**Panafrican Research Agenda**

*on the pedagogical integration of ICTs*

**Preliminary version**

Phase 2
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*
# TABLE OF CONTENTS

1. SUMMARY.......................................................................................................................... 5

2. JUSTIFICATION OF THE PROJECT - IN AN AFRICAN CONTEXT ........................................... 7
   2.1 Pedagogical integration of ICTs: what is it? ................................................................. 9
   2.2 Use of ICTs at in various learning contexts in Africa ............................................... 10
   2.3 From digital divide to technopedagogical divide ..................................................... 11
   2.4 Why ICTs in African education? .............................................................................. 12
   2.5 Challenges of ICTs integration: industrialized countries................................. 13
   2.6 Challenges of ICTs integration: Africa ................................................................. 15
   2.7 The importance of conducting PanAfrican research on the pedagogical integration of ICTs ................................................................................................................ 19

3. THE PANAfrican RESEARCH AGENDA ON THE PEDAGOGICAL INTEGRATION OF ICTs .................................................................21

4. PHASE 1 REVISITED – OBJECTIVES, RESEARCH QUESTIONS AND ACCOMPLISHMENTS ..........................................................................................................................22
   4.1 Communication and sharing of research results ................................................. 23
   4.2 Evaluation ............................................................................................................. 23

5. LESSONS LEARNED - IMPORTANCE OF CONTINUED IDRC SUPPORT FOR RESEARCH ON THE PEDAGOGICAL INTEGRATION OF ICTs IN AFRICA ................................................................................................................ 25

6. THE PANA OBSERVATORY REVISITED – AN UNPRECEDENTED RESOURCE FOR DATA ON THE PEDAGOGICAL INTEGRATION OF ICTs IN EDUCATION ........................................ 27

7. PHASE 2 – MISSION, RESEARCH QUESTION, AND OBJECTIVES ................................ 32
   7.1 Mission ..................................................................................................................... 32
   7.2 Research question ................................................................................................. 32
   7.3 Objectives .............................................................................................................. 32
8. RESEARCH METHODOLOGY .................................................................34

9. ICTs AND GENDER ............................................................................36

9.1 ICTs and gender in primary and secondary education
     in West and Central Africa .................................................................36

9.2 Gender-specific examples of ICTs integration at different
     teaching levels .....................................................................................37

9.3 Consideration of gender in the ongoing project............................39

10. PHASE 2 – OUTCOMES AND ACTIVITIES ....................................40

10.1 Research outcomes .................................................................40

11. PHASE 2 - SPECIFIC OUTCOME 1 – STRATEGIES TO IMPROVE SCIENTIFIC
     PUBLICATION ON ICTs IN EDUCATION IN AFRICA ...........................41

11.1 The central importance of research publication in Phase 2 .......41

11.2 Strengthening research capacity .....................................................41

11.3 The importance of scientific publication in Phase 2 of the
     PanAf project .......................................................................................43

11.4 Analytic capacity building ...............................................................45

11.5 Available data ................................................................................47

11.6 Policy dialogue ..............................................................................48

11.7 Practical guides ............................................................................49

12. PHASE 2 – SPECIFIC OUTCOME 2 – PARTNERSHIPS ....................50

13. PHASE 2 – SPECIFIC OUTCOME 3 – ADDITIONAL RESEARCH ........52

13.1 Additional countries ..................................................................52

13.2 Additional institutions .................................................................52

13.3 Additional indicators .................................................................52

14. REFERENCES ......................................................................................54
1. SUMMARY

This document presents the second phase of the PanAfrican Research Agenda on the Pedagogical Integration of Information and Communication Technologies (ICTs). 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. The guiding pedagogical principles for better usage of these technologies, across all teaching levels and in varied educational contexts, are briefly outlined; next, we identify the main issues related to the pedagogical integration of ICTs into education systems; following that, we stress the importance of conducting research on this problem. Based on our findings, drawn from limited African scientific literature combined with the abundant English and European literature, we define key issues and research objectives. With support from the International Development Research Centre - Canada (IDRC), African training and research institutions in the education sciences will continue to focus on these key issues and objectives within the framework of the second phase of a continent-wide project addressing the pedagogical integration of ICTs into African education systems.

Following this initial justification of the project covering definitions, theoretical approaches and a review of the literature and concepts relating to the pedagogical integration of ICTs in African schools, the PanAf project is re-introduced. 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 continuing to be invested in technologies for schools on the continent. Results of past studies have lacked a harmonized communication facility that supports the sustainability of project outcomes; additionally, African education researchers would benefit from methodological and dissemination capacity-building. The PanAf project 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.

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 ICT in teaching in learning).
Support for the importance of continued research in this domain is presented, arguing that 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 towards enhancements in teaching and learning based on this understanding. 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 participants in the PanAf project, and work grounded in data available on the Observatory, can have a significant and broad, positive ICT4ED impact across Africa. A better understanding of successes and challenges in the pedagogical integration of ICTs should be applied not only to academic publication but also to improved practice and evidence-based policy.

The functions of the primary research tool of the PanAf project - the Observatory at www.observatoiretic.org - are reviewed, and finally the mission, objectives, questions, priority activities and specific outcomes of Phase 2 are introduced. A sustained effort to focus on the challenges presented by the pedagogical integration of ICTs in teaching and learning in Africa will consist of: concerted scientific, practical, and policy-focused dissemination; new institutional partnerships; and continued collection and analysis of high quality data. Following a quick review of Phase 2 methodology, and a renewed focus on Gender issues, the research outcomes are detailed: PanAf Phase 2 will focus first on strategies to support publication on the subject of ICTs in education by African researchers, through improved scientific, policy-focused, and practical writing; second, it will approach innovative institutional collaborations for the project; and finally it will take on additional field research – in new countries, institutions and for new indicators.
2. JUSTIFICATION OF THE PROJECT - IN AN AFRICAN CONTEXT

The concept of a developmental “divide” in ICTs for education is not proprietary to the digital age. In the 1970s, a few of the better-endowed African schools were already undergoing a minor audiovisual crisis. They were using fragile, cumbersome and costly equipment that necessitated time-consuming repairs, and there was also a compatibility problem between the different components. However, the underlying reason for the scholastic failure of these new technologies was that this audiovisual breakthrough took place at the margins of pedagogy - creating a pedagogical divide between the powerful learning tool and educational outcomes. As Michel (1981) explains, education practitioners and policy-makers did not know what to do with new and unfamiliar tools. To add to the problem, educators were unsure as to which overall strategies to use - integration across disciplines, independent work, individual or collective work, and so on. Advances in educational applications of audiovisual technology were hindered by both the fears and hopes it raised. Against this background, the first computers began to infiltrate African schools.

Computers made their first appearance in certain schools in North Africa at the end of the 1960s, mainly for management applications. It was only in the 1970s that they were used in educational institutions in North America and Europe. In Africa, the first computers arrived in educational institutions per se at the end of the 1970s, for instance, with the LOGO project in Senegal in partnership with the Massachusetts Institute of Technology (MIT).

Governments at the time were apparently motivated by a dual goal: to initiate students to the computer, and to introduce certain software programs. Two streams were very dominant: Skinner’s programmed teaching and LOGO language, developed by Papert. LOGO, the first computer language for children, was especially popular in North America. Seymour Papert, LOGO’s creator, had completed his studies with Piaget in Geneva and was working at MIT at the time. His most famous work, Mindstorms - Children, Computers, and Powerful Ideas, became a universal reference. Papert’s overriding aim was to develop educational tools and software with Socio-Constructivist potential. More precisely, he wanted to develop a language that would allow students to construct their own knowledge. LOGO software was initially developed for the Apple II, and later for IBM computers.

For more than a decade, introductory computer courses in Africa were offered in only a few lycées and some universities. While Information and Communication Technologies came to the forefront in North America and Europe in the 1980s with the Personal Computer (PC), they were largely ignored in Africa and computer processing was instead considered the requisite discipline. The urgency of
this “divide” was particularly felt in Africa in January 1982, when Time Magazine acknowledged the importance of the computer by naming it “Man of the Year,” the first time a machine was honoured. Computer processing was, and still is, taught in many schools throughout the 54 countries on the continent.

The next development in North America and Europe was Computer-Programmed Teaching (CPT). Teachers then became interested in teaching certain subjects with the help of technology. From teaching computer programming per se and computer programmed teaching, we move to Computer-Assisted Teaching (CAT), which was widely adopted and now an entire spectrum of tutorials has since been developed for educational purposes. Tutorials, or educational software, were designed to help learners acquire knowledge and develop skills (Clark & Mayer, 2003). By the early 1980s, Computer-Assisted Learning (CAL) emerged on the scene, and in the mid 1990s, ICTs was being used in a variety of disciplines. Since the late 1990s, the pedagogical integration of ICTs appears to be ascendant in educational circles. The hope now is that teachers can better teach all manner of subjects with the help of Information and Communication Technologies, and that students will learn more, and more easily. In today’s education community, Information and Communication Technologies are recognized as a cross-curricular competency for students and teachers alike.

In 2006, the Internet celebrated its 37th birthday. In the space of only a few short years, this tool that was initially limited to use by military, and later, higher education institutions, increasingly became a familiar tool used daily by individuals on every continent. The number of Internet users on the Earth vaulted from 16 million in 1995 to over 650 million in 2006. The exponential use of technologies also heralds a revolution long awaited by some educators - the global knowledge community, promised in the 1970s, proclaimed in the 1980s, and anticipated in the 1990s with mixed feelings of fear and disbelief, has in the 21st century become an undeniable reality for all people.

In a speech delivered at the University of Nairobi, Barack Obama by then a Democratic Senator criticized the inertia of many African countries in matters of technology and education. For instance, he noted that South Korea and Kenya have had similar economies for the past 40 years, but South Korea now enjoys an economy that is 40 times larger than its African counterpart, particularly due to the successful implementation of technologies into all spheres of Korean society, including education.1

Although technology has jump-started the engine of the information era, it is now incumbent on all nations to take part in constructing the information society such that no person is barred from access to the knowledge available on the Internet, and so that every person might share the benefits of a better future, market globalization and internationalization. (From a speech delivered on August 28, 2006.)
2.1 Pedagogical integration of ICTs: what is it?

