



The 3rd OECD World Forum on “Statistics, Knowledge and Policy”

Charting Progress, Building Visions, Improving Life

Busan, Korea - 27-30 October 2009

**THE PANAFRICAN RESEARCH AGENDA ON THE
PEDAGOGICAL INTEGRATION OF ICTS**

THIERRY KARSENTI

TOBY HARPER-MERRETT

DJÉNÉBA TRAORÉ

MOSES MBANGWANA

KATHRYN TOURÉ



*Information and communication technologies
are not a panacea or magic formula, [...]
But they can improve the lives of everyone on this planet.*
Kofi Annan, 2005

1. INTRODUCTION : THE IMPORTANCE OF CONDUCTING CONTINUED PANAFRICAN RESEARCH ON THE PEDAGOGICAL INTEGRATION OF ICTS

At the second World Summit on the Information Society (Tunis, November 2005), Kofi Annan reminded us that we are living in a world of rapid change where technologies play a multitude of roles. How we tap this technology's potential will shape our future together. We cannot remain indifferent to this enormous metamorphosis. In fact, the participation of researchers and educators in the processes of change that information and communication technologies bring to education is an opportunity to construct, shape and share development knowledge. ICTs are increasingly present in African societies and have been introduced to varying degrees at all education levels from preschool to university, and in both the formal and informal sectors. They are also used to offer distance education to teachers and other adult learners. However, in various education systems across Africa, ICTs are increasingly being taught as a completely separate discipline, while the integration of ICTs into pedagogical practices to improve the quality of teaching and learning across disciplines remains the exception.

According to many researchers, information and communication technologies (ICT) in an educational context refer to a set of combined technologies that enables not only information processing but also its transmission for purposes of teaching, learning and educational development. In this paper, we have attempted to define the pedagogical integration of ICTs, according to Karsenti and Larose (2005), as a use that permits either enhanced teaching or enhanced learning. More precisely, the pedagogical integration of ICT into schools means the appropriate, consistent and sufficiently regular use of ICT that produces beneficial changes in educational practices and improves students' learning. This type of integration unavoidably implies the routine use of ICTs in the teaching and learning processes. The pedagogical integration of ICT must therefore be understood as an integration such that the student learns and socializes through a multitude of interactive and communication channels. It cannot be reduced to mere use of ICT, which is nonetheless imperative.

The PanAfrican research agenda on the pedagogical integration of information and communication technologies (PanAf) is one of the first representations of ICTs in education across Africa, and Phase 1 has been widely and internationally recognized for its boldness and innovation in terms of data collection and sharing, capacity building, and communication style. This only underscores the importance of this extended study - that promotes the effective use of ICTs to enhance learning and develop education systems. ICTs themselves do not necessarily encourage students to be creative or to grasp the scientific approach. No matter how powerful the hardware, it serves no educational purpose if it is not applied appropriately. Hence, PanAf Phase 2's education research has a responsibility to identify best practices in the pedagogical uses of ICTs, a societal issue of enormous importance.

In this paper, we first highlight the objectives, research questions and accomplishments of the Phase I of the PanAfrican Research Agenda on the Pedagogical Integration of ICT (PanAf). We then introduce the objectives, research questions and main research activities planned for Phase II which started in September 2009. We then briefly present the PanAf Observatory (www.observatoirectic.org), one of the central elements of this project. Lessons learned and main research findings are outlined in section V.

2. PHASE I REVISITED – OBJECTIVES, RESEARCH QUESTIONS AND ACCOMPLISHMENTS

The rationale of the PanAfrican Research Agenda on the Pedagogical Integration of ICTs' research challenges can be summarized in three points:

- The depth of previous research on the pedagogical integration of ICTs in Africa does not reflect the demonstrated importance of the issue for social and economic development, nor to the level of material aid invested in ICT4ED on the continent.
- Results of past studies have lacked a harmonized communication facility that supports the sustainability of project actions.
- African education researchers would benefit from methodological and dissemination capacity building.

The PanAf agenda addresses the three challenges above, in that it:

- Collects new school-scale data, using mixed methodologies.
- Creates innovative opportunities for knowledge sharing.
- Provides learning opportunities for those involved.

