the defining categories mentioned above. Mozambique was, around the middle of the nineteen-eighties, at the very bottom of the scale on most international comparative measures.

My attempts at "reaching the unreached" through the training of those who could facilitate their learning focused in the first place on allowing the teacher trainees to get to know what physics really means, i.e. to discover the spirit of scientific inquiry in its fullest sense by practicing it. In the second place it focused on allowing the trainees to develop skills and attitudes and to acquire knowledge concerning how to involve their own future students in discovering that same spirit of scientific inquiry.

The following "designs for instrumental action" (Rogers, 1995) were employed:

- Individual and group identification and selection of relevant problems to be addressed, taking into account Mozambique's set curriculum for the teaching of physics in secondary schools.
- Collaborative development and construction of instruments for scientific inquiry in the problem areas referred to above using scrap materials wherever they are to be found. (Teacher trainees went as far as searching in dustbins and exploring waste dumps to find what they needed.)
- Collaborative and individual design and development of classroom based modalities to involve students, under the guidance of teachers, to get involved in and become excited and increasingly knowledgeable about the various dimensions of what it means to explore one's environment through scientific means, particularly in the area of physics.

- Microteaching for practicing important classroom skills pertaining to the modalities referred to in the previous point as well as for critically reviewing – collectively and individually – of teacher performance and improving it continually through formative feedback. This involved the use of video equipment, with a class of 15 initially viewing videotape-recorded performance sitting around a 5-inch monitor. Lack of equipment called for the reinvention of the microteaching environment, using the *principles* of the technology in question but not most of the *equipment* that is normally being used. It resulted in a powerful alternative that was the product of a truly collaborative effort involving all teacher trainees and myself.
- Demonstration of relevant skills, particularly to create a questioning classroom environment, including higher-order questioning, using videotaped copies of 16 mm film originals with English soundtracks simultaneously interpreted in Portuguese, the language of instruction.
- Collaborative assessment of individual and group achievement based on the use of evaluation instruments completed by individual group members and subsequent guided discussion. I retained overall responsibility for attributing grades. Discussion of learning achievement was itself a powerful reinforcement of learning. There were no cases of student disagreement with attributed grades.

This experience showed the importance of rethinking invented technologies when they are applied in contexts different from the ones for which they were initially developed. It also shows that the kind and sophistication of hardware may be less important than is sometimes thought, to the extent even that technologies initially invented based on the use of particular hardware may well work without it or with different hardware without loss of quality. Most important in this experience was its strong emphasis on learning *in the context of* a community and *as* a community, in addition to its focus on the development of a mindset, rather than on the acquisition of particular pieces of knowledge and of isolated skills. The experience was successful and rewarding for all those involved, despite the harsh circumstances in which it developed. More real physics was learned than in many a school with a well-equipped laboratory.

My failed attempt in the country whose name I will not mention

The scientific mind is well represented among infants and small children (see e.g. Gopnik, Meltzeff, & Kuhl, 1999); members of the scientific community; and the unschooled. The unschooled are often also the less privileged in terms of wealth and other factors that could keep them from doing things. They are forced to cope and to solve problems on an almost daily basis. Their mind must thus be naturally focused on the existence of problems. They interpret their environment in terms of the problems, challenges and opportunities it affords so that they are constantly on edge to solve problems fast and adequately, to meet challenges and to respond to opportunities.

The above consideration led to a major initiative during the nineteen-nineties to attend to the learning needs of unschooled populations in the country whose name I will not mention. It took place more or less ten years after the above described experience of training physics teachers in Mozambique and twenty years after my involvement in improving primary education in Botswana. There were mountains in the country whose name I will not mention, and forests, large rivers, fertile land for agriculture, and waters for fishery. A large proportion of the population of that country had never gone to school. Consequently, many people could not read and write. Few also spoke the official language of the country whose name I will not mention, as many different tribal communities had their own languages. In terms of infrastructure it should be said that large parts of the country did not have electricity. Road infrastructure also left much to be desired. Television was limited to a small number of more densely populated areas, but radio coverage, particularly through emerging local radio stations, was rapidly expanding and becoming an interesting medium for social and human development. Interestingly, Internet connectivity was on the increase as well and, in fact, far better developed than in many countries in the same region that were economically in a far better position than the country whose name I will not mention.

