

**RESEARCH IN AFRICAN HIGHER EDUCATION: CHALLENGES AND
MANAGEMENT OPPORTUNITIES FOR REFORM AND SUSTAINABLE
DEVELOPMENT**

Uche G. Emetarom,

*Department of Educational Administration,
Abia State University, Uturu, Nigeria.*

E-mail: uchemeta@yahoo.com

Tel.: +234-803-3496381

Ben. O. Emunemu,

*Department of Educational Management,
University of Ibadan, Ibadan, Nigeria.*

E-mail: doriben7701@yahoo.com

Tel.: +234-803-3242980

Abstract

Higher Education in Africa has made little progress in respect of fulfilling their mandates and missions to generate applied and policy-relevant knowledge as inputs to sustainable national development process. This is attributable to research output, which has lagged behind their training accomplishments. In making these claims, and considering the fact that research is a defining character of higher education and the moving force behind the socio-economic, political, scientific and technological development of any nation, the paper starts by discussing the concept of research. This is followed by an assessment of the importance of research in the overall development of the economies of nations and the global community. It then ex-rays the challenges to research in higher education in Africa. Thereafter, it discusses the management opportunities for research in African higher education for reform and sustainable development. The paper concludes by calling on leaders of African countries and the management of higher educational institutions to adopt, monitor and implement policies that will enhance research amongst other reforms for sustainable development in Africa.

Introduction

There is need for greater understanding of African higher education issues, particularly in research, to formulate appropriate policy responses for sustainable development in the African continent. Higher education, in the context of this paper, is the education which is obtained by choice after successful completion of Post-Basic Education. It is classified into Universities, Polytechnics, Monotechnics, Colleges of Education and Innovative Enterprise Institutions, which have the goal to give high level, relevant manpower training, which will enable individuals to be self-reliant as well as being useful and productive members of the society for sustainable development.

Barnett (1997) posits that higher education can be defined in terms of the level and functions of the educational experience, which the institutions offer. Hence, higher educational institutions are unique institutions, as research constitutes a defining character of higher educational institutions (Saint, 1995). From management perspective, their managers may hold various titles such as Vice-Chancellor, President, Rector and Provost. These persons have control and influence over student services, academic affairs, housing, physical plant, human resources, activities, admissions, financial aid, security and safety, libraries, bookshops, auxiliary services and other operations. These constitute enormous challenges, to which research could be a useful strategy in providing credible information for the solution of varied problems confronting African countries.

It has been emphasized that research is one of the secrets behind the development of any nation. Hence, the United States of America, Russia, Japan, Germany, Norway, Britain, among other countries, owe their developments to research outputs. For instance, in 1999, the Norwegian government established a fund for research and innovation, designed to ensure more stable long term public financing of Norwegian research. Today, Norway creates extensive wealth for sustainable development and thus has a remarkable international position in oil, gas and hydropower. She is the world's third largest oil exporter, and her petroleum industry is her largest industry in terms of wealth-creation. In addition, the Norwegian hydropower expertise is considered to be world leading. In the area of food, Norway is one of the world's largest exporters of seafood and her food industry is the country's largest sector in terms of the number of employees.

There seems to be a general agreement that higher education quality has declined, perhaps significantly, in the last two decades in many African countries (Saint, 1995). This is probably as a result of reduced funding. This trend has its effect on research potentials and also on the expectations of the larger African society for sustainable development. Africa, as a continent, is increasingly in dire need of research as one of the factors for her sustainable development, and research in higher education has been regarded as a vehicle for development. African higher educational institutions, therefore, need to sharpen their potentials toward research.

There is no gainsaying the fact that the level of development to be attained by African countries hinges on the level of their research activities. Obe (2004) asserts that the rate of growth of an economy is usually determined not only by the technical correlates, but also by the ability of the citizens to be scientifically literate and active. National development, and a sustainable one, is expectedly the ultimate target of every responsive and productive government all over the world.

Development has been conceived as a quantitative improvement in the output of goods and services and a qualitative improvement in the quality of life among a population (Baba, 2006). In view of the above concept and nature of development, African higher educational institutions may be dysfunctional if they fail to adjust their focus to research. In recognition of these, there is need to embark on a number of reforms which will re-vitalize research in African higher educational institutions for sustainable development in Africa.