Drawing from the existing literature, this section presents a brief overview of the various visions and concepts of ICTs integration into education, the principles and theories of the pedagogical integration of ICTs, and the potential uses of ICT in various African learning contexts.

According to many documents and authors (UNESCO, 2004; Grégoire, Bracewell & Laferrière, 1996; Karsenti & Larose, 2002; Tardif, 1998), ICTs in an educational context refer to a set of combined technologies that enables not only information processing but also its transmission for purposes of learning and educational development.

The scientific literature describes different pedagogical approaches to the integration of ICTs into education. Raby (2004), building on the works of Lauzon Michaud and Forgette-Giroux (1991), made a clear distinction between two different types of ICT integration: physical and pedagogical. Physical integration consists of making technological equipment available to teachers and students and promoting its use for occasional pedagogical needs. Physical integration is therefore understood as a process that leads to the introduction and/or deployment of technologies in the educational institution.

In contrast, the pedagogical integration of ICTs into schools means the appropriate, habitual and sufficiently regular use of ICTs that produces beneficial changes in educational practices and improves students’ learning (Depover & Strebelle, 1996; Isabelle, 2002). This type of integration implies the routine use of ICTs in the teaching and learning processes. The pedagogical integration of ICTs must therefore be understood as integration such that the student learns and socializes through a multitude of interactive and communication channels. It cannot be reduced to mere physical integration, which is nonetheless imperative.

Furthermore, the pedagogical integration of ICTs does not necessarily mean introducing these technologies as a new curriculum subject and instructing students in its operation (MEQ, 2000; Karsenti, Savoie-Zajc & Larose, 2001; Raby, 2004). Rather, ICT should be used habitually and regularly by students and teachers who are actively engaged in real-life learning contexts in order to support and improve the teaching and learning experiences and make them more meaningful.

Taken as a whole, pedagogical integration of ICTs means not only the implementation of networks and equipment, but also the use of a set of innovative technological techniques—audiovisual, information processing and telecommunications—to enhance learning at schools and in continuing education programs and for economic, social and cultural development.
The theories and principles of pedagogical integration of ICTs may be grouped into six main orientations for the utilization of ICTs for educational purposes:

1. Adopt a critical and discerning attitude toward the pros and cons of ICTs as a teaching and learning support, and critically assess the data gathered by networks;
2. Identify and evaluate the potential for information processing tools and networks to develop educational competencies;
3. Identify and communicate information using pertinent and varied forms of multimedia;
4. Use ICTs effectively to research, interpret and communicate information and to solve problems;
5. Use ICTs effectively to build networks for exchange and continuing education in specific subject areas for teachers, learners and pedagogical practitioners;
6. Tap into ICTs opportunities for learning and assessment activities.

2.2 Use of ICTs at in various learning contexts in Africa

In Africa, we find multidimensional uses of ICTs, from primary school to higher education. ICTs are increasingly used in primary schools, including the preschool, kindergarten, primary and elementary levels. Aside from entertainment value, the greatest benefit of ICTs at this level is the liberation of the students’ ideas and aspirations. ICTs also provides valuable and varying support for child learning, as it fosters emotional and social development, motor skills, physical health, language acquisition, general knowledge, cognitive skills, etc. The use of ICTs in preschool and primary school is a core learning tool for the educational basics: reading, writing, communication, listening, patience, and so on.

ICTs utilization appears to be more widespread in African secondary schools, including general secondary and technical schools, where it is used by both teachers and students to teach and learn subjects. In the technical and professional schools, ICTs are used more specifically to teach and learn specialized disciplines. Thus, we observe that certain disciplines have developed ICTs-related practices. Accordingly, ICTs integration into learning activities in secondary schools would seem to be all the more important, since it goes beyond interpersonal communication and integrates several dimensions such as interactive learning, collaborative learning, and research for information for analysis and problem-solving.

In the higher African educational institutions, ICTs integration also appears to be considered a necessity both for university students and teachers. Indeed, as we highlight below in the section on issues, numerous disciplines are either not taught or poorly taught in Africa owing to lack of teachers. ICTs utilization for online learning (e-learning) is one way to address this lack, as it would provide broader access to higher learning. Moreover, the higher education sector includes graduate teaching and continuing education, where ICTs holds enormous potential for adult self-training and lifelong learning. Distance education has become increasingly common, particularly in adult learner communities in various
university programs. In many African universities and training schools, ICTs utilization in this context fosters self-training and successful cyberspace initiatives that are independent of time or location. Thus, ICTs enables coaching and tutoring outside regular class hours. This opens the way to a new approach to the concept of time units, learning locations and learning activities. Aside from all this, online learning allows international cooperative teacher training. It also promotes national and international exchanges between teachers and contributes to the fine-tuning of pedagogical practices.

2.3 From digital divide to technopedagogical divide

Although information and communication technologies occupy an ever-larger place in the daily lives of an enormous number of people, we must recognize that the ingress of ICTs has not been consistent across all societies. This leads to the well known “digital divide” between the so-called developed and developing countries. In fact, many African countries, which are also some of the poorest on the planet, are increasingly living in a world of technological deficiency, i.e. lack of access to knowledge that is available to everyone else via the Internet.

The OECD (2006) recently demonstrated that this lack of basic network infrastructure and international connection might be blamed on the more pronounced digital divide in the world’s lowest income areas. In concrete terms, apart from countries at war, the West and Central African countries are lagging the furthest behind the Western World in this respect. For instance, Niger regularly ranks at the top of the list in two categories: poorest countries in the world and countries where information and communication technologies are particularly slow to arrive.

Accordingly, if Africa aims to better prepare its citizens for the challenges of the third millennium, it must also foster a thorough integration of information and communication technologies, i.e. the regular and routine pedagogical integration of ICTs into education in order to tap new, attractive, promising and diversified potentials. On the other hand, we must note that African initiatives to connect to the Internet are not in their infancy. In fact, despite the great divide between Africa and the Northern countries and within African countries and regions as well, technologies appear to be gaining ground with exponential speed. To illustrate, the Senegalese capital Dakar has a constantly growing number of households with high-speed connection, which was almost inconceivable a few short years ago. Moreover, a recent study funded by the IDRC (Karsenti et al., 2005) revealed that almost 75% of students in certain Senegalese lycées had an email account. And yet, particularly in the southern part of the country, a large number of schools and villages have never had electricity. Thus, the phenomenon of the digital divide is not limited to Northern and Southern countries; it is also felt within the African continent and within specific countries.
Caused by a combination of social, economic, political and environmental factors, the digital divide is a complex and widespread issue in Africa. Nevertheless, our view is that there is another, ever more important, concern: the pedagogical integration of ICTs into African schools. Recognizing that, in some cases, ICTs have barely penetrated African society, the digital divide in schools remains a great worry. In the pedagogical integration of ICTs, Africa is largely still at square one.

2.4 Why ICTs in African education?

Despite the progress Africa made in the late 1970s, we note 30 years later that the introduction of Information and Communication Technologies into the education system—which is fundamental to the knowledge economy—has been a difficult struggle, and in the opinion of some researchers, far too slow.

Many have pointed out that it is utopian to talk about education technologies in a continent where great numbers of schools have neither electricity nor running water, or where there are no schools at all. The current situation of the African education system would appear to rule out ICTs use in schools. This is because school policies must address such overwhelming needs that hard choices must be made. Little priority is given to computer equipment, and even less to the pedagogical integration of ICTs. Consequently, the ICTs needs of students and teachers are typically the last on the list. These arguments are important, but they should not be used to eliminate technologies completely from the African education system. Education should be able to prepare Africans for today’s realities, and this is paramount. The African education system must also prepare children for tomorrow’s realities. At the same time, it must help preserve the past so that technologies do not become a Trojan horse in the form of cultural or intellectual imperialism.

Why introduce ICTs into education? As explained above, ICTs wields a fundamental impact on political, economic and social conditions in changing societies. For this reason, the key stakeholders in African education—teachers, school principals, specialists, parents, and government ministers and officials—must be actively involved in ICTs uses and content, and above all the pedagogical integration of ICTs into education. Furthermore, we must be concern about ICTs in education because it is clear that ICTs will continue to significantly impact all societies worldwide, in all economic, social, and cultural aspects. Education cannot escape this trend. While ICTs have infiltrated schools in the Northern countries in great numbers, Africa lags far behind. For several years now, African education systems have been coping with a multitude of problems, and countries have initiated reforms that generally do not attach much importance to ICTs. The ADEA (2002), for its part, has stressed that ICTs represents a learning channel with the potential to enormously improve the quality of basic education teaching. And yet, as noted by the World Bank (2002) and in a report by the Massachusetts Research Association (2005), there is a serious lack of ICTs research in Africa in the areas of effective educational uses and potential impacts on the quality of African education. Moreover, an exhaustive review conducted in 2003 by the IDRC (Karsenti, 2003) clearly showed that only a very few studies on the
integration of ICTs into African education have been carried out, apart from a few works by South African scholars.

Moreover, the findings of these studies are striking and paradoxical: the more African societies use ICTs, the less they appear – proportionally - in schools. The spill over into education has not yet occurred. Should we be concerned about when ICTs arrives or the disparity between the social and educational use of ICTs? Do we really need to question why or why not schools are equipped with ICTs? It is not surprising that schools are slow in adapting to social change. After all, schools are considered as noble institutions that embody a commitment to the long term, with a mission to instruct and educate. So the important issue is probably not so much a question of when ICTs arrives in the classroom, but rather their enhanced pedagogical use for teaching and learning toward educational goals. The importance, in our view, is focusing less on the digital divide debate but more on the pedagogical integration of ICTs into education.

Finally, we must stress that many researchers (see BECTA, 2005), have demonstrated that technologies are likely to have greater impact when integrated pedagogically, providing the following benefits:

- Better mastery of basic competencies,
- Better mastery of the technologies themselves,
- Better skills preparation for the knowledge society,
- Higher motivation for school learning and advancement to higher learning.

