

## **ICTs, Secondary Education, and the Knowledge Economy: Exploring the Roles of the Private Sector in Post-Apartheid South Africa**

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*The emerging information-based economy requires an educated and skilled labor force. Unfortunately this caliber of human resource is insufficient in South Africa. This is in part due to the historical experience of the apartheid educational system, which stifled human capital development among generations of South Africans. Despite commendable efforts of the government to meet the increasing demand for education in the country, the gap in education, coupled with the need for trained and skilled work force, cannot be met only by the state through the traditional approach of educational delivery. Rather, the involvement of all stakeholders and approaches, especially the private sector and the employment of information and communication technologies (ICTs<sup>1</sup>) in curriculum delivery are essential. This study argues that the use of ICTs to improve secondary education in South Africa and sub-Saharan Africa in general should not wait until countries in the region reach a certain level of economic growth and budgetary stability. Rather, governments in the region should use the right economic and political incentives to encourage the involvement of the private sector in the advancement of secondary education through ICTs. Prominent among such incentives would be the full privatization of government-owned telecommunication enterprises in South Africa. Such innovative approaches involving the private sector, will expand pedagogical possibilities, promote socio-economic inclusion, and enable the country to meet the work force requirement for the knowledge economy.*

**Keywords:** *Private Sector, ICTs, Secondary Education, Global Knowledge Economy, South Africa*

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<sup>1</sup> Information and communication technologies (ICTs) consist of the hardware, software, networks, and media for the collection, storage, processing, transmission and presentation of information (voice, data text, images), as well as related services.

## INTRODUCTION

In recent history, education policy in South Africa has been marked by dramatic changes and challenges from within and outside the country. Such changes have necessitated shifts in policy paradigms, most of which specifically mirror the socio-political priorities of the government. This paper examines the interrelationship between the forces of a knowledge-based economy, education planning, human capital development and the involvement of the private sector in the provision and distribution of quality public education in post-apartheid South Africa. Recent economic growth in China and India demonstrates that increases in human, institutional and technological capabilities are the driving forces behind knowledge and innovation. These in turn, fuel economic growth (Kozma, 2006). However, these inter-sectoral connections point to one factor: an improved educational system that caters for human development goals and the needs of the present knowledge-based economy.

The 1994 emergence of a democratic government in South Africa coincided with the end of the cold war and its numerous ramifications. Post-apartheid education policy under the African National Congress (ANC) faced the challenge of responding to these multiple and sometimes contradictory demands from within and outside South Africa. First, there was the need to balance widening income inequalities and racially integrate South African society. Second, there was the need to train the workforce required to compete effectively in the emerging global economy.

This paper focuses on the imperatives of creating a quality and inclusive public education system in the face of global economic transformation. An equitable and innovative education system in South Africa contributes towards the objectives of the United Nations Educational, Scientific and Cultural Organization's (UNESCO) Education for All (EFA). In turn, EFA goals contribute to the realization of the United Nation's Millennium Development Goals (MDGs) (Perraton and Creed, 2000). Thus, while these multiples goals may overlap, they are collectively designed to narrow socio-economic disparities and advance economic development.

The main concern of the paper is not on globalization *per se*, but on the condition of secondary education that will enhance the competitiveness of South Africa in the global knowledge-based economy. As the World Bank (2005, p.18) argues "Secondary education is a vital part of a virtuous circle of economic growth within the context of a global knowledge economy." The focus on the secondary education sub-sector is not meant to belittle the roles of primary and tertiary education sub-sectors in human capital accumulation and production growth. As a matter of fact, the development of human capital stock in any given country through education and vocational training should be a holistic process with a balanced focus on all the sub-sectors. However, the focus of this paper is on secondary education development due to the long-decades of neglect of secondary schooling, not only in South Africa but also in Africa in general (World Bank, 2005). Again, in addition to its considerable yield to private returns, secondary education equips youth with the essential skills and knowledge needed for social capital accumulation, economic growth and self-sufficiency. Above all, secondary education provides the vital foundation for further learning and training of professionals such as teachers, technicians, scientists, entrepreneurs and other elements of an enriched workforce (Bregman and Stallmeister, 2002). Adequate investment in this sub-sector promises direct economic gains in the emerging knowledge economy and other positive externalities in the South African society.

The study puts forward two interrelated arguments. First, it argues that to produce a productive labor force that supports economic growth in the knowledge-based economy, it is imperative to improve the quantity and quality of secondary education in South Africa. Second, such improvements in the provision of secondary education can neither be accomplished by the unilateral actions of the state, nor by the traditional system of education delivery. Rather, the private sector must be involved in secondary education provision, while information and communication technologies (ICTs) should be employed to expand access to and improve the quality of secondary education in South Africa. Transcending the challenges of access, quality, and inclusion in secondary education on the one hand, and the imperative of responding to the need of the changing economy in the knowledge-based era on the other, is no longer the exclusive responsibility of the government. Rather, this responsibility falls on all stake-holders, particularly the private sector. While the regulation, structuring and aggregation of learning materials is essential for the transition from a labor-intensive to a knowledge-intensive economy belongs to the government, the private sector shares a responsibility in the provision and distribution of the vital technological innovations (i.e., the use of current ICTs designed around education delivery and pedagogical models) and wherewithal needed to accomplish the task. This study focuses on two key aspects of education: public schooling (primary and secondary) and vocational training. These are basic elements of human capital development.

## RESEARCH METHODOLOGY

This study applies qualitative methodology and uses a theory-driven multiple case-study approach. Given the nature of qualitative studies as well as the nature of ICT in education partnerships, multiple qualitative data collection strategies were employed. These included: semi-structure interviews and participant observation. In addition, reviews of extant literature provide a rich source of information. Thus, qualitative studies involve multiple data collection strategies for purposes of deriving rich descriptions within as natural a setting as possible (Merriam, 1998). Further, the emergent nature of qualitative research necessitates a flexible approach as opposed to a predetermined research design (Patton, 1990). As Patton (1990) puts it, in qualitative research, the research design unfolds alongside with the fieldwork. Interviewing, observing, and reviewing documents provided multiple methods to validate and cross-check the findings of the study. Collection of research data was focused primarily on developing thick and rich narrative of how private sector entities collaborate in the deployment of ICTs to expand access to and improve secondary education standards in South Africa.