The Concept of Research

The circumstances of man's existence – living with many unknown and undiscovered facts – appear to have endowed man with the natural tendency to be inquisitive and always trying to search for solutions to perplexing problems and answers to unanswered questions. This search can generally be regarded as 'research'. Sadhu and Singh (1997) see research as a more systematic activity directed towards discovery and development of an organized body of knowledge. Emeh (2006) contends that research is a process of arriving at dependable solutions to problems through the planned and systematic collection, analysis and interpretation of data. From the above conceptualization, research

can be said to involve painstaking efforts, particularly of scholars in higher educational institutions, to discover the unknown.

Consequently, research aims at thorough investigation to seek new knowledge, extend, confirm or up-date knowledge in the light of new discoveries. Nnadi (2000) refers to education research as studious inquiry for solving perennial problems in education. Similarly, research in higher education is a study undertaken by means of logical procedure with the aim of discovering new facts and verifying old ones (Odudu, 2007). In the context of this paper, therefore, higher education research is the process of searching for solutions to existing higher educational problems. Therefore, research in higher education is motivated by the urge to solve problems. Hence, one can conclude that without problem situations, there will be no research. However, research in higher education may differ according to types of data needed, the method of data collection, analysis, interpretation of results and the objectives of the research. Whatever the type of research, evidence abounds that higher education research contributes immensely to the progress and sustainable development of any nation.

Importance of Research

Research is a key aspect of the mission of higher educational institutions in Africa. It generates new knowledge, informs the national development process, enriches classroom teaching by grounding it in local realities, and imparts analytical training to participating students. It sets higher educational institutions apart from other educational institutions. It enriches course content and makes it more relevant to local settings. Research participation teaches students necessary professional skills. Most importantly, research enables a society to generate understanding of itself and its problems, which can be used to orient its development efforts (Saint, 1995).

Research in each discipline in higher education brings new ideas, skills and techniques. The importance of higher education research for sustainable development in Africa cannot be over-emphasized, as it advances knowledge, provides solutions to problems, improves educational practices, brings about overall national developments and is therefore a measure of the national development attained by any country.

Challenges to Research in African Higher Education

Despite the importance of research in the overall development of the economies of nations and the global community, research output has lagged behind the training accomplishments of African higher educational institutions. For instance, Eisemon and Davis (1991) found that only three African countries – Senegal, Rwanda and Congo – enjoyed significant growth in the production of scientific papers over the past decade, while many other countries have suffered major decline. Also, Zymelman (1990) observed that Kenya, Nigeria and Sudan account for 70 percent of all African scientific publications. However, these are predominantly in the medical and biological fields, with the physical sciences and engineering being notably under-represented, amongst others. This situation does not seem to have changed significantly in the past decade and a half.

Specifically, it is estimated that African university researchers in the natural and biological sciences produce, on the average, one scientific publication every seven years (Gaillard and Waast, 1991). In general, African higher education has made little progress in fulfilling their mandate to generate and apply policy-relevant knowledge as inputs to national development process. In other words, the research record of African higher education has not met the expectations of the African people and nations. The paper identifies the following challenges, which may have given rise to these situations:

(1) Limited Funding for Research

Financial support for research has been a major victim of governmental and higher educational institutions' budget cutting as the African economic crisis has deepened. The indicators of limited funding are discussed below:

(a) Lack of National Investment in Research

A lack of national investment in research is one major reason for the weak performance in research. As far back as 1964, a UNESCO conference held in Lagos, Nigeria, produced a commitment by participating countries to spend 0.5 percent of their Gross National Product (GNP) on scientific research (UNESCO, 1964). However, forty-five years later, this goal is far from being met and research investment remains abysmally low.

On the average, African countries were estimated to have spent just 0.36 percent of GNP on scientific research in 1985 (UNESCO, 1987). This situation does not seem to have improved in the past two decades. Odhiambo and Isoun (2008) note that more recently, scientific investment may be as low as 0.10 percent of GNP. Since research studies have concluded that research output is directly related to the amount invested in research, a minimum guarantee of national funding for research could be expected to produce positive results. The United States, Japan and the United Kingdom spend 2.3 to 2.6 percent of GNP on research twenty times as much as that spent in Africa.