The rationale for the initiative I just referred to was that, even though people could not read or write, they must be good learners and good problem solvers, otherwise they would not have survived. Giving them and their communities the possibility to create their own learning environments in accordance with *their* needs was thus

hypothesized to be a good strategy to contribute to enhancing and further developing their already existing capacity to learn and develop their mind.

At least two multilateral and two bilateral donor agencies shared the above view. One of them provided the financial support for an extensive preparation phase involving a large number of stakeholders from different government sectors; non-governmental organizations; religious communities; and civil society interest groups. Strategies were worked out to make it all happen. An extensive social consultation was held to determine how the process could best be managed. Everyone, including government ministries, agreed that the initiative should be managed in an autonomous fashion, with as little bureaucracy as possible, by a very small foundation to be created, whose overseeing board of directors could be composed of people representing the above-mentioned broad range of stakeholders.

In this case my report cannot list the technologies involved. Those would have to be developed, from the bottom up, by the interested parties concerned. It would be the task of the aforementioned foundation to manage funding sources that local groups could take advantage of for the development of their own initiatives. It never came that far.

When time came to create the foundation, the Ministry of Education was selected and invited to launch the process. It never did. The Ministry of Education in the country whose name I will not mention had, like most other ministries in the same country, a fair history of what one could call corruption. Ministry officials derived personal benefit from seeing funds channeled through their services. Despite the earlier assertion by officials of the same ministry that the initiative would die if it would be put in the hands of the ministry, they now desperately wanted it to be in those hands. It never got there, but it never got anywhere else either.

The country whose name I will not mention is a real country, but I don't mention its name because it could have been so many other countries. That it was the Ministry of Education wasn't essential either. It could have been any another ministry. The processes might have been different, but the result would have been the same. The "design for instrumental action" (Rogers, 1995) will always involve economic interests and flows of money and other resources. The control over such flows is not always transparent. The powerless – the "unreached" in terms of the definitional elements mentioned in the Call

for Papers – will have a hard time to see their interests given priority over those of the more powerful who intervene in channeling available resources, including in directions and through interests that are unrelated to the purposes for which those same resources were appropriated. We choose to call this process corruption when it happens in countries at the bottom end of the economic power game. However, we should also ask ourselves questions about the moral implications and legitimacy of the generally unquestioned supremacy of commercial and related political interests of those countries who are in the privileged position to impose their will on the rest of the world if they so choose.

The failed experience reported on here shows no clear way out of the dilemma. We possess powerful technologies that are potentially able to change the learning landscape dramatically for all. However, because there are always powerful economic interests behind those technologies – and commercial motives rather than human and social development motives drive what happens – it is unlikely that what is potentially possible will also happen.

Had the experience been successful, then some of the following technologies might have been employed (based on surveys undertaken by local researchers among the populations concerned while preparing the development process):

- The establishment of community-based and community-managed learning centers with flexible and modularizable learning resources accessible through a variety of communication channels, such as human facilitators, the Internet, community radio stations, and print.
- The development of modularizable learning resources through collaborative and participative processes, responding to the needs and desires of the populations concerned, building on their already existing expertise and bringing in whatever external inputs might have been necessary or desirable.
- The use – and possible transformation by those concerned – of existing community-based and community-managed facilities, such as those already employed by religious groups (the country whose name I will not mention has a rich diversity of religions), NGOs, and civil society interest groups, including also the linking of such a development with whatever there might have been present of the government run schooling system.

- The use of (community) radio, (local) press, in addition to traditionally existing community-based communication processes to create awareness about the meaning of learning in a sense not biased be the preconceptions inherited from the industrialized world schooling tradition.

These are but a few of the technologies that could have been envisioned at the start of the planned process but that in all likelihood would have further developed, expanded and diversified. If this had happened, interesting progress might have been made in the development of mind, because the process itself would have demanded of the populations involved to capitalize on their innate and largely unspoiled abilities to explore, observe, admire, be curious, and try out, learning from success and failure, while creatively solving problems.

