

Information Technology education and training initiatives - the Nigerian experience.

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Abstract

Nigeria and its 100 million people have made some significant strides in IT education and training. This paper surveys the major efforts made by the Nigerian government and the Nigerian people over the last three decades to work with IT Education and training. Specifically, the paper will describe the two main phases in the collaboration and implementation of IT Education and training. Phase I dates from the early 1970s when Nigerians for the first time got to know about the existence and the potential of the computer. Phase II dates from 1988 when the Federal Ministry of Education, acknowledging the importance of IT, took the first bold step to formulate a national policy for IT education by setting up a committee. For a country as vast as Nigeria, with the well-known constraints and limitations of developing nations, the initiatives have been many but so have the problems.

Keywords

National policies, developing countries, informatics

1 INTRODUCTION

As the world assumes more and more the properties of a global village, the position of developing countries such as Nigeria appears more and more tenuous. Although it is now trite to say so, socioeconomic problems such as the absence of developed infrastructure, lack of funds for investment and the lack of well-trained

human resources are part of the burden that developing countries have to contend with.

While Nigeria and other countries are struggling to lay a foundation necessary for technological takeoff, and, hopefully, bridge the yawning gap that separates us from the advanced technologies of Western Europe, those countries appear to introduce newer and more sophisticated technologies every day. The gap we seek to bridge seems to grow wider every day.

But Nigeria, as well as every country that finds itself in similar circumstances, cannot afford to give up with regard to Information Technology (IT). The debate cannot be whether or not Nigeria needs IT but what should be the fastest path to take in the acquisition of the inestimable benefits that IT has to offer.

So while it is true that Nigeria is presently battling with the every basic necessity for modern existence - the provision of potable water supply for all its citizens, for reliable electricity supply, for telephones and good roads - it is also true that our polity and economy are presently going through very difficult times, and our public and private sectors are undergoing profound and traumatic transformations aimed at putting our political and economic structures on the path of sustainable growth and efficiency. The process of redressing national economies makes it imperative to embrace IT, which has been shown to enhance modern efficient management.

It is necessary to state the background of Nigeria's place in the world in order to present the importance of Nigeria's need for IT as well as the problems involved in planning and executing a viable programme of IT Education and training for my country.

2 EARLY STAGES OF IT EDUCATION IN NIGERIA (1970-1988)

Historically IT, like most modern technologies, took Nigerians unaware. When IBM entered Nigeria in the late 1960s, Nigeria was still very much a backward economy. However a few multinationals and financial institutions in the country considered it appropriate to adopt the computer for their organizations, which were essentially subsidiaries of European or American conglomerates. Nigeria had no time to prepare for the computer or to acquire knowledge about the technology. Intensive in-service training was given to some Nigerians (usually staff already serving in the multinational companies) to enable them to operate the systems.

Universities, especially the first-generation universities and the Federal Polytechnic, quickly responded to the computer invasion. A few of them bought and installed mainframes which they operated in their computer centres. A few Nigerians who had studied mathematics and computer science abroad came home to service the computer centers and, in most cases, establish the Departments of Computer Science. Thus, one observes from the foregoing that:

- The arrival of computer systems and technology in Nigeria preceded the availability of computer skills and knowledge in our educational system.
- The need for computer education came as a response to the demands of the public and private sectors of the economy.

- Computer education, coming after the need for it was manifested in the economy, was a latecomer and some gaps had to be filled. Nigerians were dabbling in an area they knew little about.
- The first-generation Nigerian universities and the four oldest polytechnics were the advance guard for Information Technology in Nigeria.

In the following years, the universities and polytechnics adopted individual staff training strategies aimed at building as speedily as possible sustainable human resources in IT.

Big companies quickly became the source of human resource development for the emerging market in IT in Nigeria. This state of affairs continued until the early 1980s when the explosion in IT occurred, thanks to the arrival of the PC, which meant that computers became cheaper and easier to acquire. The arrival of the PC was preceded by the period of the so-called 'economic boom' - with a general, if misplaced, feeling of well-being and buoyancy. Nigeria had become a major oil producing nation and the price of oil has risen sharply in the world market. Nigerians, demanding free education and the better things of life for the citizenry, had embraced modern ways - resulting in astronomical increases in school enrolment at all levels of educational system.