Particular added values of PanAf's online Observatory (www.observatoirectic.org) include that it:

- Voices “user-scale” knowledge from African learners, educators, and institutions.
- Mixes “numbers with narratives”, for greater depth than aggregate national data.
- Creates an innovative, “open”, professional space owned by African education researchers.

The International Development Research Center (IDRC), Canada, Acacia program rests on the statement that:

Research on ICTs in education in Africa remains rare. [...] a niche for Acacia in supporting research that contributes to a better understanding of the educational uses of ICTs in the socio-cultural context of Africa; that produces evidence that can inform the main stakeholders (policy-makers, practitioners, researchers, parents, students, etc.); and that promotes the formulation and implementation of policies and reforms supporting the introduction of ICTs in the educational systems.

The PanAf network's aim is to better understand how the pedagogical integration of ICTs can enhance the quality of teaching and learning in Africa. The purpose of the PanAf project is also to contribute to this broadening process and to participate in the access, construction, and production

of knowledge in the information era. The first phase of the PanAfrican Research Agenda on the Pedagogical Integration of ICTs (PanAf) has been successful in establishing dynamic research teams in 12 Sub-Saharan African countries, creating an open, online Observatory where researchers currently share approximately 20,000 data points for 180+ indicators along 12 themes, from 100+ African schools (including hundreds of downloadable raw data files including policy documents, recorded interviews, scanned questionnaires, and examples of ICTs in teaching in learning).

With Phase 1, the PanAf network has succeeded both in collecting and sharing an unprecedented depth and quality of data, and developing exceptional international partnerships with the World Bank and UNESCO. The institutions participating in the Phase 1 research represent nearly 245 000 learners, 9000 educators and other education stakeholders, painting a never-seen portrait of the pedagogical integration of ICTs across Africa. However, the detailed analysis of this new knowledge remains, in order to draw out empirically supported conclusions and recommendations, has only just begun. In order to support improvements in education outcomes through the integration of ICTs, be they addressed to policy decision-makers, academic researchers, teacher-trainers, school managers, or educators themselves, must stand on a solid empirical base of evidence – data rigorously and meticulously collected and analyzed. After collecting an exceptional quantity and quality of data in Phase I, PanAf Phase 2 will clearly provide such an opportunity for African researchers to formulate recommendations based in the data they have collected. The first phase of the PanAfrican Research Agenda on the Pedagogical Integration of ICTs (PanAf) has been particularly successful in:

- Establishing dynamic research teams in 12 Sub-Saharan African countries.
- Creating an open, online Observatory where researchers currently share approximately 20,000 data points for 180+ indicators along 12 themes, from 100+ African schools (including hundreds of downloadable raw data files including policy documents, recorded interviews, scanned questionnaires, and examples of ICTs in teaching in learning).
- Initiating processes to encourage academic and practical publications by participating African researchers.

In line with IDRC's objectives to encourage free and open access to information, that flows through new ICTs networks, and enhances the ability to create knowledge, the greatest strengths of the project's Phase I outputs include unprecedented access to qualitative and quantitative, socially and gender-disaggregated, school-scale knowledge - via an innovative open access database. The Observatory itself is the primary output of the PanAf research project – however it is important to view it not as a product of the participating researchers' efforts but rather a structure central to the project, which houses the results of their work. It is an unprecedented knowledge resource owned and updated by African researchers in the field.

3. PHASE 2 : OBJECTIVES, RESEARCH QUESTIONS AND MAIN RESEARCH ACTIVITIES

As previously mentioned, through IDRC's Acacia program, the PanAf network's mission is to contribute to the development of African countries and people by increasing knowledge on the pedagogical integration of information and communication technologies in African schools and education systems. It is important to note that this research focus is entirely consistent with the IDRC mission, which is embodied in the five-year Acacia program, that is to support research leading to recommendations for concrete improvements in the quality of teaching and learning. Moreover, greater knowledge of the realities of teaching and learning with ICTs in African education institutions will enhance the potential of ICTs for national and international socio-

economic development - in today's globalized world, ICTs are not only a necessary tool for the learners within these institutions but also a compulsory skill for participation in a more global, international knowledge society.