In sum: Why introduce Information and Communication Technologies (ICTs) into African education?

- To help students preserve their past,
- To prepare students for today’s reality,
- To ensure a future for African students.

2.5 Challenges of ICTs integration: industrialized countries

The problems and barriers with respect to ICTs integration by teachers stem from several sources: inadequate initial training, insufficient motivation, absence of technical support, a school administration that does not embrace ICTs usage, lack of administrative support, etc. (see Cuban, 2001; Dede, 1998; Means, Penuel & Padilla, 2001). To better identify the many barriers to the pedagogical integration of ICTs into education, we have classified them into two main categories: external barriers (connected to the school, society, etc.) and internal factors (connected to the teacher or the teaching process). Among the key external barriers, the hardware issue is usually at the forefront (McCrary Wallace, 2004).

In the so-called industrialized countries, barriers to ICTs integration are limited to three main components: hardware, software, and technical support. Heavier investment in all three areas would foster the pedagogical integration of ICTs into education. However, as demonstrated by Cuban (1997, 1999), technological
access is an essential yet insufficient condition to foster the pedagogical integration of ICTs by teachers. Investment in hardware and technical training is simply not enough. Cuban’s argument is based on a series of surveys conducted on professors at Stanford University—a relatively well endowed institution where professors have enjoyed over twenty years’ access to the latest technologies and good technical support. Cuban’s findings reveal that these professors use little or no ICTs in their teaching practice, never mind all the resources at their disposal. He characterizes this as a “[...] limited and unimaginative instructional use of computers.” In his view, they use it in the same manner as primary and secondary teachers, who have neither the technical nor material resources of the university teachers. Although Cuban (1997) does not deny that equipment and technical support are essential for the pedagogical integration of ICTs into education, he points out that these conditions are nonetheless insufficient, since teaching cannot be considered a manufacturing process where productivity may be raised—and time saved—by investing in technological resources. Teaching, as Rousseau (1966, p.112) explains, is an art, the goal of which is not always to save time: “Dare I expound the greatest, the most important, and the most useful rule in all education? It is not to save time but to waste it.” (free translation) Depover and Strebelle (1996, p. 24), who researched ICTs use in Belgian schools, are entirely of the same opinion, noting that:

Many studies have shown that the pedagogical effectiveness of ICTs depends more on the capacities of teachers to integrate and operate new technologies in a relevant pedagogical context than on the available information technology infrastructure. (free translation)

For several years now, the international scientific literature (Becker, 1994, 2000; Cuban, 1997; Scottish Board of Education, 2000; Pouts-Lajus & Riché-Magnier, 1998) has highlighted eleven key issues in the pedagogical integration of ICTs:

1. Lack of time (ICTs integration is not prioritized in teaching practice, where the workload is already very heavy);
2. Hardware issues (lack of hardware, difficulty of access, obsolescence, defects, lack of adequate peripheral devices such as printers and scanners, too-slow or non-functioning Internet connections, etc.);
3. Technical difficulties (technical problems encountered when using technologies);
4. Absence or lack of technical support for ICTs integration;
5. Absence or lack of administrative support by the educational institution;
6. Absence or lack of support, training, or technopedagogical skills (inadequate initial training for new teachers and non-existent or inappropriate continuing education for practicing teachers);
7. Class management problems that limit the potential for technopedagogical innovations in the classroom;
8. Group size (too many students in the class for effective ICTs integration);
9. Organizational constraints and barriers within the education system;
10. Group heterogeneity of technical skills, which complicates the task of pedagogical ICTs integration;
11. Absence or lack of relevant pedagogical materials.

The primary problem that teachers face appears to be lack of time (Cuban, 1997). In fact, since ICTs can be very time-consuming, they are usually feared by many teachers who are already at the end of their rope and are intimidated or even overwhelmed by what has been known for many years as the “technological change” (Karsenti & Larose, 2001). As Chenevez (2002) explains, it is no easy task to prepare today’s students for tomorrow’s technological challenges when the teachers themselves are out of date. It is also true that ICTs usually complicates teaching routines at the beginning, even though, after a certain adjustment period, the rewards may be great (Pouts-Lajus & Riché-Magnier, 1998).

Some studies, e.g., by Depover (2005) and Leclerc (2003), show that teachers’ beliefs and resistance to change are basic factors in the use or non-use of ICTs. The Québec Conseil supérieur de l’éducation (CSE) (2002) and Fullan (2001) also stress the importance of training and awareness raising for all stakeholders on the relevance of integrating ICTs into schools. Without the commitment of teachers, it would be hard to image successful ICTs integration (Isabelle & Lapointe, 2003; CSE, 2000).

According to numerous authors (Leclerc, 2003; CSE, 2000; Isabelle, Lapointe & Chiasson, 2002; Rogers, 2000; Sherry, 1998; Depover & Strebelle, 1996; Bibeau, 1996; Fullan, 2001), ICTs use in education must surmount organizational, administrative, human, pedagogical, training, informational, technical support, funding, and technological problems. The lack of training and time required to master the technology and develop appropriate classroom courses are tremendous odds that educational institutions must overcome if they are to adopt and integrate ICTs into their portfolios (Tunca, 2002; CSE, 2000; Pajo & Wallace, 2001).

Turning to the organizational, administrative, and human factors, barriers include lack of vision and strategic planning (Bibeau, 1996), scattered efforts, disorganization and uncooperativeness between sectors and users, and poor organization.

### 2.6 Challenges of ICTs integration: Africa

There are several explanations for the failure of ICTs utilization for pedagogical purposes in certain African educational contexts (see Karsenti, 2003). According to Howell and Lundall (2000), the key factors blocking educational institutions from using microcomputers as teaching and learning tools are insufficient funds, insufficient number of computers, lack of teachers with IT skills, teachers’ inability to integrate the computer into the different subject areas, and lack of appropriate microcomputer teaching programs.

As mentioned above, computer usage has not evolved consistently across Africa. In South Africa, for instance, certain fringe elements of the school age population are using computers for educational purposes at a level comparable to that
of developed countries, while the majority of schools in sub-Saharan Africa are still exploring the ways and means of connecting to the Internet, with many in the introduction and launching phase.

The overall findings of the studies consulted point to the hardware issue as the primary constraint on the equitable use of innovative technologies. The dearth of structures and the high costs of equipment greatly exacerbate the group usage ratio. Even so, all 54 African countries have connected to the Internet (Jensen 2002). However, there remains the mind-bogglingly difficult feat of achieving a student-computer ratio of 10 to 1 and 100% Internet connection in most of the primary, secondary, and higher educational institutions in Africa. To illustrate, the World Bank’s World Links for Development (WorLD) project (2000) estimated a ratio of 139 students per computer across Africa.

Other studies show that the problems blocking African educational institutions from equipping themselves with computers are, in descending order: lack of electricity, lack of funds, insufficient accommodation capacity, lack of qualified staff, and insecurity. On top of that, very little of the equipment available nationally is allocated for ICTs use in education, in schools. Furthermore, in sub-Saharan Africa, the low density of telephone lines and the high costs of installing and maintaining them constitute a major barrier.

Numerous authors (Oladele, 2001; Intsiful, Okyere & Osae, 2003; Selinger, 2001; Tunca, 2002; Bakhoun, 2002) have also cited lack of tools; inoperative software; insufficient or absence of technological infrastructure such as telephone lines; marginal, disparate, inadequate and obsolete communications networks; fluctuating electric power supplies; recurrent power brownouts and blackouts; ailing road systems, etc. In fact, it would seem that most African countries have neither the infrastructure to ensure nation-wide Internet connection nor the wherewithal to install it. Thus, UNESCO found that the overall rate of Internet penetration across Africa was only about 1.5%, with wide variations across regions, always keeping in mind that these conditions are determinant yet insufficient for ICTs literacy.

With the help of organizations such as WorldLinks, African countries have made determined progress in the areas of computer equipment and Internet connections in schools. Clearly, there has been a substantial influx of computer hardware in many lycées and colleges in several African countries. Nevertheless, as revealed in a recent study funded by the IDRC, these investments are not enough to ensure a genuine pedagogical integration of ICTs. In fact, the study showed that once the WorldLinks funding was used up, IT use gradually faded in the institutions, with a few rare exceptions where students were highly motivated to use ICTs (see Karsenti et al., 2005).

To these hard-to-control variables we can usually add the high numbers of students required for an efficient pedagogical use of computers. And this despite the fact, as noted by Depover (2005), that enrolment in basic education in Africa is barely 50%, while access to secondary school is an option for only a minority of students.
In addition, the issue of ICTs utilization becomes more acute when we consider access by women. In most cases, women are unable to take advantage of the opportunities offered by ICTs. In many regions, women have been accorded second-class status in the areas of self-government and the interconnectedness offered by the information era. In some communities, cultural restrictions that prohibit girls from attending school at all add further barriers to effective ICTs utilization in schools (Draxler & Haddad, 2002; Karsenti et al. 2005).

Marie Hélène Mottin-Sylla and colleagues (2005) studied six French-speaking African countries (Benin, Cameroon, Burkina Faso, Mali, Mauritania and Senegal) from 2004 to 2005. They found that, overall, women have much fewer opportunities than men to benefit from the African digital revolution, as they have been allotted the roles of consumers and “helping hands.” Their research reveals the scope of the ICTs gender divide and voices a plea for greater equality in the digital revolution. Section X of this document specifically addresses the gender issue.

In most African universities, training appears to have reached a limit in terms of overcrowded auditoriums and classrooms teeming with hundreds, even thousands, of students. Open and distance education (Formation ouverte et à distance – FOAD) is one response to this problem. However, a successful FOAD initiative, considered a panacea by many, including l’Agence Universitaire de la Francophonie and the African Virtual University (AVU), requires the appropriate usage of ICTs, in other words comprehensive pedagogical ICTs integration.

Aside from the time and place constraints on ICTs development, the use and maintenance of existing infrastructures runs up against the lack of local expertise and user know-how in the African education system.

