Appropriating and making technologies work for you in teaching and learning: depth is of essence

Qu'est-ce que s'approprier les TIC[1] ?

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Abstract

Cell phones have been rapidly and creatively appropriated across Africa, in unexpected ways. The computer and internet are not nearly as widely used, especially by teachers. This is because of cost and complexity but also because of time. Teachers do not have opportunities and time to learn to integrate information and communication technologies (ICT) into their teaching, yet ICT use could help them deepen the learning experience. This chapter looks at use of ICT in education through the lens of appropriation. Appropriation is more than merely using or mastering a technology. Appropriation is a process of shaping technology to make it respond to specific needs, to the point where it becomes almost part and parcel of our being. It is similar to the way we learn and transform and even deform language to make it respond to our needs. The concept of appropriation is important in understanding ICT in education in Africa, where educational systems have been imported and computers are being parachuted in by multi-nationals more concerned with revenues and profits than ensuring the qualitative use of ICT. This chapter examines ICT use in learning situations in specific communities across the continent. The author and the reader then deconstruct and interpret these examples to get inside and understand what is happening. This provides insight into how ICT appropriation processes shape the way we teach and even how we relate to knowledge and to others and could ultimately help us transform educational systems to be more in sync with the needs, desires and aspirations of learners. The chapter includes invitations to engage in personal reflection and in short practical exercises, to make the read more subjective and interactive, similar to the appropriation process.

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[1] technologies de l'information et de la communication

In Africa we live in societies where education is ill informed by our own cultures (Nyamnjoh, 2004). Development processes on the continent since colonialism and structural adjustment are largely outward looking. Educational systems were imported from former colonial powers. Today classroom innovations are proposed regularly by outside partners and technologies are increasingly parachuted into schools. There is little concern for training teachers, while teachers need opportunities to learn to use these technologies and make them meaningful for their teaching and their own professional development and lifelong learning.

In this chapter, we take a looking at the use of technology through the lens of appropriation. This can help us determine whether usage is contextually meaningful. We look at whether and how the technology is anchored in the aspirations, concerns and needs of specific cultural contexts. "Appropriating" means adapting something to your specific needs and desires, rather than just using it "out of the box."

Look at how cell phones have been appropriated in Africa. Farmers use them to access servers with the price of produce in local markets and then decide which might be the most profitable for them on a particular day. We buy airtime by the second. People transfer airtime credit from one phone to another. Some even transfer credit by cell phone that can be picked up in cash at a local boutique. Health practitioners use cell phones in nutrition surveillance and to encourage patients to take their medicines correctly. Cell phones are increasingly integrated in early warning systems related to threats to human health and agriculture. Educational administrators are experimenting with how to gather statistics for national databases via cell phone. Nigerians and Senegalese have used the cell phone as an instrument of protest in boycotting mobile phone companies in response to poor service, indicating the potential of cell phone use in civic participation and democratic movements. Citizens used text messaging to participate in election monitoring in 2007 in Sierra Leone. For service providers and traders, from taxi drivers to carpenters, a cell phone number is like a doorbell. Via the cell phone villagers reach out to the diaspora to request finances. And those in the diaspora stay abreast of developments back home on a regular basis. In Senegal, you will see the use of highly decorative cell phones at weddings. These particular phones may not work so well but become status symbols at important ceremonial events. People are also accessing radio broadcasts via downloads to their cell phones. These diverse uses of the cell phone were not

in the mind of the designers but came about through creative adaptation of the technology to meet specific contextualized needs.

The use of computers is much less widespread than the use of cell phones in Africa. When it comes to teaching and learning, they are hardly used. Why are there not more teachers getting their students to use the computer and internet to conduct research and prepare and present the results? Why aren't more teachers experimenting and negotiating computer and internet use to make it meaningful in preparing youth for the challenges of tomorrow? Part of the reason has to do with the cost of the computer compared to the cell phone. Yet researchers have remarked that even when computers are readily available, teachers are slow to appropriate them. This has partly to do with the fact that we prioritize the technology itself instead of opportunities to learn how to use the computer and the internet, which is more complex than the cell phone. In addition, in Africa we have promoted one-way, top-down teaching methods rather than interactive ones that would be required to derive benefits from using the computer and internet for teaching and learning.