The quest for education translated into a sharp increase in the number of universities and polytechnics. In 1975, the Federal Government took over the funding of all existing universities and established seven new ones. State governments established five additional universities, bringing the total number of universities in the country to 18 - four of which were universities dedicated to technology.

Most of the new tertiary institutions established departments of computer science and/or computer engineering. But there was nothing that could be called a policy on IT Education and training at the national or state levels in Nigeria. Initiatives taken by tertiary institutions to establish and operate computer science and/or engineering departments were individual initiatives dictated by expediency. The initiatives were aimed at producing human resources in response to the rising demand for trained computer personnel by the ever-growing Nigerian economy.

3 GOVERNMENT STRATEGIES, POLICIES AND INITIATIVES (1988 - 1997)

Initiatives for secondary schools

It was not until 1988 that the Federal Government of Nigeria took the first bold steps to formulate a coherent set of national educational policies and strategies for IT. Then the Federal Ministry of Education set up an Advisory Committee to study the issue of IT's explosion as it affected Nigeria and to make recommendations to government on how best to harness the benefits of IT for the overall development of the country. The Committee was also to offer advice that would enable government to democratize computer literacy at the nation level. The committee submitted its final report, *National Policy on Computer Education*, to the Honorable Federal Minister of Education on August 27, 1988.

The report recognized the need to introduce/incorporate computer studies at all levels of the Nigerian educational system and recommended that computers should be introduced at all levels (including the primary schools), provided the necessary facilities and resources were available.

In spite of the report's optimism, the committee was sufficiently realistic to appreciate that Nigeria could not afford the enormous costs involved in the introduction of IT education in the nation's primary schools at that stage of our infrastructural and economic development.

One can infer from the foregoing that the Federal Ministry of Education had accepted in principle the recommendation of the committee to introduce computer education at the secondary school level and had immediately instituted a pilot programme in the nation's Unity schools, all the federal government-owned secondary schools established in every state of the federation at the rate of two per state. Consequently, the Ministry directed all the Unity schools to begin the teaching about IT from the 1989 session onward. Although it took three years, because of the difficulties that will be discussed later, for the directives on IT to be carried out, the fact remains that computer literacy programmes have permeated not only into Unity schools but also into a large number of other state and privately owned secondary schools.

Initiatives by tertiary institutions

Prior to 1988 the first-generation universities and polytechnics were the first to respond to the imperatives of IT Education and training in Nigeria - only the universities and Colleges of Technology were expected to teach courses in computer science and produce graduates in that discipline. The result was:

- Very few Nigerians had access to tertiary education and only a negligible number were admitted into departments of computer science. Thus only few Nigerians got to be trained in computer technology.
- Social demands for computer-literate Nigerians far outstripped the level of production.
- Since there was no exposure to IT prior to tertiary education, very few Nigerians were conscious of the career possibilities in computer science and very few got to embrace the discipline.
- There was no way Nigeria could achieve the objective of democratizing computer literacy while the policy lasted.

The situation changed following the report on the National Policy on Computer Education published in 1988. Part of the report highlighted the crucial role that universities were expected to play in leading the country into the IT age.

Perhaps it was in recognition of the crucial role of universities that the Federal Ministry of Education directed the National University Commission (NUC) to develop objectives for computer literacy. The directive led to the NUC issuing *Approved Minimum Academic Standards for Nigerian Universities* (1989). The *Standards* said, among other things, that all university undergraduates were required to take and obtain a pass mark in at least two basic computer courses - Introduction to Computers and Applications of Computers to X (where X stands for the student's field of study) before they could graduate. Although departments

are given the option to choose which year of study to introduce the courses, it is noteworthy that the *Standards* are quite apart from requirements for both students from the computer science departments, and students enrolled in courses in computer engineering and the physical sciences, who obviously have to take many more computer courses for graduation. By the 1990/91 academic year, all 37 universities in Nigeria had started to implement the policy.