## HUMAN CAPITAL GAP IN POST-APARTHEID SOUTH AFRICA

In 1994, the ANC-led national government in South Africa inherited racially segregated and centralized patterns of education. The apartheid system of education failed to lay the foundation for the development of vital human capital required for sustained social and macroeconomic development in the country through inclusive education and training. The paucity of human capital in the South African economy results in lower productivity among the major groups in the country (i.e. African and Indian populations). Furthermore, apartheid policies that denied these groups

education rendered them unprepared for employment in sectors that pay good quality wages. In broader terms, insufficient human resources in South Africa place the country in a disadvantageous position to innovate and adapt in the changing global economy. Given that income growth in any economy depends on the productivity growth of its workers (i.e. the real output per worker), it is implied that investment in human capital or resource development defines the limits of income (Barro, 2002; Becker, 1975; 2002). As Goldin (2003, p.73) observes, “The 20th century became the human-capital century. No nation today — no matter how poor — can afford not to educate its youth at the secondary school level and beyond.”

The theory of human capital is based on the belief that individuals and the society at large derive economic gains by investing in people. It is argued that such investments, aimed at exploiting the utmost potential of people, should target areas such as education, health and nutritional improvement (Schultz, 1963). Human capital formation is based on the view that people have skills, experience and knowledge, which are forms of capital – human capital (Flamholtz and Lacey, 1981). Logically, investments are made to develop human capital and returns are expected in forms of higher earnings for individuals and general economic growth in the larger society. Investment in education and skill formation, just like investments in other factors of production, are considered to be significant factors in economic growth (Sweetland, 1996; Wößmann, 2000). Educational and vocational training increases the stock of human capital first, in the form of individual Intelligence Quotient (IQ) and eventually individual earnings. In using this theoretical framework, the emphasis is on education rather than any other aspect of human capital such as health and nutrition. Based on this understanding, secondary (including vocational schools or centers) and college education should attract more investment because additional knowledge and information acquired in school amounts to higher productivity. Empirical studies show that an average year of attending secondary and higher levels of education, particularly for males aged 25 and above has a positive correlation on economic growth (Barrow, 2002). With growth in per capita income resulting from schooling, economic growth will be achieved in any given country. This will result from the expansion of scientific and technological knowledge, which in effect raises productivity of labor and other production inputs.

Therefore, the preparedness of each country to compete effectively in the global economy can be measured by the stock of its human capital represented by the level of educational attainment and training (Goldin, 2003). The apartheid education system, which denied the majority of South Africans access to quality education, unwittingly failed to build the necessary human capital for the future development of the South African economy. This history has had a negative affect on per capita income distribution and the employability of the majority of people in the country. It has also proven to be an obstacle to economic competitiveness, productivity, innovation and technological adaptation, only a modest proportion of the South African workforce can meaningfully be absorbed in the technology-driven economy of today. This relationship between dimensions of education and competitiveness of an economy is well illustrated by many scholars (Alvarez, *et al*, 2003; Sahlberg, 2005) (see Table 1).

By implication, a low stock of human capital makes it difficult for the country to secure the benefits of the global economy. Ironically, while improved human capital in forms of a well educated and skilled workforce can translate to productivity growth, *ceteris paribus*, the scarcity of a skilled workforce has resulted in the displacement of unskilled labor thereby causing the rate of

unemployment in South Africa to skyrocket. Streak and Westhuizen (2004) estimate that the unemployment rate in South Africa in March 2004 was at 41.2 percent if broadly defined, and 27.8 percent if one applies a strict definition of unemployment<sup>2</sup>. The domination of South Africa's workforce by unskilled and illiterate populations will continue to weaken productivity growth, especially, in an ICT-driven global economy, if appropriate education and training policies are not introduced to elevate the quality of their lives. Lag in economic productivity, especially in the face of global competition, illustrates the visible impacts of globalization in South Africa.

But how does globalization affect South Africa? The answer is certainly not definitive. What is clear, rather, is that the country can hardly derive optimum gains from globalization with the present stock of its work force. Given that globalization requires human resources that are knowledge-based, short supply of such resource places South Africa in a precarious position in the emerging global economic order.

Table 1: Dimensions of education reform that focus on the determinants of economic competitiveness

Determinants of economic competitiveness and their implications to education			
Determinant of economic competitiveness Dimension of education reform	Human capital (education and training)	Use of information and communication technologies	Innovations and technological adaptation
<b>Restructuring and adjustment</b>	<ul style="list-style-type: none"> <li>- Enrolment ratios and participation rates</li> <li>- Access and mobility</li> <li>- Length of schooling</li> </ul>	<ul style="list-style-type: none"> <li>- Student/computer ratio</li> <li>- ICT in curriculum</li> <li>- Flexibility and choice</li> </ul>	<ul style="list-style-type: none"> <li>- School-business partnerships</li> <li>- Investments in tertiary education</li> </ul>
<b>Quality</b>	<ul style="list-style-type: none"> <li>- Academic knowledge/skills               <ul style="list-style-type: none"> <li>- literacy</li> <li>- mathematics</li> <li>- science</li> <li>- meta-cognitive and interpersonal skills</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Teacher readiness to use ICT in teaching</li> <li>- Schools' ICT infrastructure</li> <li>- Assessment policies</li> </ul>	<ul style="list-style-type: none"> <li>- Use of various teaching methods</li> <li>- Focus on both individual and team learning</li> <li>- Creativity and risk-taking</li> </ul>
<b>Financing, infrastructure and management</b>	<ul style="list-style-type: none"> <li>- Education spending</li> <li>- Lifelong learning</li> <li>- Decentralization</li> </ul>	<ul style="list-style-type: none"> <li>- Information management system</li> <li>- Investing in infrastructure and networking</li> </ul>	<ul style="list-style-type: none"> <li>- Increasing higher education expenditures</li> <li>- Increasing financing of research and development</li> </ul>

Source: Sahlberg, 2005.