The main research question of Phase II is ***how, for whom and under what circumstances can the pedagogical integration of ICTs substantially improve the quality of teaching and learning at all levels and scales of African education systems?*** It is important to note that this main research question - central to the PanAfrican Research Agenda on the Pedagogical Integration of ICTs (Phase 2) - falls directly in line with IDRC's mission of "Empowerment through Knowledge", promoting interaction, cooperation and mutual learning through knowledge creation and adaptation.

Phase 2's research objectives and research questions will target the individual as well as classroom, or school (micro), organization or community (meso) and the system (macro) scales. PanAf Phase 2 will also include, for all objectives and research questions, comparative analyses along the themes of gender, the urban-rural and public-private divides, questions of language-based and regional differences, and refer and contribute to international literature and experiences. The main research objective of Phase II is ***To better understand how, for whom and under what circumstances the pedagogical integration of ICTs can substantially improve the quality of teaching and learning at all levels and scales of African education systems.*** Again, it is important to highlight that the accompanying main research objective is closely related to IDRC's mission.

The PanAf agenda's sustained effort to focus on the challenges presented by the pedagogical integration of ICTs in teaching and learning in Africa will mainly consist of:

- concerted scientific, policy-oriented, and practice-oriented dissemination efforts;
- a variety of new partnerships and international collaborations;
- continued collection of new data, focusing solely on the pedagogical integration of ICTs;
- continued detailed analysis of new and existing data.

As noted above PanAf Phase 2 is made up of precise research objectives that respond directly to needs flowing from the general objective and main research question. The major research themes of the project are expressed in the 12 categories of indicators for which data is currently available on the Observatory (www.observatoireict.org). These indicator categories will serve as the foundation for rigorous thematic and comparative scientific analysis over the course of Phase 2. These analyses depend on networks of collaboration between researchers working on similar or complimentary themes, and the production of relevant and rigorous scientific, political and practical publications that are at the heart of PanAf's objectives.

With Phase 1, the PanAf network has succeeded both in collecting and sharing an unprecedented depth and quality of data, and developing exceptional international partnerships with the World Bank and UNESCO. The institutions participating in the Phase 1 research represent nearly 245 000 learners, 9000 educators and other education stakeholders, painting a never-seen portrait of the pedagogical integration of ICTs across Africa. However, the detailed analysis of this new knowledge remains, in order to draw out empirically supported conclusions and recommendations, has only just begun. In order to support improvements in education outcomes through the integration of ICTs, be they addressed to policy decision-makers, academic researchers, teacher-trainers, school managers, or educators themselves, must stand on a solid empirical base of evidence – data rigorously and meticulously collected and analyzed. After collecting an exceptional quantity and quality of data in Phase I, PanAf Phase 2 will clearly

provide such an opportunity for African researchers to formulate recommendations based in the data they have collected.

The Phase 2 proposal highlights several specific research questions and objectives including: classroom impacts (1), policy (2), teacher training (3), the role of connectivity (5), innovation (6), or publications (8). It is potentially helpful to group into four the types of recommendations that will be produced based on PanAf Phase 2 activities:

- Recommendations for decision-makers seeking to develop or refine sectoral policies dealing with the pedagogical integration of ICTs¹, especially as more and more countries are working on ICT-policies for education;
- Recommendations for researchers working on themes aligned with the pedagogical integration of ICTs;
- Recommendations for teacher-training;
- Recommendations for education practitioners including school managers, educators, academic advisors, or other stakeholders in the field.

With the data collected and the analysis conducted in Phase 2 of the Pan-African Research Agenda on the pedagogical integration of ICTs, we expect a set of long-term outcomes including:

- understanding and influencing how and under what circumstances teachers use ICTs in African schools;
- understanding and influencing educational reforms in Africa, in particular on the pedagogical uses of ICTs;
- understanding and influencing how and under what circumstances ICT-education policies are developed in African countries;
- understanding and influencing the impact of ICTs on the school achievement of all learners in Africa.

4. THE PANAF OBSERVATORY REVISITED – AN UNPRECEDENTED RESOURCE FOR DATA ON THE PEDAGOGICAL INTEGRATION OF ICTS IN EDUCATION

The place of the PanAf Observatory (www.observatoireict.org) is central to the PanAf project – it is integral to sustaining and leveraging the investment already made. This is also in link with IDRC's initiative to grow an innovative database on ICT4ED, which insists on:

- Systematic, large-scale documentation and distribution of ICTs policies across Africa.
- Global access to analyses of the uses and impacts of ICTs at different teaching levels and in different learning contexts.
- Inventory and large-scale distribution of African teaching and teacher training methods in the pedagogical uses of ICTs.

