

PN-ABY-443

ISBN 99035



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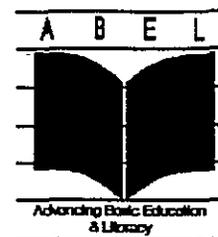
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Advancing Basic Education and Literacy

A project of the U.S. Agency for International Development



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PN-ABY-443

IEQ Publication

IMPROVING EDUCATIONAL QUALITY
FOR SUSTAINABLE DEVELOPMENT
IN AFRICA

Paul Spector
Institute for International Research

December 1994

The Improving Educational Quality (IEQ) Project is funded by the Center for Human Capacity Development, United States Agency for International Development (USAID) under Contract No. DPE-5836-C-00-1042-00. The IEQ Project is directed by the Institute for International Research (IIR) in collaboration with Juárez and Associates, Inc., and the University of Pittsburgh.

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IMPROVING EDUCATIONAL QUALITY FOR SUSTAINABLE DEVELOPMENT IN AFRICA

Paul Spector, IIR
December, 1994

SUMMARY

African nations have accomplished an almost miraculous job of educating hundreds of millions of people to become literate in the span of one generation. Equally miraculous has been the development of entire education systems which have educated a generation of intellectuals, civil servants, professionals and businesspeople where virtually no modern schooling existed before the rush of independence in the 1960s. Yet much remains to be achieved. While nations established and peopled modern sectors, the large majorities of their populations continued in traditional subsistence agriculture. Despite an overall primary school enrollment rate of over 60% by 1985, the majority of people in sub-Saharan Africa received little or no schooling. People had attained an average of 1.6 years of schooling by 1990.

Sub-Saharan education systems have generally been inefficient. Typically, nations invested between 8 and 12 years of schooling for each six- or seven-year primary school cycle. Teachers consume an average of 93% of recurrent expenditures, leaving little for textbooks, maintenance and management. Although vast sums have been spent on tertiary education, fewer than one person in 500 graduates from university.

The gap between sub-Saharan education and education in the industrial nations has always been large, and is growing. Achievement scores have been diminishing. As population expands, the per pupil amount spent on education has decreased in the last decade. The average expenditure per primary school pupil in sub-Saharan Africa in 1985 was \$458; by 1990 it had declined to \$315 per pupil.

In attempting to overthrow the constraints of colonialism the African nations have created substantial educational bureaucracies and teaching forces which have, by and large, not been able to educate effectively more than a fraction of their populations. In their haste to give access to European style schooling to the largest possible numbers of people, the funds they were able to make available for education forced them to half-step most of their endeavors. Most headmasters and teachers received less training than necessary to make them competent to deal with unfamiliar subjects, poorly prepared students, and crowded classes in inadequately furnished, run-down schools, equipped with less than the barest minimum of textbooks and other teaching resources. The result has been full education for a few, some literacy for about half the population, and little or no education by European standards for most.

The decline in educational quality has paralleled the economic decline of the majority of sub-Saharan nations. Education systems have produced too few qualified people needed for efficient growth and too many school leavers for the jobs available in their economies. On the one hand, there is a shortage of technically qualified workers required by the modern sectors, and on the other, there is a surplus of school graduates and dropouts who have no jobs to go to in the modern sectors. In most sub-Saharan nations disproportionately large numbers of people who did succeed in becoming educated entered the service of highly centralized national bureaucracies dominated by oligarchies that absorbed much of the wealth produced by their people, but did little to grow their economies.

Five overarching problems among many others stand in the way of educational reform: Poverty which dictates largely ineffectual half-measures, sham education systems which appear to give access to many, but serve mostly tiny elites, the tyranny of normative testing which is used for selection to higher schooling, but fails to promote mastery learning among the mass of students, irrelevant curricula and languages of instruction, and weak community involvement in schooling that results in frequent teacher absenteeism and other deficiencies. These deficiencies are especially deleterious for environmental education, because its success depends on widespread awareness of the importance of environmental protection.

Successful environmental protection and restoration depends on the actions of citizens at large including women who must imbue their children with an ethic that favors the environment in the face of difficult economic choices.

A look to the future in light of global innovations like automation and bio-genetics implies that much agricultural and other labor will become superannuated. Although the majority of Africans will continue to work in rural areas in the next generation, a strong movement to cities is likely to continue, possibly to accelerate. Many Africans will need to learn improved agricultural practices to take full advantage of Africa's growing seasons. Others will need to be prepared to learn low and medium skill manufacturing tasks as the textile industry and other such industries are attracted by literate low-cost African labor. Still others will need to learn high technical skills to maintain infrastructure, to maintain production equipment and to provide business and professional services if the economies are to exploit Africa's natural endowments.

This argues for several key improvements in education:

- A transitional paradigm shift is needed until the nations have enough wealth to afford European style formal education systems. Sub-Saharan Africa must reform its systems of education at every level. It must eschew wasteful, largely futile attempts at European style education that serve fully only the few who reach tertiary education. The nations must prepare all their citizens in primary schools to become highly motivated workers and life-long learners. All citizens must be equipped with the fundamental skills, civic understanding and love of learning that makes life-long self-learning the norm. Beyond this, the nations must adopt inexpensive, but extensive informal, non-formal and distance education programs for the majority that enable and encourage self-improvement and career development. These efforts should be supplemented by high quality secondary and tertiary schooling to stimulate the growth of their economies by equipping sufficient numbers to occupy business, technical, managerial, professional and academic jobs. Both public and private education should be encouraged.

Governments should set and maintain relevant, high output standards for all education. The conception of educational quality should shift from conveniently determined, but largely meaningless measures of inputs to output measures that validly assess knowledge, accomplishments and performance capabilities. Donors to education and the nations themselves should discourage the use of meaningless certification for school and job placement and promotion. Rather they should institute equivalency programs based on work accomplishments and valid performance testing that permit those who have been self-educated (or formally schooled) to enter higher schooling or jobs for which they are qualified.

- Nations and cross-national, regional education authorities should make low-cost reading materials and radio and television programs available on a widespread scale. Instead of reinventing the wheel in the name of nationalism, they should buy, rent, borrow and adapt already available materials which exist in large numbers and good quality all over the world.

- Sub-Saharan Africa should make better use of the extant teaching force by a massive, concentrated effort to improve performance. First, teachers should be provided with detailed, high quality teaching materials, curriculum based assessment methods and materials, and adequate teacher training to use them well. The curriculum and teaching/learning materials should be centered on the students' material and social environments. This would, at once, make learning more relevant, more meaningful and more readily apprehended.

Both pre-service and in-service teacher training should be reformed. Instead of training that is largely academic, theoretical and certification-oriented, teachers should be trained to use environmentally centered instructional materials in the circumstances that they encounter like multigrade and overcrowded classes. Instead of three and four years of pre-service teacher education and training, teacher candidates should be trained in short courses lasting three or four months to use highly detailed, properly sequenced instructional materials. They should be assigned to classrooms for a year of supervised apprenticeships using such materials. They will learn correct subject matter and effective pedagogy by practising them. Then, after practical experience they should be trained for six months in schools or by distance methods to furnish them with the theoretical underpinnings of good practice. Certification should come after two or three years of effective teaching.

Instead of largely futile three- and five-day in-service workshops that attempt to teach general strategies and methods, practising teachers should be furnished with the same high quality materials, and should be trained for two or three months in their use, and then should be provided with coaching and instructional leadership by their headmasters and supervisors that insures that performance improves. The sea-change that such a program will make in instructional performance and in all subsequent schooling will justify the costs of the reform. It is time to change from feeble half measures to a massive infusion of quality.

Nations should undertake concomitant improvements in organizational quality and staff development from headmaster up, throughout ministries of education in order to improve policies and practices. Headmasters should be given the same training as teachers in the use of high quality instructional materials, plus three full months of training in instructional leadership, and the management of personnel, material and money. Other education officials should be familiarized with the instructional reforms and should be trained to carry out the duties in each job that will directly or indirectly support more effective instruction.

- The nations of sub-Saharan Africa should establish high quality, cross-national regional professional schools for agriculture, commerce, industry and the professions.
- Selective use should be made of high cost electronic instruction for specialized education and training like teacher and engineering education until electronic equipment becomes widely enough available for mass instruction.
- Nations should educate local communities on how to take more active roles in education. Mutually sympathetic, cooperative relations should be encouraged between schools and parents in order to improve educational relevance, local governance, material and financial support of schools and teachers, and to motivate educators to attain and sustain high quality performance.
- Nations and donors should encourage human rights education and democratization in order to engage parents and others in influencing governments to improve educational quality in general, and environmental education in particular. Ultimately the schools reflect the true wills and capabilities of local communities. Largely pre-literate societies that have had their human rights trampled by colonial regimes and dictators who interfered with traditional forms of governance and education must be encouraged to assert their right to insure their childrens' current and future well-being.

INTRODUCTION

This paper is an unorthodox attempt to bring realism into thinking about educational development and the environment in sub-Saharan Africa. It is divided into six sections. After this introduction the second section reviews the status of education in sub-Saharan Africa in relation to economic growth. It compares sub-Saharan nations with respect to various measures of educational and economic improvement over the last thirty years in relation to similar measures in the industrial countries. The third section identifies major problems. The fourth reviews problems in more detail by adverting to lessons we have learned historically about successful and unsuccessful educational development efforts. The fifth section speculates about the future in an attempt to anchor thinking about educational improvements in reasonably optimistic scenarios of economic development in the region. The sixth section makes recommendations that we believe would bring the knowledge and skill of the masses of the sub-Saharan population closer to those of the industrial countries over the next thirty years.

Early Rapid Progress in Educational Development

Enormous educational progress was made in the quarter century from 1960 to 1985, in the blink of an eye as history is measured, throughout much of sub-saharan Africa. The educational accomplishments have been little short of miraculous when one considers that several hundred million people have been made literate, and scores of millions have learned to function in technical, commercial and manufacturing jobs in the span of one generation. The scope of progress can be understood only when one knows how little was done to educate the populations under colonial domination. Hardly a modern physician, engineer or scientist existed when most of the nations attained independence.

Most of the sub-Saharan African nations have succeeded in creating educational establishments which are poised for a kind of educational take-off in many countries. School capacity has been created to cater to the majority of the population in most of the nations. A teaching force of millions is in place. Ministries of education have the functional components like curriculum development centers and teacher service units needed to support the business of education. African governments, teachers unions and parents are concerned about educational quality as well as sheer access to schooling. African educators and donors to African education have learned a great deal about the mechanisms and processes involved in developing and running education systems and about the constraints on equity, efficiency and quality. The policy environment for more equitable, higher quality education is beginning to improve in some countries and is on the verge of improvement in some others. Experience and research have begun to point the way to improvements both in education ministries and in schools. In a few places teachers and students are beginning to be provided with sufficient teaching and learning materials to permit the hope of higher quality on a massive scale. Some African educators are becoming familiar with the modern instructional designs and techniques that are accelerating educational productivity in the industrial nations and the rapidly developing nations of Asia.

Over a span of 25 years after independence there were rapid increases in numbers of schools, classrooms, teachers, enrollments, and literacy. There is no question that a much greater percentage of the African population is literate now than before the nations gained independence. There are clearly many more skilled workers and professionals than heretofore.

Educational Decline

There appears to be general agreement that education in Africa is deteriorating after making progress in the 1960s, 70s and early 80s. According to Samoff, Metzler and Salie:

...the economic crisis confronting Africa, coupled with externally imposed structural adjustment policies and the rapid increase in population of school age children (over 3 percent in most African countries), has led to a serious crisis in funding education. This financial crisis has resulted in a significant reduction in per capital funding and an increase in direct and indirect costs borne by

African students and their families. Between 1970 and 1983, the average per capita expenditure on primary school pupils in sub-Saharan African countries declined from US\$67 to US\$48 in constant dollars; for secondary school pupils the per capita decline was from US\$362 to US\$223 (World Bank, 1988: Tables A-17, A-19).

...According to World Bank data, in 1983 the percentage of primary aged children peaked at 75 percent; by 1986 this figure had declined to 68 percent...

Measures of academic achievement also show a pattern of decline. On cross-national tests the few African nations which have been involved have scored below virtually all others.

Contrasting Educational Histories: sub-Saharan Africa and the Industrial Nations

Two economies emerged in colonial and post colonial times in most of the sub-Saharan countries. One was based on export of minerals and cash crops; the other remained in subsistence agriculture. An informal sector outside the employment sector emerged in the first and persisted in the latter. The first entered the modernizing global economy; the other retained largely traditional modes, as modified by colonial administrative rearrangements. The first affected only small minorities of the populations while large majorities remained in the traditional economies.

The new governments, with the aid of former colonial powers and donors, developed education systems modeled on those of Europe which consisted of most of the components needed to fulfill functions performed by full blown modern education systems in the industrialized nations. These systems brought literacy to the majority of the male population and substantial proportions of the female population in many countries. They served mainly urban dwellers and relatively small numbers of rural students as preparations for careers in the employment sector. Education systems became the route to government service and to some of the other technical, executive and managerial jobs associated with the modern sectors of the economies. However, many key jobs continued to be filled by expatriates. Throughout sub-saharan Africa many hundreds of thousands, and eventually, millions of people became highly educated. But many hundreds of millions remained essentially uneducated and continued to earn their living in traditional agricultural pursuits or in the informal urban economies. Nevertheless, on average, about half the total population of sub-Saharan Africa is reported to have become literate.

It took about one-hundred-and-fifty years in Europe and North America after the beginning of industrialization for enrollment to reach 100% in primary school and 75% in secondary school. As late as the 1960s high school completion in America was an uncommon accomplishment. In 1915 secondary enrollment was barely 7 % of primary enrollment, and it reached only 33% by 1960. In the early years of industrialization, after basic education, which often consisted of three or four years of schooling young people worked on family farms or as craftsmen's apprentices and in commerce. Schooling increased as industrialization proceeded. The number of schools and classrooms, textbooks, teachers and administrators grew gradually with the wealth of nations.

In contrast, most of the African nations attempted to educate their populations quickly. Schools were built with explosive rapidity. Education ministries functioned to construct and maintain schools, to develop curricula, to distribute textbooks, to conduct national examinations and to recruit teachers. Teachers and headmasters were appointed, often with no education beyond primary schooling or less. Teaching forces became the largest component of government service. Sometimes African countries, with less than one tenth of the GDPs of the industrialized countries, devoted similar proportions of their budgets to education. Today the average expenditure in sub-Saharan Africa is about 3% of the national budget compared to the average in the industrial world of about 5%, although the average per capita GNP is one twelfth as large. Teachers' costs on average absorb 93% of recurrent budgets, leaving little for textbooks, maintenance and other recurrent costs.