With 64 percent of the economy driven primarily by the tertiary sector (made up of manufacturing export-led activities) (Berg & Louw, 2004), South Africa is one of the few middle-income countries in Sub-Saharan Africa. The economic transition in South Africa is partly guided by the macroeconomic strategy enshrined in the Growth, Employment and Redistribution (GEAR) policy. As a framework for diversifying the economy, the GEAR strategy aims to end South Africa's mineral dependency, and encourage the growth of non-gold export revenue (Bhorat, *et al*, 2002). The implication of this change in the composition of the country's economy is a shift towards a liberalized knowledge economy. This implies an increase in demand for more skilled manpower

<sup>2</sup> Expanded definition of unemployment includes people who have given up looking for work (Streak & Westhuizen, 2004).

especially in technology and manufacturing sectors (Tsikata, 1999, cited in Berg & Louw, 2004). In general terms, the demand for unskilled labor is declining while the demand for skilled labor is increasing following the rise in the share of the country’s exports that employ more skilled labor and technology (Berg & Louw, 2004).

As mentioned above, South Africa does not have the required labor force to meet the demands of its emerging macroeconomic structure. This gap in labor force is attributable to a gap in human capital development created by the apartheid education system of the past. This is also the cause of a mismatch in the labor market in the country. South Africa is simultaneously experiencing a rising rate of unemployment among young unskilled workers and a shortage of skilled and semi-skilled manpower in many sectors of the economy (Bhorat *et al*, 2002; Bhorat, 2004). This means that the education system in the country is not in sync with demands of the global marketplace and contemporary capitalism “where services are the economic engine and [modern] ICT is perceived to be critical for productivity growth” (D’Costa, 2006. p.3). As D’Costa (2006) argues, the increasing tradability of services creates new sources of export revenue for developing countries with a skilled and educated workforce such as India, China and the Philippines. South Africa and much of sub-Saharan Africa have yet to take advantage of the global economy where service has become a major revenue earner. This is among the major consequences of legislated educational denial for majority of South African people, or as in many cases, legislated under-education of the majority that characterized the apartheid system of education. At best, the system produced graduates without the requisite knowledge, skills and attitudes to find meaningful employment and participate fully as responsible citizens.

A 2002 survey conducted by Berg and Louw (2004) indicate that 42.9 percent of the 25-year-old age group completed secondary education, as opposed to only 13.6 percent of the 65-year-old age group which are largely those exiting the labor market. This study shows that progress has been made in terms of the secondary education completion rate in recent decades, as the percentage of 45 year olds completing secondary education has slightly increased to 21.2 percent (*ibid*). Table 2 shows the changing profile of educational system and labor force in South Africa. This has equally had a positive effect with respect to the proportion of the prime labor force (20-64 years) with secondary education qualification. Despite this progress in quantity of education, concerns about quality, relevance and effectiveness of secondary education outcomes in the country loom large.

**Table 2: Educational attainment of South Africa: 1995-2002, Individuals aged 26 years and over**

Education level	1995	2002
No schooling	15.78%	12.64%
Incomplete primary education	19.11%	18.65%
Complete Primary education	7.30%	7.79%
Incomplete secondary education	32.32%	31.96%
Complete Secondary education	15.97%	18.51%
Tertiary education	9.52%	10.45%
	100.00%	100.00%

Source: Berg & Louw, 2004

Considering the relationship between productivity gains and the availability of human capital, the lack of required education and skills could only heighten the level of unemployment and reduce worker productivity in South Africa. The World Bank and the Greater Johannesburg Metropolitan

Council cite the shortage of required skills in the country as a serious obstacle to economic growth in South Africa (Mallet, 2003). Though the influence of globalization transcends the defined jurisdiction of the state, it is the responsibility of the state through policy processes, to mediate the local impacts of globalization. One of the expected responses of the state is to transform and update the education system to meet the challenges of the global knowledge economy.

### THE CHALLENGES OF SECONDARY EDUCATION IN SOUTH AFRICA

The emergence of democratic governance has brought along many changes the South African secondary school system, and with that several challenges. Among these challenges include an acute shortage of skilled teachers needed to meet the increasing demand for secondary education. On the supply side, South Africa trains 6,000 teachers each year, most of whom will not go into teaching (Crouch and Perry, 2003), to meet the demand of 12.1 million learners (primary and secondary school-age combined) in 28,000 schools (Fiske and Ladd, 2002; South Africa Information, 2005; Peltzer, *et al*, 2005). Many teachers in South Africa, especially those teaching mathematics and sciences, are unqualified. While few teaching aids are provided, textbook provision in many provinces is abysmal. It is not uncommon to have one or two math and science teachers in a high school with a student population of 900. While South Africa has an excellent record in primary and secondary school enrollment, compared to other countries in the region, the high rate of secondary school dropouts (Crouch, 2005) discount gains made at the enrollment stage. Apart from the high rate of attrition in the teaching profession, the HIV/AIDS pandemic in the country has compounded the challenges of teacher shortage (Crouch, 2001; Peltzer *et.al*, 2005). In a report titled, *Educator supply and demand in South African Public education system*, Peltzer, *et al*, (2005) reveal that 12.7 percent of all educators in South Africa are HIV positive. (See the breakdown according the nine provinces in South Africa in Table 3).

**Table 3: Overall HIV prevalence among educators by province, South Africa 2004**

Province	Number	HIV positive (%)	95% conf. Interval
Western Cape	2 134	1.1	0.6–2.0
Eastern Cape	1 855	13.8	12.0–15.8
Northern Cape	891	4.3	2.9–6.5
Free State	1 152	12.4	10.1–15.0
KwaZulu-Natal	3 627	21.8	19.8–23.9
North West	1 437	10.4	8.7–12.4
Guateng	2 772	6.4	5.4–7.7
Mpumalanga	1 315	19.1	16.2–22.3
Limpopo	1 905	8.6	7.3–10.1

Source: Peltzer et al, 2005.