(b) Lack of Government Allocation for Research to Individual Institutions

At the level of individual higher educational institutions, government allocations for research are often non-existent in universities, colleges of education, polytechnics and monotechnics. For example, a 1990 study of graduate research and development capacity in ten universities by the Association of African Universities (AAU) discovered that only two universities received formal allocation for research in their annual budgets (Nwa and Houenou, 1990). In a subsequent study in 1991, on the cost-effectiveness of another nine African universities, the AAU found that research expenditures represent only 2.7 percent of university budgets. It was also discovered that wide variations in the amounts allocated occurred from one year to another, thus making it difficult to establish and sustain institutionalized research programmes (AAU, 1991).

This situation does not seem to have improved in all universities, with almost two decades after this study, while a reduction in research budget was recorded in some. At the University of Cote d'Ivoire, for example, an already meager research budget was cut into half between 1983 and 1989, which constituted less than 0.7 percent of the university's budget. It was found that research conditions in 16 African countries were characterized as depressed; national demand for research inputs is poorly articulated; little incentive exists for individual researchers. The research performance of Francophone universities was judged to be particularly distressing (Kinyanjui, 1991).

(c) **Foreign Donor Dependency for Research.**

External donors have often endeavoured to offset the lack of government funding for research. In some cases, they have tried to enrich teaching programmes and intellectual environments in higher educational institutions. In other cases, they have been more interested in the specific research product, which is within the context of the donor priorities for a particular country. This has resulted in the increasing role for foreign donors in financing African scientific research. In Kenya, for example, it has been estimated that the ratio of foreign to national research funding is about 10:1 (Eisemon, 2006).

In addition, Kola-Cisse (1999) observed that Africans concerned with this dependency have noted donor tendencies to concentrate support on selected institutions in few countries and to stress short-term analysis of specific problems over the research that is for capacity-building which will have more developmental impact. The impact of such trends on the development of a national research culture is clearly detrimental to the sustainable development of African countries. Under such circumstances, according to Eisemon and Moussa (1991:26), African research runs the risk of becoming:

Science-supported by foreign donors, carried out in a developing country often in collaboration with foreign researchers, supported by international and bilateral assistance agencies and the philanthropic foundation, which is responsive to the donor community's agenda in the Third World, and published in English.

This dependency on external research funding also creates dilemmas for African researchers as to whose interests they should serve. Their decisions may incur the risk of alienation from colleagues and policy makers or from donors.

(2) **Discouraging Environment for Research**

A second cause of low research output and poor quality of many research products has frequently been an environment, which discourages critical investigation, particularly when it is related to national policy issues (Rathgeber, 2001). The larger environment has often not been conducive to the development of serious research. For example, where freedom of expression is circumscribed and critical

thinking is discouraged, it is difficult to create an academic culture that fosters research and that of good quality product.

(3) Deterioration in the Terms of Service of Academic Staff

The parallel deterioration in the terms of service to academic staff has made employment in universities, polytechnics, monotechnics and colleges of education a part-time proposition as full-time staff limit their time on campus so as to pursue outside income-supplementing activities. Even when regulations stipulate increased presence of academic staff at work, university administrators seem to be incapable of demanding compliance with the work day since they are only too familiar with the economic hardships faced by staff. In addition, due to the inadequate salaries earned by staff, particularly in the face of inflation and the many demands on their salaries, they are unable to use part of their income to fund individual researches. Under such situation, research is generally the first activity to be sacrificed.

(4) Absence of Incentive

There is little in the way of incentive or reward to encourage research activity by staff in higher educational institutions. Thulstrup (1992) observed that the absence of such incentive has been regarded as the main obstacle to good and efficient research in most developing countries. Although promotion is often linked to research output in higher educational institutions, particularly in the universities, this criterion for advancement appears to have become increasingly less relevant as increased teaching loads, administrative duties, outdated libraries and low salaries make research and publication almost impossible. In addition, extended time periods as well as the commuting of some academic staff to their institutions reduce the opportunities for academic advancement, and the resulting salary increases may not be justified in terms of their opportunity costs.

(5) Dominance of Consultancy Option by Governments

African governments, generally, do not encourage research undertakings or recognize superior performance in this area. Instead, the pseudo-research produced by quick consultancies is often a financially more attractive option, which is being engaged in by governments and individual academic staff in higher educational

institutions in Africa. Hence, to date, the research performance of African higher education has been deficient, while higher educational institutions have not always accorded research sufficient priority, and African governments must shoulder much of the blame. On the whole, policy decisions on forms of higher education financing and undergraduate enrolment have frequently created disincentives for research and for the graduate training with which higher education is often associated. By not committing themselves to building national research capacity through a supportive policy framework, sustained funding and use of local technical expertise, higher educational institutions inhibit the quality and output of the research enterprise. Higher educational institutions in countries where freedom of expression is curtailed suffer an important extra constraint in this regard. The need, therefore, for management opportunities for reform and sustainable development in Africa cannot therefore be over-emphasized.