High Cost of Emulating European Education Models

Despite frequent adersion by politicians and educators to the ideologies of practicalization and Africanization, the education systems were for the most part academically oriented as if the aim of education were principally to graduate students from university. Although some excellent elite primary and secondary schools as well as a few highly respected universities were developed, they served, as elsewhere in the world, mostly the members of the urbanized establishments. Disproportionately large amounts of national education budgets were devoted to tertiary education, much of the money being spent on subsistence for the children of more affluent families. But few students attended and fewer graduated. On average 99.8% of those who enter first grade do not graduate from university or other tertiary schooling: Of every 1000 students who enter first grade 2 emerge as graduates from tertiary education. All measures of educational achievement indicate that, on average, academic attainments are meager compared to achievement in the developed world.

While the vast majority of students have learned little compared to students in the industrial nations, much costly half-stepped activity has taken place. Millions of teachers were poorly prepared to teach only partially relevant curricula. Costly teachers colleges and inservice programs failed to produce sufficient numbers of competent teachers. Millions were spent on inefficient textbooks that often go unused. Schools and classrooms often failed to meet the threshold conditions necessary to facilitate learning. The quality of instruction was generally well below that of the developed world.

Meanwhile, highly inefficient and meagerly effective education systems grew into being. Ill-furnished, crowded classrooms often served two or more grades. First grade classes of a 100 or more pupils were not unusual. Typically, textbooks, workbooks, references, readers and libraries were scarce or entirely lacking. Education systems efficiency was (and is) low in most sub-Saharan nations. On average, about forty percent of those who enter first grade drop out before finishing primary school. Schools are clogged with repeaters. Teachers are faced with highly heterogeneous classes, frequently even in first grade, with students ranging in age from 4 to 20 years. In many countries half the first grade students drop out by second grade. Resources are devoted disproportionately to teachers and to students in the fifth and sixth grades in desperate attempts to help those remaining in primary school to pass school leaving examinations.

Sub-Saharan African education systems did serve to bring a measure of basic literacy and numeracy to about half the population, but failed to produce sufficient numbers of technically and managerially competent workers to meet the needs of the modernizing sectors of the economies. A modern paradox developed in many countries. Too few people were fully educated. Still too many partially educated graduates and school dropouts emerged from schools for the numbers of jobs available in the modernizing sectors. At the same time too few technically qualified graduates were produced for the relatively few jobs that needed them.

Africa in the Global Economy: the Gap Between sub-Saharan and Industrial Nations

We cannot predict what course educational development should take without an understanding of the overarching economic and social realities of Africa today. Economic growth in most sub-Saharan nations has been meager compared with other regions. With about 10% of the world's population the region accounts for one hundredth of the world's GNP.

For illustrative comparison, South Korea and sub-Saharan Africa had average GDPs in 1960 that were about 15% of the average GDP in the North. By 1990 Korea's average GDP had grown to 47% of that of the North while sub-Saharan Africa's had declined to about 8% of the North's average GDP. By 1990 Korea, whose population of 43 million people had a gross GDP of \$236 billion, while sub-Saharan Africa with a population over 550 million had a gross GDP of \$240 billion.

The absence of industrial and commercial opportunities made government service the largest employer of educated labor. Thus, for example, teaching forces in sub-Saharan Africa constitute about 5% of the labor force as compared with 1-2% in most industrial countries. Civil services consume about 50% of national budgets in sub-Saharan Africa. Government in one country consumed 90% of its national income.

Sub-Saharan Africa is poor and becoming poorer as its rapidly rising population outstrips economic growth. Although the picture is not as bleak as sensationalist media depict it, (most people are not starving; the average caloric intake is reported to be 2500 calories in sub-Saharan Africa.) the struggle for resources among the various sectors will further impoverish education. Africa has too little education at all levels compared to the industrial world to place it in a position to close the gap between it and the much more rapidly developing industrial countries. Continuing the half-measures which has characterized educational development to date in Africa will guarantee that the gap grows. This is not a formula for development. Since Africa must import expensive things produced by the developed countries, it will have too little wealth to invest in growth in general, and in education in particular, if things continue as they have been going.

Most people in the industrial world do not know the plight of the African people, and they are content in their ignorance to do nothing to alleviate it, for it impinge only fitfully on their lives. Currently, human events in Africa have little effect on the rest of the world, although inevitably, the potential explosiveness of worsening poverty must intrude on the peace of the peoples of the developed nations.

Table VIII in the Appendix shows the distribution of the labor force in Agriculture, Industry and Services in 1965 and from 1989-1991. The percentage of the labor force in agriculture dropped from 79% to 67% while the percentage in industry rose only from 8% to 9%, and services rose from 13 to 24% between 1965 and 1989-1991. This table also shows the average urban population to be at 31% in 1991 with a projection to 38% in 2000. Of the 33% in industry and services about 2% was in rural areas and the remaining 31% in cities.

Table IX in the Appendix shows the labor force distribution as compared with the percent of total GDP production in billions of US \$ in 1990 as distributed by agriculture, industry and services. The total GDP was \$240 billion. Although 67% of the labor force was in agriculture only 22% of GDP was produced by agriculture. Nine percent of the labor force was in industry, but 35% of GDP was produced by industry. The 24% of the labor force in services produced 43% of GDP. Thus, although 69% of the population was in rural areas and 67% earned their living from agriculture, agriculture represented only 22% of the GDP while industry and services accounted for 78% of GDP, the vast majority of it in cities. This table also shows the distribution of GDP in the industrial world compared with the distribution in sub-Saharan Africa. In the industrial world in 1990 4% of the GDP is attributable to agriculture; 37% to industry and 59% to services.

Table X shows the gaps in GDP, GNP, literacy and enrollments between sub-Saharan Africa and the Industrial World as expressed in % of the Industrial World (Industrial World = 100.) Real GDP per capita was \$1,200 in sub-Saharan Africa and \$14,440 in the Industrial countries in 1990. GNP per capita was \$490 in sub-Saharan Africa; it was \$14,580 in the Industrial countries. The adult literacy rate rose from 28% of the North's to 47% between 1970 and 1990. The combined average primary and secondary enrollment in SSA rose from 26% to 46% of the North's between 1970 and 1990. However, real GDP per capita fell from 14 to 8 percent of the North's.

Table XI compares the communications infrastructure between sub-Saharan Africa and the Industrial World. On average the industrial countries had 1,130 radios per thousand persons while sub-Saharan Africa had 150. SSA had 23 television sets per thousand persons while the industrial nations had 545. SSA had 18 telephones to the industrial world's 590. There were 40,620 persons per post office compared with 4,200 in the industrial countries. These figures should be borne in mind when considering the use of technology for education. Electronic methods alone, however powerful they may

be, are unlikely to be cheap enough to buy and operate to fulfill the need for widespread basic education. However, used for special educational purposes like teacher education and engineering education, and used in conjunction with live teachers they promise to exert impact well beyond their costs.

THE CURRENT STATE OF EDUCATION IN SUB-SAHARAN AFRICA.

Educational Enrollment and Completion Rates

Education statistics for sub-Saharan Africa are generally presented in aggregate form as averages across the region. It is well for our purpose to disaggregate some of the figures. The following discussion is based on Tables I to XII in Appendix A. Detailed statistics are presented and discussed in the Appendix.

Primary Schooling

Average primary school enrollment in sub-Saharan Africa is reported to be over 60%. Of the region's 550 million people, nations with 140 million people reported enrollments below 60%, while nations with 165 million people reported enrollments above 70%. However, nations with an additional 255 million people failed to report enrollment statistics. It is difficult to believe their enrollments were above 60%.

The average primary school completion rate for the region was reported to be 52% in 1992. But nations with only about 100 million people reported a completion rate over 50% while nations with 165 million people reported a completion rate below 50%. Nations with a total of 430 million persons either reported less than 50% completion rate or failed to report enrollment rates at all.

It should be no surprise then that the mean years of schooling for the region was still only 1.6 years in 1990, while in the industrial world the mean is over 10.0 years. Importantly, the gap in mean years of schooling between sub-Saharan Africa and the industrial world diminished to any significant extent in only a handful of nations with only a few million people between 1960 and 1990.

Secondary Schooling

The gross secondary enrollment rate was reported to be 17% in 1990. The range was from 3% to 53%. Aside from South Africa this amounted to some 13.6 million students for the whole region (1986 figure). Nations with a total population of only 30 million persons reported over 30% enrollment. Most of the nations with the remaining 520 million people reported enrollment ratios of less than 22% or failed to report secondary school enrollments. About 7% of secondary students are in teacher training and another 7.5% in vocational education. Thus, of the 13.6 million students 11.8 million are in general academic courses.

Tertiary Schooling

Outside of South Africa the whole region reported a total enrollment in tertiary education of 673,000 students. By contrast, the State of California had well over 1,000,000 tertiary students out of a population of 30 million. The average sub-Saharan enrollment rate was reported to be 2% in 1990. Nations with a total population of 208 million reported enrollments of from 3% to 5%. Nations with 236 million reported 2% or less. Nations with 96 million persons failed to report tertiary enrollments. Almost a third of tertiary students were in Nigeria which has about a third of the total population.

About 61% of tertiary students were in the arts including social science, commerce and business. About 38% were in science: 10% were in natural sciences and 10% were in medicine; 12% were in math and engineering; and 6% were studying agriculture. Thus one person in 8500 is studying natural science

and medicine. One in about 7,000 is taking math and engineering. One person in 14,000 is studying agriculture in a region where two-thirds of the people make their livings from agriculture.

The tertiary graduation rate was 0.2% compared with 9.4% in the industrial world. This means that of the 67,000 who graduate each year, 4,000 are in agriculture. Conjecturing conservatively-- of these, half are probably not really well prepared. Of the remaining 2,000 probably half go abroad, leaving 1,000 well qualified agricultural graduates to enter the career field in which 335 million people earn their bread.

Another set of statistics is noteworthy. The 1993 Human Development Report indicates that although the Industrial World had 380 persons per doctor in 1990, sub-Saharan Africa had 24,380 persons per doctor. The 1994 Human Development Report, however, shows a figure of 35,680 persons per doctor in sub-Saharan Africa. The figure did not change because many doctors died or emigrated suddenly. It is based on new data. It is a good indication of how insubstantial data are in this context. It is also an indication of how few technically qualified people are available for the work of economic development.

These statistics tell the story of sub-Saharan Africa to date more significantly than any other. For all the expenditures on education systems, the outcomes in terms of professionally trained manpower are very modest. No doctor serves 24,000 or 35,000 people. At most they can serve a couple of thousand. The rest of the population goes unserved. The African education systems have been elitist despite rhetoric to the contrary, serving mainly the small urban establishments. The general education picture is hardly better. Although on average one in 500 persons completes a university education, only a small proportion of these graduates are in agriculture or the other technologies relevant to development.

In light of these figures, the policy of shifting tertiary budgets in favor of primary budgets, which the donor agencies have been plying blindly, instead of reforming both levels of education in functionally effective ways, at best look like it is ill advised.

The implications of these figures for scientific environmental research and practice is self-evident.

The reported literacy rate is also noteworthy. About one in two persons has a reportable degree of literacy. That figure, like all others, is questionable. But if it is near accurate, it is probably the most important single statistic for the future of education in Africa.

Behind the evident state of the economic factors is a troubling generic question about education. If the African population were as well educated as the west European population would it be better off? Would there be as much corruption and disorganization? Would there be more democratic political control by the mass of the populace? And would it result in more productivity and well being for the masses? Would the economies be so dependent on extraction rather than manufacturing? Would the physical and organizational infrastructures be so poorly developed?

The current state of affairs in East Europe may be illuminating. The population *is* educated, though not as well educated as West Europe's with regard to civic and political democracy. Despite dramatic downturns in productivity with the changes currently taking place, few people doubt that the educated populace of East Europe will evolve rich market economies, or mixed economies akin to the West European and American models. Not many people are so sanguine about Africa.

We assume it as a given that all persons should be educated as a human right. The question is not whether to continue to emphasize educational development, but how to accomplish the kinds and amounts of educational development that will contribute most to social and economic development rather than burden and inhibit them. What are the right kinds and amounts of education? How can they be attained with the resources available? Obviously, if Africa is to close the gap with the industrial nations it is essential that its people attain both more basic education and more technical and commercial education, in interaction with such other factors as population stabilization, democratization, and capital formation.

II. MAJOR CURRENT PROBLEMS IN EDUCATION

Five overarching problems (among many others) have plagued sub-Saharan African education: Poverty, Shamism, the Tyranny of Testing, Irrelevance, and Inadequate Community Participation in Education.

Poverty

In its laudable haste to eradicate the effects of colonialism and racism, Africa has attempted to educate more students than it could afford to do effectively. Many more schools were built than could be maintained. Yet, for the most part they were crowded with more students than could be fully educated. Teachers were created in haste and given too little education and training. Most failed to become expert either in their subjects or in pedagogy. Almost all of the too little money available for education each year was devoted to teachers. Yet remuneration was spare, forcing many into moonlighting. Few or no learning materials were made available. Most headmasters were appointed without training. What little training was given to headmasters, supervisors and teachers in service usually consisted of short courses or workshops that fell short of significant positive impact. Often, furnishings were inadequate and supplies invisible. Many schools lacked even the simple technology of usable chalk boards and chalk.

Recent failed Attempts to Remedy Problems

When donors recently attempted to rectify this lack of money by more massive input programs, the funds were inadequate to overcome well entrenched constraints. The planned programs were usually inadequately designed to overcome the problems, and could only be poorly implemented. Assumptions were made that national ministries, in some instances, regional ones, could successfully implement the intended programs. Unfortunately the programs usually continued to attack problems piecemeal rather than systemically, although their designers may have intended otherwise. Donor planners assumed conditions and capabilities that did not exist. For example, in two countries in which we are now working; where massive amounts were spent to make textbooks and other learning materials available, they are generally not being used. In one country most of them are wrong for the students for whom they are intended, eg., sixth graders who, however, cannot read them. In another country, some of them are unusable because they start with untexted illustrations whose use is explained in teachers guides that have not been available. In both cases the funds allocated for teacher training were inadequate to overcome old teaching habits. Had training been adequate to overcome traditional pedagogic habits, it would, nevertheless, still have been insufficient to impart enough subject matter knowledge to the majority of teachers to enable them to complement the textbooks which were provided. Although the textbooks were well designed for European and American use, they lacked many elements which would have made it possible for the majority of teachers and students to follow sound teaching/learning sequences.