Creating the conditions for the development of mind

Another ten years later. Above I have related three experiences in which I have been involved, each separated by a ten-year interval from the previous or subsequent experience. Two of them were successful; one was unsuccessful. I am again – or still – interested in the development of the spirit of inquiry; the power of imagination; the spirit of collaboration; the quest for beauty; the desire to understand and do so profoundly; the aspiration to create; the courage to be critical; the will to transcend existing boundaries; the spirit of building on prior knowledge; the search for unity; and the spirit of construction. I believe that the mindset that comprises these various attitudes and skills, which, for short, I call the scientific mind (noting though that it is not reserved for scientists alone), is crucially important for our time.

Technologies have become ever more powerful in their capacity to facilitate learning processes. However, those learning processes seem, at the same time, to become narrower and narrower in scope, focusing on the acquisition of knowledge interpreted in its most impoverished sense, namely as a commodity that can be accumulated, traded and "used in merciless competitions for survival and domination" (Salomon, 2001), serving narrow-minded commercial interests of which it is justified to ask how far they are removed from just ordinary greed. This comes at a time when the bandwidths are filled with "ignorance…noise and anti-thinking" (Lederman, 2001), seriously threatening the

ability of the human species to interact wisely with its physical and biological environment and for members of that species to live and develop together in peaceful, harmonious and, in fact, human ways.

De Castell, Bryson and Jenson (2002) call it a "potent irony" that educators, "confronting a range of enormously powerful, radically transformative digital tools…have sought to render their and their students' encounters with and uses of these transformative tools (a) familiar and (b) comfortable," thus failing to explore new uses of new means. As we contemplate e-learning, let us not forget that the most important part of that word is contained in the last eight letters of it. The prefix "e" is quite irrelevant. The search is thus on for ways to employ our awesome technological capability to discover ways of encouraging people to develop mind, rather than to continue age-old patterns of knowledge transmission by some and knowledge acquisition by others.

The Learning Development Institute (LDI Web site, n.d.) has identified, since its inception in 1999, The Scientific Mind (TSM) as one of the important focus area for its research. My involvement – with others – in the development of that area during the years to come will be motivated by the following assumptions:

- The transmission of audio signals through modulated electromagnetic waves, both in what used to be the radio spectrum of short, medium and long waves, but now also through digital direct satellite broadcasting, such as in the 1.5 GHz band through the WorldSpace system, continues to be an exciting medium. The sole use of audio, unadulterated by pictures, allows members of the audience to create their own images in their heads, thus activating in them the power of imagination. I find this important because "the imaginative moment is as creatively central to science as to poetry or to figurative art" (Luria, 1978, p. *x*). It is therefore a central dimension of human existence that can help to bring the shattered pieces of a fragmented world back together.
- There is great value in the technology of book design, production and distribution, the latter e.g. through libraries or by passing books on among people as artifacts that, in addition to the information they contain, can be loaded with the emotional value of friendship and love or the intellectual stimulus of a professional relationship, depending on the context in which the book is given by one person

and received by the other. Centuries of intuition- and research-based thinking and experimentation have gone into book development and in the develop ment of a culture of validation of worthwhile ideas by making them appear in print. The portability and random access value of books as well as the possibility to annotate them are still largely unsurpassed. The technology of book is likely to continue to develop and to become further integrated with other technologies such as book reviews in the press, through radio, by TV, and on the Web, as well as Internet-enabled and Internet-reinforced distribution mechanisms. There is every reason not to think of the book as an obsolete technology.