The HIV/AIDS pandemic takes a huge toll on the teaching workforce and the South African education system in general. Expanding education provision requires thousands of new teachers and the training of thousands more who are unqualified or under-qualified, but already working in South African schools. The challenge of placing thousands of qualified new teachers in classrooms across the country to meet the astronomical rise in demand for secondary education cannot be accomplished in a two to three year period. The present rate of growth in secondary education associated with the traditional approaches to curriculum delivery is inadequate to meet the rising demand for secondary

education in South Africa. At the present rate, it is estimated that it will take South Africa and most countries in SSA over 50 years to achieve secondary education standards similar to those of industrialized countries (Alvarez, 2003). There is growing evidence that ICTs may be the only feasible and economically sound means of expanding access to and improving the quality of secondary education in South Africa in the short run (Isaacs, 2002). The deployment of ICTs in secondary schools, which includes teacher training in the use of ICTs, will enable South Africa to use limited resources including teachers, to accomplish the goals of improved secondary education and human resource development.

## THE GLOBAL KNOWLEDGE ECONOMY

What is globalization and what ramifications does it have in the South African economy? Stromquist (2002, p.1) describes globalization as “a multi-domain, multi-level phenomenon.” The multifaceted nature of globalization has attracted multidisciplinary responses and analyses with respect to its meaning, its driving forces and impacts. Globalization is not a new concept in the relationships of nations. However, there are relatively new dynamics and pace in present globalization processes. Different societies in different parts of the world have always interacted with one another. In the past, such interactions were expressed through concepts such as ‘internationalism,’ ‘transnationalism’ or ‘multilateralism’ (Mol, 2000). The commercial mercantile expansion of Spain and Portugal in the fifteenth century, which eventually opened up the New World, was a historical epoch of globalization. In the same vein, the end of nineteenth century witnessed a profound era of globalization with apparent political manifestations such as imperialism and colonialism in most of what is now designated Developing Countries.

Thus, economic ‘globalization’ refers to the increased pace of economic integration, interaction and interdependence around the world, especially through trade and financial flows. The dynamics of such human contacts include but are not limited to the flow of people (labor) and knowledge (technology) across borders (International Monetary Fund Staff, 2003). Globalization is an agent of the market and the market promotes efficiency through competition and specialization. These are neo-liberal economic forces which have given rise to deregulation and privatization (D’Costa, 2006). Globalization empowers people across the world to tap into markets beyond national borders. In his book *The World is Flat* (2005), Thomas Friedman used the metaphor of a Flat World to identify three historical phases of globalization. According to Friedman, the world is presently in the era of Globalization III. It is an era when individuals have experienced unprecedented empowerment through easy access to information. With such enormous information resources at their disposal, coupled with fewer barriers in cross-border movements, individuals have taken control of global marketplace, thanks to the liberalization of the global “knowledgeplace.” In today’s world, it is obvious that any country that tries to preserve its own system, jobs, culture or traditions by keeping the rest of the world out does so at its own peril. As Friedman admits, the world has been “flattened” by technological forces, especially information and communication technologies (ICTs). Despite its risks especially in developing countries, globalization creates a globalized economy in which, “distinct national economies are subsumed and rearticulated” (Hirst and Peters 1996: 8 and 10, cited in Smith, 2002) within a more integrated system through international trade and financial processes.

Despite the divergent views and emphasis, it is clear that the fundamental pillars of globalization are economic-based. But as mentioned above, this is beyond the influence of national economies as a unit. Rather, the globalized economy reckons with the divergent and multi-lateral influences of international financial institutions, non-governmental entities and regional trade regimes. According to many scholars (Bende-Nabende, 2002; Sahlberg, 2004; Kozma, 2005a), the two principles of a globalized economy are: 1) market liberalization for the expansion of production and consumption in an increased *laissez faire* environment; and 2) the increased application of ICTs in production, communication and service delivery around the world. These are social and economic trends that reinforce each other in the evolving nature of globalization. It is expected that with a reduction in state intervention, the “invisible hands” of supply and demand will encourage more competition and efficient allocation of economic resources and technological advances will enable the production of high-quality products and services to be more cost-effective. The equilibrium that the “invisible hands” produce is the common denominator driving the globalized economy. The fairness of this common denominator to low- and middle income countries like South Africa has been a subject of debate, but it is not the focus of this study. However, one thing is certain; these countries have come to accept, and must adjust to the implied socio-economic imperatives of the system.

The present notion of globalization is characterized by the integration of national economies into a global economy, through free trade and financial flows, technology and information exchanges, and movement of people hastened by sophisticated and rapid communication and transportation technology (Daly, 1999; Henriot, 1998; Karlinar, 1997). The effect is the continuous interdependence of the world economy and the intensification of global economic uniformity with the help of advanced communication technology. The uniformity that is being forged is expected to create and enhance global networks of production and reduce trade barriers. Globalization is therefore a complex process that impacts countries in various ways. The most visible aspect of globalization is the economy, but it has a synergistic relationship with education development issues in various countries.

### EDUCATION IN THE KNOWLEDGE ECONOMY

The emerging global economy is based much more on the flow of ideas than on basic industrial infrastructure and capital. In today’s economy, ideas and information are as valuable as tangible goods (Castells, 1998). This trend is known as the knowledge-based economy (KBE) or “knowledge society.” The U.K white paper titled, *Our competitive future: building the knowledge driven economy*, (cited in Peters, 2001, p. 7) defined knowledge economy as:

one in which the generation and the exploitation of knowledge has come to play the predominant part in the creation of wealth. It is not simply about pushing back the frontiers of knowledge; it is also about the more effective use and exploitation of all types of knowledge in all manner of activity.

The basic elements of the knowledge economy are: ICT; intellectual property (such as patent and brand names); technical information (such as nanotechnology and biotechnology); and stored data (Castells, 1998; Miller, 2005; Kozma, 2005a). While both knowledge and industrial economies drive economic growth, these two types of economies have apparent differences. First, knowledge products are inexhaustible and their use is not limited by spatial boundaries or geographical distance

(Miller, 2005). Second, knowledge products can easily be produced in mass and wider distribution is enhanced by electronic means. The knowledge-based economies are conventionally measured by the composition of workforce. It is characterized by explosion of data and codified knowledge, driven by a revolution in information and communication technologies.