The problems are so massive that they cannot be solved with the kinds of money the donors will make available, or the nations can afford themselves, as long as conventional measures, following the paradigms of European style formal education, are used to solve them.

Shamism

Sham education systems have emerged in the period since independence. When teaching was being done by European and American missionaries who were usually well educated, well trained and inspired, the quality of instruction was high. Many African students, despite pre-literate family backgrounds did very well. A small class of highly educated African educators emerged. These, together with European and American expatriates designed education systems on the basic formal European model. However, in the nations' haste to educate as many citizens as possible, the quality of teaching that the missionary educated Africans received, and that they themselves could furnish, could not be replicated on a massive scale. Good teachers could not be made by fiat and short courses. An unfortunate cycle of bad teaching-inadequate learning-bad teaching was instituted for the majority of

African learners. A teacher who has not learned algebra cannot teach it effectively without the most powerful and detailed teaching aids. And these are almost universally lacking in Africa.

Crowded Curricula

The lack of qualified teachers was aggravated by other problems. Curricula were crowded with nation-building elements, as well as with the core subjects. Time devoted, for example, to learning national songs and many others, robbed time from language arts and mathematics. Many teachers and students had to slog long distances over bad terrain in the best weather, and over impassible mud and streams in rainy weather. Absenteeism was, and is rife. Some teachers had to take two weeks away from school to collect their paychecks. Many teachers had to attend to other business to eke out a living. There is almost never an adequate teacher substitution system for teacher absences. The effective school year in rural sub-Saharan Africa is often less than half the putative school year; sometimes less than a third. Often classes have well over the 60 or so students that a single teacher can be taught to handle effectively, even though the general sub-Saharan average student/teacher ratio is 38:1 and in some countries it is as low as 25:1.

Inadequate Instructional Approaches, Deficient Instruction, Destruction of Learning Motivation

Rote learning is the mode in sub-Saharan Africa. The typical teacher's instructional approach is to stand in front of the class and lecture, and to instruct the students to copy what he/she writes on the chalkboard into their notebooks. Active learning, designed to develop higher cognitive capabilities such as independence of inquiry, is exceedingly rare. Students interact rarely either with teachers or other students. Girls especially, fail to participate in active learning. In overcrowded classrooms one observes a few students in front listening to the teacher, while the majority are idling or chatting. Teachers fail to manage large numbers of students or multi-grade classes effectively. Too little time is devoted to practice and review in most classes. Often, when teaching is not too rigid, it is too casual. Ten minutes may be spent on math one day and a half-hour the next. Too many teachers spend too much time out of the classroom. And much of the time spent in classroom is spent inefficiently. For example, we recently observed a teacher call each of seventy-one students up to the front of the class to read aloud a sentence in a textbook while all the others were left to their own devices for most of the morning.

Too little time is spent on learning tasks. The net result of all these inefficiencies is that most students have not become adept at reading, writing or mathematics. Most students fail to learn to read sufficiently well to become efficient learners of other subjects. Moreover, student typically suffer boredom and the mystification of not knowing the meaning of what is being taught because they have failed to learn the fundamentals or the prerequisites. Schooling for all but the brightest and most fortunate students becomes a round of frustration and failure, relieved only by periods of storytelling, games and song.

Many children drop out of school all along the way. Many students repeat classes. In some countries the age of first admission is not fixed or is treated lightly. As mothers enter the work force, they enter 4 and 5 year olds into first grade as a means of finding child care. Teachers are faced not only with overcrowding and multigrade problems, but in each grade they must deal with a heterogeneous set of learners. In many schools, for example, first grades have not only a surfeit of six-year olds, but also a few four and five year olds, and other students as old 12, even 18 or 20 years of age.

Whole school systems have become inefficient. Often they suffer apparent teacher and classroom shortages because schools are clogged with repeaters. First and second grades are overcrowded, while fifth and sixth grades have too few students per teacher. As much as half the teaching force and school spaces are devoted to repeaters who should have made it through grades the first time.

Such school systems are sham systems. The reported statistics show that for every 100 students who enter first grade only 60% finish the last primary grade, and as was discussed above this is a dubious statistic. If one examines the school leaving test scores carefully, one comes to realize that, of the

those who sat for the exam, only a small percentage do well. Schooling for the remainder has largely been a sham. Only about two in five primary school leavers enters secondary school. Only about two in a hundred is in tertiary schooling, and one in five hundred graduates from tertiary schooling.

Furthermore the numbers are misleading. The quality of education is low. When this author asked the head of the best school system in one of the nations with the most favorable statistical pictures on the continent, whether there were any outstanding primary schools he said, "Yes, some consistently show high percentages who get a good pass on the school leaving exams. But many of their students need remediation when they get into secondary school. Their teachers are very good at drilling them for the exams, but the students don't actually know much." This is too harsh an indictment. In actuality many, many students are well prepared, but the numbers are proving insufficient to allow sub-Saharan Africa to participate in the global economy to any extent commensurate with the size of its population.

The Tyranny of Testing

As far as we know, all sub-Saharan nations have school leaving exams at the end of primary schooling. These were originally designed to select graduates to continue to the few spaces available in secondary school. The difficulty of the exams were set each year to reflect the number of graduates who could be admitted to secondary school. Schooling was (and still is) a principal path to the good life. In Africa it was a path from a preliterate tribal or rural village life to a place in modern middle class society, generally by means of a government job. It meant access to a decent flat, electricity, appliances, some health care, a car, travel abroad, a place in the modern world for one's self and one's family.

Passing the school leaving exam so that one could stay on the path to certification and modernity became the preeminent concern of students and parents. Knowledge for the sake of knowledge was a passing fancy. The goal was to get a white collar job. Originally the tests were the same as or derived from examinations that suited the colonial establishments. They were designed to select Europeans into the cultured realms of the ruling classes. Their topics were often foreign and irrelevant to African students. For, example, when we were working on reforming West African exams in the 1960s there were still questions on central heating. This, to some students who could not interpret a black and white photograph because they had seen so few.

Selection vs. Mastery Testing

Even when tests were reformed they were designed to keep people out of schooling and jobs because there were so many applicants for so few positions. Test items were made deliberately difficult so that they would eliminate people from contention. There was no intention that the tests would determine whether the vast majority of students had mastered what they needed to know and do in their work lives.

Students who get into the final two years of primary school spend most of their time being drilled by their teachers to pass the exams. School systems devote highly disproportionate resources to this goal. While it is not uncommon to see classes of 120 first graders with one teacher, few chairs or tables and no books, one often finds the few remaining fifth and sixth graders relatively well off. There may be only a few to a teacher, most are equipped with chairs and desks and many have textbooks and notebooks as well as other teaching aids. Schools, headmasters, and teachers as well as students are evaluated by parents and officials by the exam scores. In the early days of the US Peace Corps, Volunteer teachers in Africa often complained that teachers were complicit in cheating their students through the exams.

While norm-referenced selection testing holds sway over education systems, the idea of continuous curriculum based, criterion referenced testing has only recently come into fashion among donors to African education. The diagnostic purpose of such testing to permit learners, teachers, and education officials to learn what needs to be done to improve instruction and learning to mastery is still not well

understood on the ground in sub-Saharan Africa. To reach its full potential criterion referenced testing needs to become an integral part of the instructional process. Each unit of instruction should carry with it non-punitive, diagnostic test items or other assessment techniques such as a portfolios which are designed to inform both student and teacher about whether, and how well, the student has learned the unit. This should be followed by suitable remedial instruction for those who have not mastered the material, by enrichment for the fastest learners and by the normal course of instruction for the average student.

Use of Output Information for Systems' Diagnosis

Periodic test sampling, using the same types of curriculum based assessment items, should be used by education officials to diagnose systems deficiencies as a principal source of information pointing to systems remedies, e.g., improved texts or teacher training. Attempts to use criterion referenced testing thus far have failed to incorporate the essential core element of continuous unit testing and remediation or enrichment at the classroom level. Thus, in a few countries curriculum based assessment has been used for systems diagnosis without concomitant capacity to remedy the deficiencies. Continuous criterion referenced testing is being resisted by test specialists who have become expert in the normative testing tradition, in part because they are test rather than instructional specialists, and in part because they are usually overburdened in carrying out the national norm referenced testing that is still needed to select candidates for higher schooling.

The investment that is necessary to design, develop, pilot, and administer continuous, unit level, criterion referenced tests, and to train massive numbers of teachers to apply remedial and enrichment materials effectively, appears to be daunting to educators and education donors, although the cost of doing so is small compared to the money that has repeatedly been wasted on other half-measures.

Irrelevance

The curricula of most African education systems were aimed at providing an academic education, at moving students along a path that was designed to take them through university and into professional jobs. This, despite the fact that eighty to ninety percent of the populations were rural agriculturalists and pastoralists. As we have seen only one in five hundred persons of tertiary age graduated from tertiary schooling, even in 1990. Yet, because of the exam system, much of the time they were in school, the majority of students were exposed to subjects and topics that were irrelevant or meaningless to them. School gardens were introduced relatively late and are still not common. Agricultural topics were rare, and even rarer were instructional approaches which made them meaningful to the actual work lives to which the majority of children were destined. Worse, students were ill-equipped with the basic literacy and numeracy skills which would have made them more productive as self-learners in either agriculture or the newly emerging jobs in the modern sector.

Education and Work

Although agriculture generates relatively little wealth compared with manufacturing and services in sub-Saharan Africa, as measured by current statistical methods, it employs the vast majority, some 67%, of the workforce. As we have seen an average of only 6% of tertiary students (one per 14,000 persons) is studying agriculture. Few study agriculture as a vocational topic at the secondary level, and virtually no students study it systematically at the primary level. Moreover, virtually no primary level teachers are equipped to teach it. Furthermore, it appears that in most countries, university researchers in agriculture have little connection with field extension agents, who in any event, are often hampered by insufficient funds to pay for transportation to their clients. It is not surprising that African agricultural productivity, in the main, rarely approaches Asian productivity.

A similar situation exists with regard to secondary level vocational education in general. Only 7.5% of sub-Saharan secondary students (outside South Africa) are in vocational education. For a number of years it was fashionable to devalue such education because some (questionably valid) research had

found it to be less highly valued by employers than general education, and because it was very much more expensive per student than general education. Recent findings reported by Middleton and his colleagues indicate that vocational education, by whatever of the several means it is acquired (apprenticeships, OJT, public or private schooling) may be more valuable than general schooling in developing economies. The numbers being trained by the education systems are too few for the 33% of the sub-Saharan workforce who earn their living in industry (9%) and services (24%).

The donors' pressure on African governments to shift education funds from tertiary to primary education rather than to reform both to become qualitatively more functional, may be gravely mistaken. There is simply an insufficient number of well qualified tertiary graduates to people the modern sectors of the economies and make them grow. There are too few businesspeople, managers, finance and accounting people, engineers, scientists, technicians, manufacturing production specialists, communications and transportation specialists, operations analysts, brokers of all kinds, tertiary level teachers, and the myriad of other highly trained intellectual workers needed to grow the economies, even if corruption were curbed and capital infusions were increased.

The average of 2% tertiary enrollment masks the fact that countries with much of the total population of sub-Saharan Africa have enrollments of 1% or less. Given the average graduation rate, this means that fewer than one person in a thousand actually finishes tertiary schooling each year. Moreover, since only 6 % of those enrolled are studying agriculture, all other things being equal, in countries with 1% enrollment ratios, an average of fewer than one person in 28,000 is studying agriculture. The picture in other scientific fields is marginally better. Add to this bleak picture, dubious quality and the brain drain from Africa, and the policy of de-emphasizing tertiary education, instead of reforming and expanding it, must surely be reconsidered.

Many parents see little value in the kind of curricula their children are supposed to learn, and many others are disappointed that so little learning takes place. Still others see it pointless to invest such small money as they have on uniforms, fees and books that will return meager value to their own and their children's lives. They realize that their children have minuscule chance of winning in the certification lottery which the schools represent, and place more value on the work their children can do, and the practical experience they can gain around their homes and farms. Nevertheless many parents are ambitious for their children to enter the modern sector.

Regardless of their orientation parents value any education that contributes to their children's well being, especially if it equips them to lead better lives in their own communities. Although much thought was given to these needs and desires by educational planners, the lack of resources forced choices that gave effective priority to the drive to create civil services which it was hoped could stimulate a march to modernization. The bulk of the African population was effectively relegated to no education at all, or to education with small relevance to them, and the march to modernization, as remarkable as it was in the first generation after independence, has slowed to a walk. It is to be hoped that educational reforms will increase relevance for the bulk of the citizenry and will help to re-energize the move to modernization by making them more productive in every sector of their economies.

The Problem of Language

A special aspect of relevance is the meaningfulness of language. If one doesn't understand what is being said, regardless of how relevant it is, it is ipso facto irrelevant. This aspect of relevance is a special burden to African nations and their teachers and students. The mother tongues for most African students were and are non-European languages. The languages of the former colonial powers became the effective, if not the official national languages. In some cases instruction in the first few grades was done in the maternal languages, and then switched to the national languages. In some cases it was done in tribal languages other than the maternal ones. In others instruction began in the national languages. In any event most children had to learn most of their knowledge and skills through the screen of a second language. Often their teachers were also not fluent in the second language.

Although children are very adaptable in learning languages, it is much easier for them to learn a new language when they are immersed in it than when it is also new to all the people around them, a very awkward, artificial situation. This latter is the case for most African students, a further barrier to educational quality.

For many, perhaps most students, the time spent learning the language of instruction, or still another foreign language, is of no value since they never use any but the maternal language once they leave school. More relevant would have been the acquisition of real reading fluency, as well as a love of reading for the sake of continuing self-education. Change to maternal languages of instruction is fraught with difficulties. Some parents have opposed it because they saw such change as excluding their children from government service and a modern life. The prospect of producing learning materials in a multiplicity of languages is daunting. The problems of training teachers to use them is equally daunting. Nevertheless, this whole problem merits serious re-examination and appropriate policy reform.