- Storytelling is probably as old as the first hominids who, in the course of evolution, started to utter sounds that could prompt them and others to reflect on their common existence. This technology is well developed in most so-called traditional societies. It has been in decline in many industrialized societies, except perhaps at the level of socialization of young children into the family, at least in those cases where the family is still a functional social entity. Some of the pre-schooling practice in western society is also still well aware of the value of storytelling. I understand by story a narrative that is open-ended in the sense that it leads to a wide variety of opportunities to expand one's thinking. In addition to stimulating the audience of the story in the various directions earlier referred to as comprising the scientific mind, stories – whether fictional or documentary – are also great means to stimulate the collaborative clarification of important values shared among members of the human species. Some of the age-old religious literature, when not in the hands of fundamentalist re-interpreters, may play a role in that context as may the various secular expressions of man's quest to understand himself and the universe.
- Communication via the Internet is potentially a great means for community building. The Internet is becoming increasingly accessible throughout the world, however in large parts of the world it is also still only a very small proportion of the pop ulation that can effectively take advantage of such access. The extent to which the Internet will indeed lead to real community building depends on the quality and visibility of prompts that are attractive to people as possible

opportunities to enhance their existence through interaction with others. Such prompts compete with a large number of distracters and there can be much debate – there probably should be much debate – about what distracts and what attracts. To the extent that the Internet is able to promote community building it may become one of the most important technologies for the development of the human mind.

- The technology underlying the World Wide Web has great scope for enhancing human interaction and reinforcing other technologies. Search engines provide access to an unprecedented range of media in an integrated environment. The technology has risks and advantages, depending on critical Web-preparedness. One needs to have a critical level of Web-preparedness before the Web can be explored to one's advantage. Below that level one runs the risk to lose essential faculties of using information wisely.
- The technology of hands-on involvement in activities has proven, throughout the history of humankind, to be one of the most powerful mechanisms for the development of mind, particularly when guided by apprenticeship-based relationships between human beings, either in a face-to-face or a mediated context. There is every indication and there is research (see e.g. Jonassen, in print) that shows the powerful nature of learning as activity.
- Schools and ministries of education are, in many countries, an unlikely entry point for effective processes that are intended to lead to the development of mind. However, they should not be forgotten as potentially important long-term targets in the framework of a fundamental reform effort.
- The development of mind is a lifelong and lifewide process, which highly depends on interaction among human beings and between human beings and their environment. This notion is not restricted to any particular age group and I thus assume that it will be best nurtured in a transgenerational perspective.
- The technology of human facilitation has been well developed particularly in connection with helping other people to function intellectually. Far less attention has been given to its role in people's functioning in the affective domain. Such attention may have been less urgent as most human beings, when confronted with

emotional issues in a face-to-face context, know intuitively what to do. Due, however, to the increased presence of intervening technologies, a greater part of human interaction in developing mind is no longer face-to-face, often resulting in serious problems of an emotional nature, a phenomenon well-known to distance educators. I assume that the technology of human facilitation will remain to play a significant role in the development of mind and that its role in the development of the affective dimensions of mind will in fact increase.

The above statements, while formulated as affirmations, are, as previously indicated, assumptions. For reasons of brevity, the number of assumptions is kept limited. The given list should be seen as indicative rather than as exhaustive. I contend that these assumptions merit the critical scrutiny of those involved in generating processes for the development of mind.

Summary

In this paper I have highlighted and analyzed a small sample of selectively chosen experiences in the use of information and communication technologies in the context of the development of human learning. The period covered by those experiences was approximately 30 years, a timeframe in which the nature of the available technologies has changed significantly, though the nature of their uses has undergone far less change. Often, new technologies have been used to merely replicate already existing processes rather than as opportunities to make the next step forward. Over the same period of 30 years, thinking about what it means to learn has undergone significant change, perhaps not among the bulk of mainstream practitioners, administrators and policymakers, but certainly among leaders in important areas of research and development. Moreover, conditions in the world have changed in a manner that calls for serious attention to the development of mind rather than to transmission and acquisition of knowledge. Through the cases analyzed I have argued, using Rogers' (1995) definition of technology, that the concept "technology" is best interpreted, not in terms of the hardware involved, but rather in terms of the design of what one does, instrumentally, to ensure that with increasing certainty particular goals can be achieved. I have also argued that the development of mind does not depend on a particular single technology but rather on the imagination

with which the technological heritage of humankind, reinforced by the current capacity to build on that heritage, can be drawn upon in the context of concerns that focus on the human mind rather than on the technology.

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