On top of this, there is the thorny problem of infrastructure, which is indispensable for ICTs use by educational institutions. For instance, staff must be found to implement technological applications and develop teaching programs (Murphy, Anzalon, Bosch & Moulton, 2002). And when ICTs, as in all pedagogical contexts, the human factor is paramount. For instance, if taught by a trained teacher’s assistant, children might learn computer skills that are never or rarely used at school. And it is no surprise that Africans who learn how to use ICTs tools consume more resources than they produce (see Karsenti, Touré & Tchameni Ngamo, 2006). This is because the lack of information, training, experience, as well as pedagogical, staffing, professional, technical, and financial support impedes the development of uses and teaching content adapted for African contexts as well as the construction of student-run education portals.

Of all the human resources deficiencies, the most important is surely that of teachers. Generally, initial teacher training in Africa does not prioritize the use and pedagogical integration of ICT (Karsenti, 2006; ROCARE-Cameroun et al., 2006).

To ensure the participation of all teachers in the ICTs integration process and to mobilize their interest and encourage them to use ICTs in practice, it would seem indispensable to create favourable conditions. This problem is all the more urgent
since many African schools do not have a specially equipped room or convenient time-space for those teachers who would like to work with computers.

In fact, in most African countries, schools have very little computer access time, and rarely at times that are convenient for teachers or students. Since teachers are not very familiar with media use, they often adopt inappropriate pedagogical strategies. Students do not have standardized background knowledge in the different subject areas, nor do they have standardized technological skills or experience with multifaceted learning styles. All these shortcomings impede the pedagogical use of ICTs.

ICTs integration into education also raises new challenges for teachers as students begin handing in assignments lifted straight from the Internet. Aside from the low pedagogical value of such effortless work, teachers must now add exposure and confrontation of plagiarizers to their many other duties. And although teachers bear the burden of proof in such cases, when they are not ICTs-savvy, the task becomes practically impossible.

ICTs also threaten the teacher’s classroom authority. ICTs appeal to the students and leave the teacher with a feeling of powerlessness. This can be very unsettling, especially for teachers who follow traditional, encyclopaedic approaches. However, current research (see BECTA, 2005) indicates that ICTs should not replace open pedagogical approaches. Rather, it should provide practical assistance by improving teaching activities and facilitating student learning. Children are rapidly won over by a story told on an educational CD-ROM. The animated images and sound tracks are attractive extras that teachers could probably not produce themselves. Nevertheless, children will immediately invite the teacher to watch the story with them and ask them to explain various elements or the ending of the story, and so on.

James (2001) noted that, even in South Africa, which seems to be far ahead of other African countries, less than 5% of educational institutions that are equipped with computers have budgets for teacher training in ICTs use. And yet, to ensure the sustainable use of ICTs in teaching, investment in human capabilities is paramount.

In many sub-Saharan African countries, there is a real political will to introduce ICTs into the education system, but no clearly formulated national ICTs policies. Information technology is more or less lumped in with the official school programs, with no budget allocations for ICTs. Funds for ICTs equipment and operation generally comes out of school fees, fundraising campaigns, and donations from national and international organizations and partners, and in countries like Nigeria and Cameroon, state funding. Meanwhile, the research literature has repeatedly stressed the need to adopt stable, ongoing policies and budgets for ICTs utilization (Karsenti & Larose, 2005).

Beyond developing human resources and building the capabilities to design, install, maintain and use new ICTs infrastructures and applications, a key challenge for ICTs use in African societies is to arrange for their distribution and use in distant and isolated rural schools (Chéneau-Loquay & N’diaye Diouf, 1998). Cyber-cafés are an important vehicle for ICTs use in many African countries. They act to
spread ICTs use to areas where there are few access points. Aside from the issue of unequal distribution of technological equipment across the regions, there are concerns about the equitable use of ICTs in a continent where a substantial portion of children without opportunities to use computers in class have no computers at home either, unlike children in developed countries. These problems are liable to hinder the pedagogical integration of ICTs into many African schools. All this against a background of the relatively recent and limited introduction of ICTs into Africa, the lack of appropriate equipment, the lack of qualified human resources, and the enormous number of disadvantaged populations. A further serious handicap is the acknowledged fact that people need time to familiarize themselves with the computer and explore its potential before they can use it to revolutionize classroom activities.

2.7 The importance of conducting PanAfrican research on the pedagogical integration of ICTs

The majority of strategic studies on ICTs in African education differ according to the country studied. Objectives vary from collaborative learning to providing communities with information. Some objectives are unclear. Other objectives are relatively precise and measurable, or else more general and instructive in studies that clearly describe the various applications of ICTs in African schools.

This only underscores the importance of this extended study - that promotes the effective use of ICTs to enhance learning and develop education systems. It is important to continue research that describes how ICTs are used in order to facilitate the application of best educational practices, according to the principles proposed by Chickering and Gamson (2004):

- Good practice in undergraduate education,
- encourages contact between students and faculty,
- develops reciprocity and cooperation among students,
- encourages active learning,
- gives prompt feedback,
- emphasizes time on task,
- communicates high expectations, and
- respects diverse talents and ways of learning

This research also sheds light on the pedagogical uses of ICTs in varied African learning settings and areas such as student learning, programs and pedagogy, online education (e-education), professional development, evaluation, etc. Results of both the trans-national research project on ICTs integration in African ICTs pioneer schools (see Karsenti et al., 2005), and PanAf Phase 1 clearly demonstrate that ICTs usage in Africa has been inadequately documented compared to other parts of the world.
This view is supported by UNESCO (2004):

[...] monitoring and evaluation are the weakest components in most ICTs in education programmes. While a number of stocktaking research studies have been conducted on ICTs infrastructure penetration and access in schools, there have been minimal monitoring and evaluation of ICTs integration and its impact on teaching and learning. Evaluation is an important phase in the formulation and implementation of an ICTs in education programme. Evaluation, both formative and summative, means that policies, practices, and activities are documented, interpreted and analyzed (p. 135).

Pedagogical ICTs integration initiatives have involved a variety of situations such as visual projection, preparation of class notes, and distance self-learning. A promising research approach would be an attempt to provide an overview of the diverse experimental uses of ICTs in learning. Long-terms ICTs initiatives, national and continental, have not yet been clearly monitored or evaluated.

It would also seem urgent to reflect on the pedagogical integration of ICTs into teaching in particular African localities where learning with these tools is a very chaotic process. ICTs themselves do not encourage students to be creative or to grasp the scientific approach. That requires a pedagogical framework within which technology can facilitate the use, processing and production of relevant information, among others. No matter how powerful the hardware, it serves no educational purpose if it is not used for appropriate purposes. Hence, education research has a duty to shine a scientific spotlight on training in the pedagogical uses of ICTs, a societal issue of enormous import.

As a continent that lags far behind in ICTs adoption, use and innovation, Africa is not at the point where it can use educational ICTs to provide its people with a better education or to take advantage of the investment potential and opportunities it offers. Nevertheless, several countries are convinced that ICTs use is an undeniably sound economic development strategy when viewed as an investment in the future. This raises possibilities of ICTs utilization for African development and a restructuring of knowledge based on a consideration of local African realities.
3. THE PANAfrican RESEARCH AGENDA 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.

“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 remains exceptional.

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 continuing to be invested in technologies for schools on the continent.
- Results of past studies have lacked a harmonized communication facility that supports the sustainability of project outcomes.
- 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.observatoiretic.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.
4. PHASE 1 REVISITED – OBJECTIVES, RESEARCH QUESTIONS AND ACCOMPLISHMENTS

IDRC’s Acacia programme 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 purpose of the PanAfrican Research Agenda on the Pedagogical Integration of Information and Communications Technologies (ICTs) is to contribute to this broadening process and to participate in the access, construction, and production of knowledge in the information era.

The PanAf project’s aim is to better understand how the pedagogical integration of ICT can enhance the quality of teaching and learning in Africa.

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).
- 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 1 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.
4.1 Communication and sharing of research results

Communication of data and results has been central to the project - beginning with the creation of the Observatory (described below) where all project data has been uploaded.

In addition to this “living” resource, where data is made continually and permanently available, a project news portal maintained by ERNWACA www.panaf-edu.org act as the main point for dissemination of reports and information related to project activities.

Large-scale diffusion of research results has been taken up through:

- Reports produced by the participating countries
- Discussions with the project partners and stakeholders
- A bi-annual newsletter which can be accessed online, produced by ERNWACA and distributed to researchers and practitioners as well as education administrators and policymakers
- Results presentations at forums and other gatherings
- Overall results presentation in a collective work “100 Schools”
- Results presentation to the media at conferences organized by ERNWACA and other partners.
- Organization of national policy dialogue workshops to present project results to all concerned, particularly the schools, partners, policymakers and local and national elected representatives
- Results presentation at an international forum organized by the IDRC, April 22nd and 23rd, 2009, in Dakar, to provide closure to Phase 1 of the project, to present the overall results of the study, to globally evaluate the activities carried out. It would also allow an exploration of future directions, including program exchanges, institutional strengthening, the development and implementation of policies and projects for the pedagogical integration of ICTs, etc.

4.2 Evaluation

Evaluation of this first phase of the PanAfrican Research Agenda on the Pedagogical Integration of ICTs has been carried out on an ongoing basis and with diverse means - drawing lessons as activities progress. Ongoing evaluation has been part of the continuous reflective process whereby the lessons learned are continuously reinvested into project management and partnerships in order to improve the quality and relevance of the research. These lessons are shared with the community of practice that the research network providing the Observatory data constitutes, thus contributing to the community’s development.
The participants at the various methodological, capacity-building and dissemination workshops have completed evaluations and the results have been communicated shortly thereafter. A formal electronic survey has been administered to national participants (responses received from at least one representative researcher in each country) on the quality of implementation and suggestions for next steps. Both Université de Montréal and ERNWACA submit interim technical reports to IDRC in accordance with guidelines and expectations. Finally, a cyclical process of feedback throughout the PanAf project community seeks to maximize the quality of ongoing activities and of the scientific rigour of the research outcomes, as illustrated below:
5. LESSONS LEARNED - IMPORTANCE OF CONTINUED IDRC SUPPORT FOR RESEARCH ON THE PEDAGOGICAL INTEGRATION OF ICTS IN AFRICA

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.

