1. Introduction: ICT and Changing Mindsets in Education

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In using ICT in education, as long as the focus is technology we will fail. As long as the process is overly extraverted with little endogenous say-so and do-so, we will fail. This introduction to *ICT and Changing Mindsets in Education* will briefly develop these arguments as a way of introducing the edited papers collected in this book.

Information and communication technologies (ICT) on their own will not bring about improvements in educational quality, but when we change our mindsets to use them reflectively and strategically, teaching and learning processes can be deepened. This includes leaving behind paradigms of teacher as master. Creative and contextualized appropriation of new technologies contributes to more active and interactive pedagogies, increased motivation, updated teaching materials, discovery of self and others, and changed roles and relationships among teachers and students and with knowledge. Learning can become more dynamic as teachers and students become partners in accessing information, constructing relevant knowledge, and representing self and others.

However, new technologies such as internet and computers are often introduced and sometimes even parachuted into schools in ways that do not enhance teaching and learning, that promote automated thinking instead of critical thinking, that encourage dependency rather than autonomy and interdependence, and that reinforce existing patterns of exclusion. Too often the emphasis is on equipment, on making profits from schools, or on promises of modernity than on opportunities for teachers to learn and experiment effective uses of technologies to enhance teaching and learning processes. Ministries of education have been all too eager to import computers into schools, without putting in place a policy environment and curriculum that supports the integration of technology into teaching and in ways that ensure equitable access. The focus seems to be on technology rather than on learning objectives and contexts, as if we were slaves to computers rather than champions of education. According to Rieber and Welliver (1980, cited in Newhouse, 2002: 16), with no systemic plan for incorporating technology into schools, efforts fail.

Appropriate policy frameworks must guide ICT initiatives to promote quality of education. Teacher training and new skills in partnership management are essential. In Africa, we need local, national and regional efforts that facilitate development by educators of appropriate digital resources created by and for Africans and others, otherwise we may see ourselves as mere consumers for example of Wikipedia and Microsoft encyclopaedia Encarta Africana. It will not be easy to create the right conditions for meaningful appropriation of ICT in educational settings in a world where the state is increasingly withdrawing from social sector responsibilities, where over 50% of schools in some countries do not even have electricity, and where we witness a convergence not only of computing and telecommunications industries but also of these sectors with education. Businessmen and women, supranational companies, and developers could control our palettes and dictate usage patterns if educators and researchers do not play a more active role in designing the

way forward for the use of ICT in education. This will require, among other actions, harnessing research processes and findings.

Joseph Ki-Zerbo, the renowned historian from Burkina Faso, reminds us that 85% of scientific and technical research on Africa is orchestrated off the continent (Moumouni, 1998: 7). When calling for self-directed research systems in Africa, the philosopher Paulin Hountondji argues for the "methodical reappropriation of one's own know-how as much as the appropriation of all the available knowledge in the world" (Hountondji, 2002: 255). Such an approach will be required in the meaningful appropriation of ICT in education. As Jìmí 0. Adésínà (2006) argued so well, enthusiasm for ICT and "techno-talk" can be a fatal distraction if we do not consider the mechanisms for endogenous decision-making around ICT development on the continent. He argues that this necessitates reinvestment in the public sphere and particularly in higher education and research.

Some schools in West and Central Africa began pioneering the introduction of ICT such as computers and internet in the late 1990s, with little government support when national policies on ICT in the education sector were nonexistent. ERNWACA[1] researchers, in partnership with the University of Montreal and with support from the International Development Research Centre (IDRC), have researched processes surrounding the introduction and use of ICT in teaching and learning and learned lessons from early adopters in 36 schools, schools which came to be called "pioneer schools." Despite the risks, in terms of time management, financial cost, instructional strategies, and student benefit (Gillard, Bailey & Nolan, 2008), why are some schools and educators in Africa integrating ICT into teaching and learning?