- Better understanding of the roles of school principals, administrative staff and the community in the ICTs integration process.

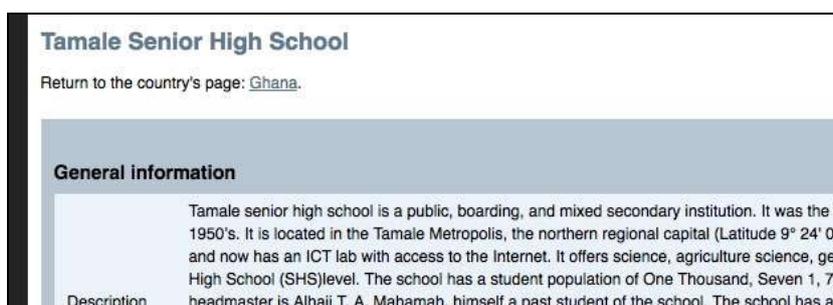
The PanAf Observatory has three main search functions are:



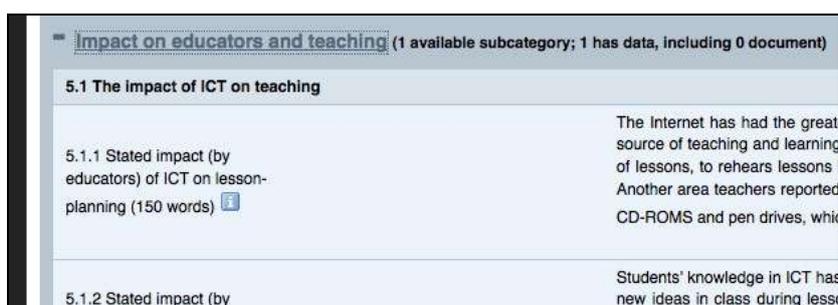
1. Simple Search...



Which allows a user to access data at an institutional scale...



Both qualitative...



And quantitative.

7.4.5 Percentage of managers trained to use ICT (in education)	6.67 % (1 / 15)	2009-12-15
7.4.6 Number of female managers (total for the institution)	5	2009-02-28
7.4.7 Number of male managers (total for the institution)	10	2009-02-28
7.4.8 Number of female managers trained to	0	2009-12-15

2. Advanced Search, which creates tables of data from multiple institutions...

Presentation Partners Use Simple Search **Advanced Search** Summary Search

Advanced Search

The "Advanced Search" function allows you to create tables of data comparing multiple indicators, at multiple geographic scales.

Geographical Limits

The 12 showcased countries (Cameroon, Central African Republic, Côte d'Ivoire, Gambia, Ghana, Kenya, Mali, Mozambique)

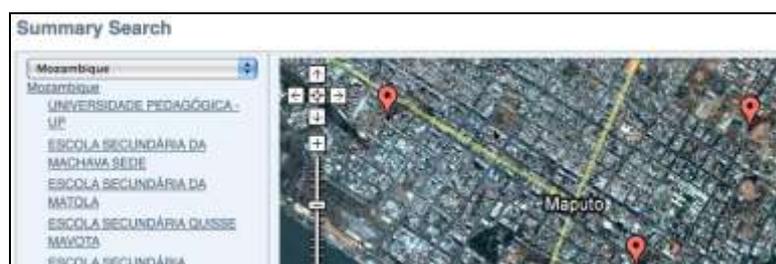
For multiple indicators...

	2.1.2 Percentage of computers connected to the Internet	4.5.4 The percentage of courses taught using ICT
Lycée Bilingue de Tiounde	100.00 % (72 / 72)	45.45 % (10 / 22)
Lycée Général Leslers	94.03 % (63 / 67)	64.71 % (11 / 17)
Lycée Jess	92.00 % (69 / 75)	100.00 % (22 / 22)
Lycée Technique de Bafoussam	100.00 % (14 / 14)	40.00 % (20 / 50)

And is exportable to any spreadsheet software.