The effect of the policy has been phenomenal for IT education in Nigeria. According to the NUC Annual Report for 1996, approximately 60 000 graduates were produced by the 24 Federal universities in the 1995/96 academic session alone for regular programmes, while the 12 state universities produced about 19 000 graduates. If one adds another 12 000 graduates produced by the universities that operate 'Sandwich Programmes', we are talking about approximately 91 000 graduates produced in one year. At least, 4500 are single honours graduates of computer science and computer engineering. Although the figures are rather low for a country that has a population of about 100 million, they nevertheless constitute a significant step in Nigeria's march towards IT education acquisition.

The forward step is even more dramatic when you consider that the National Polytechnic Commission, which is to polytechnics as the NUC is to universities, is also striving to introduce computer courses into the curricula of all our polytechnics. The result will be an additional 50 000 computer-literate graduates produced annually by the polytechnics.

Since 1988 there have been genuine and concerted efforts by the Nigerian government to popularize IT Education and training in the country's educational system. Whether the efforts have been matched with the requisite funds to ensure high quality in the IT training that is dispensed in our education system is another matter.

The role of the informal sector

The story of IT Education and training in Nigeria cannot be complete without mention of the extremely active role which the informal sector has played and continues to play in this area. The informal sector is the hundreds of computer training companies which have sprung up all over in Nigerian cities. They are usually small- to medium-sized companies owned and run by individual businessmen and women. They have an average of three or four personal computers, a printer, a classroom and two instructors. They offer well-packaged computer training programmes to target groups of Nigerians. The programmes, which are divided into modules, take from 5 to 20 weeks depending on the requirements of the trainees. Programmes offered are mostly computer appreciation courses and courses devoted to word processing, the use of spreadsheets or the use of specialized application packages. The trainees come from every stratum of the society. They may be company executives who wish to catch up with the 'computer bug' because they fear they might lose out if they do not get computer literate, but most are young secondary school leavers who have completed their training as typists or stenographers and want to enhance their chances of finding good jobs by adding computer literacy to their qualifications. Through informal sector training a very large number of Nigerians who did not have the benefit of computer education during their school days are able to acquire competence in the

use of the computer. It is estimated that at least 500 000 Nigerians receive such training each year from this sector.

4 PROBLEMS IN IT EDUCATION, TRAINING AND SOLUTIONS

Improper funding and lack of infrastructure

One obvious problem with which Nigeria has had to contend in her bid to achieve a viable IT Education and training programme is the debilitating state of her economy and infrastructure. Although she possesses the requisite potential for rapid growth and development - abundant human resources and unbelievable reserves of solid and liquid minerals - Nigeria suffers from the same inadequacies of other backward economies.

In an age of painful economic reforms dictated by international financial agencies, Nigeria, like most Third World countries, is going through very bleak times as our public and private sectors groan under profound and traumatic transformation aimed at supposedly leading our economy to the path of sustainable growth and efficiency.

In such a situation it is easy to appreciate that one of the setbacks to IT Education and training has been linked to the problem of allocation of available scarce resources. Where the managers of the Nigerian economy are faced with the choice between using the limited funds at their disposal to provide drinking water and electricity for the people or promoting computer education, they naturally settle for the former. The result is that over the years, one has had the impression that government has done little more than pay lip service to the development of IT education and training.

For example, since the 1988 government directive that computer courses should be introduced into the curricula of the nation's secondary schools that laudable objective is still to be fully realized, even in the Unity schools. And when it is known that the Unity schools, which are owned by the federal government, form only about one percent of the nation's schools one understands how computer training is faring at our secondary school level. The truth is that until now, most states, although they realize and appreciate the need for computer education, find themselves restrained by insufficient funds and cannot introduce computer studies into their secondary school systems.