The papers in this collection will begin to answer that question. Most of the papers present findings from the ERNWACA transnational research project, conducted in Benin, Cameroon, Ghana, Mali, and Senegal from 2003 to 2005. The study involved 66 000 students and 3 000 teachers as well as school directors and other administrators, pedagogical advisors, and parents. A qualitative case study approach, employing interviews, focus group discussions and observation, was combined with a quantitative approach, using questionnaires to gather data on the scope and nature of teacher and student use of ICT. ERNWACA researchers confront an emerging area in education research and wrestle with how to frame the questions in ways meaningful for communities on the continent and elsewhere. They answered questions about the pertinence of ICT in education in Africa and raised others.

The first paper, by Toure et al., attempts to respond to a question researchers received from several education policymakers: whether the introduction of computers and internet in schools in Africa is not another form of cultural imperialism, making pawns of educators and educational processes. Will it be like reliving the "decomposition of traditional African society and values under the economic and politic domination of the colonial regime?" (Moumouni, 1998: 19) Are computers being forced on Africa as a way to generate profits, create knowledge dependency, and export worldviews? To respond to such questions, the authors discuss relations with borders – borders that do more to bring us closer to each other than to separate us (Giroux, 2005: 7). Empirical evidence from school directors, teachers, students and parents highlights how meaningful integration of ICT into teaching and learning processes provides opportunities for learners to broaden their horizons, develop critical thinking skills, represent themselves, and share with others. The authors argue thus that the question of how to support such processes is more important

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[1] Educational Research Network for West and Central Africa (ERNWACA)

than the question of cultural imperialism stemming from a position of victimization and technological determinism.

Therese Mungah Shalo Tchombe in her paper reviews gender differentials in the use of ICT at school and provides us with a cognitive framework for looking at the use of technology in pedagogy, a framework in which learning is a constructive rather than a receptive process and knowing is created rather than transferred or acquired. She argues that ICT in education, especially in African contexts, can improve the quality of education by supporting new pedagogical approaches in which the teacher is more of a "guide on the side" than a "sage on the stage." As she puts it elsewhere, the study showed "some shift from textbook-based schooling to web-supported community of inquiry. … [Before,] knowledge resources available in content-thin textbooks and limited libraries could not sustain inquiry-oriented pedagogy" (Tchombe, 2006: 42). Prerequisites for using ICT in transformative ways in educational settings include teachers who are confident and competent enough to guide technology use and students with sufficient knowledge base and cognitive skills. Teacher training and curriculum reforms are thus necessary. A gender look at access and effective use of ICT shows that boys have been favoured when it comes to accessing technology, in part due to socially constructed gender roles and relationships. Research results show that girls are more focused on the task at hand when using ICT in school while boys are more exploratory and drawn to games. Tchombe stresses that gender-specific indicators on ICT should be developed, mainstreamed and monitored in all ICT initiatives. She also repeatedly alludes to benefits of ICT for inclusive education that reaches students with learning difficulties and physical or mental developmental challenges.

What will it take for ICT to improve the quality of education in sustainable ways? The paper by Adjibodou Aristide et al. contends that as is the case for most educational innovation, vision and leadership are required – at the national level and at the school level, with increased autonomy at all levels. We need to teach not just "tech." We need imagination, not just information. And we need strategies to ensure ICT resources are available to those outside urban areas.

Béatrice Steiner goes beyond schools to investigate the role and use of internet cafés in Malian society. Steiner describes the different types of cafés around Bamako and profiles their users. She uses anthropological and ethnographic approaches to provide insight into who communicates with whom within different social networks and via what media and suggests in her preliminary findings how new technologies like the cell phone and internet may or may not influence reconfigured relations.

Moses Mbangwana in his paper looks at the potentials of ICT to help re-conceptualise and restructure educational endeavours in Africa. ICT influences current economic, social and cultural reconfigurations and, if steered appropriately, could help drive educational change and contribute to provide effective training to large numbers of people in Africa. The author reviews literature on divergent views regarding the role schools should play in promoting fluent uses of ICT and their primacy as resources in schools and classrooms. In schools, focus is still on access and on teaching computers rather than using computers to help teach. Mbangwana goes on to discuss key initiatives in the still sporadic integration of ICT in education in Africa. After painting a picture of access to ICT in public and private ICT "pioneer" schools in Cameroon, he argues implicitly that the national initiative to provide multimedia centres to secondary schools will meet obstacles unless partnership development and management issues are taken seriously. He refers to the cost of foreign expertise in terms of finance and limited knowledge of local culture and the need to train

and coach indigenous experts at both school and national levels. Like Professor Pierre Fonkoua (2006) who argued for the introduction of "ticeologie" – the study of the science of the use of ICT in teaching and learning – into teacher training programs, Mbangwana argues for an active role for teachers in ICT and education initiatives and a deeper commitment to teacher training.