The Relevance of Environmental Education

Learning about their own environments is the most natural subject for children to deal with in primary and junior secondary education. Moreover, it can be both the most engaging and interesting, and the most effective way to teach, not only about the environment, but also the literacy and numeracy skills needed for all further education. If the social environment, health, safety and sustainable productivity are included, then the environment can be the core topic upon which to found a fully relevant basic education. For math students can be taught arithmetic around the numbers of their friends, relatives, animals and plants and the things they use for food, clothing and play. Reading can be fun if it is about things they recognize and are concerned about. Community mapping exercises can be the introductions to both geography and geometry and to the physical sciences. Their own extended family relationships, histories and activities in making a living can be the foundations of social studies in the context of environmental preservation, clean up and restoration. Learning about their own health, hygiene and sanitation can serve to introduce issues of environmental protection as relevant practical matters of the deepest concern to their own and their families' well being. School gardens, small livestock projects in rural areas, and small scale artisan and commercial activities suited to upper primary and junior secondary students could serve as the practice through which to introduce students, not only to the world of work, but also to practical environmental issues. A complete curriculum built around environmental matters would go a long way to making education more relevant, interesting and effective.

Using the Schools for Practical Environmental Work

At the secondary and tertiary levels, practical environmental work should serve as one of the core ways in which the students and teachers begin to engage their communities and the world of work. Teachers can teach their students to take environmental measurements of air and water purity, of soil loss and restoration, of crop damage and renewal, of deforestation and afforestation, of the incidence of illness and accidents that may be related to environmental hazards, and so on. Moreover, they can engage in active environmental preservation and restoration as part of their schooling. For example, their practicums could include Intensive Pest Management, school and community clean up activities, recycling, reforestation, terrace building, experimental cropping, experimental crop fertilization and pest control, water control and purification, wildlife management, planning and guiding eco-tourism, urban clean-up and management of water supplies, waste disposal and recycling, and many other activities.

Tertiary faculties and students could carry out the laboratory work, the research designs and the analyses of experiments and the evaluations of environmental preservation and restoration activities that they and secondary students and staffs carry out. They should also teach primary and secondary teachers to carry out their own environmentally related instruction.

The Importance of Girls' and Womens' Environmental Education

Education of girls will become increasingly important since environmental protection will be successful, not only because of the decisions and actions of specialists, but also, because it will depend even more heavily on the behavior of the citizenry in conducting their day-to-day affairs. The influence of mothers on their families will be the most powerful medium for inculcating attitudes and habits in the millions of children and young adults whose behavior will affect the environment. Beyond this, the added personpower of females in actually carrying out environmental projects of the sort discussed above will make them increasingly feasible to do and will promote their success.

The Differences Between the Developed and the Developing Worlds with respect to the Environment

Most people in the developed world are beginning to recognize that the Environment is globally vulnerable. They are beginning to worry that what happens to it in Africa *will* affect the rest of the world. Ironically, probably more educated First World people are aware of the threats to biodiversity, wildlife, and air purity and of deforestation, the greenhouse and ozone effects than they are about the plight of Africa's people.

In the developing countries most of the people are still necessarily concerned about getting pure water, about increasing the land they can put into production, and about improving marginal livings regardless of what agriculture, commerce and industry do to the environment.

Growing population pressure, the drive to utilize forests and other marginal lands for agriculture, and to overfish the seas, and the growing slum urbanization of African cities will require that environmental educators be much more locally analytic about realistic preservation and restoration possibilities than they have been heretofore. This problem will be aggravated because it will be exceedingly difficult:

- o for impoverished economies to provide adequate energy, transportation, communications and marketing infrastructures,
- o to create adequate water supplies and waste management,
- o to formulate and promulgate effective regulations,
- o to devise functionally powerful controls and incentives that will motivate the people at large to preserve the environment,
- o to institute effective controls and incentives for entrepreneurs and managers that can complement or counteract the competitive pressures to increase incomes at environmental costs.

Professionalizing Environmental Workers

To be effective environmentalists and environmental educators will need to understand the realities of life in Africa and will need to tailor their inventions and messages accordingly. In contrast to what has happened in general African education, in order to protect the environment, it will be necessary to educate the great *majority* of the populace to make them aware of what each individual realistically can and should do, and of the pressures communities can apply to government and industry in the real economic circumstances of their lives.

This will require that government and NGO officials who are responsible for environmental protection and restoration become fully professional and sophisticated about environmental matters. It is to be hoped that we will not make the same mistakes in environmental education as were made in general education. Environmental protection is still an immature area of professional endeavor. Most of the people working in

it have migrated into it from agriculture or other related professional areas and are not yet fully aware of the whole range of matters that characterize professional expertise in more mature realms.

Most government efforts in sub-Saharan Africa have consisted in forming offices or committees to develop strategic action plans and curricula still modeled on those of developed countries. Most environmental education in sub-Saharan Africa to date has been piecemeal technical training for a few officials and superficial general education modeled on the conceptions and concerns of the developed world. Few officials have received a thorough environmental education. Fewer still have the professional expertise to develop institutions that can effectively formulate and implement strategic environmental programs tailored to their own situations. This calls for major curriculum development efforts in each nation for the sophistication of African professionals at all levels of environmental concern.

INADEQUATE COMMUNITY PARTICIPATION IN EDUCATION

In functioning democracies education ultimately, if not immediately reflects the will and the needs of the people. Sub-Saharan Africa has largely been ruled after independence by single powerful leaders or by oligarchies deeply dependant on the extractive economies. As we have seen education has not been entirely relevant to the needs of most of the populations.

Despite some rather widespread instances of community involvement in local school committees, most sub-Saharan parents have little say in defining curricula, in hiring and firing teachers, or in the evaluation and governance of headmasters, teachers, supervisors and other education officials. Education has become the domain of the educators rather than the students. Pre-literate parents are generally fearful of engaging educated people in any critical capacity because they fear that they don't know what they're talking about. Until recently most African parents were pre-literate; over half of them still are. Even when they had legitimate concerns many parents felt reluctant to confront the educational establishment with them, partly out of insecurity and partly for fear the teachers would take umbrage at their children. Most parents with children in school feel that the educators must know more about what they are doing than laymen do, and they entrust their children's educations completely to the education establishment. The ultimate consequence of this sense of inferiority is that the majority of their children spend relatively little time on the tasks of learning, and what little time they do spend is spent inefficiently.

Any attempt to reform education to make it more relevant, efficient and effective should include serious efforts to sophisticate parents and other community members with respect to standards of performance and outcomes to which educators should be held by the communities for whom they work. Parents should, not only, be concerned with their children's progress, but should be enabled to measure progress by means of continuous assessment reports early enough for them to take action to help in remediating failures, rather than having to depend on the annual or end-of-school examinations that come in too late to permit any remedial recourse.

The Need to Create Learning Communities

To be effective, education for democratization needs to preserve harmony, fellow-feeling and cooperation rather than to generate conflict between parents and teachers. When parents understand and sympathize with the problems teachers encounter, and offer support, teachers will be motivated to do their best for students. In short, education reform should include local democratization which creates learning communities that enable parents and teachers mutually to exert informed influence over local schooling.

Although some African teachers have begun to focus on the development of the child, most are still concerned with teaching subject matter rather than children. One important element of educational reform will need to be the development of attitudes towards children which respect the children's personalities as children. Not until teachers take into account their full humanity and their individual

psychologies, styles and needs in the teaching/learning process will fully effective education take place. Eventually parents, out of concern for their children's health and well being, and for their future livelihoods, will engage the education systems about the quality of the whole of their children's educations. When they become informed about educational possibilities, standards and ways in which to influence the practice of education, they will exert their influence to improve the attitudes and behavior of teachers and other education officials, and they in turn, will tend toward more effective education than is now the norm. This happy outcome can be accelerated by appropriate human rights education programs.

The authoritarian nature of most African central governments has not eradicated village democracy that still persists despite two centuries of colonial and post colonial administrative manipulation by external central authorities. However, pre-literate, unenfranchised and militarily powerless villagers have few means by which to influence the decisions and actions of representatives of authority who are stationed in their regions, including headmasters and teachers, or the central authorities themselves. Serious attempts to change authority-community relationships toward greater democratic control will require participatory education about human rights which creates dialogues among officials, NGOs, citizens, educators, and the media. Effective human rights education would lead the parties to discuss the values that enhance human well-being, and the practical steps that can be taken in their own social-political-economic contexts to promote well being. In the context of school improvement, stakeholders should discuss locally as well as nationally, the measures that will protect the safety and health of their children as a platform for further discussion about the curricula that will enable their children to become responsible adults who are capable of making livings in the global economy, and of performing the civic duties that make societies work for the benefit of their citizens.

If improved education and environmental action are to be seriously entertained, nations will need to mount public education programs to encourage people to become informed about their own and others' rights and obligations. Such education needs to empower local communities by making them aware that they *should* influence national and regional environmental and educational policies, and it should motivate them to become informed about how to do so.

These are by no means the full set of problems that beset African education, but they convey much of the difficulty one faces in trying to improve its access, equity and quality.

III. LESSONS LEARNED

Before we discuss future strategies it would be worthwhile to look to past mistakes and successes. We have learned a great deal about educational development in the last half-century. Hindsight may help us envision a future with some measure of practicality. A look at what has happened will help to focus us on the current realities that must be taken into account in planning for the future.

If one were gifted with the knowledge we have now, what would one have done differently between 1945 and 1995 to create appropriate education systems in sub-Saharan Africa?

First, one would have had the prescience to understand that with the population explosion, industrialization of agriculture and globalization of the economy, it was becoming impossible to sustain the numbers of people who were being born and surviving by farming as an occupation. Therefore, there would have been an attempt to accelerate development of the modern manufacturing and service sectors as well as to make agriculture more productive. Since business capability (as opposed to management) is not well taught in schools, but is still learned mostly through apprenticeships, it would have been wise to import as many businesspeople as possible, and partner them with native citizens as happened in much of East Asia.. The purpose would have been, not only, to develop industry, finance and commerce in the largely pre-capitalist and pre-literate agrarian societies which obtained then, but also to provide practical education on a wide scale in these matters.

Second, one would have introduced universal basic education as rapidly as feasible in an uncluttered curriculum that permitted students to become thoroughly literate and numerate. The instructional system would have stressed mastery learning. The overarching purpose of basic education would have been to guarantee that every child would become an eager reader, adept at arithmetic and a happy, curious learner, a person who was a capable and willing self-learner. Beyond that every avenue of cost/effective information dissemination would have been used to support lifelong learning, including increasingly available higher schooling, distance learning, and non-formal education.

Third, one would have introduced a testing and recruiting system to find all the inherently brilliant children, young people and adults one could. Education systems should have concentrated on educating all three groups in accordance with their learning needs and capabilities.

Exceptionally able adults would have been made literate and numerate and given intensive, extensively thorough (not short course and workshop) training in crafts, industrial and commercial methods, business, finance and management. At the same time they would have been educated in the humanities, in values stressing human rights, in an understanding of the responsibility to conduct socially responsible government and civil affairs, in the utility of egalitarianism in protecting human rights, and in the utility of the orderly processes of democracy. The schooling form, particularly for adults would not have been Western style colleges, but some combination of work and study, with heavy reliance on well managed distance education with appropriate tutorials, mutual self-study groups and minimally appropriate residential study, once people had become thoroughly literate. A rigorous system of continuous curriculum based testing and feedback would have been necessary to guarantee mastery.

The brightest young adults would have been groomed not principally for verbally based academic and civil service careers, but more frequently, for business careers, and managerial and professional vocations. They too, after longer periods in some combined form of work and school would have been graduated to high-quality distance education programs wherever feasible, involving both work and academics.

The most intelligent young children would have been given the same grounding in literacy and numeracy as all other children, and in company with them, but would have also been given enrichment opportunities to permit them and their societies to take advantage of their special learning abilities. They would have been enlisted in helping their peers and juniors to learn as well.

All children would have been given high quality basic education through the fourth grade at first, and then as wealth grew, through the sixth, seventh and ninth grades. Secondary schooling would have been added gradually in keeping with increased GDPs and labor force needs. From the outset the most gifted (rather than the most wealthy) would have been provided with subsidized secondary, tertiary and professional schooling until highly qualified leadership cadres were prepared in each region of each country.

A massive publication program would have been undertaken to sustain literacy. Comic books, photonovels, penny dreadfuls, big little books, cheap thrillers, romances, newspapers, hobby magazines, all on the cheapest paper available, would have been disseminated as cheaply as possible everywhere, subsidized if necessary to gain acceptance, as literacy developed in the population. Entertainment publications would have been supplemented by an equally widespread program of how-to-do it publications, offered in the cheapest possible form, again subsidized if necessary, until the majority of the populace read for pleasure and self-improvement.

A widespread program of PVO based clubs and associations, like 4-H, junior businessmen, crafts clubs and the like, encouraging technical and vocational activities in agricultural, commercial and industrial arts would have been promoted. Private profitmaking and non-profit vocational training programs like that undertaken by the YMCAs and the correspondence schools in the US at the turn of the century would have been encouraged.

Apprenticeship programs and other low cost forms of vocational training like vocational training centers, industry-wide, and individual company training efforts would have been encouraged and supported by government policy, incentive programs and subsidies.

Governments would have established regional or Africa-wide Bureaus of Standards for products, performance testing, safety, and environmental protection.

A system like the US Land Grant Colleges, and agricultural, and polytechnical colleges would have been established to link research and advanced education to extension services, factories and workshops.

First-quality regional, trans-national universities, engineering and professional schools requiring high levels of resources and expertise would have been established and fostered for the brightest and most qualified students. Highly competent graduates for the complex professions and businesses--doctors, engineers, business managers, financial specialists, actuaries, and other professionals requiring both high intelligence and qualifications would have been produced at a rate commensurate with the needs of the growing economies. Governments would have used market indicators as well as more conventional manpower planning methods to inform investment policies.

Teacher education and training would have concentrated on learning the core subjects well, and on the practical pedagogy of literacy, numeracy and the other core subjects rather than on theoretical subjects. Respect for the learning abilities and styles of children would have been inculcated by linking pedagogical training to education in child psychology. Teacher training institutions would have developed and maintained close links to schools so that faculties could teach material relevant to the schools and methods pertaining the realities of the classrooms, for example, overcrowding, multigrade instruction, scarcities of teaching materials.

Active teaching/learning methods promoting teacher-student, student-student and teacher-teacher interactions, active participation by girls as well as boys, and by parents as well as students, critical thinking, independent thought, and problem solving and higher cognitive activities like interpretation, adaptation and application would have been introduced by means of participatory methods to teacher training and to the schools.