Country	Indicator	Value	Unit
Cameroon	2.1.2 Percentage of computers connected to the Internet	100.00 %	(72 / 72)
Cameroon	4.5.4 The percentage of courses taught using ICT	45.45 %	(10 / 22)
Cameroon	2.1.2 Percentage of computers connected to the Internet	94.03 %	(63 / 67)
Cameroon	4.5.4 The percentage of courses taught using ICT	64.71 %	(11 / 17)
Cameroon	2.1.2 Percentage of computers connected to the Internet	92.00 %	(69 / 75)
Cameroon	4.5.4 The percentage of courses taught using ICT	100.00 %	(22 / 22)
Cameroon	2.1.2 Percentage of computers connected to the Internet	100.00 %	(14 / 14)
Cameroon	4.5.4 The percentage of courses taught using ICT	40.00 %	(20 / 50)

3. Summary Search, which uses Google Maps...



To browse data from participating institutions across Africa.



Perhaps the most innovative element of the Observatory as a research tool is that the data on the site are managed directly by researchers in the field. Each PanAf national research team has a number of login accounts with which they add and update data from their participating institutions. As illustrated in Figure 4.4, oversight, to ensure the expected level of scientific rigor, is provided by the project management team and international scientific committee, yet the researchers “own” the resources that they share on the Observatory.

The Observatory is a "living" resource, continually updated and improved from both content and functional perspectives. Throughout Phase I, the original design of the user interface has been adapted to respond to needs expressed by participating researchers. The resulting tool currently has three research functions (Simple Search – for data from individual institutions, Advanced Search – to create tables of data from multiple institutions for specific indicators, and Summary Search – to browse summaries of data from institutions on a Google map). Phase II will see the Observatory continually improved – with a migration to a new server expected shortly, and a Google search function integrated – and the addition of social media functions to encourage networking amongst the participating researchers. These new functions will include online researcher profiles with introductory videos, and instant messaging capabilities.

In 2008, nearly 100 000 visitors, an average of over 250 individual IP addresses per day, browsed the data available on the PanAf Observatory (according to Google Analytics – the most widely recognized site visit analysis tool).

5. LESSONS LEARNED AND MAIN RESEARCH FINDINGS

We will not present herein the whole of the research results emerging from the analysis of the ambitious volume of data collected during Phase I of the project. Rather, we will focus on presenting a synthesis of results specifically related to the pedagogical integration of ICTs.

Analysis of the data collected by the 12 national research teams reveals a multitude of uses of ICTs in the nearly 120 African schools participating in the project. These uses vary from initiation of learners to the fundamentals of computing, to the creation of elaborate projects involving learner-created websites, videos, field research and experimentation content. The types of ICTs uses found in PanAf Phase I data can be grouped as follows:

1. Use as the subject of learning;
2. Use as the means of learning;
3. Other uses.

As noted in other ICT4ED projects in African schools with support from IDRC (for example the “Pioneer Schools” project), Phase I data shows that the majority of the uses of ICTs fall into the first of the groupings above, while very few fall into the second (use of ICTs to teach subjects other than computing itself) while current literature argues that the latter is where usage should be concentrated. In this context, ICTs are not used as a “way” to learn, they are “what” is taught – educators focus on initiating new users to the basic functions of the machine. For many it seems especially important to understand these functions fully before proceeding to applying them to other learning situations. The data shows that many educators are convinced that in order to use computers for learning one should first be able to name the parts of the machine. The interviews conducted in the course of Phase I were inconclusive in identifying the sources of this conviction, however the link between educators’ attitudes reported, and the uses of ICTs in teaching and learning, seems strong.

This teaching “of” (rather than “with”) ICTs that characterizes usage in African schools is limited to demonstrating to learners how the computer functions, occasionally through the presentation of certain tools including word processing or spreadsheet software popular with the educators responsible for the actual computer rooms. It is challenging to quantify this observation precisely, but the evidence suggests that about half of institutions from which data collected in Phase I subscribe to this mode of “pedagogical integration” – teaching computers to learners. Though the teaching of computers may have its place in numerous regions of Africa where schools are the only venue for accessing and learning ICTs, it is paradoxical that in cities where 75% of learners report frequent use of cybercafés– and are comfortable with at least the basic functions of computers – the approach to computers in schools would be so limited. In this context, PanAf Phase II presents doubly important opportunities to permit education practitioners and policy decision-makers to move beyond this initial mode of the integration of ICTs.