Using a cell phone is relatively simple. And we use them for rather one-dimensional activities. With them we move voice and data from one place to another and usually the sender and receiver is known and there is almost instant confirmation about the transfer of information. Use of the internet however is multi-polar and multi-dimensional and more complex than using the cell phone. We must look for pertinent information, process it and repackage it. Though we use a clickable mouse with the computer, we have to do more than just click to make the computer meaningful for our work.

Another important factor for our discussions here is time. If we review the different examples of appropriation of the cell phone listed above, many became meaningful because of speed. Via the cell phone a farmer is able to boost his or her daily revenue due to timely access to market prices. Citizens are able to contribute to election monitoring because they are able to forward news of irregularities for instant review and action. We are able to transfer credit almost instantaneously from one place to another, from one person to another.

Use of the computer and internet in education becomes most meaningful not for gains in speed, but for gains in reach and depth. Consider the African scholar who is able to make her writings more available via a personal web site. With the site and via email and other communication, the scholar may reach a wider audience, get cited more, and also benefit from more reviews and feedback that, in time, can deepen her work. You will agree that such a use of technology is more multi-polar and multi-dimensional that what we do on a regular basis with a cell phone.

Consider the teacher who negotiates the integration of the computer and internet into his teaching and asks students to actively participate in collaboratively constructing a web site where results of research in the community are presented. These sorts of constructive processes are known to deepen learning because they engage the learner and the world around her. However, they take time: time for the teacher to feel comfortable with technology and constructive teaching methods, time for students to feel comfortable with inquiry based learning, and time to prepare and guide and participate in the process.

And the paradox is that teachers have little space to learn new things, already overburdened with large class sizes, sometimes over 100, different subjects and levels for which they must prepare, and tight daily timetables.

Business people use the cell phone and the computer as tools to save money or increase profits. But in education, we are most interested in deepening the learning experience and expanding the cognitive breadth of learners. This does not happen overnight. Integrating the computer into education in ways that will make qualitative differences in specific contexts takes time and requires us to understand the conditions for appropriation of technology.

Appropriating vs. just using technologies

If you appropriate something, you do not just repeat like a parrot does, rather you create, you innovate. You take a technology and use it in an unexpected, new, or creative way … that helps you accomplish something you want to accomplish. You inject part of yourself into the process. The difference between "use" and "appropriation" is "doing what is obvious and easy with the technology versus turning the technology to serve your own purposes, ensuring that it reflects your goals and culture" (Surman & Reilly, 2003: 25). When we mold technology to our needs and wishes, "its real potential emerges" (Surman & Reilly, 2003: 35).

If we have appropriated technologies for teaching we have made them respond to specific contextualized learning needs. Their use becomes embedded in our practice. And this does not happen without transformation. Transformation of the way technologies are used and transformation of the way we think and the way we learn … and the way we teach. Appropriation does not happen without change.

Some teachers who understood teaching as the transfer of knowledge from teacher to student have had to, in their encounters with information and communication technology, rethink teaching. They have had to make more space for what students bring to the classroom, in terms of their interests, pre-existing knowledge, and new knowledge, including that

discovered on the internet. Teachers who considered themselves the "master" see their students assimilating new knowledge on the internet and begin to question their role as teacher and realize it may be more appropriate to be the "guide on the side."

When we appropriate technologies, they start to become part and parcel of the way we get our students to learn. We make technologies "our own," in the same way, for example, that we have learned our mother tongue and "made it our own." We were not born knowing a language, but we learned different languages and made them a part of ourselves. We have appropriated them to different degrees.

Appropriation means taking something outside yourself and shaping it strategically. If this process does not happen, what is taken remains "foreign." Appropriation is a process of taking something from outside your everyday sphere of activity, working with it and using it to accomplish specific contextualized objectives. Local appropriation of information and communication technologies (ICT) is:

> *... a **process** where communities and groups **select and adopt communication tools** according to their different needs and then **adapt the technologies so that they become rooted** in their own social, economic and cultural processes. The process reflects creativity and freedom of expression and, in some cases, resistance to political and cultural dominance by global media markets. (as adapted by Global Knowledge Partnership [GKP], 2002: 19; from work by Michiels & Crowder, 2001; emphasis added)*

Questions for reflection

1. *In your life, what have you truly "appropriated"? Give two examples.*

2. *Pedagogically, what have you appropriated, since your first days in the classroom, to improve the quality of your teaching? Give one example.*

Appropriating technologies in teaching

Let's get ourselves thinking actively. Go ahead and take out a pencil or a pen and take 10 minutes to complete the following practical exercise. … And pat yourself on the back when you finish.