Management Opportunities for Research in African Higher Education

Having discussed the challenges to research in higher educational institutions in Africa, the next natural question is “How can this situation be managed, if not reversed?” In seeking and providing management opportunities for research in African higher education for reform and sustainable development, a multi-faceted management strategies are required. Such management strategies include freedom of expression as a condition for critical independent thinking, an institutionalized capacity to promote and manage research, appropriate incentives and rewards for research output, guaranteed minimum funding for research from both governments and donors, and establishment of research networks.

(i) Freedom of Expression and Critical Independent Thinking

Basically, there is need for greater public discussion of the important relationship between research capacity and national development. With increasing trend towards greater political pluralism in various African countries, opportunities for the linkage between freedom of expression, the development of critical independent thinking and quality in research and teaching must be made explicit. Saint (1995) warns that if Africa’s greatest poverty is a paucity of ideas, the cost to a

country that produces a generation of uncritical thinkers will be enormous.

(ii) **Institutional Capacity to Manage and Promote Research**

Higher educational institutions must ensure that they have institutionalized leadership capacity to manage and promote research. Many institutions, at best, have a chairman and members of research committees, who are not functional. The University of Malawi, for example, created the post of Research Coordinator in 1988 to encourage staff to undertake research, to improve the proposal preparation process and to seek external funding for their research undertakings. This resulted in a notable increase in research activity. Ngu (1992) affirmed that the University of Yaounde produced even more impressive gains through new research policies which combined incentives with accountability. Specifically, in the mid 1980s, the University of Yaounde, in Cameroon, found that the quality and quantity of its research was declining. In response to this, a new management strategy for promoting research was instituted. First, accountability for funds spent on research became mandatory. Research grants from the university were awarded to staff on the basis of the scientific value of the research proposal submitted, their relevance to the development of Cameroon, and the research track record of the scientist involved. Annual progress reports were required. Less than 20 percent of applicants received awards, and in this way, competition was fostered.

Secondly, significant investments were made in upgrading the equipment and infrastructure necessary for research. Using 50 to 70 percent of the university's annual budget allocation for research to rehabilitate facilities did this. Six years later, good material conditions were in place for several faculties. This policy paid dividends by reducing the need for scientists to go abroad for research and by focusing research on national needs. In the process, staff improved their research skills. Also, the number of research publications increased by five-fold and the amount of external funding for research quadrupled.

The University of Sierra Leone has established a University Research and Development Services Unit to develop and market applied research and consultancy proposals. The University de

Ouagadougou has created a position of Assistant Dean for Research. Other universities, polytechnics, monotronics and colleges of education and innovative enterprise institutions in Africa should adapt these policy strategies as management opportunities for increasing the output and quality of research in Africa.

(iii) Appropriate Incentives and Rewards for Quality Research Output

Furthermore, a range of incentives and rewards should be offered to encourage not just research, but research of respectable quality. However, national and institutional circumstances must be taken into consideration in determining and applying these. Possible incentives may include prizes, national recognition, computers, paid travel to professional meetings, and eligibility for additional training or study, among others.

(iv) Guaranteed Minimum Funding for Research from both Governments and Donors

Governments, donors and higher educational institutions need to ensure that funds are available to support research and provide for research infrastructure. The AAU (1991) recommends regular budget provisions for research and the maintenance of scientific equipment, a standing 5 percent allocation for higher education libraries, and a more aggressive search for private sector support for research.

(v) Establishment of Research Networks

In recent years, there has been considerable interest in the establishment of research networks especially by donors. These networks have been seen as a viable management strategy for fostering quality research output under conditions of widespread deterioration in individual, institutional and governmental financial capacities and infrastructure. Generally, this management model involves the coming together of a group through identification of talented individuals (colleagues) in an institution or in several institutions who will also be interested in identifying a problem area, doing a proposal, raising funds for the research (most likely through contribution) to cover field travel, equipments, materials, research assistants, publication and dissemination of their research output. A few people in higher

educational institutions practise this strategy; hence consciousness needs to be raised on this, because, currently, the establishment of research networks is mostly donor-driven. This involves the identification of talented individuals in several countries or in a particular country, and directing research grants to these individuals for their work, and this group having periodic meetings to assess and disseminate their research output.