Nonetheless there are nuances to the generalization – some learners are actively involved in gaining competency with ICTs, rather than passively absorbing the subject matter as presented by educators they maximize opportunities presented to become engaged in the learning process. These learners are called upon to appropriate ICTs, and the data shows they are relatively successful in doing so, though practical sessions presented by educators are often brief and resources otherwise limited. This second mode of integration presupposes that learners will at some point have access to computers, in order to apply their lessons to real situations. These situations, educators report, are more challenging to manage, even if they understand their value from a pedagogical perspective. Some educators have indicated that they would prefer not to facilitate this type of learning situation, given the impression that they would “lose control” of their classrooms – and demonstrating, through this, an attitude that ICTs present a menace to the role of teacher. It is important to retain, despite these challenges to directly and actively implicating learners in the use of ICTs, that this mode of use is particularly valuable in enabling a learner-centred style. Recent literature clearly shows that learners gain ICTs competencies better

through active manipulation of the machines as opposed to a ‘hands off’ theoretical approach. Across all schools participating in Phase I, the use of ICTs to teach subject matter other than computing itself was almost completely absent. In fact, despite the demonstrated potential impact of this type of use on the quality of education in Africa, such pedagogical integration is rarely observed.

Finally, PanAf Phase I research showed that several educators use ICTs to conduct research with the objective of better informing their lessons in mathematics, philosophy, chemistry, history, electro-mechanics, industrial design, etc. ICTs, therefore, are serving to improve the lessons prepared by educators, notably through Internet-based searches resulting in updated and enhanced professional knowledge.

Rare is the case of learners called upon to learn a variety of subject matter, and to appropriate their own educational experience, through ICTs. This mode of usage could accompany use of ICTs by educators, and coaching of learner ICT-use. The goal, however, is to avoid passivity and rote learning. Learners should, at some point in the lesson, actually use ICTs to learn. For example, in the case of primary school projects, learners can gain social or natural science knowledge directly through the use of ICTs. Education should no longer be centred on the educators, but rather on the learner. Scientific literature supports the effectiveness of this type of usage, and by extension its potential for the improvement of the quality of education in Africa. Here again is the role of PanAf Phase II – to directly support this type of change in education systems on the continent.

Open access to these newly collected narratives from the field is an unprecedented ICT4ED resource, and an example of great leadership by African researchers. From a scientific perspective, Phase 1 of the project has contributed enormously by making available gender-disaggregated data on the pedagogical integration of ICTs in African schools – as noted by Dr. Nancy Hafkin (retired director of UNECA ISTD, an ICT4ED pioneer, and member of the project’s international scientific committee: *“The PanAf Observatory is to be congratulated for its commitment to the collection of sex-disaggregated data [...] Researchers participating in this project may not be aware of the uniqueness of this [...] but what they are doing by collecting sex-disaggregated data is still the rare case...”*

Of particular interest to African researchers, graduate students, education and development practitioners, and policy decision-makers are the qualitative responses from educators and learners regarding use and impact of computers for teaching and learning in the participating schools. Among these, perhaps the most important are educators’ and learners’ reflections on the impact of ICTs on their lesson planning and access to knowledge. International researchers, for example, simply need to be made aware of the data available on the Observatory, while development practitioners, school managers, educators and national policy decision-makers generally require appropriately packaged knowledge products based in rigorous research results.

It is essential that the project continue as planned into a second phase - moving towards better understanding of the pedagogical integration ICTs in African schools, and enhancements in teaching and learning based on this understanding. All Phase 2 activities will aim beyond issues of “connectivity” and “access”, to address the integration of technologies into learning per se, as upheld by both theoretical and practical approaches.

In the medium and long term the research undertaken by members of the PanAf network and work grounded in data available on the Observatory can have a significant and broader ICT4ED impact on the continent. A better understanding of successes and challenges in the pedagogical integration of ICTs should be applied to improved practice and evidence-based policy.

Results of past studies have lacked a harmonized communication facility that supports the sustainability of project actions; additionally, African education researchers would benefit from methodological and dissemination capacity building. The PanAf network addresses these challenges, in that it collects new school-scale data, using mixed methodologies, creates innovative opportunities for knowledge sharing, and provides learning opportunities for those involved.