As for the schools themselves, they would have had adequate, if not ample supplies of learning materials including texts that helped teachers to instruct effectively and students to learn efficiently. Publications would have been as cheap as possible and would have abjured the expense of color, useless illustrations and heavy stock in favor of sufficient space devoted to well organized and well presented information. Schools would have had sufficient furnishings to meet at least threshold conditions for learning, i.e., tables and benches for all students and teachers, chalk boards, shelter from the elements, water and sanitary facilities.

Modern instructional methods would have been introduced as they were in East Asia, chiefly by use of print and graphics supplemented by radio. Instructional design elements like classroom management, cooperative learning, clearly defined objectives, well designed instructional strategies, conceptual integrity, careful sequencing from simple to complex learning, distributed learning, continuous feedback and frequent positive reinforcement, practice and review, maximum time on learning tasks, and horizontal and vertical curriculum reinforcement would have been taught to teachers and incorporated in teaching/learning materials.

Universal mastery learning, supported by continuous curriculum based assessment, would have been incorporated as a normal part of the instructional design throughout the schooling system. High standards like 80% mastery by all, rather than the 40% and 50% standards that are now in use would have become the norm.

Headmasters would have been trained to manage personnel, finances, and materials and most importantly, to provide instructional leadership. Headmasters (like all other leaders) would have been appointed and furnished training on the basis of merit and capability rather than favor or relationships.

Supervisors would have been trained in modern instructional techniques, appointed on the basis of merit and rewarded for coaching teachers and headmasters to improve instruction and management rather than simply to police compliance with formalistic requirements such as record keeping.

Ministries of education would have been kept lean. Management information systems would have employed objective learning achievement information and information about the conditions of learning in the schools that affect achievement instead of the reams of useless, unusable and unused demographic data that lie mouldering in the dim recesses of education ministries. Education officials would have been trained to use effectiveness information (achievement) and efficiency information (repeats and dropouts) to detect problems, supplemented by empirical action research to diagnose causes and remedies. Experimental factorial research methods seeking causes and effects rather than correlational research methods seeking associations would have been instituted as the modal research paradigm.

National testing programs would have been divided into two parts. One would have sought diagnostic information about the pace and amount of mastery learning. The other would have been used to select students for scarce, higher schooling and job placement. One would have concentrated on basic mastery and information about the factors inhibiting it like teacher and student absences and lack of learning materials. The second would have concentrated on a combination of cognitive and motor aptitudes, enriched achievement accomplishments, and data on work habits and character. The two purposes would not have been confused.

Educational planners would have faced the fact that only a small portion of any adult human group including teachers and headmasters is truly creative, innovative and inventive. They would have recognized that human talents and accomplishments, like virtually all other characteristics, follow the normal curve. Half of all teachers in a nation are below average. Much of what most people learn they forget unless they employ the learning in their work or play. Teacher training would have been designed by brilliant specialists who understood the nature of human learning, were familiar with the realities and vicissitudes of third world classrooms, and understood the problems of teaching. Teacher training would have been highly structured, full of practical application and structured to give ample opportunity to learn and practice adaptation to varieties of student behaviors.

Teacher and headmaster trainees would have been imbued with an ethic and culture of close consultation, teamwork and mutual support in the face of scarcities and difficulties. Provision would have been made for uninterrupted learning in the primary grades by arranging for substitute teachers when needed, by timely payment of salaries, by living wages, by minimizing travel distances and other difficulties for both teachers and students.

Governments would have made it easy for out-of-school learners to qualify for legitimate certification by providing out-of-school means for self-instruction and a system of objective equivalency tests.

Finally, but first in practice, communities would have been encouraged to participate and contribute heavily to their children's schooling in significant ways--by providing facilities, furnishings and supplies, teachers' housing, salaries or salary supplements, and most importantly, by being encouraged and empowered to engage in informed, participatory governance. Parents as well as teachers and supervisors would have been made aware of standards of teaching practice and measures of learning outcomes, and they would have been encouraged to influence teachers, headmasters and the education establishments at large to provide relevant, efficient and effective education. Where national or provincial systems could not furnish adequate education, parents would have been encouraged to obtain education privately for their children.

IV. ANTICIPATING THE FUTURE

It is estimated that the population of sub-Saharan Africa will rise to 1.2 billion by 2025. Some demographers estimate that the figure will be closer to 1.5 billion. The school age population will probably triple between 1994 and 2025. Some 250 million young people between the ages of 15 and 25 will be alive in 2025. Of these, between 25 and 30 million can be expected to be in secondary and tertiary schools. At today's employment rates at least 150 million will be unemployed, underemployed or self-employed. If the trend to economic growth with lagging employment persists, more than that number can be expected to be unemployed. Furthermore, if the trends to leave rural for urban areas, and to leave agriculture for industry and services persist, even greater numbers of both these young people and their elders will be without jobs or working in sub-minimal jobs earning inadequate incomes.

If sub-Saharan Africa's growth in GDP lags even behind its recent low rates, its absolute income per capita will be lower than it is currently, and the gap between its income and the income of the industrialized world will increase. Therefore, the costs of imports to sustain infrastructure like electrical, communications, and transport systems will rise, thus leaving even lower proportions of wealth available for the costs of health, education, defense and all other forms of public and private consumption.

The overwhelming future reality will be an enormously increased population with three times as many people of school age as there is now. They must find ways to make a living. For that, it will be necessary to educate vast numbers of students so that they can produce goods and services which are salable internationally as well as domestically.

The worst threat to the African population is armed strife, and societal anarchy and chaos which prevents even emergency assistance. To prevent localized or widespread chaos will require, not only, enough food and goods, but also, a level of individual and governmental social responsibility which controls behavior sufficiently to permit civil society to function. This will require that every educational instrument available be exercised--traditional and introduced religious education, moral, spiritual, ethical, civil, formal and informal, even military education and training.

SOME MAJOR TRENDS THAT WILL AFFECT WORK AND EDUCATION

The following trends will affect the conditions in which educational improvements will take place. Some will aggravate existing problem; others promise to alleviate them:

- the further development of the global market economy in which capital finds cheap labor; this will probably bring additional work and wealth to sub-Saharan Africa as well as greater demands for education,
- the growing impact of technology on the competitiveness of production which makes even cheap labor uncompetitive with cheaper machinery, chemistry and now, biological engineering; this will probably increase agro-industry and reduce employment in agriculture, but may increase employment in ancillary industries like food processing,
- the burgeoning information and communications explosion; in the near term should make it easier to educate and train specialists like ministry personnel and teachers where electricity is available, and investment in terminals of all kinds is cost/effective; in the longer term this will contribute to all adult education by improved and more convenient distance methods,
- the growing industrialization of agriculture which displaces people and drives them toward manufacturing and services in cities, hence

- increasing urbanization will make education more readily cost-effective because greater concentrations of students can lead to better utilization of resources, more easily implemented teacher training programs, and so on,
- economic growth without commensurate growth in employment, will raise unemployment and underemployment and reduce public and private funds available for education; will place greater pressure to increase productivity of teachers and others by means of various technologies,
- increasing opportunities for the cheapest labor on the one hand, and for the best educated labor on the other, while middle levels of labor must find niches in relatively poorly paid services; will encourage, increasingly, an economic strategy of no-frills, but effective basic education for the majority, and concentration of information resources like interactive multi-media instruction, CD ROM libraries for small numbers of specialists,
- growing awareness and concern for the need for environmentally sustainable development; will encourage greater relevance in primary, secondary and tertiary curricula; students, teachers and professors will deal with practical applications of skills and knowledge regarding real life matters in rural and urban areas,
- growing awareness of the need to allow market forces to operate in order to achieve sustained economic development; will dictate greater resort to user fees for education at all levels; will encourage private schooling which is in general cheaper and better; will call for reallocation of government functions to, for example, establishing standards instead of implementing programs,
- growing awareness that displaced labor must be afforded new work and career opportunities or social security; may dictate public works programs like the old CCC which will both help to build necessary infrastructure and provide conditions for disciplined education and training for young (and older) adults; may make it feasible to use electronic technology like audio and video cassettes for basic education and vocational training,
- increasing electrification and reduced costs of solar power and batteries; will make it increasingly feasible to use technology to enhance educational productivity; implies a long-term strategy in which such technology is used first for specialist education, then on gradually increasing scale for more general education,
- increasing automation and reduced costs of information processing and transfer; costs of information that can be created automatically will be reduced, but there will be increased costs of information depending on human creativity as scarce creativity is mined to feed growing electronic capability; there will be danger of bad instructional programming being foisted on educational consumers and a need to establish new kinds of standards,
- increasing personal mobility; will raise the numbers of people who need to be educated in towns and cities, may call for portability in instructional materials, that is, increased availability of self-instructional material and qualifying equivalency tests,
- increasing population pressure in the poorest parts of the world,
- increasingly cheap manufacturing and agricultural productivity as a consequence of technology while certain services like child and elder care, health care and education remain labor intensive; most unskilled, semi-skilled and otherwise abundant labor will be poorly paid relative to those who perform highly valued, highly skilled work; this implies that the most cost/effective means must be found to educate and train low- skilled workers, since economics will drive funds and resources toward the production of highly skilled workers.

- increasing instability where people are unemployed or lack sufficient income to sustain dignified life; this implies increases in military expenditures and personnel; this may be turned into a virtue if the military is used to furnish cost/effective education and training and to build infrastructure that can be used in the civilian economy.

Some Possible Future Scenarios

If Africa is lucky its four great natural advantages will come into full play in the next three decades. These advantages are:

- Its proximity to Europe's prosperous population, and the increasingly wealthy populations of Western Asia and South America,
- Its climate; its warmth and long growing season,
- Its low cost labor,
- Its mineral wealth.

Assuming that African nations can stave off strife long enough to enable economic growth to resume, (and if by great good fortune South Africa becomes an engine of development for much of sub-Saharan Africa) it is likely that certain industries will generate wealth and place demands on the education sector. This is not meant to be an a comprehensive discussion, but an illustrative one which sets the stage for speculation about what might be done to improve the productivity and quality of education.

New biological engineering will improve the quality and supplies of crops which will be increasingly in demand in Europe, Western Asia and South America. These may be the foundations of extensive food-processing, fiber, pharmaceutical and cosmetics industries. The best hope will be that more private and public income will be generated, but these developments cannot be expected to absorb much of the enormous anticipated increase in Africa's rural population into the agricultural labor force, since modern agriculture is likely to be industrialized. Some numbers will, of course, be employed in the new industries, and their new wealth will be shared with others who engage in services to them and in domestic manufacturing for them.

There is likely to be increased demand for semi-skilled and skilled farm laborers, engineers, and researchers, managers, manufacturing operatives, commercial and domestic service workers, transportation and communications workers, construction workers and maintenance personnel. As income is generated there is likely to be demand also for furniture and household manufacturing workers in wood, metals, glass, plastics and sanitary ceramics. There will also be increased demand for secondary and tertiary teachers.

Three of the aforementioned advantages may facilitate a growing textile industry. As the East and South Asian nations' labor becomes too expensive one can predict that African labor will be the next in line for the highly mobile textile industry if quality standards can be met. The dynamism of the fashion industry dictates a high degree of adaptable hand labor. Proximity to populous prosperous markets will probably reinforce the cheap labor advantage of Africa.

If this industry matures it will require highly skilled CAD designers and sample makers, vast numbers of semi-skilled machine operators, skilled maintenance personnel and mangers and large numbers of unskilled porters, packers, shipping people: It will generate employment in the ancillary textile manufacturing industry, and in the simpler machine tool industry necessary to produce spare parts and such relatively simple machines as cloth cutters, pressers, box makers.

This industry can absorb large numbers of primary school graduates and drop outs. It will also call for modest numbers of secondary school trained maintenance workers, and skilled operatives in the

ancillary machine tool industries. As wealth is generated it too will create demand for services, construction workers and domestic products.

One can foresee major developments in the heavy and light metals industries, although there will probably be declining demand for miners as new mechanical and chemical processes automate production. The metals industries will generate demand for skilled operatives and maintenance personnel, engineers, researchers and designers as well as shop floor supervisors and other managers. If this industry develops there will be concomitant development in the heavy and light transport industries for ores and finished products.

There will probably be a substantial increase in the tourist and resort industry as the prosperity of Europe and the rest of the developed world affords people more leisure and money to travel. Africa's natural beauty, its unmatched wildlife and climate will generate a great deal of winter tourism from North and South America and East Asia. The development of this industry will generate vast demand for both trained service workers like chefs and office personnel, and for unskilled labor like waiters, chambermaids, laundry workers and drivers. It will generate large demand for auto rental and bus workers, including unskilled vehicle handlers, semi-skilled office workers and skilled maintenance mechanics. It will generate more modest demand for semi-skilled tour guides and park workers and skilled musicians and entertainers. If the industry flourishes it will generate ancillary crafts and souvenir, resort clothing, and recreational equipment manufacturing.

One can foresee a significant forest management and forest products industry to produce pulpwood, construction and furniture materials. This industry will absorb relatively modest numbers of semi-skilled forest workers, transport workers and mill operatives, considerable numbers of semi-skilled and skilled cabinet makers and carpenters, and small numbers of biologists, chemists and other researchers.

These industries will absorb many primary school graduates and dropouts and more modest numbers of secondary school trained maintenance workers and tertiary trained researchers, technicians and engineers.

Finally, one can foresee the development of an electronics assembly, small appliance and large appliance manufacturing industries with their large demands for semi-skilled and skilled workers.

All of the industries mentioned above will require their share of complex professional workers like accountants, lawyers, and brokers. There will also be a growing number of computer operatives, maintenance personnel and trainers.

There probably will not be a demand for manual data processors as the information industry undergoes further automation, for example, the increased use of smart cards in place of conventional credit cards.

STRATEGIES FOR THE FUTURE

The people themselves will need to play the major role in their economic betterment. Governments are unlikely to have enough money to provide the infrastructure, planning and programs that will be needed. This is true of education as well as other sectors. Governments will need to provide the impetus and facilitation that makes it feasible for people to be productive, but probably will not be able to do much more. Reductions in military expenditures and manpower are unlikely given the pressures that are building from population increases and declining economies. Military or quasi-military organizations may be used to good advantage to increase educational and training productivity.