Practical exercise

Put the following actions in two categories: ones demonstrating a/ little appropriation of technology and b/ a greater degree of appropriation of technology. Then, for each action, write why, according to you, there is little or a lot of appropriation.

a. *A teacher attends classes to learn to use Word or Excel.*

b. *Social studies teachers in two different schools in Abidjan ask groups of students to prepare 1-minute youtube videos on workers in the informal economy. Students critique the videos of their peers via email, according to mutually agreed upon criteria.*

c. *Administrators at a school in Benin communicate information on students' performance by placing audio messages on a server. Parents access these messages, in their local language, by calling the server with their cell phones.*

d. *A teacher makes readings for her science course available on the Web so students may access them and continue to study even where there are university strikes.*

e. *Newly literate women in Mali go to the keyboard to type up stories and poems well known in the community in Bambara language for use in preschools.*

f. *A teacher surfs the Web to find maps to teach history and geography and drawings to teach biology.*

g. *A student brings information to class from several different reliable web sites to support her response on an exam and challenge the low grade a teacher had given her on it. The teacher changes the grade, realizing that the student was right and he was wrong.*

Let's look now at the different examples. A teacher who surfs the Web to find maps and drawings is active. Perhaps he was tired of drawing maps with chalk on the blackboard each day. He makes a conscious decision to surf and sift through information until he finds the teaching materials that are the most useful for the particular subjects and grade levels he teaches. He may ask himself, "Will this one print well or reproduce well?", "If taped to the wall at the front of the classroom, will students at the back be able to make out the aspects we will stress in class?", or "Maybe I will need several copies so students may work in groups on an exercise using the map in relation to the lesson for the day."

Then we have the teacher who makes her science course available on the Web. For her, this is a proactive way to continue to reach her students despite strikes at the university. This is also a way of sharing more responsibility for learning with learners. She provided a

structure in which the learners may progress despite perturbations on campus. The teacher appropriated technology to respond to a West and Central African socio-political reality.

What about the newly literate women in Mali who type up well known stories for preschool learners? These women are not only active; they are creating teaching materials for teachers in their community. In using computers and printers, they are appropriating technologies to document what has remained oral to influence the school curriculum. They translate their culture into written word to communicate tradition and imbibe their children with local values.

What about the innovative way of communicating information on student performance to parents in Benin? At first administrators posted only the end of term grades, over the maximum possible grade of 20, on a computer or "server" that could "serve" the grades to parents. Parents phoned in to get the results by text message, but administrators learned that many parents could not interpret the grades, i.e. to know that 14 out of 20 was acceptable and 8 out of 20 meant the student needed to provide more effort. So they decided to accompany the numerical grade with oral narrative – in the language of the parents. This is an example of creatively adapting and combining technologies to respond to the socio-economic and cultural realities of parents.

Another example of the pedagogical appropriation of technology in Benin is that of teachers who helped students contact national stars to have the right to develop Web sites to promote their works. In this instance, teachers helped students make contact with national personalities. Students developed competencies in communication while learning more about their own culture and how to present it to others. In a way, they became producers of culture.

Finally, what do you think about the girl who gathered documentation on the internet to present a case to challenge a teacher regarding a grade she received? This student appropriated ICT to defend herself and challenge the authority of the teacher. Such repeated incidents are likely to change classroom dynamics. As we said earlier, appropriation does not happen without change. Appropriation involves tinkering with relations of power.

Deconstructing these various examples shows us the different characteristics of what it means to appropriate technologies in educational settings. Appropriation involves agency and interactivity, on the part of teachers to meet certain teaching needs and on the part of students to become active in their own learning. Sometimes it involves using technology to challenge powers that be and may result in reconfigured relations between teachers and students. Guided appropriation of technologies can provide students with the power to query and represent themselves and their community to their peers and to others, in another nearby

school or in a country on the other side of the globe. Appropriation of information and communication technologies means adapting or bending them to respond to specific contextualized socio-cultural considerations. Such appropriation can bring value to local knowledge and culture that is often undervalued or altogether neglected in some educational systems in Africa. The pedagogical appropriation of technology can deepen the learning experience. The process requires socio-constructivist teaching methods; otherwise the use of computers in teaching could just mimic the rote learning that has characterized education in many schools.