The nature of a knowledge economy demands that education and training assume different dimensions. The implication is that acquisition of knowledge and skills in the global economy necessitates drastic education reforms in South Africa and sub-Saharan Africa at large. With a particular focus on secondary education, countries in SSA have pursued education policies that encouraged what Robert Kozma (2005a) referred to as a 'knowledge acquisition' agenda. This passive learning model in secondary schools in South Africa does not develop the type of skills and competencies required for the knowledge economy. This is an approach that places enormous emphasis on the quantity of education as opposed to the quality. The goal of the approach is to boost enrollment, decrease dropout rates and increase the amount of knowledge acquired in reading and math. This is finally harmonized through standardized tests where high scores are equated with more knowledge (Gillies, 2003; Kozma, 2005a). The result of this approach has been massive production of secondary school graduates with enormous 'book knowledge' and little or no practical knowledge essential for real world situations that students face after graduation. This approach to education does not only deny students the skills required to survive and compete effectively, but also detaches them from the realities of the emerging global economy.

As the World Bank (2005) and the UK Department for International Development (DFID) (2000) white paper observes, education and skills are the commanding heights of the modern global economy. The White Paper went further to assert that "Globalization - and the growth of knowledge-based systems of production - are both increasing the rewards for education and raising the costs of exclusion from it" (DFID, 2000. p.36). On the other hand, the World Bank (2005) warned that developing countries without a minimum threshold level of education and skills, will not benefit from the increase in factor productivity made possible by technological innovations in forms of foreign direct investment, and learning across international supplier-producer chains. Considering its economic impacts, globalization requires a reconsideration of how knowledge is produced and transmitted at the local and national levels. Stromquist (2002. pp.15-16) posits that globalization "takes education system out of the state monopoly into the marketplace."

The provision of an improved secondary education system is one of the major means through which South Africa can prepare its citizens to benefit equitably from economic growth generated by global economic changes. Researchers (Dessus, 1999; Kozma, 2005a) assert that quality education has both social and economic values in society. This idea is reinforced by Hanushek and Kim (1995) who demonstrate that the significance of labor force quality is an explanatory variable of differences in international per capita growth rate. It is such differences in educational quality between and among countries that determines the capacity of each country to produce one marginal unit of human capital (Dessus, 1999).

A careful deployment of old and new ICTs can go a long way in bridging both the quantitative (access) and qualitative (standard) gaps in secondary education in a developing country like South Africa. Generally, in the age of globalization, education in South Africa faces additional challenges. Such challenges include: backlog of uneducated population; limited financial resources; rising rate

of unemployment; growing amount of new knowledge; and limited infrastructural resources. It must be emphasized that the rollout of computer laboratory and internet connectivity in schools does not necessarily guarantee positive outcomes in students' learning. However, many studies, both in OECD (Organization of Cooperation and Economic Development) and developing countries show that many educators and learners exploit the full potential of ICTs for better learning outcomes. Kozma (2005b) reports that learners use networking and computers for visualizations and multimedia, simulations, computer-based science laboratories and experimentation.

Technologies can be used to improve learning and instruction in schools. Different forms of technology such as computers or CD-ROMs can be used to store, process and retrieve lessons and curriculum resources on demand. Educators have found ICTs to be a crucial tool for supporting drill or practice in previously taught skills or concepts in class, and assistive for pupils with special needs (Condie et al, 2007). In a recent study titled *The impact of ICT in schools: a landscape review*, Condie *et al* (2007) gave a detailed analysis of the benefits of the use of ICTs in primary and secondary education. With the support of empirical data, the study presents many positive outcomes of ICT-enhanced education among which are; the motivation and engagement of learners; independent learning and autonomy of pupils; as well as the development of core skills such as collaborative learning and communication among learners. These are visible effects of deploying technologies in education which can contribute to better education outcomes. Specifically, ICTs are found to have improved students' attainment in different subject areas. Such improvement has been observed in core subjects such as English language, mathematics and science (Condie *et al*, 2007). As Haddad (1998, p. 25) explains, these technologies make it possible for teachers and learners to master educational materials by "endlessly going over the same material in a variety of forms and media, layering in additional information and nuances of understanding while re-enforcing the learning objectives." Furthermore, technologies enable more interaction and collaboration among teachers and students who may be separated in both time and space.

ICT environments provide borderless global access to information for educators and learners. Internet connectivity makes it possible for educational resources, such as lesson plans, books articles and other resources, to be exchanged with relative ease. In addition to using ICTs as a learning tool, ICT are also designed and used to develop specific skills such as word-processing, drawing and design. Computer technologies enable learners to acquire problem-solving "21st Century skills" and competencies that go beyond traditional school knowledge (Kozma, 2005b). Such skills situate learners in a better position in today's knowledge economy the moment they graduate from secondary school. These innovative practices, engendered by new ICTs, help to improve educational quality.

In an effort to ensure equity, ICTs are resourcefully used to make education accessible to more learners. According to the South African Institute of Distance Education (SAIDE, 2000), one rationale behind technology-enhanced education is to expand educational provision to significantly larger numbers of learners particularly those in rural and under-resourced communities. The deployment of old ICTs such as radio and television, and the new technologies such as computer, internet connectivity and satellite imaging can expand the options for engaging in teaching and learning at individual community and societal levels (UNESCO, 1999; Butcher, 2001). This is particularly helpful for those who have not been able to obtain education due to inadequate schools and the lack of qualified teachers, or due to barriers such as time schedule for classes, age

limitations, educational fees, or language of instruction. Butcher (2001) adds that, due to dwindling education budgets, the use of ICTs in distance education programs are designed to achieve economies of scale by amortizing identified costs over time and large student numbers. This system of technology application in education has contributed to education development in some low and middle-income countries such as Mexico, Brazil and the Dominican Republic. A good example is the *Telescundaria* project in Mexico, which was established in 1965 to deliver formal secondary education curriculum through television channels via satellite to over 12, 700 rural communities (Calderoni, 1998; Estrada, 2003). This project was prompted by lack of secondary school teachers willing to teach in rural parts of the country.