The Importance of Literacy

For the people to educate themselves they must be given a truly sound foundation in literacy. This means not only reading skills but also the lifelong reading habit. This can only be accomplished early in

life with young people in the schools, and it must be reinforced by plentifully available and affordable reading matter. After that, formal and non-formal distance methods employing both electronic media and print can be highly cost/effective. It should be understood that distance education relies most heavily on print and graphics. Radio, TV and other electronic means are used as ancillary methods to motivate, pace, model and explicate where print is less effective. Virtually all computer based applications also require literacy.

The Promise of Informal and Non-formal education

Soon after independence much hope was placed in non-formal education as a means to develop widespread literacy. This proved not to be very effective. After it was realized how difficult and generally unsuccessful adult literacy programs were, donors and governments put their hopes in more costly formal school systems. The difference between developing adult literacy and other non-formal programs was not understood. Developing reading skill in adults requires highly disciplined, sustained effort somewhat analogous to the excruciatingly taxing effort a paralyzed stroke victim must make to regain motility. Once people are literate, well designed non-formal learning requires much less effort. Expert instructional designers make use of interesting, entertaining, even gripping information about vocational, professional, avocational matters or for personal or family improvement, the appropriate subject matter of non-formal education. With the real possibility of improved health, income or social status as motivators, well designed and well implemented non-formal education programs promise to succeed where literacy training failed.

At about a 50% literacy rate Africa may be at a kind of educational take off stage. The highly cost/effective methods of formal and non-formal distance education are likely to be the most potent way to educate both specialists and the general adult population.

Optimal Use of All Available Educational Resources

It will be necessary to use meager resources in the most/cost effective, least wasteful ways. School properties should not be left idle. People with skills should be employed fully. Children's time should not be wasted on digressions and diversions when they need to be learning to cope with a difficult world. Resources like humor, song, poetry, human interest, animal lore, fantasy, suspense should be brought into play in learning basic skills, both to provide a measure of relief from the humdrum and to make learning fun. Instructional technology should not be diverted into expensive, electronically infeasible, or logistically impossible avenues when more robust vehicles like print and audio cassettes are available.

Programs should take advantage of peoples' natural bents. Literacy should be reinforced by having students write about their own family and village histories. Children should exercise their knowledge of arithmetic by measuring their homes and gardens. Anything that people will see as guarding their own or their family's health should be used to teach or reinforce learning. Peoples' tendency to gamble, to play lotteries, should be used in the learning process as well as to raise funds for education, e.g., through raffles and lotteries. Contests with big prizes should be run for educational achievements, for example, play writing contests about primary health care, or environmental restoration. People should be recognized and rewarded for meritorious achievement, for example, school of the month programs, contests on local production of teaching aids, improvements in achievement scores, reductions in absenteeism.

Utilizing the Great Potential of the Teaching Force

We must deal with realities rather than wishes. The reality needs to be faced that millions of teachers now in place are not competent to fulfill their roles. It is both futile and undesirable to attempt to bypass them because they need to accomplish socialization as well as cognitive teaching, and they need to do the former using the vehicle of the latter. Further, as far as we know all electronic media have failed in the schools as a principal means of instruction. This is not because they are instructionally faulty (though they can be) but because they have been too expensive or logistically infeasible. Some can be

used to good effect as teaching aids. The use of computers in teaching has thus far been problematic in the North as well as in the developing world. For example, in a Norwegian study it was found that after two-years only 50% of teachers who were taught to use computers felt comfortable in using them for pedagogy. Only 15% actually felt confident enough to create their own programs.

Until teachers' performance is improved they will absorb resources wastefully and by their presence block effective instruction. Yet they represent the most potentially useful resource if they can be motivated and shown how to improve their work. The solution is not to require of them what they cannot do, but to assist them to improve what they can. Most of them cannot create sound instructional approaches or materials. But they can follow them if they are available, attractive and handy, for example, lessons fully worked out on posters for both students and teachers to see and follow. The technology of instruction is well understood and can be applied in practical ways to enhance teacher performance.

Modern management and organizational development principles can be brought to bear on improving teacher productivity. Teamwork and natural hierarchy can be used as motivators and forces for self- and group improvement. Headmasters must be appointed and trained adequately to marshal these now largely fallow resources. But leaders cannot accomplish the impossible. Schools must be provided sound teaching materials, and teachers and all other educators must be taught how to use them to good advantage.

It needs to be understood that the quality of those entering the teaching force will not improve until teachers' pay is competitive with other professional careers. That will not happen until GDPs are greater than they are now, and until the societies need the products of teachers' work to create even greater wealth. In the meantime it is necessary to work with the not inconsiderable talents of the extant teaching force.

The Realistic Problems of Improving Teaching Performance

A serious note of realism needs to be emphasized here. Although hundreds of thousands of African teachers are undoubtedly first rate, most African teachers are not well prepared. Unlike most international educational planners, the author and his staff have worked in several African, Asian and Latin American countries directly with teachers outside the cities in attempting to develop complete sets of primary instructional materials, assessment measures, and teacher, headmaster and supervisor training programs, in addition to centrally directed management information systems, distance teaching programs and organizational development programs. In our experience, most rural and many urban teachers, more so in Africa than elsewhere, are ill equipped to teach effectively at the primary level.

We have found that most international educators working in bilateral and multilateral education programs overestimate teachers' real qualifications, in part because they take as valid, certifications of dubious quality, but more so because their experience has been confined to working with highly qualified, often brilliant, African officials who have risen to the peaks of their education systems. Few educational researchers and planners have worked directly with typical, ordinary teachers in any extended way.

It is worth telling of a typical actual experience in order to emphasize the importance of the following paragraphs. In one development project we were assigned a pool of 50 selected teachers from which to select 15 to work on the development of primary education materials. After a month of practical work in which we found that some teachers were barely literate, we were able to select 13 individuals for further training. After three months of intensive training which included much practical development work, we found that four could work independently with only modest editorial supervision. The remaining nine lacked sufficient knowledge of their subjects or sufficient writing skill ever to be able to contribute significantly without total rewriting by expatriate editors. This experience was not atypical.

The current supply of capable teachers (in contrast to teachers who are certified as qualified) in Africa is inadequate to meet the demand, and most teacher training programs with which we are familiar are not capable of producing truly qualified teachers, partly because so many of the students who enter the teacher training institutes are badly educated, and partly because of the various inadequacies of the teacher training programs themselves.

Improving Teacher Performance by Practise with Detailed Teaching Materials

The teaching performance of the millions of teachers in being and in formation can be improved by providing teachers with sound instructional technology, by furnishing them with detailed, optimally sequenced materials, by teaching them how to use the materials and how to manage their classes, and by providing them with the leadership to see to it that they do so. This does not mean workshops on abstract theory or the provision of a few samples of exemplary teaching with exhortations that they use their creativity to generate similar ones. It also does not mean that groups of unprepared teachers take in each others' laundry. It means providing all teachers a detailed road map of the instruction that must be done in the curriculum to get from A to Z. Those few who are more creative need not follow it. They can fly their own routes. For those in training now, and in the future and for the millions of impoverished incumbents such detailed, day by day delineation of what to do will help them produce a population with enough basic education to fulfill short-term economic requirements, and to be able to continue learning as needed to participate in developing their economies further over the long-term.

Centering the Curriculum on the Environment

To make learning truly relevant and meaningful to students core subjects including reading, math, science and social studies should centered on their environments. This will make learning more cognitively connected to what students already know, more interesting and more useful to them than the traditional curriculum. It will make learning basic skills and knowledge easier. This is the principal way in which to effect curriculum reform from academic, subject matter centeredness to learner centeredness. The environment should not be introduced as a separate topic, but should be integrated into all other subject matter so that each subject becomes more relevant. The following math and social studies example illustrates what we mean by integration:

If the objective is to induce students to learn division by two numbers, they will be asked to show how to divide a field, or a plant nursery or their own classroom into spaces used for different purposes.

To take the example of the classroom as our own--the children will be asked to play families. They will be asked to divide the classroom into houses for the families, and the houses into rooms for family members in pairs. In later examples they will occupy the rooms in groups of three, four and five. They will learn how many rooms are needed for families with various numbers of children by actually occupying the spaces designated as rooms. Thus a family with two children will be assigned one room for parents and one for the two children. A family with four children, a mother and father will get three rooms, and so on.

The same game can be played with different species of farm animals or plants, with possessions like stores of grain, fruit, books or any other objects. It could be done with pebbles or dots and circles on the chalk board, but as the objects become less meaningful and more abstract, the learning becomes less meaningful. Fast learners may grasp the concepts readily with the abstract examples however, the majority of learners will need more trials to master them when the abstract examples are used. Moreover, positive environmental impact is lost when the abstract method is used. The curriculum fails to establish the deep meaning of the environment--the everyday aspects of the world in which the children live-- by allowing children to induce environmental concepts while learning everyday skills in dealing with natural tasks and problems.

To illustrate environmental learning combined with math learning further. The children will be asked what they should do to house all the people in the classroom when erosion, fire or flood destroys some of the houses. They solve the problem by counting real people in their own families and by allocating individuals and families to the remaining houses that can be shared with the displaced persons. The discussion can lead the children to consider what causes such disasters and what

can be done to prevent them. A similar scenario can be centered on the question of what should be done when locusts or other pests eat up all the stored grain belonging to some of the families; or half of it or a quarter or a third and so on.

The reader can see how developing a curriculum around the environment and using active learning methods affords the teacher an opportunity to deal with numbers and social problems and concepts such as ideas of fairness, compassion and justice at levels suited to second and third graders. If one pursues this example, it can be seen how questions about the just allocation of resources, and the establishment and conduct of social and political institutions and regulations to effect just and effective uses of the environment can be introduced as the children become more mature and can deal with such concepts.

Improving Ministries of Education

We need to face the fact that Ministries of Education are also full of wasted human resources. They too have the potential for becoming more useful. Donors should undertake serious organizational development programs including effective staff training. This does not mean one- and two-week certificate workshops or three-day retreats. It implies highest level backing for serious analyses of structural and functional failings, followed by participatory staff training and problem solving. This in itself implies programs to raise awareness of educational leaders like Ministers, Secretaries and DGs about modern instruction and the requirements for effective and efficient human learning. It then demands staff training in these same basics followed by their participation in long-term problem-solving and design activities moderated by well trained, sophisticated facilitators who are armed with conflict resolution skills as well as group facilitation capabilities. These activities must be undergirded by field work in schools and communities, and reinforced by intensive technical training programs that would prepare officials to carry out their duties effectively, for example, technical training in the design and use of accounting systems, instructional materials or management information.

It may be worthwhile to invest in really good multimedia programs to raise awareness in ministries and to furnish technical training, but these should not be confused with the need to engage in face-to-face organizational problem-solving and staff development.

Environmental Curriculum Development and Instruction at Senior Levels

To educate and professionalize individuals who are responsible for environmental matters requires curriculum development efforts which are tailored to the actual environmental state in each nation and region. We can only suggest the generic topics in which officials should become expert. These topics must be tailored to local conditions for instruction to telling..

People who are responsible for environmental protection and restoration, and for environmental education should be really expert, in the following range of topics:

Major topics that should be covered concerning the basics of environmental protection:

Fundamental environmental issues such as population growth, deforestation, desertification, soil degradation, pollution (air, water and soil), agricultural development, industrialization, urbanization.

Methods of assessing environmental risks and impacts, risk management, evaluating compliance with regulations and standards; methods of national resource accounting; techniques and instruments used in mapping and measuring.

Major environmental issues and conflicts: differences in concept about the environment and approaches to environmental protection and restoration; differences related to population,

health, sustainable agricultural, industrial and commercial growth; public and private interests; market forces and government planning, regulatory and control functions.

Special problems of rapid urbanization including water pollution, transportation and air pollution, solid waste management, and land management.

An overview of worldwide problems, international agencies, national government and nongovernment actors on the environmental scene, and global and regional agreements and actions with respect to the environment.

Major topics that should be covered concerning institution-building for environmental management and administration:

Setting goals and priorities; establishing environmental institutions and associated management functions; practical stakeholder analysis.

Designing and establishing information systems for environment protection; choosing and developing geographic and mapping approaches.

Designing environment-related job/career structures, personnel functions such as recruitment, job design, training, evaluation, assignment and advancement.

Designing environmental research, training and education programs, and public information functions and activities including use of media, and public fora.

Enlisting the private sector, and the general public in environmental protection; developing government-nongovernment relations and activities; enlisting traditional and modern sector institutions and associations; identifying and enlisting conflicting interest groups.

Assessing and managing environmental impacts and risks.

Formulating and developing practical, implementable policy, legislation, standards, and regulations.

Administering environmental programs; methods and resources needed for implementing policy and for enforcing legislation, regulations and standards.

Economic and non-regulatory incentives for pollution control, conservation and restoration.

Financing environmental protection and recovery; taxation, loans, bond issues, relations with donor agencies, public-private equity arrangements, land-use, resource-use arrangements, debt for equity exchanges, licensing, and royalties.

Mediation and dispute resolution involved in all phases of environmental action from goal setting to enforcement and public education.

Contracts, grants, and endowments.

National and sub-national relationship with international organizations, transnational companies, bilateral and multilateral arrangements; international sources of information, funding, training, technical assistance and networking.

A Note on Educational Finance

Insofar as possible financing should be done at both the grass roots and central levels. It would be futile to furnish the funds to communities or families to pay for education locally or privately until the supply of competent teachers and truly suitable teaching/learning materials has been much expanded. Therefore, central or even regional development efforts that do not give short shrift to improving the supply should be financed and staffed appropriately. At the same time, local financing should be done to enable communities and families to exercise competitive pressures to raise standards and competencies. This can be done through donor assistance to some degree, but needs to be done on a massive scale by giving local jurisdictions the right to levy taxes and engage in other revenue generating measures. Donor assistance might be better leveraged by concentrating on creating the supply, and by inducing central governments to truly devolve authority as well as responsibility to the periphery. It needs to be emphasized that the local competencies to create local competency also needs to be financed and developed.

RECOMMENDATIONS

Primary and Secondary Education

As a feasible and practical interim measure, since virtually all primary schools use essentially the same core curricula, the donors ought to mount an international program to produce the complete primary core curriculum centered on the environment. The environment should be fully integrated into the core subjects. These materials should be complete in that they include all topics in language arts, math, science and social science and are produced for each lesson in each topic. They should be really excellent model learning materials, embodying all that we know about effective instruction. They should be modularized so that children can learn in small groups and at their natural paces. Each lesson unit should contain assessment methods so that the teachers and pupils can determine progress. Each lesson should be branched to permit slower learners to catch up and to provide faster learner with enrichment. The materials should be produced both in maternal and national languages. They should be created by the world's best experts. As a preliminary step, it will be necessary to develop principles for integrating environmental matters into the traditional core subjects, so that instructional designers can be furnished with guidance and prototypes. They should be published as cheaply and distributed as widely as possible.