Importance of appropriation in African educational settings

Why is it so important to think about appropriation when thinking about the use of technologies in teaching in Africa? In Africa we live in societies where education is ill informed by our own cultures (Nyamnjoh, 2004). Development processes on the continent since colonialism and structural adjustment are largely outward looking. Educational systems were imported from former colonial powers. Today classroom innovations are proposed regularly by outside partners and technologies are increasingly parachuted into schools. There is little concern for training teachers, while teachers need opportunities to learn to use these technologies and make them meaningful for their teaching and their own professional development and lifelong learning.

Looking at the use of technology through the lens of appropriation can help us determine whether usage is contextually meaningful. We look at whether and how the technology is anchored in the aspirations, concerns and needs of specific cultural contexts. This approach for reflecting on our use of technology deemphasizes determinism and reaffirms agency. Rather than the technology dictating how we work, we decide and shape how the technology should work for us. Teachers are perceived as creators and resistors and as agents and subjects of change.

According to Hountondji (2002), an ambitious strategy of appropriation of knowledge by African societies (not driven by the North) is needed (p. 222). Ancestral or traditional knowledge has been marginalized and relegated to the periphery when it needs to be opened up and integrated (Hountondji, 2002). To end extraversion and dependence, there must be a "methodical reappropriation of one's own knowledge and know-how as much as the appropriation of all the available knowledge in the world" (p. 255). Teachers can use technologies in ways that help learners value what they already know, learn from other

communities, construct their own knowledge, and share across communities. By valuing what is already inside, learners can more confidently confront other worlds.

Questions for reflection

1. *Do you know other teachers who have begun to appropriate technologies for teaching? Give two examples.*

2. *What about learners, in what ways have they begun to appropriate technologies in creative ways for their own learning? Give two examples.*

Reflective exercise

List three ways in which you use technology.

1.

2.

3.

List three ways in which you could appropriate technology more deeply for teaching.

1.

2.

3.

Understanding appropriation in relation to language

We already discussed how appropriating technology is like learning a language. To further explore the concept of appropriation, let's continue to think about language. Consider how Ivorian youth have appropriated the French language by developing their own slang called *le Nouchi*. In developing this slang, they have to some degree appropriated or "domesticated" the language they inherited from their colonizers.

Black Americans, according to Baldwin (1979), did not adopt a foreign tongue, but created "an alchemy that transformed ancient elements into a new language: … *the rules of the language are dictated by what the language must convey*." Appropriation involves

bending and shaping … like what the Black American does with the English language. Like the blacksmith who crafts his metal over the fire, skilfully and strategically, until he has a useful tool, responsive to his specific needs, or those of his neighbour. Consider villagers in Mali who use a car battery to power a projector at night for use during literacy classes after everyone has returned home from a day of work in the fields. The villagers bend or adapt or appropriate the car battery in using it to help them meet their contextualised learning needs.

Blacks appropriated the English language, in ways that transformed the language and eventually their environment and that responded to their need to communicate with each other and in ways, i.e. to communicate danger, that the white man before them, from whom they learned the language, could not understand.

Do you know children who master language enough to develop their own version of the language, so adults cannot understand them? These children have more than mastered the language; they have appropriated it for their specific needs. Appropriation is not just mastery, it is more than mastery. In appropriating something we bring a part of ourselves to bear. We make our context, our needs, desires, and aspirations matter. These factors become influential as we shape a technology to meet our needs.

Look how Wolof speakers in Senegal refer to ICT. They call them *Dioumtouway kharala you bess yi* which means "tools for performance." Rather than focusing on information or on communication, the appellation refers to the end result of ICT use. Bamanankan speakers in Mali when referring to internet sometimes say *Tilé koura subahana mansinw minu nyèsiné bè kunafoni soroli ni a jensenni ma* which could translate as "extraordinary machines of the new era destined to receive and diffuse information" or, *ni doniya tilalila*, "share knowledge." For new information and communication technologies (NTIC) some Bambara speakers say *enitiki*. Different cultures call ICT by different names, in ways that bring their culture to bear. How do *you* "name" ICT in the different languages you speak? The act of naming ICT in a culturally meaningful way is part of the appropriation process.