Are teachers ready? Only a few it seems, according to Mamadou Lamine Diarra in Mali and Kofi Boakye in Ghana. Boakye cites literature on the potential of computers to support learning processes in schools, and asks if teachers are ready to assume the challenge. He presents quantitative findings suggesting that students are not fully benefiting from new technologies in schools because teachers are insufficiently prepared. Ghana is used as a case in point, where 55% of teachers seem to know how to browse the Web and 71% use email, and almost 90% of teachers say computers have changed the way students learn, yet few teachers use ICT to prepare lessons or otherwise integrate ICT in their teaching activities. Of the teachers questioned, 24% received some training in ICT but little training in using ICT to teach. Boakye explains that some of the African ICT "pioneer" schools included in the research project have begun innovating ICT in teaching but that widespread institutionalisation will take time. He argues that teachers need to seek and receive initial and ongoing training in how to use ICT to enhance their teaching. He like some of the authors cited calls for "re-forming" teacher education rather than just trying to "re-tool" teachers. He also sees researchers and trainers not just as providers and promoters of knowledge and skills but as reformers.

Dakpo et al. examine favourable conditions and constraints concerning the integration of ICT in the educational system of Benin. Their paper focuses mainly on infrastructural issues which can significantly affect the integration of ICT in the school system. Their study sample included some 8 000 subjects from public and private high schools and colleges distributed into five categories namely: heads of school, computer teachers, teachers of other disciplines, students and parents. The results of their study show that the integration of ICT into the teaching and learning processes in Benin, relatively recent, is mainly a private initiative of school authorities. The principal actors in the educational sector are of the opinion that the main constraints and difficulties are at the level of infrastructure (i.e. electricity, telephone, computers in sufficient numbers, accessories, connection to internet).

The paper by Daouda Cissé, at the end of this collection, is a must read. He applies pedagogical theory to changing contexts brought about by the use of ICT in teaching and learning. Looking first at the didactical triangle of Houssaye (1993) that links teacher, learner, and knowledge, he, like others, notes that the teacher-student relationship, in a context of distance education, may be weakened while the student-knowledge relationship becomes burdensome as the learner has to assume it with less guidance from the teacher. Cissé warns thus that pedagogical relations will be weakened if university professors content themselves to just "transmit knowledge" by "making their courses available on internet." The author then presents a model that accounts for the social character of the construction of knowledge, which he, like Mbangwana, considers more appropriate in helping us integrate ICT into teaching and learning in meaningful ways. In this socio-constructivist model, the role of the group is important and the teacher is not just a creator but also a tutor, responsible for mobilising reflective and collaborative work among learners. Because ICT use can serve the worst and the best, he recommends profound reflection in order to avoid mere cosmetic adjustments as we integrate ICT into pedagogical practices. He invites

educators in Mali and other African countries to be preoccupied with this integration process, even if other teachers, i.e. in Canada, are not yet overly perplexed or concerned about the pedagogical use of ICT (Karsenti, 2006).

In addition to the above, other papers collected here reveal perceptions about educators and learners in relation to ICT and changing mindsets in education. They also suggest a host of important research issues going forward. How are persons in rural areas benefiting, or not benefiting from ICT? How is ICT being integrated in formal and non formal education in ways that promote autonomy and interdependence rather than dependence on foreign experts and financial institutions? How is curriculum being rethought and reconfigured in the age of ICT? How are students and teachers appropriating ICT to articulate the transition into higher education, the world of work and lifelong learning? What are educators in Africa doing with ICT to enhance their pedagogies? How are learners learning differently with ICT? What are the benefits and detriments for female and male learners? How is learning with ICT similar to and different from ancestral approaches to learning in Africa? How are schools that integrate ICT linking with communities? What kinds of communities are integrating ICT and what new learning communities are evolving? What difference does this make in daily life and in fulfilling personal and communal aspirations?

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