The new materials should be virtually self-instructional so that teachers can follow them regardless of special training, since inevitably, substantial numbers of teachers will miss whatever training is given. Nevertheless, a full scale teacher training program should be mounted to make the materials fully useful and used. The training should be furnished both pre-service and in-service to all who need to know how to use the materials including faculty of teacher training institutions, supervisors and other education officials who need to make plans and policy decisions about their use.

If such a program is carried out properly, we can expect to break into the self-perpetuating cycle of bad teaching-bad learning-bad teaching that is impeding African education. The competence of teachers and other educators will rise to world class standards if the programs are fully implemented rather than half-stepped.

The investment that a program of this sort will require is miniscule compared to the benefits that will accrue in bettering the lives of hundreds of millions of people, giving them a better chance to participate in the global economy, and helping to preserve and restore the environment for all of us.

A similar program should be undertaken for general secondary education.

Well designed print and graphic material should serve as the basis for well designed computer or other electronic programs which will become feasible over the next twenty or thirty years as electricity becomes more widely available, and instructional devices like video and audio cassettes, CD's, learning terminals, and PCs become cheap enough to use and maintain in massive numbers.

During this interim period, after the basic instructional designs for high quality instruction have been prepared for print, adaptations for audio and video cassettes, and for multi-media interactive delivery should be prepared, in that order. These should be prepared for both teachers and students. The material prepared for students should be the basis and focus of the instruction prepared for teachers. They should be made available for use initially for pre-service teacher training as soon as teacher training facilities can afford to get, operate and maintain the needed equipment.

Vocational and Technical Education and Training

Donors should assist the sub-Saharan nations to determine human resources requirements by means of market indicators and appropriate surveys in order to plan for appropriate investment policies for vocational and technical training. Recent findings indicate that many different cost/effective study paths have been taken by people in employment in the modern sector. These have included vocational secondary schools, on-the-job training, apprenticeships programs, industry sponsored training programs, vocational training centers and various combinations of these.

Computer and interactive multimedia simulation training has proven to be cost/effective for training to operate and maintain very costly equipment. A ten or twenty thousand dollar investment in training devices is highly cost/effective in preparing workers to deal with a piece of equipment worth a million dollars.-Generally, because of the high cost of programming training, only the most affluent firms have been able to mount such training in the industrial countries. It may be wise for donors to help groups of sub-Saharan nations to undertake joint regional investment programs in such advanced training, especially as major infrastructural or production investments are contemplated.

Tertiary Education

Tertiary education in sub-Saharan Africa needs major reform and expansion. The nations need a vast network of effective technical schools, and the private sector as well as governments should be encouraged to develop them. The multinational companies should be encouraged to pool resources to help in establishing and staffing polytechnics perhaps in connection with their businesses, but not limited to their own interests. The private sector should be given incentives to develop high quality technical colleges which will be sustained by user fees. A student loan system suited to African levels of affordability should also be instituted.

The nations would do well to organize or reorganize two tiers of first rate regional universities. The first should be devoted to research and to the preparation of faculty for other universities and colleges. The second group should emphasize teaching of professionals, businesspeople, and managers who will practise in their economies. Both tiers should be fully equipped with modern libraries, laboratories, and computer systems, and should be staffed by both African and expatriate professionals of highest caliber.

Modern information and communications systems should be fully exploited to keep these universities fully abreast of developments all over the world which will contribute to their own strength and to the development of sub-Saharan economies.

Multi-media instructional capability should be developed for tertiary subjects. Some excellent examples already exist, and this literature will grow rapidly in the developed countries, but they will continue to be expensive for another half-generation. However they will soon be useful in expanding tertiary capability within the nations. They are currently affordable for regional tertiary schools that may be charged with producing cadres of highly qualified professionals.

All teaching/learning materials should be prepared for audio and video cassette together with suitable print materials as a first step in any program. These can already be distributed to large segments of tertiary students and faculties. Multi-media interactive materials should be made available to regional schools on a subsidized basis and to other institutions on a commercial basis, but schools should not be encouraged to invest in equipment or programs until they are truly able to sustain cost/effective instruction by these means. The third world landscape is littered with unused and unusable instructional equipment. Donor sponsored programs to subsidize tertiary schools for brief periods just short of their own capability for sustainment would be useful to make faculties literate in these forms.

Distance Education and Training

Full scale distance learning programs from basic primary through tertiary education and out of school adult self-improvement should be prepared for literate older drop-outs and adults. Equivalency testing programs should be carried out to permit people to gain reentrance to school or terminal certification.

Environmental Education

Officials of government and non-government organizations should be trained to develop strong institutions that can effectively engage the public in environmental protection, restoration and education. A generic model curriculum might be developed for this purpose with donor support, but it should be adapted to local needs in order to apply it in each nation and region. Education systems should be utilized as a resource for both environmental education and action. Environmental education can become the core around which education more relevant to the masses of African students can be developed. This will require considerable curriculum reform. As has been suggested earlier, donors should sponsor development of a model generic curriculum that each nation could adapt to its own conditions.

Community Involvement and Human Rights Education

Education programs should be prepared and used to help to develop learning communities which will engender mutual support for and involvement in effective school governance and practise. In connection with this human rights education should be encouraged in an effort to help local communities together with governing authorities, the media, educators and other professionals promote human rights, included the right to effective education, in the context of their own social and cultural environments. Absent an effective education program of this sort, it will be difficult to engage informed community involvement in education effectively.

TWO FINAL CAUTIONARY NOTES

All forms of corruption need to be eliminated or reduced, including corruption in the textbook industry. There is no need for hardcover, multicolor, lavishly illustrated textbooks published by First World firms. We have seen 100 page textbooks where 9 full-page, four-color illustrations of cows were used to pad out the texts while the texts themselves lacked exercises, reviews, self-tests, summaries, appropriate illustrations, or for that matter thoughtfully presented stimuli, carefully sequenced to move mastery learning along at students' learning rates. Some education officials have made fortunes on sweetheart deals with publishers.

Donors need to understand how hungry profit-making firms are to do good as well as to do well for themselves, and how persuasive salespeople who believe in their products can be. They will, with the best intentions, attempt to manipulate donor agencies into getting governments to invest in glamorous technologies which are demonstrably highly effective under controlled conditions. They usually do not understand the vicissitudes of Third World learning environments that prevent the technologies from working in vivo. But these vicissitudes are manifold and should be thoroughly examined before large scale technology is advocated or bought. Again and again investments have been made in promising

technologies that failed. The older generation of education officials have become gun-shy. They have become too cautious and are prone to reject technologies that should be considered for special uses where conditions can be controlled. However, younger education officials who have no memories of failure are more readily lured by technological magic bullets.

APPENDIX A

Discussion of Tables

In only two of the 47 countries in sub-Saharan Africa have both the economy and education continued to grow through the 1980s. In Mauritius and Seychelles, education and per capita GDP continued upward throughout the 1980s and 90s. Most children of primary school age are enrolled in school, and a majority of them complete primary schooling. Their average real per capita GDP is \$5720 and \$4191, respectively. However, their combined population is only 1.2 million persons. Two other countries, Botswana and Gabon, with a combined population of 2.9 million also appear to have continued to enjoyed significant growth in the 1980s, but not much improvement in schooling. A fifth nation, South Africa (pop. 38.9 million) with a relatively high average per capita GDP of \$4865 in 1990 suffered a drop in per capita GDP. With the exception of Swaziland whose per capita GDP was \$2384, and Congo with a per capita GDP of \$2362, the rest of Africa had average per capita GDPs ranging from \$309 to \$1743 in 1990. Although many economists argue that these figures are too conservative since much economic activity in the rural areas is not counted in these figures, it is clear that there is insufficient money available for imported energy, other commodities and debt repayment needed to grow the economies. African participation in global trade has fallen from 4% a decade ago to 2% currently.

The gap in average per capita real GDP between most sub-Saharan African nations and the industrialized North has been widening since 1985¹. (The figures in this section are presented in Tables I to XI in Appendix A.) By 1960, aside from South Africa, the countries had attained average per capita real GDPs ranging between 5% and 17% of the average GDP of the North. Between 1960 and 1990 the gap in average real GDP had diminished for only six nations with a total population of 31 million people. The gap in average GDP had enlarged for the nations with the rest of the 500 million sub-Saharan people.

Table II, which shows the gap between mean years of schooling between the North and the sub-Saharan countries, shows a roughly parallel picture. By 1960 only Seychelles with a population of fewer than 100,000 had attained as much as 50% of the mean years of schooling of the North. Mauritius and South Africa had attained to 41%. Lesotho, Swaziland, Cameroon and Ghana had reached between 30% and 35% of the mean years of schooling of the North. Most of the rest of the sub-Saharan African nations had attained between 1% and 22% of the mean years of schooling of the North. Since then the gap in mean years of schooling diminished between 1960 and 1990 by a few percent only in three nations, Swaziland, Lesotho and Zimbabwe (4%, 4% and 7%, respectively.) In the rest of sub-Saharan Africa the gap has remained static, either remaining the same or rising or decreasing by one or two percentage points. Since the mean years of schooling for the industrial nations is about 10 years, and has remained approximately at that number between 1960 and 1990, a movement of one or two percent in the gap is of no practical consequence.

Thus, it is clear that in sub-Saharan Africa, for the vast majority of people, despite increased enrollments in primary and secondary schools, the average mean years of schooling has remained somewhere between one-tenth of a year and two years. Since averages mask realities, it should be understood that these mean years of schooling represent vast numbers who have had no schooling as well as the considerable numbers in some nations who have had substantial schooling.

Table III shows the gross primary school enrollment figures for 1990 by country. Eight nations with a combined population of some 30 million people, for which figures are available, show enrollments of over 90%. Additionally nine nations with a combined population of 134 million show enrollments over 70%. Eight nations had enrollments between 52% and 59% (population: 92 million.) Six nations with a combined population of 36 million had enrollments below 45%. Sixteen nations whose population was 255 million failed to report primary enrollment figures. Their enrollments are unlikely to be high.

¹Tables are presented in Appendix A.

As can be seen from Table IV, the reported average primary school completion rate for sub-Saharan Africa was 62% of those who entered first grade. The nations reported primary completion rates ranging from 8% to 98%. Only three nations with a combined population of 9 million showed over 80% completion for enrollments of over 80%. Twelve countries showed over 50% completion for gross primary enrollments of 50% to 80% (combined population: 94 million.) Seventeen nations with a combined population of 165 million people reported completion rates below 50%. Thus nations with approximately 430 million people either had completion rates below 50% or failed to report enrollment rates.

These figures fail to reveal the most significant fact about sub-Saharan education. Achievement for most students, regardless of the number of years of schooling they complete, is low compared with nations in the industrial world.

Table V shows a total secondary enrollment in 1986 of 13.6 million students (aside from those in South Africa.) In 1990 an average secondary school gross enrollment ratio of 17% was reported for sub-Saharan Africa. The range was from 3% to 53%. Seven nations with a combined population of 32 million reported over 30% enrollment in secondary school. Sixteen nations, with a total population of 315 million, reported enrollments between 10% and 21%. The remaining 180 million people lived in nations that either did not report secondary enrollment or had secondary enrollments of less than 10%. Of these over half, nations with 122 million reported enrollments of less than 10%.

Of the 13.6 million sub-Saharan Secondary students outside of South Africa in 1988, the World Bank Statistical Tables reported that 7% were in teacher training. The Human Development Report which includes South Africa, reported that 7.5% were in vocational training in 1990. About 87% or 11,888,000 secondary students outside South Africa were in general secondary education in 1986. Figures for secondary school completion are not readily available. The Human Development Report indicates that the repeater rate is 17%.

Table VI shows an average gross tertiary enrollment rate of 2% for sub-Saharan Africa in 1990. Sixteen countries with a combined population of 208 million had enrollments of 3% to 5%. Eight countries with a combined population of 104 million had a 2% enrollment rate, and ten countries with 132 million people had a rate of 1%. Twelve nations failed to report tertiary enrollment rates (population: 96 million.) In 1986 the total tertiary enrollment in sub-Saharan Africa was 673,000 (aside from those in South Africa.) Almost one-third of the students were in Nigeria which has approximately one-fifth of the total sub-Saharan population. The tertiary graduation rate was 0.2% of those who entered first grade in sub-Saharan Africa as compared with 9.4% in the industrial countries.

Table VII shows the distribution of tertiary students. 61% were in the arts, including education, social science, commerce and business, and 37% were in science including natural science, 10%; medical sciences, 10%; math and engineering, 12%; and agriculture, 6%. Thus, one person each in about 8,500 is studying natural sciences and medical sciences; one person in about 7,000 is studying math and engineering and one person in about 14,000 is studying agriculture at the tertiary level.