To reiterate, the principal objectives of the project are first to collect, analyze and share high quality data on the pedagogical integration of technology at schools across Africa, and second to build capacity in the individuals and institutions involved. Investment is also made in appropriate dissemination strategies - to ensure the Observatory sees use and that stakeholders recognize its importance as a resource. 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.

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 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 institutions will help improve its contribution
to national or international development. In today’s globalized world, it is not only a necessary tool for learners but also an entry ticket into the knowledge society. This must also be combined with national policy that recognizes its importance. IDRC has explored in depth the role of research for policy-making and maintains that making informed decisions can lead to effective change, even if it may take time.

In the medium and long term the research undertaken by members of the PanAf project 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.
6. THE PANAF OBSERVATORY REVISITED – AN UNPRECEDENTED RESOURCE FOR DATA ON THE PEDAGOGICAL INTEGRATION OF ICT IN EDUCATION

The place of the Observatory in this next phase will remain central – 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:

www.observatoiretic.org
1. **Simple Search...**

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

**Tamale Senior High School**

Return to the country's page: Ghana.

**General information**

Tamale senior high school is a public, boarding, and mixed secondary institution. It was first established in the 1950's. It is located in the Tamale Metropolis, the northern regional capital (Latitude 9° 24' 00" N and Longitude 10° 0' 00" E). The school now has an ICT lab with access to the Internet. It offers science, agriculture science, general education, and technical education at the senior high school (SHS) level. The school has a student population of One Thousand, Seven Hundred and Eighty. The headmaster is Alhaji T. A. Mahamah, himself a past student of the school. The school has a...
Both qualitative…

5. The impact of ICT on teaching

5.1 Stated impact (by educators) of ICT on lesson-planning (150 words)

The internet has had the greatest source of teaching and learning of lessons, to rehearse lessons. Another area teachers reported CD-ROMS and pen drives, which

5.1.2 Stated impact (by students)

Students’ knowledge in ICT has new ideas in class during lessons.

And quantitative.

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

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, Nigeria, Senegal, Sierra Leone, Tanzania, Zimbabwe)
For multiple indicators...

<table>
<thead>
<tr>
<th>Institution</th>
<th>2.1.2 Percentage of computers connected to the Internet</th>
<th>4.5.4 The percentage of courses taught using ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lycée Bilingue de Yaounde</td>
<td>100.00 % (72 / 72)</td>
<td>45.45 % (10 / 22)</td>
</tr>
<tr>
<td>Lycée Général Lecore</td>
<td>94.03 % (63 / 67)</td>
<td>64.71 % (11 / 17)</td>
</tr>
<tr>
<td>Lycée Joss</td>
<td>92.00 % (59 / 75)</td>
<td>100.00 % (22 / 22)</td>
</tr>
<tr>
<td>Lycée Technique de Batoussam</td>
<td>100.00 % (14 / 14)</td>
<td>40.00 % (20 / 50)</td>
</tr>
</tbody>
</table>

And is exportable to Microsoft Excel.

<table>
<thead>
<tr>
<th>Country</th>
<th>Institution</th>
<th>3.1.1.1 Number of educators who have completed 1 to 50 hours of continuing education/professional development which included ICT integration</th>
<th>3.1.2.2 Number of educators who have completed more than 50 hours of continuing education which included ICT integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senegal</td>
<td>CUM Lamine Senghor de Jou</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Collège Africain Sports et Études</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Collège Sacré-Cœur</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Ecole Front de Terre</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Ecole Serigne Amadou Aby Mbaye</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Faculté des Sciences et Techniques de l’Éducation et de la Formation (FASTEF)</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Lycée Commercial El Hadji Abdoulaye Neass</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Lycée Damba Diop de Mbour</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Lycée John Fitzgerald Kennedy</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Senegal</td>
<td>Lycée Senghor Njoye</td>
<td>21</td>
<td></td>
</tr>
</tbody>
</table>
3. Summary Search, which uses Google Maps…

<table>
<thead>
<tr>
<th>Summary Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mozambique</td>
</tr>
<tr>
<td>UNIVERSIDADE PEDAGÓGICA - UP</td>
</tr>
<tr>
<td>EScola SECUNDÁRIA DA MACHAVA SEDE</td>
</tr>
<tr>
<td>EScola SECUNDÁRIA DA MATOLA</td>
</tr>
<tr>
<td>EScola SECUNDÁRIA QUISSE</td>
</tr>
<tr>
<td>MAVOTA</td>
</tr>
<tr>
<td>EScola SECUNDÁRIA</td>
</tr>
</tbody>
</table>

To browse data from participating institutions across Africa.

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 indicators from their participating institutions. Oversight, to ensure the expected level of scientific rigour, 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 1, 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 2 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.
7. **PHASE 2 – MISSION, RESEARCH QUESTION, AND OBJECTIVES**

7.1 **Mission**

Through the Acacia program, the PanAf project’s long-term mission is to advance the state of knowledge on the following “ICTs for Education Development” issues:

- The policies and strategies that can mostly effectively support embedded and systemic ICTs practices in education.
- The changes needed to curricula and instruction to support the development of an ICTs-inclusive pedagogy.
- The impact of ICTs on student and teacher knowledge, skills and attitudes, and the appropriate indicators for evaluating them.
- How ICTs can enhance or detract from the teacher-pupil learning and communication process. At what levels of the education system do these tools play the most important role: pre-primary, primary, secondary or tertiary, or at teacher training?
- Significant differences or similarities in education practices in Anglophone and Francophone countries in Africa.

7.2 **Research question**

*How can the pedagogical integration of ICTs substantially improve the quality and efficiency of teaching and learning at all levels and scales of African education systems?*

This main research question - central to the development of the PanAfrican Research Agenda on the Pedagogical Integration of ICTs into Education (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.

7.3 **Objectives**

*General Research Objective:*

The objective of Phase 2 of the PanAf project is to respond to the above question (how to improve teaching and learning through the integration of ICTs) by developing and communicating recommendations and solutions for education policy-makers and practitioners.
This general objective is in direct continuity with Phase 1 of the project, flowing from the original research question and in line with the literature (Huberman and Miles, 1994). This general objective is also divided into specific ones in order to address precise needs in the development and dissemination of knowledge on the pedagogical integration of ICTs in Africa (Phase 2 priority activities are further developed in OUTCOMES, below).

**Specific Research Objectives:**

PanAf Phase 2’s specific objectives flow directly from its principal one, above and they are strictly aligned with the Observatory indicators already in place. They go beyond the descriptive function of PanAf Phase 1 and include comparative analysis of the field data already collected in the field. Among other objectives, comparative studies will necessitate a deepening of transnational collaboration amongst PanAf researchers. The specific objectives, below, also provide the opportunity for scientific and professional publication – a particular focus of Phase 2. They include to:

- Support transnational comparative analysis of data on the use of ICTs in educational institutions, as well as its impact on the quality of teaching and learning in African contexts.
- Evaluate the role of ICTs policy on the quality of teaching and learning in African contexts.
- Better understand the impact of ICTs on the quality of teaching in African schools.
- Better understand the impact of ICTs on the quality of learning in African schools.
- Better understand the role of school management, administrative personnel and the larger community in the integration of ICTs by educators and learners, and evaluate this role with regard to the quality of teaching and learning in African contexts.
- Gain a more complete understanding African teacher-training with regard to the pedagogical use of ICTs, (a) evaluating the impact of this training on their pedagogical integration of ICTs, and (b) analysing the relationship between this training and the quality of teaching and learning in African contexts.
- Better understand the role of connectivity, other resources, and their management within educational institutions on the quality of teaching and learning in African contexts.
- Explore innovative ICTs in education strategies, particularly in national scale policies, to improve equity (including in the realms of gender, culture, special needs, and languages), and their relationship to the quality of teaching and learning in African contexts.
As Ferdig, Sprague, Maddux and Albion (2007) argue, there is – still – an ongoing debate in the field of educational research that evaluates the value and rigor of qualitative versus quantitative research methods. While some educational research journals adopt a “gold standard” with randomized, controlled trials, many qualitative researchers argue that such “traditional research practices have been less of a stunning success than we hoped for and some of the disappointment has motivated some scholars to seek other models of inquiry” (Eisner, 2001, p. 138).

Somewhere in the middle is the notion of mixed methods and concern for selecting the correct method for a specific question (see Johnson and Onwuegbuzie, 2004). Eisner (1993) argued that if: “there are different ways to understand the world, and if there are different forms that make such understanding possible, then it would seem to follow that any comprehensive effort to understand the processes and outcomes of schooling would profit from a pluralistic rather than a monolithic approach to research (p. 8).

Still some more radical researchers have argued – and still argue – that combining the two methods is illogical on the grounds of epistemological or ontological inconsistency. Their objection is that the two methods are based on competing worldviews and should not be mixed (see Stange, Crabtree, & Miller, 2006). Luckily, this view is countered by a growing body of literature which suggests that qualitative and quantitative methods both have strengths and weaknesses and combining the two can make use of the strengths and overcome the weaknesses of both approaches (see Karsenti and Savoie-Zajc, 2000, 2004; Borkan, 2004; Johnson and Onwuegbuzie, 2004). Further, they argue, mixed methods may make it possible for researchers to choose their methodologies according to their research questions and objectives (Karsenti and Savoie-Zajc, 2000, 2004), as well as when findings are revealed, and thus prevent forcing their research into either a qualitative or quantitative design according to past preference (Miller & Crabtree, 2005). There is a great body of literature supporting both methods; there are also books and articles that provide thorough explanations of the debate and the future of educational and educational technology research (Smith, 1983; Haertel & Means, 2003; Schrum et al., 2005; Eisner, 1993; Maddux, 1995a, 1995b, 1996a, 1996b; Baker & O’Neil, 2003). “As for methodological debate, although there is an increasing number of texts and guides for those who might wish to mix or integrate methods, there is still fairly limited engagement with the methodological or theoretical underpinnings and implications of integrative research strategies” (Mason, 2006, p. 10).
Phase 2 of the PanAf project will continue on the mixed-methodological path begun in Phase 1, combining quantitative and qualitative data collection, and dynamic instruments including audio and video recording.