"Language, incontestably, reveals the speaker. … People evolve a language … to describe and thus control their circumstances, or … not to be submerged by a reality … they cannot articulate. … They … have very different realities to articulate, or control" (Baldwin, 1979). Imagine teachers who appropriate ICT for teaching in ways that people use language, as described by Baldwin. These teachers, who don't just use ICT but appropriate them strategically for pedagogical purposes, bring socio-cultural realities to bear on learning and

equip learners with tools to shape their futures. Teachers in Argentina will not necessarily appropriate ICT in the same way that teachers in Niger do.

What conditions are required for the pedagogical appropriation of technology?

What conditions are required if we are to go beyond mere use of technology to "appropriate" it? This requires starting with strategic uses in mind (Surman & Reilly, 2003: 45). What would you like technologies to do for you?

Change and appropriation do not come out of a box. There has to be time and support mechanisms for individual and group experimentation and creativity. Collaboration is important in change processes, which requires communication, and border crossing. Support mechanisms, in the case of technology integration, can be

Practical exercice

For each activity below, write how it demonstrates the appropriation of technologies for teaching and/or education administration

- Students in Benin develop web sites for stars from Benin to develop their skills in technology and at the same time promote their own culture.
- English teachers in francophone countries in West Africa integrate time for student use of the internet into their classes to encourage more use of the spoken language and more mutual sharing of culture with English speakers in other parts of the world. This motivates students, makes courses more lively, leads to better mastery of the foreign language, and makes the teacher advance pedagogically.
- A school director in Senegal makes stencils of selected content gathered from the Web by his pedagogical team and, combing the use of newer technologies with older ones, reproduces them with a ditto machine for classroom use.
- Rural people in Mali use a truck battery in the evenings to power a projector for literacy classes. People gather around outside after their work in the fields to follow the lessons.

as hi-tech as access to technology experts and as low-tech as space for collective dialogue and reflection on practice. Training can become a force for change, counterbalancing pressure to maintain the status quo and supporting processes that may entail risk. Reading and writing can be part of the constructive process – helping in coming to terms with newness and selecting and integrating parts of it.

Appropriation often involves combining one thing and another. Like social change and like learning, it is a process involving self and other, tradition and novelty, and constant tension between comprehension and non-comprehension. Appropration is an organic social process that takes place over time. It involves blending from various sources and, in the case of technology, molding it to serve specific contextualized needs. Appropriation requires time. It requires flexibility. Communication, dialogue, experimentation and reflection are at the heart of the process, a deepening process.

There is an underlying tension in change and appropriation processes between old and new, between liberation and annihilation, between retention and loss of culture, between affirmation and loss of identity, between local and global. In the midst of these tensions, we transform raw materials into something intimate, meaningful and useful. As Hountondji (2002: 242-3) explains, "The real preoccupation ... conerns the 'unpacking' of the ... technology and its integration within the host culture."

Conslusion

Though computers and internet are not widely used by teachers in Africa, there are numerous examples of how some teachers in Africa are creatively appropriating ICT to deepen and even transform the ways we teach and learn. Appropriation is a process by which

Practical exercise

**More examples
of the pedagogical appropriation of technologies**

Write how each activity demonstrates appropriation

- Students in Ghana use videos to represent themselves in virtual intercultural encounters, as part of promoting tolerance and respect for diversity, knowing one's culture and another's culture. They become authors of their own representations, which are then exchanged among different locations (see Borgartz, nd).

- Professors of psychology in a teacher training institute in Cameroon developed a web site via which girls and boys anonymously ask questions about reproductive health, HIV/AIDS, etc. and receive informed answers on line.

- Faculty in a South African university developed special software so students, to demonstrate their understanding of theory related to film narrative and spectatorship, could construct film sequences. This was a way to ensure contextually appropriate learning resources in post-apartheid South Africa (Deacon, Morrison & Stadler, 2005).

we adopt and adapt technologies to make them respond to specific contextualized challenges. By studying how teachers on the continent have appropriated ICT, we can inform and deepen our practice and the learning process. If we appropriate ICT rather than just using them out of the box, we ensure that use is meaningful in relation to the needs, desires and apirations of learners in the communities we are meant to serve. An innovation has to take root to be appropriated and when it takes root in a specific context it will grow differently than it grows elsewhere.

This thought piece draws on ERNWACA research and on reading, fieldwork, reflections, and writings for my PhD thesis. Comments from teachers, school directors, and researchers are welcome and may be sent to kathryn_toure@yahoo.com.