Creating a competitive workforce has two major advantages that place a country in a strategic position in the global economy. First, it raises the aggregate productivity of the economy. Second and in more general terms, there is a positive correlation between secondary education enrollment and the level of Gross Domestic Product (GDP) in developing countries (Fuller and Holsinger, 1993 cited in Figueredo and Anzalone, 2003). As Alvarez *et al* (2003) and te Velde (2005) point out, quality education attracts manufacturing and foreign direct investment (FDI) into the country and promotes trade with other countries. FDI is an important source of private capital for developing countries. As stated in the outcome of the UN conference on Finance for Development (FfD) “private international capital flows, particularly foreign direct investment, along with international financial stability, are vital complements to national and international development efforts” (Outcome: point 20, p. 5, cited in DfID, 2000). Therefore, it is imperative for policymakers to lay an appropriate education and training foundation in South Africa that can establish a sustainable link between local economic resources, including its trade structure (outputs) with the demands of the global economy. This raises the question: what secondary education system will equip South Africans with the skills to succeed in the 21<sup>st</sup> century global economy?

The required skills for the knowledge economy have direct implications for secondary education and pedagogy in South Africa. Secondary schools in a knowledge society are expected to offer students not only concepts and established sets of knowledge, but also the opportunity to apply current knowledge in creating and sharing new knowledge. Among the competencies and foundation skills, which should be part of the secondary education system in South Africa, are the ability to use a range of technology tools, to use such tools to solve problems collectively, to retrieve and organize information, to communicate effectively in a variety of ways, to think critically, innovatively and creatively (Alvarez *et al*, 2003; Sahlberg, 2004; Kozma, 2005a). This type of educational system will encourage classroom activities and projects that will engage students in open-ended, real world problems. Besides, these generic skills are appropriate for all secondary students who work in the global economy, whether they enter the labor market right after secondary school or continue on with professional training, or higher education. Adapting the secondary education system in South Africa to meet the new requirements of the new global economy is a responsibility that falls not only on the state, but also on private and civil society actors in the country.

## PRIVATE SECTOR POTENTIAL AND ICT-ENHANCED EDUCATION IN SOUTH AFRICA

In an effort to bridge the gap in educational attainment created during the apartheid era, the educational system in post-apartheid South Africa has not only undergone a drastic restructuring, but

also employed cost-effective technologies to improve educational quality and expand access. As the World Bank (2005, p.22) observes, “secondary education is now being recognized as the cornerstone of educational systems in the 21st century and quality secondary education is indispensable in creating a bright future for individuals and nations.” The major variables that influence secondary schooling in South Africa in a globalized economy are: the structure of the economy; patterns of employment; and the nature and composition of the required workforce (Gillies, 2003). Other things being equal, effective and competitive participation in the globalized economy require a critical mass of workers with quality secondary education. This will provide sufficient foundation for higher training (in universities and Technikons), and also create the right environment to attract foreign direct investment. Many studies (Alvarez, *et al*, 2003; Bregman and Bryner, 2003; Figueredo and Anzalone, 2003; World Bank, 2005) have also documented the various social benefits which secondary schooling can offer. These include improvements in health, social inclusion, gender equality, civic participation and boosts to primary and tertiary education.

Generally, there is a growing recognition of the need for a multi-sectoral approach to educational development. Known as public-private partnership (PPP) in many circles, this approach on a more philosophical level is a pragmatic solution to the increasing budget constraints facing public education today, especially in developing countries. Many scholars (Melaville and Blank (1991; Taylor-Powell *et al* 1998) contend that the basic premise of a collaborative partnership is the acknowledgment that working together is likely to produce better outcomes than acting alone when confronted by an issue or problem whose solution goes beyond the scope of any one agency or discipline. Thus, partnerships are attempts to respond to a growing consensus that governments can no longer work in isolation to solve problems that fall within the public sphere. The imperative of private sector involvement in public education has been a fundamental assumption of education policymaking in industrialized countries. In contrast, countries in Sub-Saharan Africa have not taken advantage of the private sector in improving public education. Fortunately, South Africa has a buoyant private sector and proactive civil society organizations that can effectively participate in a collaborative partnership with the state.

### COLLABORATIVE PARTNERSHIPS AND ICT IN SOUTH AFRICAN SECONDARY SCHOOLS

How can the private sector help present and future generations of South Africans to acquire skills and competencies that make them less vulnerable to the vagaries of a globalized knowledge economy? What inputs can the private sector make to enhance the quality and quantity of public education in South Africa? It is important to underscore the fact that, in an era of dwindling public resources, collaborative partnership between the state and the private sector offers a means to accomplish the above targets. Such collaboration is imperative in order to strengthen the capacity of the education system to better serve students and society. The structure of collaborative partnerships in education in South Africa can be based on formal or informal agreements (Pretorius, 2003; Gillies, 2003). The cooperation that can benefit secondary schools can take the form of work-experience placement, visits to companies, curriculum development projects, staff development and training, mini-enterprises and mentorship of learners (Pretorius, 2003). These approaches can generate enormous gains that can go a long way to promote civic and community well-being, and the improvement of secondary education.

It must be noted that collaborative partnerships or public-private partnerships in education raise questions about the nature of private interest in such ventures (Robertson, 2002). Private interests, as Robertson (*ibid*, p.15) argues, come in different forms, namely: profit making; shaping the behavior of society; and improving the public image of the firm as a corporate citizen in the community. These are issues that can be monitored through adequate state regulation and intervention to ensure accountability and quality service.