The sample of participating institutions will remain purposefully unrepresentative of the general state of African education systems, and will instead be selected for their ability to convey best practices and particular challenges, experienced by leading primary, secondary and tertiary institutions across the continent. The means of dissemination of research results will remain open, with raw data made immediately publicly available on the Observatory in a “wiki” style, and with the specific expansion of scientific, policy, and practitioner-focused writing.
9. ICT AND GENDER

From the literature review, research on ICTs and gender centres on three themes: women’s access to ICTs; women’s ICT usage and expertise; and ICTs access and use equity between men and women.4 The results do not prove the hypothesis that gender issues go away because the Internet is a virtual environment. It appears that the virtual space is still dominated by men, and that some spaces initially occupied by women were later taken over by men. Women’s limited access to ICTs would certainly result in negative educational and economic outcomes.

The little research that exists on ICTs and gender in the Southern countries aims to identify the barriers to women’s access and use of ICTs and the solutions that should be implemented, but it does not explore structural issues. These studies are also combined with studies on poverty, demonstrating that economically “poor” women are the most disadvantaged in society. The barriers include lower literacy and education levels, time and cost constraints, geographical locations of access points, insufficient number of computers, sociocultural norms, and lack of information processing skills.

Overall, we note that ICTs projects have been carried out in the Southern countries without adapting technical solutions and management approaches to the characteristics, needs and contexts of the countries. It would be important to develop tools to better collect and analyze quantitative and qualitative data on the tendencies of men and women to access and use ICTs and to identify the needs and aspirations of men and women in this area.

9.1 ICT and gender in primary and secondary education in West and Central Africa

Under a project funded by the IDRC, research was conducted in 40 primary and secondary “ICTs pioneer” schools in five countries from 2004 to 2005. Discussions with the participants uncovered certain realities in West and Central Africa concerning ICTs and gender. In the course of this trans-national research project, we found that, although the computer rooms in the schools studied held an almost irresistible attraction for everyone, both students and teachers raised gender-related issues of ICTs access.

“The people in charge of the computer, multimedia and information processing rooms were mostly, if not exclusively, men. Women were rarely assigned ICTs monitoring or teaching duties. However, in about a dozen schools, we learned that special arrangements had been made to allow the less technically adept students to become more comfortable with ICTs use. Unfortunately, the scheduling was not always convenient, especially for women.
In the opinion of most school principals, if a difference existed between the boys and girls, it was not very apparent. They also stressed that both boys and girls exhibited computer savvy and enjoyed using ICTs. Generally, it appeared that the girls got better marks in the computer class as well as in other subjects.

At school, priority ICTs access was given to the most motivated pupils, regardless of sex, although the boys seemed to have more access to computers outside of school, e.g., at cyber-cafés. Some teachers remarked that, in terms of handling computer tools, the boys seemed to have mastered the computer better than the girls overall. In most cases, a few boys were known as ICTs experts by their friends.

(Research into ICTs and Gender: Some Key Themes (2003). Butcher, Neil et al., unpublished paper, 21p.)

9.2 Gender-specific examples of ICTs integration at different teaching levels

Many sub-Saharan African countries need to improve the quality of education and resolve the equity issue. Discrimination against girls, or sexual differentiation, is a serious concern and a barrier to the integration of ICTs in education. The disparities observed between girls and boys in learning to use ICTs, at all education levels, underscores the gender-specific nature of African societies, where women's and men's living conditions differ. Depending on the region, women enjoy less social access and are submitted to diverse forms of exclusion, which renders them more vulnerable. Sociocultural frameworks have confined African women to the role of housekeeper (RNN, 1997). In such conservative cultural environments, women and men take up distinct duties and roles, resulting in rather different lifestyles and conditions, which in turn produces different bodies of knowledge and gives rise to different informational needs. Thus, sexual differentiation results in a kind of second-class status for women, where women's interests are shaped to comply with deeply held beliefs about their roles in various dimensions of life. These beliefs and ideologies are intrinsic to cultural practices and religious beliefs and practices as well as other aspects of African life (Wolpe et al. 1997). The problem is exacerbated by the fact that girls appear to be alienated by ICT, considering them as belonging to the masculine realm. An investigation of computer savvy by university students revealed that female students were less skilled in the use of information technologies than their male counterparts (Sayed & Karelse, 1997). This imbalance at all levels is undoubtedly attributable to a mixture of cultural norms, but also to historical, economic, sociological, legal and traditional factors.

However, a certain balance between boys and girls in ICTs training would be required for the successful long-term integration of ICTs into schools. Moreover, girls make up slightly more than half the student population in most African countries. We cannot contemplate integrating ICTs into the schools without giving due consideration to girls. ICTs integration should not be allowed to be a domain strictly reserved for males. By raising awareness among girls and facilitating their
access to ICTs, in short, by advocating sexual equality, we could enable a better implementation of ICTs into education systems. Any efforts to correct gender imbalances would require schools to encourage girls to use ICTs.

According to many studies (Huyer, 1997; CSTD–GES, 1995), several factors must take into account when developing ICTs integration policies so as to overcome the constraints that bar girls from using these technologies at school. For example, educators’ (parents’ and teachers’) behaviours would have to change towards children, from a very young age. Above all, special measures would have to be implemented in the schools to facilitate girls’ access to the computer rooms. There should be no barriers to girls. Otherwise, there is a risk for lack of interest and awareness, exacerbated by the influence of the socio-cultural environment. Every person who can read and write can use ICTs.

The ICTs integration process should therefore consider the entire environment, scholastic and socio-cultural, so as to correct the educational imbalance between the sexes and produce a new generation of young girls and women who are knowledgeable and trained in day-to-day ICTs use. In other words, girls should be offered the same educational opportunities as boys. Sexual discrimination, i.e. exclusion or marginalization, constitutes a serious hindrance to the effective integration of ICTs into the education system. The notion of discrimination should be banned from the integration process and replaced by provisions that allow all students to learn ICTs. In the interests of equity between the sexes, large-scale strategies should be designed to overcome the barriers to ICTs use by girls at school.

If ICTs is introduced into school systems without taking into account these social factors, there is a risk of introducing further disparities. The integration of ICTs might work to the disadvantage of girls by reinforcing their subordinate status. The best solution would seem to be to develop ICTs integration into schools based simply on the increasingly evident needs for efficiency, efficacy, flexibility and sustainability. The realities of the socio-cultural environment and the integration of ICTs into schools must be taken into account to prevent appropriation, pretence and ignorance. The lack of educational opportunities offered to females, the handicapped and other vulnerable sectors of society constitutes a fundamental obstacle to their participation in the information society and the use of ICTs.

In this perspective, the principle of equity is universal education and training that takes into account the diversity of the social mosaic, regardless of individual gender, social class, ethno-cultural group, or skills.
9.3 Consideration of gender in the ongoing project

Inequity, at various scales, compounds the effects of risk and vulnerability among the poor. With the goal of better understanding the multiplex challenges of equitable development, this research will address gender, rural/urban residence, and socioeconomic class, using both targeted and integrated methodologies. The indicators will engage these issues specifically, to produce tangible recommendations for improved ICTs-in-education equity while throughout the indicators, equity issues will be addressed in research design, implementation and evaluation. Since this research project aims to contribute to social and equitable change, and the issue of Gender issue is an essential component, the project would incorporate a consideration of gender at many levels—from project management to data collection and analysis and results distribution.
10. **PHASE 2 – OUTCOMES AND ACTIVITIES**

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

- concerted dissemination efforts,
- new partnerships,
- and continued collection and analysis of new as well as existing data.

10.1 **Research outcomes**

As noted above PanAf Phase 2 is made up of precise research objectives that respond directly to needs flowing from the general objective. The major research themes of the project are expressed in the 12 categories of indicators for which data is currently available on the Observatory. These indicator categories will serve as the foundation for thematic and comparative analysis in the course of Phase 2. Among the outcomes of these analyses will be networks of collaboration between researchers working on similar or complimentary themes, as well as ensuing scientific and practical publications that are at the heart of the project’s objectives.
11. PHASE 2 - SPECIFIC OUTCOME 1 – STRATEGIES TO IMPROVE SCIENTIFIC PUBLICATION ON ICTS IN EDUCATION IN AFRICA

11.1 The central importance of research publication in Phase 2

In Phase 2, investment will be made in the publication of papers and other documents based in Observatory data, by participating African researchers. This will be grounded in:

- Organizing qualitative data analysis workshops, writing workshops, etc.
- Rigorous analysis of the existing data - focusing on transnational and thematic lessons-learned on subject of the pedagogical integration of technologies.
- Continuing to encourage scientific dissemination through communication in international, relevant conferences such as eLearning-Africa, and the Society for Technology and Teacher Education.
- Continuing to encourage scientific publication based on Observatory data - supporting thematic transnational research projects (and strengthening the capacity of researchers, institutions, and graduate students, within the participating countries).
- Continuing the policy dialogue initiated in each participating countries at the end of Phase 1.
- Producing practical publications to support research, classroom practices, and teacher-training (including a Handbook for Research on the Pedagogical Integration of ICTs in African Schools; Handbook for Research on the Pedagogical Integration of ICTs in Africa: 50 strategies for educators - a practical guide for educators; Road Map for a Successful Integration of ICTs in African Schools – a brief pamphlet for educators and school administrators).