Some of the most successful and promising donor-driven research networks are: the African Economic Research Consortium (AERC), the Educational Research Network for Eastern and Southern Africa (ERNESA), the Educational Research Network for West and Central Africa (ERNWACA) and the Council for the Development of Economic and Social Research in Africa (CODESRIA) with headquarters in Dakar (Tindimubona, 1992). However, although these sub-regional networks have achieved some success in fostering research output at these levels, the establishment of a regional research network is expedient. Emetarom and Enyi (2008) are of the view that a regional higher education management information network system (RHEMINS) can play valuable roles to the entire higher education system in the African region. The authors contend that some of such roles are to provide information and relevant ideas about fund-raising or fund-sourcing and possible solutions to nagging problems. Hence, this opportunity to interact with peers in other institutions and countries in Africa, through RHEMINS, will provide levers for future inter-institutional staff co-operation for joint research of quality output.

Qualified educational researchers in higher educational institutions in Africa should, therefore, seek the membership and influence of these and other notable research networks, in order to foster research that will benefit their nation. Research Networks (individually financed or donor financed) will perform very well where membership is based on individual qualification, rather than institutional status; where the linking research theme is specifically defined to facilitate the emergence of common interest; where quality research publication is an explicitly defined output; and where internal mechanisms for quality control is available. This is to avoid the situation observed in some cases, where networks have been poorly articulated and grounded in local demand, thus creating the risk of becoming "all net and no work".

Networks are attractive, because they offer the promise of good value for money, of combating brain drain and of generating high visibility. They should be and they are attractive to researchers because they break down intellectual isolation, provide opportunities for income and travel and may lead to new paid or self-employment possibilities. As noted earlier, most networks are heavily donor-dependent and hence contribute minimally to institutional or national development.

Conclusion

Research output and quality have lagged behind the training accomplishments of African higher educational institutions. Hence, if African higher educational institutions are to be key contributors to national capacity-building processes, they will have to demonstrate continuing relevance in a rapidly changing world through research for reforms and sustainable development. Continuous communication and feedback between higher educational institutions and employees, for identification of research areas, are needed to ensure that higher education in Africa is responsive to labour market trends. This is because research sets higher education apart and affirms their relevance to society's needs. Research enriches classroom teaching and contributes new knowledge to guide national development efforts.

Recommendations

Consequent upon the foregoing discussions, the paper recommends as follows:

- (1) Regular and increased budget provisions to guarantee a minimum of 2 percent of GNP for research, as national investment by the governments of African countries, taking a cue from the developed economies like the United States of America, Japan and the United Kingdom, if sustainable development is to be achieved.
- (2) African governments, at all levels, should have a paradigm shift and start using the quality research findings by African scholars to achieve reforms for sustainable development.
- (3) The Association of African Universities (AAU) should play more role in the management of research opportunities in universities in Africa, particularly in terms of sourcing funds to

- sponsor the research activities of African scholars for reforms and sustainable development in the African continent.
- (4) The management of higher educational institutions should adopt, implement and monitor new research policies on institutionalized leadership capacity to promote research, which have been applied and found to be successful in other sister higher educational institutions, which have demonstrated strong commitment to research.
 - (5) The management of African higher educational institutions should pursue a policy of aggressive search for private sector research support (for funds, incentives and rewards) and collaboration – in identifying crucial research areas – for sustainable development in Africa. The local business community should be an important partner in funding research in individual African countries.
 - (6) Management of African higher educational institutions should encourage research networks in their institutions to contribute to institutional development and hence stand a greater chance of having research become permanently institutionalized for sustainable development in Africa.
 - (7) A Regional Higher Education Management Research Network System (RHEMRNS) should be established by higher education managers in Africa to facilitate reforms for sustainable development.
 - (8) Management of African higher educational institutions should review their curriculum so that course content will give greater emphasis to the development of critical thinking and problem solving capacities and to impart specific research management and administrative skills to staff and students.
 - (9) African higher education managers should establish a policy of offering, depending on institutional circumstances, a range of incentives and rewards to encourage quality research that will contribute to sustainable development.
 - (10) Individual academic staff of higher educational institutions in Africa should form research networks to break down intellectual isolation, which will enhance research for reform and sustainable development.