Bibliography

AMS [Alliance mondiale pour le savoir]. (2002). *Recommandations de l'AMS au Groupe d'experts sur l'accès aux nouvelles technologies (GEANT) du G8.* Kuala Lumpur, Malaysia: GKP Secretariat. Consulted 16 February 2008 at: www.globalknowledge.org/gkps_portal/view_file.cfm?fileid=386. For the original document in English see Global Knowledge Partnership (GKP) below.

Bakhtin, M.M. (1981). *The Dialogic Imagination*. Austin, Texas, USA: University of Texas Press.

Baldwin, J. (1979, July 29). If Black English Isn't a Language, Then Tell Me, What Is? *The New York Times*, New York, New York, USA. www.nytimes.com/books/98/03/29/specials/baldwin-english.html

Bar, F., Pisani, F., & Weber, M. (2007). *Mobile technology appropriation in a distant mirror: baroque infiltration, creolization and cannibalism.* For *Seminario sobre Desarrollo Económico, Desarrollo Social y Comunicaciones*, Móviles, América Latina. Convened by *Fundación Telefónica* in Buenos Aires, Brazil. http://arnic.info/Papers/Bar_Pisani_Weber_appropriation-April07.pdf

Borgartz, L. (nd). Digital media and cultural exchange: Representation, self-representation and the Fiankoma project. Digital Media Ma Report. www.fiankoma.org/pdf/Digital%20Media%20and%20Cultural%20Exchange.pdf

Deacon, A., Morrison, A., & Stadler, J. (2005). Designing for learning through multimodal production: film narrative and spectatorship in *Director's Cut*. *International Journal of Education and Development using Information and Communication Technology (IJEDICT) 1*(1), 72-89. http://ijedict.dec.uwi.edu/include/getdoc.php?id=221&article=26&mode=pdf

GKP [Global Knowledge Partnership]. (2002). *Recommendations on Issues of Bridging the Digital Divide* (Virtual Consultations, Section II: Build on Existing Local Resources). Kuala Lumpur, Malaysia: GKP Secretariat. Consulted 20 January 2007 and 4 and 16 February 2008 at: www.globalknowledge.org/gkps_portal/index.cfm?&menuid=189&parentid=92 and www.globalknowledge.org/gkps_portal/dotforce_recommendation.pdf; for the translation into French see *Alliance mondiale pour le savoir* (AMS) above.

Hountondji, P.J. (2002). *The Struggle for Meaning: Reflections on Philosophy, Culture, and Democracy in Africa.* Athens, Ohio, USA: Ohio University for International Studies.

Lund, A. (2004, November). *Teacher Expertise as Appropriation: Emergence of Transformed Practices*. Paper presented at the ProLearn conference, Oslo, Norway, consulted 18 November 2006 and 7 December 2008 at: www.pfi.uio.no/konferanse/prof_learning/docs/pdf/Paper/Gruppe%204/Lund%20-%20paper.pdf

Nyamnjoh, F.B. (2004). A relevant education for African development: some epistemological considerations. *Africa Development, 29*(1), 161-184. www.nyamnjoh.com/2004/11/a_relevant_educ.html#more

Surman, M., & Reilly, K. (2003). Appropriating the internet for social change: towards the strategic use of networked technologies by transnational civil society organizations. New York, New York, USA: Social Science Research Council. www.ssrc.org/programs/itic

Toure, K., Diarra, M.L., Karsenti, T., Tchaméni-Ngamo, S. (2008). Reflections on cultural imperialism and pedagogical possibilities emerging from youth encounters with internet in Africa. In K. Toure, TM.S. Tchombe, & T. Karsenti, (Eds.), *ICT and Changing Mindsets in Education.* Bamenda, Cameroon: Laanga; Bamako, Mali: ERNWACA / ROCARE. www.rocare.org/ChangingMindsets/pdf/ch02-ICTandChangingMindset.pdf
In French / *en français* :
www.rocare.org/ChangingMindsets/pdf/ch03-ICTandChangingMindset.pdf

Toure, K., Tchombé, T.M.S., & Karsenti, T. (2008). *ICT and Changing Mindsets in Education / Repenser l'éducation à l'aide des TIC*. Collection of 15 edited papers, in French and in English, from 19 researchers. Bamenda, Cameroon: Laanga; Bamako, Mali: ERNWACA / ROCARE. www.rocare.org/ChangingMindsets