11.2 Strengthening research capacity

Apart from promoting the sharing of information and expertise, the PanAf Observatory will address the current shortage of scientific publication and collaboration among the researchers. One of the chief benefits of the project would be the strengthening of research capacities in Africa. It is noteworthy that, although the case for ICTs and their integration into the teaching/learning process has been demonstrated and acknowledged, this project would produce further benefits through the acquisition of new research knowledge.
If developing African countries are to escape from the research rut in which they are caught, they need to embark on large-scale research projects that reach larger audiences. This would be essential for the mutual strengthening of research capacities among African researchers. All project participants would greatly benefit from the store of research methods and tools available on the Observatory. Moreover, the range of methodological approaches adopted would strengthen research capacities and be instrumental in obtaining better and more coherent research results in a medium-term perspective. Using the key elements to strengthen research capacities, as explained below, the countries could work with the entire body of data on ICTs integration, drawing from a variety of sources as well as interfaces between authors of previous works and users of those works. Finally, to strengthen their capacities, the partner countries would also have to be willing to participate in the project.

As previously demonstrated in numerous studies on the pedagogical integration of ICTs, this project should have a major impact on the capacity development of teachers and researchers. The quantity and quality of the data for collection and analysis would help researchers develop their knowledge and professional abilities, and would also constitute a training resource for improving teaching practices and scientific undertakings.

This research project therefore offers multiple scientific benefits. The research model would allow researchers from the participating countries to develop their capacities to assume shared responsibility for the research data and results they produce. The sequencing strategy for the data collection and in-depth analysis steps would help the researchers develop at each level the critical stance and synthetic approach required for sound scientific research. Furthermore, since the data collection would be carried out across a variety of primary, secondary and tertiary schools as well as diverse professional, technical, specialized and partner organizations, the resultant research dynamics would promote greater collaboration and shared responsibility.

These are some of the chief dividends that would help develop and strengthen researchers and contribute to national research, with a view to comparisons with similar international studies using similar tools and indicators. The national researchers and research teams and scientific committees would have opportunities to voice their opinions, independently of their country, on the overall study results. This would be an undeniable asset, as it would encourage a general openness to other people, ideas and realities. Through the data confrontation process and exchanges of views from many African perspectives, combined with an objective oversight by scientists from abroad, very high quality results should come out of this international research project.

Because the research focuses on the pedagogical integration of ICTs from primary to tertiary school, it would also contribute to strengthen research capacities in many African educational institutions through national and/or sub-regional methodology workshops. They would be held with the aim of adopting a consistent investigative approach and results distribution procedure. These methodology workshops would help teachers and researchers improve their skills in data collection and processing as well as publishing the results of their work.
Furthermore, this study would help reinforce collaboration between researchers within the countries, while fostering bilateral and international cooperation between researchers and institutions within and between countries. In addition, this study would facilitate coordinated research initiatives on ICTs use among the various African educational institutions. At the same time, this research would confer more widespread recognition on national experiments in the pedagogical integration of ICTs.

11.3 The importance of scientific publication in Phase 2 of the PanAf project

Scientific writing will be a major outcome of PanAf Phase 2 - using the data made available on the Observatory to produce articles for submission to recognized, scientific, peer-reviewed, international journals.

There are two main types of articles that scientific journals publish. First, they publish theoretical arguments and literature reviews - provided those manuscripts do not simply summarize but rather present new models or ways of examining issues in the field. In the field of Education the second type of publications - research studies that present data outcomes, results, and implications for education and technology, are more common. In most journals, publications can adopt any method. However, it is important to note that more qualitative than quantitative pieces get rejected - there are at least two main reasons that could explain this imbalance. First, researchers who present quantitative outcomes generally understand the method and the reporting techniques associated with that method. For instance, you would expect that the author would present the method, the instrument, and the outcomes in their writing. They would include results in data tables and then they would present a discussion of that work. Editors and reviewers then evaluate the literature review, the theoretical perspective, the decision to use a particular instrument, the analyses, the method chosen, and the implications. The main point is that quantitative authors generally present:

- a literature review and theoretical approach;
- the process and methodology of the study;
- the data collected;
- a discussion of their results and recommendations for future research.

If the manuscript is rejected, it is generally due to a weakness in one of these areas. Conversely, the number one reason qualitative articles get rejected is, in general, because authors fail to include data.

With the Observatory, researchers have easy access to approximately 20,000 recent data points (see figure below). Therefore, this should not be an issue for publishing. Editors and reviewers also need to be convinced by strong theoretical arguments backing the study, appropriate methods and instruments to get at data, and then discussions that relate the findings back to the theory (this last step is often left out of many pieces submitted to scientific journals). PanAf researchers should keep in mind that scientific publications or manuscripts must convince readers through strong argumentation, data presentation and analyses, regardless of whether they are qualitative or quantitative in nature.
There are a number of publications that serve as guidance for such writing (Wolcott, 2001; Denzin & Lincoln, 2005; Elliott, Fischer, & Rennie, 1999). Additionally, writing up qualitative data is obviously critically related to the method of analyses chosen. A write-up of discourse analyses will look different than narrative structure analyses. The point is that authors need to find ways to present the data rather than simply summarizing and hoping that readers will simply presume the data and analyses was presented properly and accurately. A second reason that manuscripts reporting qualitative findings are either rejected or sent back for revisions is generalizability. Some researchers may argue that the qualitative method sits within a paradigm where findings can only be discussed within the context of the specific study. Generalizing to a broader context is not the purpose or the function of said research. Although many journals value situated research and accept that it may imply limitations in transfer and generalizability, editors and reviewers also underscore the importance of the discussion being situated within a larger framework. Firestone (1993) suggested that there are a number of ways in which qualitative researchers can generalize analytically. Two of these include “predictable threats to generalizability can be organized under the broad headings of selection, setting, history, and construct effects” and selecting “single cases to maximize their use for generalizing about theories” (p. 19). Firestone added:

The argument for qualitative research has never been that its claims for generalizability are exceptionally strong. Qualitative research is best for understanding the processes that go on in a situation and the beliefs and perceptions of those in it. Still, qualitative researchers can do things to increase the broad applicability of their findings. Some of these—like providing rich, “thick” description—contribute to case-to-case reasoning. Others—like intentionally sampling for theoretically relevant diversity and replicating cases through multisite designs— are particularly useful in a more analytic approach. In any event, qualitative methods should not be avoided because of the fear that their claims for broad relevance are especially weak. (p. 22)

PanAf researchers must understand that there are different ways to present and report qualitative data. However, Geertz argued that thickly describing that data—and the context of that data collection—provides a way to get at some of the validity and generalizability that Firestone (1993) referred to. Lincoln and Guba (2007) added that instead of internal validity, external validity, reliability, and objectivity, qualitative researchers ought to be examining credibility, transferability, dependability, and confirmability (respectively).
The point is that PanAf researchers should understand that a method chosen for a study has nothing to do with the acceptance or rejection rate of publication. The peer-review process is focused on argumentation and data to support that line of reasoning. Editors and reviewers expect a clear theoretical perspective that leads into a strong question; that question must be related to education. They are looking for the correct method (including instrumentation and techniques) to answer that question. They want to see the data and the analyses, and then they expect the conclusion to relate the findings back to the broader literature and theoretical perspective. Finally, the literature review itself should permeate throughout the manuscript, as an introduction to the problem, the justification for the method and analyses, and as triangulation of the data and related findings.

Most journals will publish works that include rich data evidence, regardless of the method used in the research design. Detailed and careful research analyses, as well as purposeful design and construction of the write-up are critical to building a strong foundation of educational technology literature. Researchers in educational technology and technology and teacher education more specifically, who decide to follow a platinum standard for research publication, are strengthening and broadening the credibility of a relatively young field. In Phase II, the project management team and international scientific committee will promote this line of thinking, and assist with this important goal.

11.4 Analytic capacity building

Referred to as “writing workshops”, PanAf Phase 2 will include several opportunities for participating researchers to build their analytic and writing capacity, with the specific objective of creating publishable articles based in Observatory data. As opposed to past workshops, these will be smaller group gatherings, delivered in a single language, over a greater period of time.

In PanAf Phase 2 the principal strategies to support scientific publication based in Observatory data will include a series of four writing workshops where participants, in small groups (2-3 country teams per workshop) will proceed from the first stages of writing, to the submission of an article for publication.

Specifically:

• Five-day writing workshops with a ratio of at least 1:4 trainer to participants, where researchers emerge with an article ready to submit for peer review; and five-day writing workshop with a ratio of at least 1:4 trainer to learners, where researchers from different countries, in teams of two, emerge with an article on a comparative transnational theme ready to submit for peer review.
Sample writing workshop progression:

1. **Choose a theme for analysis:** based on data available on the Observatory and personal interest / professional relevance.
   - **"Homework":** Reading / Literature review: what else has been written on this theme, any "calls for further research"?
2. **Specify research objectives / questions:** what scientific concern will the proposed article respond to, with what methods?
   - **Target a specific journal:** in order to develop the article within the expected structure / read examples from this journal.
3. **Collect data on the Observatory:** create tables of specific indicators for specific institutions / countries using Advanced Search function.
   - **Write an outline / first draft:** lay out the proposed article’s structure and contents in point form.
4. **Submit to peers and PanAf team:** expect several cycles of editing and review as the final draft is developed.
   - **Submit to targeted journal:** expect several cycles of editing and review before the draft is accepted.

Through this strategy, in the two years of Phase 2 (2009-2011), the PanAf project aims to support the development of some 50 scientific articles on the pedagogical integration of ICTs in Africa.

Additionally, the project will establish more formalized online resources to support researchers in their analysis, writing and submission of articles for publication.

The project will continue to offer remuneration to researchers tied directly to the number of articles a) submitted, and b) accepted by scientific journals.

There will also be investment across Phase 2 to support dissemination of research results in alternate forms, including through participation in international conferences. Researchers will continue to be invited to participate in conferences such as eLearning-Africa, and The Society for Information Technology & Teacher Education (SITE).
11.5 Available data

The unprecedented depth of data made available by the PanAf project in its first phase, in order to support scientific, political and practical analysis and writing in Phase 2, is illustrated below:

[PanAf Observatory www.observatorioetc.org Phase 1 data volume]

- 12 COUNTRIES
  - za  cm  cg  ci  ke  ml  cf  ug  gh  gm  sn  mz

- x 10 SCHOOLS EACH
  - 1  2  3  4  5  7  8  9  10

- x 185 INDICATORS
  - (12 CATEGORIES, 60 SUB-CATEGORIES)
    - POLICY
    - TEACHER-TRAINING
    - GENDER
    - ... IMPACT ON LEARNING

= Open-access, mixed-methodology data:
for 215,000 learners;
including 20,000 data-points,
900 scanned questionnaires,
250 recorded interviews,
50 InfoDev national reports,
50 UNECA policy documents and
50 UIS education statistics sheets.