The focus of this study is on the contributions of the private sector in the integration of ICTs in secondary schools in South Africa. Much attention has been given to ICTs as crucial components of the secondary education reform process in the U.S.A, Europe and Asia. However, the potential influence of this process has gained little or no attention in African countries. ICTs can be used for curriculum development and delivery, and also for skill development and training among secondary school students. In addition to curriculum delivery, ICTs have proven to be a cost-effective way of professional development for teachers, particularly those in rural and isolated communities. Howie *et al* (2005) contend that the integration of ICTs in secondary education in South Africa can benefit students in two major ways: provision of computer skills for (workforce development), and making learners knowledge creators. In addition, the integration of ICT in secondary education is particularly important because it serves as a means of expanding access to quality secondary education in less privileged and remote communities in South Africa. Many of these communities are denied adequate education due to acute shortages of teachers and other educational resources in the country.

### ICT IN EDUCATION POLICY IN SOUTH AFRICA

South Africa is one of the few countries in sub-Saharan Africa with a national policy on ICT in education. This policy encourages the participation of the private sector. The government White Paper on e-Education sets out their response to a new information and communications technology environment in education. It also represents a new framework for the partnership of government and the private sector in the provision of ICT in education in South Africa (DoE, South Africa, 2003). Based on the framework set by the national departments of education and communication in South Africa, different interest groups have initiated educational technology projects aimed at improving quality and expanding access to secondary education curriculum and training. It is within the context of these policy frameworks that collaborative partnership groups such as the Mindset Network Organization, the Khanya Educational Technology Project, Intel's Teach to the Future Program and the South African SchoolNet program have evolved. The activities of two of these educational technology collaborations (*i.e.*, the Mindset Network Organization, the Khanya Educational Technology Project) are explained further below.

### **The Mindset Network Organization**

The Mindset Network Organization, a non-governmental organization (NGO) based in South Africa, is a major contributor to the development of secondary education with the use of technology. Mindset Network Organization makes use of studio broadcasting of secondary school curriculum to teach many students in different secondary schools across the country at the same time. Programs are transmitted from a broadcast quality studio in the Mindset Network head office, in Bramfontein, Johannesburg. In order to receive the programs, each participating school needed a digital satellite television (DsTv) decoder and a television set. The objective of the organization is to use ICTs to expand access to and improve the quality of secondary education in South Africa. The activities of the organization are funded primarily by local and international donors and corporate sponsors (Mindset Network Organization, 2004). The foundational members of Mindset Network Organization are Liberty Life, Standard Bank, Sunday Times, The Nelson Mandela Foundation, Telkom Foundation, Sentech, PanAmSat and MultiChoice Foundation (ibid).

### **Khanya Education Technology Project**

The Khanya Education Technology project was established in April, 2001 as an initiative of the Western Cape Education Department in South Africa. The purpose of the project is to use information, communication and audiovisual technology to improve teaching and learning, or curriculum delivery in schools in the Western Cape Province (Western Cape Education Department, 2004). The Khanya Project is a technology response to teacher shortages because it seeks to deliver high quality learning resources through the medium of ICT. The project is focused on well-managed secondary schools in poor communities with sound academic results, where the potential of new technology will expand educational reach and improve quality. Some organizational members of the Khanya collaborative partnership are donors, while others provide products and services to Khanya at discounted prices (Khanya Educational Technology project, 2004). The organizational partners to the Khanya project are: Anglo American Chairman's Fund, Cami Education, DG Murray Trust, Edit Microsystems, First Rand Foundation, Master-math, Mecor Computers, PetroSA, Picasso Headline Publishers, Potter Foundation, and Specialist Schools Trust (Khanya Educational Technology project, 2004).

ICT in secondary education partnerships involving the private sector are not ends, rather, they are means to an end. As specified earlier, the objectives of the two cases presented above are similar: to use ICTs to improve the standard of secondary education and expand secondary education to communities that are underserved or those that lack secondary schools. At this juncture it will be ideal to pose two related questions: to what extent are the Mindset Network Organization and the Khanya Education Technology Project good examples of the deployment of ICT to increase the quality and coverage of secondary education in South Africa? And second, to what degree are the two organizations good examples of how collaborative partnerships can use ICTs to contribute to the development of secondary education and human capital in South Africa?

These two cases share some similarities and differences. In terms of their similarities, both the Mindset Network Organization and the Khanya Educational Technology project are using ICTs to improve quality and equitably expand access to secondary education in South Africa. The prime

target of both organizations is poor and underserved communities within their areas of operation. The two cases also have a number of differences. First, Khanya is a provincial-based project, carrying the approval of the Western Cape Cabinet. Though it has some private sector partners, the program is an independent unit in the Western Cape Education Department (WCED). The partnership was also initiated by the WCED and later joined by organizations from the private sector. To this extent, Khanya projects are partly determined by the availability of provincial funding.

In contrast, the formation of the Mindset Network Organization was pioneered by the Liberty foundation, a private sector organization. Despite the involvement of the national departments of education and communications in terms of policy frameworks and guidelines, the Mindset Network is predominantly private sector-driven. Another major difference between the two cases is the choice of technology. While the Khanya project emphasizes the establishment of computer laboratories in schools, the Mindset Network Organization applies an integrated multimedia approach, especially the use of broadcast television, data-casting, video, and print supplements in the *Sunday Times*, the largest national weekly newspaper. As educational projects, both cases represent good examples of private sector involvement in human capital accumulation through the provision of secondary education. However, the involvement of private sector entities in these ventures is not without major challenges.

### CHALLENGES FACING ICT IN EDUCATION PARTNERSHIPS

Collaborative partnerships that use ICTs for secondary education improvements in South Africa are faced with a wide range of challenges. Among these is the apparent inflexibility in the national and state departments of education. Many private and corporate entities involved in the partnerships see the rigid procedures of government as a cause for delays in reaching agreements and in rolling out technologies to schools. National and provincial governments in South Africa should endeavor to create an enabling environment for private sector participation in mainstreaming ICT in secondary educational development. As McNamara (2005) argues, creating an enabling environment for private sector participation does not mean “getting government out of the way.” Rather, the role of governments in this context is to ensure appropriate regulations and ICT in education policy processes. This will encourage private partners to match public resources with investment resources from the private sector.