Country	GDP %AGE 1960	GDP %AGE 1990	CHANGE IN PERCENTAGE
Mauritius	21	40	19
Seychelles			0

Table I
GDP for sub-Saharan Nations as a Percentage of the
Average GDP of the Industrialized Nations (North = 100)

Country	GDP %AGE 1960	GDP %AGE 1990	CHANGE IN PERCENTAGE
South Africa	56	34	-22
Botswana	10	24	14
Gabon	17	29	12
Cape Verde			0
Swaziland	9	17	8
Lesotho	5	12	7
Zimbabwe	13	10	-3
Sao Tome + Principe			0
Congo			0
Kenya	12	16	4
Madagascar	10	7	-3
Zambia	14	5	-9
Ghana	16	5	-11
Cameroon	11	7	-4
Namibia	11	11	0
Cote d'Ivoire			0
Tanzania	16	9	-7
Comoros			0
Zaire	7	3	-4
Nigeria	12	8	-4
Liberia	10	6	-4
Togo	9	5	-4
Uganda	7	4	-3
Rwanda	5	5	0
Senegal	16	9	-7
Ethiopia	6	3	-3

Table I
 GDP for sub-Saharan Nations as a Percentage of the
 Average GDP of the Industrialized Nations (North = 100)

Country	GDP %AGE 1960	GDP %AGE 1990	CHANGE IN PERCENTAGE
Malawi	5	4	-1
Burundi	9	4	-5
Equatorial Guinea			0
Central African Rep	13	5	-8
Mozambique	17	7	-10
Sudan	14	7	-7
Angola	19	6	-13
Mauritania	9	7	-2
Benin	13	7	-6
Djibouti			0
Guinea-Bissau			0
Chad	10	4	-6
Somalia	10	6	-4
Gambia	9	6	-3
Mali	9	4	-5
Niger	6	4	-2
Burkina Faso	6	4	-2
Sierra Leone	6	8	2
Guinea	9	3	-6
Regional Average	14	8	-6

Table II
Mean Years Schooling For sub-Saharan Nations as a
Percent of the Average in Industrialized Nations (North = 100)

Country	%AGE 1960	%AGE 1990	Change in Percentage
Mauritius	41	41	0
Seychelles	51	46	-5
South Africa	41	39	-2
Botswana	22	24	2
Gabon	27	26	-1
Cape Verde	22	22	0
Swaziland	33	37	4
Lesotho	30	34	4
Zimbabwe	22	29	7
Sao Tome + Principe	25	23	-2
Congo	22	21	-1
Kenya	22	8	-14
Madagascar	22	22	0
Zambia	29	27	-2
Ghana	36	35	-1
Cameroon	36	35	-1
Namibia	15	16	1
Cote d'Ivoire	19	17	-2
Tanzania	19	19	0
Comoros	11	10	-1
Zaire	16	16	0
Nigeria	11	12	1
Liberia	18	20	2
Togo	16	16	0
Uganda	11	11	0

Table II
 Mean Years Schooling For sub-Saharan Nations as a
 Percent of the Average in Industrialized Nations (North = 100)

Country	%AGE 1960	%AGE 1990	Change in Percentage
Rwanda	11	11	0
Senegal	8	8	0
Ethiopia	11	11	0
Malawi	19	17	-2
Burundi	3	3	0
Equatorial Guinea	9	8	-1
Central African Rep	11	11	0
Mozambique	18	16	-2
Sudan	8	8	0
Angola	16	15	-1
Mauritania	3	3	0
Benin	7	7	0
Djibouti	3	3	0
Guinea-Bissau	3	3	0
Chad	2	2	0
Somalia	2	2	0
Gambia	5	6	1
Mali	3	3	0
Niger	1	1	0
Burkina Faso	1	1	0
Sierra Leone	9	9	0
Guinea	9	8	-1
Regional Average	17	16	-1

Table III Gross Primary School Enrollment Ratio	
Country	%AGE
Mauritius	99
Seychelles	
South Africa	
Botswana	100
Gabon	
Cape Verde	100
Swaziland	100
Lesotho	100
Zimbabwe	
Sao Tome + Principe	
Congo	
Kenya	
Madagascar	
Zambia	
Ghana	
Cameroon	95
Namibia	
Cote d'Ivoire	61
Tanzania	69
Comoros	68
Zaire	81
Nigeria	
Liberia	
Togo	92
Uganda	84
Rwanda	94
Senegal	52

Table III Gross Primary School Enrollment Ratio	
Country	%AGE
Ethiopia	59
Malawi	
Burundi	80
Equatorial Guinea	
Central African Rep	62
Mozambique	75
Sudan	58
Angola	
Mauritania	48
Benin	71
Djibouti	44
Guinea-Bissau	56
Chad	54
Somalia	
Gambia	54
Mali	23
Niger	32
Burkina Faso	36
Sierra Leone	
Guinea	32
Regional Average	83

Table IV Average Primary School Completion Rate	
Country	% of Grade One Entrants
Mauritius	98
Seychelles	
South Africa	
Botswana	87
Gabon	44
Cape Verde	66
Swaziland	53
Lesotho	
Zimbabwe	
Sao Tome + Principe	
Congo	
Kenya	44
Madagascar	31
Zambia	80
Ghana	
Cameroon	68
Namibia	
Cote d'Ivoire	73
Tanzania	68
Comoros	31
Zaire	64
Nigeria	84
Liberia	
Togo	46
Uganda	
Rwanda	46
Senegal	81

Table IV Average Primary School Completion Rate	
Country	% of Grade One Entrants
Ethiopia	44
Malawi	47
Burundi	87
Equatorial Guinea	
Central African Rep	48
Mozambique	34
Sudan	76
Angola	
Mauritania	68
Benin	40
Djibouti	89
Guinea-Bissau	8
Chad	30
Somalia	37
Gambia	64
Mali	40
Niger	75
Burkina Faso	63
Sierra Leone	
Guinea	48
Regional Average	69

Table V
Secondary School Enrollment Ratios

Country	
Mauritius	53
Seychelles	
South Africa	
Botswana	47
Gabon	
Cape Verde	
Swaziland	49
Lesotho	31
Zimbabwe	46
Sao Tome + Principe	
Congo	
Kenya	19
Madagascar	18
Zambia	14
Ghana	31
Cameroon	21
Namibia	38
Cote d'Ivoire	12
Tanzania	4
Comoros	15
Zaire	16
Nigeria	17
Liberia	
Togo	10
Uganda	
Rwanda	6

Table V
Secondary School Enrollment Ratios

Country	
Senegal	11
Ethiopia	12
Malawi	3
Burundi	4
Equatorial Guinea	
Central African Rep	6
Mozambique	4
Sudan	17
Angola	
Mauritania	10
Benin	6
Djibouti	12
Guinea-Bissau	4
Chad	3
Somalia -	7
Gambia	10
Mali	4
Niger	4
Burkina Faso	5
Sierra Leone	12
Guinea	5
Regional Average	62

Table VI
Tertiary Level Gross Enrollment

Country	Gross % Enrollment
Mauritius	1
Seychelles	
South Africa	
Botswana	3
Gabon	
Cape Verde	3
Swaziland	3
Lesotho	6
Zimbabwe	2
Sao Tome + Principe	
Congo	2
Kenya	1
Madagascar	3
Zambia	1
Ghana	1
Cameroon	
Namibia	
Cote d'Ivoire	
Tanzania	
Comoros	
Zaire	
Nigeria	2
Liberia	1
Togo	1
Uganda	1

Table VI
Tertiary Level Gross Enrollment

Country	Gross % Enrollment
Rwanda	
Senegal	1
Ethiopia	
Malawi	
Burundi	
Equatorial Guinea	
Central African Rep	
Mozambique	1
Sudan	
Angola	2
Mauritania	0
Benin	1
Djibouti	
Guinea-Bissau	
Chad	
Somalia	
Gambia	1
Mali	
Niger	
Burkina Faso	
Sierra Leone	1
Guinea	
Regional Average	2

Table VII
Distribution of Tertiary Students 1986

Country	Arts:				Science:					Other:
	All	Education	Social Science	Busi	All	Natural	Med	Math	Agri	
Mauritius	73	44	7	22	27		5	16	6	
Seychelles										
South Africa										
Botswana	90	37	53		10	10				
Gabon	71	7	50	14	28	2	9	15	2	1
Cape Verde										
Swaziland	65	4	42	19	35	20			15	
Lesotho	91	68	13	10	9	8	1			
Zimbabwe	90	71	19		10	3	3	2	2	1
Sao Tome & Principe										
Congo	81	13	68		16	6	5		5	4
Kenya	44	26	10	8	56	6	5	40	5	
Madagascar	56	3	53		44	17	16	11		
Zambia	57	27	23	8	39	15	6	12	6	4
Ghana	54	4	35	15	42	11	9	14	8	4
Cameroon	70	8	38	25	29	12	3	7	8	
Namibia										
Cote d'Ivoire	68	26	38	4	32	10	13	8	2	
Tanzania	39	14	18	8	60	1	6	43	10	1
Comoros										
Zaire	53	29	17	7	40	4	14	16	6	7
Nigeria	54	15	34	5	43	15	11	12	6	3
Liberia	61	8	14	39	39	9	1	24	5	
Togo	70	2	46	21	30	12	11	2	5	
Uganda	64	24	18	22	33	10	4	14	5	4
Rwanda	64	9	41	13	36	9	10	13	6	

Table VII
Distribution of Tertiary Students 1986

Country	Arts				Science					Other
	All	Education	Social Science	Busi.	All	Natural	Med.	Math	Agri	
Senegal	58	3	56		42	20	18	2	2	1
Ethiopia	56	15	18	23	37	6	7	13	11	7
Malawi	73	57	8	7	27	5	7	6	10	
Burundi	65	36	19	10	29	11	7	5	5	6
Equatorial Guinea										
Central African Rep	74	8	62	4	26	3	17	3	3	
Mozambique	24	6	18		76	5	11	38	22	
Sudan	73	4	69		27	4	6	8	9	
Angola	36	1	34		64	7	20	31	6	
Mauritania										
Benin	75	5	68	2	25	10	4	8	3	
Djibouti										
Guinea-Bissau										
Chad	88	11	78		12	12				
Somalia	72	48	18	5	26	6	6	5	8	2
Gambia										
Mali	58	28	8	22	42		10	15	17	
Niger	70	9	62		30	7	9	7	6	
Burkina Faso	67	1	50	16	33	6	7	7	13	
Sierra Leone										
Guinea	28	27		1	72	41	5	14	12	
SSA w/o Nigena	66				33	9	9	12	6	2

TABLE VIII
Labor and Urbanization

Country	Percentage of the Labor Force in						Urban Population as % of Total	
	Agriculture		Industry		Services		1991	2000
	1965	1989-91	1965	1989-91	1965	1989-91	1991	2000
Mauritius	37	19	25	31	38	50	41	42
Seychelles								
South Africa	68	48	11	14	21	37		66
Botswana	88	43	4	5	8	52	28	42
Gabon		75		11		14	46	54
Cape Verde		52		23		25	29	36
Swaziland		74		9		17	33	45
Lesotho	91	23	3	33	6	44	20	28
Zimbabwe	79	64	8	6	13	30	28	35
Sao Tome + Principe							33	
Congo	66	62	11	12	23	26	41	47
Kenya	86	81	5	7	9	12	24	32
Madagascar	85	81	4	6	11	13	24	31
Zambia	79	38	8	8	13	54	50	59
Ghana	61	59	15	11	24	30	33	38
Cameroon	87	73	4	5	9	22	41	51
Namibia		43		22		35	28	34
Cote d'Ivoire	80	65	5	8	15	27	40	47
Tanzania	91	85	3	5	6	10	33	47
Comoros		83		6		11	28	34
Zaire	82	71	9	13	9	16	40	46
Nigeria	72	43	10	13	18	44	35	43
Liberia	79	75	10	9	11	16	46	57

TABLE VIII
Labor and Urbanization

Country	Percentage of the Labor Force in:						Urban Population as % of Total	
	Agriculture		Industry		Services			
Togo	78	65	9	6	13	29	26	33
Uganda	91	86	3	4	6	10	10	14
Rwanda	95	90	2	4	3	6	8	11
Senegal	83	31	6	6	11	13	38	45
Ethiopia	86	80	5	8	9	12	13	17
Malawi	92	82	3	3	5	15	12	16
Burundi	94	92	2	2	4	6	6	7
Equatorial Guinea		66		11		23	29	33
Central African Rep	88	83	3	3	9	14	47	45
Mozambique	87	85	6	7	7	8	27	41
Sudan	81	62	5	10	14	28	22	27
Angola	79	73	8	10	13	17	28	36
Mauritania	89	69	3	9	8	22	47	59
Benin	83	70	5	7	12	23	38	45
Djibouti							81	84
Guinea-Bissau		82		4		14	20	25
Chad	92	83	3	5	5	12	30	39
Somalia	81	76	6	8	13	16	36	44
Gambia		84		7		9	23	30
Mali	91	85	1	2	8	13	19	23
Niger	95	85	1	3	4	12	20	27
Burkina Faso	90	87	3	4	7	9	9	12
Sierra Leone	78	70	11	14	1	16	32	40
Guinea	87	78	6	1	7	21	26	33
Regional Average	79	67	8	9	13	24	31	38

TABLE IX
Labor Force Production as a % of GDP

Country	Agriculture	Industry	Services
Mauritius	12	33	55
Seychelles			
South Africa	5	44	51
Botswana	3	57	40
Gabon	9	49	42
Cape Verde			
Swaziland			
Lesotho	24	30	46
Zimbabwe	13	40	47
Sao Tome + Principe			
Congo	13	39	48
Kenya	28	21	51
Madagascar	33	13	54
Zambia	17	54	29
Ghana	47	16	37
Cameroon	27	28	45
Namibia	11	38	51
Cote d'Ivoire	47	27	26
Tanzania	59	12	29
Comoros			
Zaire	30	33	37
Nigeria	36	39	25
Liberia			
Togo	33	22	45
Uganda	67	7	26
Rwanda	38	22	40

TABLE IX Labor Force Production as a % of GDP			
Country	Agriculture	Industry	Services
Senegal	21	18	61
Ethiopia	41	17	42
Malawi	33	20	47
Burundi	56	15	29
Equatorial Guinea			
Central African Rep	42	17	41
Mozambique	64	15	21
Sudan			
Angola	13	44	43
Mauritania	26	29	45
Benin	37	15	48
Djibouti			
Guinea-Bissau			
Chad	38	17	45
Somalia	65	9	26
Gambia			
Mali	46	13	41
Niger	36	13	51
Burkina Faso	32	24	44
Sierra Leone	32	13	55
Guinea	28	33	39
Sub-Saharan Africa	22	35	43
The Industrial World	4	37	59

Table X Development Gaps Between sub-Saharan and the Industrial World Expressed as % of the Industrial World (North = 100)				
Category	Index for sub-Saharan Nations			
	1960	1990		
Real GDP per Capita	14	8		
	1970	1990		
Adult Literacy	28	47		
Primary/Secondary	26	46		
School Enrollment				
Economic Production per Capita: Industrial vs. sub-Saharan Nations 1990				
		Real GDP		GNP
Sub-Saharan Nations		\$1,200		\$490
Industrialized Nations		\$14,400		\$14,580

TABLE XI Communication Profiles: sub-Saharan Africa and the Industrial Countries				
Category (Per 1000 People unless noted)	Sub-Saharan Africa		The Industrial Countries	
	1990		1990	
Radios	150		1130	
Televisions	23		545	
Newspaper Circulation	11		390	
Telephones	18		590	
Passenger Cars	15		390	
People/Post Office	40620		4200	
	1980	1986-88	1980	1986-88
Telephone Index (North=100)	10	3	100	100