References

- Association of African Universities. (1991). Study on Cost-Effectiveness and Efficiency in African Universities. Accra, Ghana: Association of African Universities.
- Baba, J.M. (2006). Population and rural development. In J.M. Baba (Ed). Population Education Monograph. Lagos: Nigerian Educational Research and Development Council, NERDC.
- Barnett, R. (1997). Higher Education: A Critical Business. Buckingham: The Society for Research into Higher Education and Open University Press.
- Eisemon, T.O. and Davis, C.H. (1991). University research and the development of scientific capacity in Sub-Saharan Africa and Asia. In P.G. Altbach (Ed). International Higher Education: An Encyclopedia. New York: Garland publishing, Inc. Kuala-Lumpur.
- Eisemon, T.O. and Moussa, K. (1991). Foreign Assistance for University Development in Sub-Saharan Africa and Asia. Paper presented at the World Bank Senior Policy Seminar on Improvement and Innovation in Higher Education, July 1 – 4, Kuala-Lumpur.
- Eisemon, T.O (2006). Foreign Training and Foreign Assistance for University Development in Kenya: Too Much of a Good Thing?" International Journal of Educational Development 6, 1-13.
- Emeh, U.B. (2006). Funding and Research: Problems and Prospects. Ilorin: Nathadex publishers.
- Emetarom, U.G. and Enyi, D. (2008). Strengthening the management of the Higher Education Systems in Africa: The Role of A Regional Higher Education Management Information Network System (RHEMINS). Retrieved from <http://www.airweb.org/page:asp?Page=1523> on 20th July, 2008.
- Gaillard, J. and Waast, R. (1991). La recherche scientifique en Afrique. Afrique Contemporaine: 148, 24 - 30.
- Kinyanjui, K. (1991). Progress report on capacity-building in Education Research and Policy Analysis. Paper Presented at the Meeting of the DAE Working Group on Higher Education, June 25 – 26, Dakar, Senegal.

- Kola-Cisse, M. (1999). Managing University-Based Research and Research Institutes in Africa: Evaluating the Prospects for Improvement. *Higher Education Policy*. 5 (2) 55- 60.
- Ngu, J.L. (1992). The relevance of African higher education. Paper Presented at a Senior Policy Seminar on Enhancing Effectiveness and Efficiency in African Higher Education. World Bank, Economic Development Institute, March, Harare, Zimbabwe.
- Nnadi, U. (2000). *Education Research in Modern Dispensation*. Owerri: Destiny Books.
- Nwa, E.U. and Houenou, P. (1990). *Graduate Education and R and D in African Universities Accra Ghana: Association of African Universities*.
- Obe, O.I. (2004). Science the Catalyst for Overall Development. *A Journal of the Scientific Products Association of Nigeria*, 8.
- Odhiambo, T.R. and Isoun, T.T. (2008). *Science for Development in Africa*. Nairobi, Kenya: ICIPE Science Press.
- Odudu, P. (2007). *Realities in Education Research: A Nigerian Context*. Owerri, Imo State: Hill-Top Printers.
- Rathgeber, E.M. (2001). A Tenuous Relationship: The African University and Development Policy-making in the 1980s. *Higher Education* 17, 397 – 410.
- Sadhu, A. and Singh, A. (1997). *A Research Methodology in Social Sciences*. Bombay: Himalaya Publishing House.
- Saint, W.S. (1995). *Universities in Africa: Strategies for Stabilization and Revitalization*. Washington, D.C.: The World Bank.
- Thulstrup, E. (1992). *Improving the Quality of Research in Developing Country Universities*. PHREE Background Paper No. 92/52. Washington, D. C.: World Bank.
- Tindimubona, A.R. (1992). *Research, Graduate Studies and Regional Cooperation in African Universities*. Paper contributed by the African Academy of Sciences to the Senior Policy Seminar on Enhancing Effectiveness and Efficiency in African Higher Education. World Bank, Economic Development Institute, March, Harare, Zimbabwe.
- UNESCO. (1964). *Outline of a Plan for Scientific Research and Training in Africa*, Paris: UNESCO.

- UNESCO. (1987). *CASTAFRICA II: Science, Technology and Endogenous Development in Africa: Trends, Problems and Prospects*. Paris: UNESCO.
- Zymelman, M. (1990). *Science, Education and Development in Sub-Saharan Africa*. Washington, D.C.: World Bank.