An additional challenge in ICT in education partnership in South Africa is the primacy of technology in some projects. Many ICT in education partnerships tend to lose focus on educational improvement. As Trucano (2005, p. 12) argues, “One of the enduring difficulties of technology use in education is that educational planners and technology advocates think of the technology first and then investigate the educational applications of this technology only later.” Trucano’s assertion was confirmed to me during the fieldwork for this study, which took me to a number of secondary schools in the Gauteng Province in South Africa. In a given school, a brand new computer laboratory was established with a total number of 34 computers. However, none of the teachers in the school were literate in the use of computers for educational purposes. According to the principal of the school, close to a year after the computers were installed, teachers in her school were still waiting to be trained on the use of the technology for teaching and learning. The implication is that

many computer laboratories established by collaborative partnerships in many schools are either lying waste or under-utilized for the achievement of the desired educational outcomes.

Another major setback to ICT public-private partnerships in South Africa is the high cost of electricity. In November of 2001, the South African Parliament approved an amendment to the Telecom Act, which includes a provision for an e-rate policy. The e-rate will allow public schools a 50 percent discount on calls and for Internet access charges (South African, DoE, 2003). Other services that would be covered by the e-rate include electricity, videoconferencing services, high-speed data connections, phone service and some types of internal wiring and network equipment within schools. The implementation of the e-rate policy will enable private sector entities through collaborative ventures to expand the provision of appropriate ICTs to secondary schools in more communities at a lower cost.

By implication, the availability of electricity or lack of it in many parts of South Africa has a huge influence on the choice of schools and communities where ICT in education partnerships extend their activities. Many schools in rural areas in provinces such as KwaZulu-Natal lack access to the electricity grid making the deployment of ICTs impossible. In effect, ICT in education partnership projects are concentrated in schools with electricity, many of which are located in urban areas. This trend has created a digital divide within South Africa between schools in urban communities and those in rural areas. While such ICT activities provide valuable educational outcomes in schools with electricity, they tend to, in the words of Kerry McNamara (2005), “forget the forgotten and provide further advantages to the advantaged.” It must be pointed out that majority of the poor in South Africa resides in rural communities without electricity<sup>3</sup>. Against this background, the concentration of ICT in education projects in schools with electricity in South Africa has the danger of exacerbating existing social and economic inequalities created mainly during the apartheid era. To ensure that the positive outcomes of ICT in secondary education is fairly distributed in post-apartheid South Africa, private sector partners should address infrastructural challenges facing ICT in education diffusion in South Africa such as lack of electricity, by using alternative and sustainable sources of energy, particularly in rural areas without a conventional electricity grid.

Sustainability of ICT partnerships and infrastructure pose a major challenge to technology-enhanced secondary education in South Africa. Many ICT-based education projects in South Africa lack elements that will enable them to survive beyond the roll-out or demonstration phase. As Cisler (2002) contends, the sustainability of ICT-enabled projects is based on four major pillars, including: social sustainability (i.e., a function of community involvement); political sustainability (i.e., a function of policy and leadership); technological sustainability (i.e., a function of learning objectives); and economic sustainability (i.e, entailing cost effectiveness and the ability of a school, community or the government to finance an ICT-enabled program over the long term) (Cisler, 2002). An uninterrupted source of electricity and the maintenance of the various ICT infrastructures raises the question of how schools and communities can sustain the hardware or equipment, software, applications and services associated with ICTs in education partnerships over time. In most cases, donors and private sector providers of educational technologies tends to overlook this sustainability

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<sup>3</sup> In the year 2000, more than 18 million people, or 46 percent of South Africa’s population, lived in rural areas (Published in Monograph 47, Poor Safety: Crime and Policing in South Africa's rural areas, May 2000) <http://www.iss.co.za/Pubs/Monographs/No47/Chap1.html>

factor at the planning stage of ICT in education projects. Therefore, to ensure the sustainability of private sector investments in ICT in secondary education, partners may have to develop a comprehensive ICT technical standards and specification. This will ensure infrastructure readiness and platform deployment across the country.

## CONCLUSIONS

Secondary education is critical for workforce development and economic viability because primary education is no longer sufficient for meaningful employment, and tertiary education while necessary, may not be within the reach of nor appropriate for the majority of South Africans. If education and training is defined as giving students the information and skills they need to compete effectively in the global economy, the traditional methods of learning in South Africa and the rest of SSA are anachronisms in today's fast-paced and information-driven world. I agree with Gary Becker who states that "how well individuals and economies succeed [in the new global economy] will be determined mainly by how successful they are at investing in and commanding the growing stock of knowledge" (cited in Keegan, 2000, p.12). Improvement in secondary schooling is vital for the development of South Africa in today's global economy. ICT potential as well as strategies that promote private sector partnerships for ICT in education, are crucial for realizing the fundamental goals of creating a secondary education system that drives economic growth, provides a stable foundation for further learning and reduces unemployment and poverty in South Africa.

Liberalizing its economy, and accepting globalization in principle without the necessary labor force to meet the demands of such economic order, puts South Africa in an economic trap. Although widely dispersed and flexible, South Africa and other African countries are yet to secure a place in the new global economy. Refocusing and transforming the secondary education system in South Africa is a sufficient means to the end of economic competitiveness in a global economy. This is because secondary education has a direct impact on human capital development, productivity, poverty reduction and social inclusion (World Bank, 2005).

Secondary education has proven to be a catalyst for development and growth (Gillies, 2003). The strategic position of secondary schooling makes it both necessary and indispensable for private and social reasons. The goals of improving secondary education in order to meet the demands of the 21<sup>st</sup> Century economy in South Africa coincides with the hopes of building communities and ensuring equitable distribution of educational resources, particularly to those that were denied access to education during the apartheid era. Human capital development through education and training for all South African students will increase the competitive edge of the country in the global economy. Good quality schooling is the basis, but is not sufficient on its own. The South African state does not have the economic wherewithal to unilaterally bring its secondary education system to the point where it can meet the demands of the global economy. This is particularly true with the sustainable integration of ICTs in teaching and learning. This underscores the involvement of private sector institutions in the implementation of secondary education and vocational training in the country.

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