= for example:
six 150-word qualitative indicators
ten scanned questionnaires
two mp3 interview recordings
11.6 Policy dialogue

With their phased integration into African educational institutions, ICTs are attracting increasing attention from governments who see them as tools to raise the quality of teaching and learning at a national scale. Programmes and projects to equip schools are underway, and some countries have prioritized this area through the development of education sector ICTs policy strategies. However, in general, studies demonstrate that Sub-Saharan African governments lack the capacity and expertise to develop and implement such strategies and policies effectively. More worrying still is the fact that in a number of countries there is no state body responsible for the coordination of this sector, which is marked by a certain anarchy arising from the multiplicity of initiatives both public (government, bilateral and multilateral cooperation) and private (enterprises, NGOs, patronage, etc.). So that interventions in this area might have a meaningful impact, it is necessary to initiate and support fruitful dialogue between different stakeholders in the education system. High quality PanAf project data and analyses are already made available via the Observatory to policymakers and practitioners in order to inform, develop and implement ICTs integration in educational institutions. Formal policy dialogue sessions further the accessibility of these research results and ensure that the project’s future work takes into account current needs and priorities expressed by the national education development community.

PanAf Phase 2 will include the continuation of fruitful dialogue between researchers and education stakeholders, particularly policy decision-makers, at the national and regional scale. National teams have the responsibility to synthesize and communicate their research results for a policy decision-making audience. With the goal of supporting evidence-based ICTs, Education, and ICT4Ed policies at the national scale, PanAf national research teams must both create a space for dialogue on a new and oft-overlooked subject, as well as develop clear recommendations for curriculum reform, teacher-training, school management, and other topics aligned with the major themes of the project. The more specific the researchers’ recommendations, the more clearly they are communicated, and the more appropriate the individuals identified to participate in the dialogue, the more effective the potential outcomes.

Existing regional integration organizations across the continent offer spaces and opportunities for policy dialogue in the framework of sectoral programs such as education, a chief priority. These would be suitable venues for establishing collaborative relations with organizations such as the Union Économique et Monétaire Ouest Africaine (UEMOA), the Communauté Économique des États de l’Afrique de l’Ouest (CEDEAO) in West Africa, the Communauté monétaire et économique d’Afrique centrale (CEMAC) in Central Africa, the Union du Maghreb arabe (UMA) / Arab Maghreb Union (AMU) in Northern Africa, the Southern African Development Community (SADC) and the Common Market for Eastern and Southern Africa (COMESA) in East and Southern Africa, and the Union africaine (UA) / African Union (AU). Continent-wide and internationally, the Association pour le développement de l’éducation en Afrique (ADEA), the Commonwealth of Learning and UNESCO offer frameworks for dialogue with decision-makers. ROCARE has acquired extensive experience in this field of political negotiation, which could be leveraged to further develop relationships.
11.7 Practical guides

Building on the Phase 1 publication Successes and Challenges of ICTs in teaching and learning: 100 African schools, and in addition to initiatives aimed at scientific publication and policy dialogue, PanAf Phase 2 will produce practical guides for education researchers and practitioners. Based in analysis of the Observatory data, these guides (or “handbooks”) could take the form of wikis - for example: http://ltc.umanitoba.ca/wikis/etl/index.php/Handbook_of_Emerging_Technologies_for_Learning or educational YouTube-style videos to communicate research results to a broader audience.

The subjects of these practical publications would be ICTs integration competencies for educators and school managers, and ICT4Ed research competencies for researchers – for example:

- Handbook for Research on the Pedagogical Integration of ICTs in Africa: 50 strategies for educators,
- Road Map for a Successful Integration of ICTs in African Schools,
- Principles and Guidelines for Successful Pedagogical Integration of ICT in African Schools.
In recent years, Africa has seen a growing number of initiatives to improve ICTs access in schools. Aside from the IDRC, several other national, regional and international public and private organizations have set up programs and projects to expand ICTs uses for teaching and learning purposes. In addition, there is Schoolnet, the Nepad eSchools, WorldLinks and infoDev, under the World Bank, The African Virtual University, etc. Some of these players, such as the Nepad eSchools and infoDev, have undertaken ambitious data collections to gain deeper knowledge of the sector.

Other organizations, such as UNESCO’s International Institute for Capacity Building in Africa (IICBA) and the RESATICE online resource network, specialize in research on ICTs in education, which would be very useful for the PanAfrican Research Agenda.

All these organizations are potential partners for this project. Contacts have already been initiated, and some have expressed a willingness to collaborate by providing information to the Observatory. The forms of partnership could vary across institutions according to their area of expertise. Useful complementarities could be identified, and the Observatory could offer a common platform for improved data collection and analysis on the state of ICTs in education, an area in which Africa is severely lacking.

Therefore, once the project is launched, a meeting with the potential partnerswould be held to discuss these complementarities and establish a strategic partnership framework for Observatory activities. Concrete memoranda of understanding would be negotiated and signed with ROCARE and the partner organizations. In support of project objectives, PanAf Phase 2 will continue to establish strategic partnerships with complimentary institutions and projects working in ICT4ED in Africa - in line with IDRC’s belief that communication and partnerships is key, between organizations and between networks.

In Phase 1, the Observatory partnered with the World Bank’s infoDev programme to communicate their national ICT in education report for each African country. This summary of the state education system and ICT4Ed challenges and initiatives in each country balanced the institutional scale data that is the focus of the PanAf project, and provided an alternate channel of communication for infoDev’s research results.
In Phase 2, the Observatory plans to expand this adaptive style of collaboration with international organizations. Three potential initiatives are already underway:

- Partnership with UNECA’s National Information and Communication Strategies (NICI) programme to communicate up-to-date African ICTs policy information via the Observatory.
- Partnership with UNESCO’s Institute for Capacity Building in Africa (IICBA) to create an Observatory profile for the largest public teacher-training institution in each African country.
- Partnership with UNESCO’s Institute of Statistics to communicate results from the pilot phase of their recently developed national ICTs in education indicators.

- Partnership with other international, bilateral and local education development organizations and programmes, including perhaps SchoolNet, AVU, AAU, NEPAD eSchools, AUF, GeSCI, and APC etc.
13. PHASE 2 – SPECIFIC OUTCOME 3 – ADDITIONAL RESEARCH

As noted above, while the focus of PanAf Phase 2 will be analysis, dissemination and application of results from ongoing data collection, the Observatory will remain central to the project. Quality control, updating and adding additional data are an important part of ensuring the relevance and sustainability of IDRC’s investment. Therefore, Phase 2 outcomes will include focused strategies to share new knowledge, from:

13.1 Additional countries

Add a North African national research team (initial links are underway with a Tunisian institution). As well, described in the Partnerships section above, a collaboration with the UNESCO Institute of Statistics will grant access to indicators from 25 pilot countries from around the world – this opportunity for comparative studies at a global scale will be invaluable to researchers in their efforts to contextualize the pedagogical integration of ICTs in Africa. Remaining open to other partnership opportunities, Phase 2 will welcome the addition of national teams who wish to contribute data to the Observatory and have secured independent funding to do so – for example, the PEDAGO-TIC project propose by the Fondation Paul Gérin-Lajoie in Burkina Faso and Bénin, financed by the Fonds francophone des inforoutes.

13.2 Additional institutions

Focus on two leading schools per participating country, with the goal of capturing best-practices in the pedagogical integration of ICTs. Also, as described in the Partnerships section above, through a collaboration with the UNESCO International Institute for Capacity Building in Africa, Phase 2 will collect a full set of Observatory indicators from the largest public teacher training institution in each African countries – an unprecedented response to the question “How are African teachers trained in ICTs?”.

13.3 Additional indicators

Target best practices in the pedagogical integration of ICTs. PanAf Phase 2 researchers will collect (using new methods including video), analyze and share data for a selection of additional indicators, including those reserved for Phase 2 from the original set (specifically transnational indexes and rankings that are of particular interest to policy decision-makers) and a selection of others developed through the course of Phase 1 to prioritize the project’s focus on pedagogical
integration and to address issues of the broadening definition of “technologies” beyond computers in classrooms. The following lists potential new indicators to be pursued in all PanAf Phase 2 participating institutions…

Specifically addressing pedagogical integration (inquiry regarding pedagogical integration – “teaching and learning with/through computers”, rather than “teaching and learning about computers”):

- Institution ICTs-connectivity and ICTs-enablement indices;
- Pioneering initiatives in ICTs for teaching and learning;
- Perception of parents (or community-members) of the relationship between the first language(s) of the learners and ICTs for learning;
- Perceptions of female and male educators and learners of the quality of teaching and learning with ICTs;
- Perception by educators of constraints to the use of ICTs for learning by female and male learners;
- Perception by female and male educators of the benefits of ICTs to the quality of their teaching;
- Types/examples of ICTs use for learning (disaggregated for female and male learners).
- Reflection by educators and learners on the relationship between ICTs and the quality of - spelling and vocabulary, exam preparation/results, reasoning skills, knowledge of other cultures, attitudes towards school/learning, self esteem.
- Reflection by graduates (associated with a specific participating institution) on the relationship between ICTs integration in their education as preparation for employment opportunities.

Specifically addressing a broader definition of ICTs (PanAf Phase 1 limited its definition of ICTs to computers in schools. Phase 2 will attempt to address various stages of pedagogical integration, including computers in classrooms, omnipresent computers, and eventually new mediums including mobile handsets):

- Reflection by educators and learners on various points of access to computers/Internet (cybercafé, home, mobile…);

“Young learners who today have access to high quality content delivered by well-trained educators, will tomorrow lead African socio-economic development.”


54 Pan African Research Agenda ...