Admittedly a couple of the states have adopted a few imaginative approaches to resolve their problems. For instance, two states have selected five or six schools for a pilot project in IT education while a third state has gone into partnership with the informal sector computer training schools to offer computer courses in its secondary schools at reduced costs. However innovative these measures may appear, the fact remains that our federal and state governments must realize that the present problems in our economy are largely related to the inefficiencies of the past. The process of redressing the national economy is largely related to the imperative for us to embrace IT, which has been shown to enhance modern efficient management. Money spent on acquisition of computer technology is money well spent so the Federal and State Governments must make up their minds to pursue credible computer literacy programmes at the secondary school level. Once their

minds are made up, they must, as a matter of priority, come up with the funds (even if it means seeking aid from international agencies and foreign governments) required for the implementation at the secondary school level. To fill the gap the following steps should be taken:

1. A computer literacy programme should be implemented, not only in our Unity schools but also into the nation's entire secondary school system. To allow sufficient time for states to prepare for the takeoff of the programme, a target date of 2001 should be adopted nationally.
2. Since a significant level of funding will be required for the implementation of the programme, only the senior secondary schools should be included in the first phase. Rather than dissipating the meager financial resources available to government by spreading computer education thinly on the ground, such resources should be concentrated on ensuring that the programme is successfully implemented at the tertiary and senior secondary levels.

The consolidation of computer education at the secondary school level (Nigeria's 6-3-3-4 educational system) will provide the much needed feeder for computer education at tertiary level.

General poverty

The problem of infrastructural deficiency is linked with the general level of poverty in the country. If one takes the example of a typical Nigerian university, one observes that not more than five to ten PCs are available for students' use in a university where as many as 8000 undergraduates are taking computer courses. The result is that most of the students are taught only theoretically and never have the opportunity of using a computer while they are enrolled in the university. Even with the few available computers, the unreliability of electricity supply makes it impossible to put them to maximum effective use. One would therefore imagine that if more money and more seriousness were invested into improving the nation's infrastructure, IT Education and training in Nigeria will be greatly enhanced.

Of course, if Nigeria is a poor country, it goes without saying that most of her citizens are poor. With galloping inflation, currency devaluation and public sector salaries that are grossly insufficient for subsistence, it can easily be imagined that most Nigerians are battling with the elementary problem of survival and can hardly find the money required for such capital intensive luxuries as the computer. The result is that today in Nigeria, what is normally known as the middle class has been financially emasculated and finds it almost impossible to embrace the use of computer. Where it is normal for middle class families in the developed world to have one or two PCs in the family, in Nigeria most of those who know the importance of computers cannot afford one.

Teacher education

Another vital factor in the effective implementation of the computer literacy programme in Nigeria is the obvious dearth of sufficiently qualified teachers who can handle computer courses at both the junior and senior secondary school levels. It is important to understand the magnitude of the problem in order to be able to suggest realistic solutions. It is calculated that there are at least 6000 secondary

schools in Nigeria. If each of these schools were to require two computer science teachers to cover courses at senior secondary school level, one would need 12 000 qualified computer science teachers. If all existing universities, polytechnics and colleges of education in the country were well-equipped to teach computer science, and were to admit an average of 100 students a year, it would take about 3 years to produce the required number of computer science teachers. And it is assumed here that such computer science graduates produced by tertiary institutions will ignore the attractive offers of the private sector and accept teaching as a profession, which is not the case at all.

So it is clear that in order to meet the critical need for qualified teachers, without whom our national computer education programme would be meaningless, government should adopt a pragmatic and systematic approach to teacher education as follows:

- Deliberately fund universities, polytechnics and colleges of education to enable them to purchase equipment and employ staff necessary for the increased production of computer science graduates.
- Allow every secondary school to nominate two or three serving members of the staff to benefit from a specially-designed 'Sandwich Training Programme' aimed at preparing them for computer teaching. This is a most prudent approach since it will draw from the body of staff who are already teaching in the secondary schools and who can easily be bonded to ensure they continue to serve there.
- Provide incentives for teachers of computer science in order to motivate young graduates to take up teaching. As a matter of fact, the present trend is that conditions in the private sector (banks, oil industries) are so attractive there is growing fear that even the universities may not have any staff left to teach computer science in the very near future.

Continuing Education programme

Due to the strong job market for degree holders in computer science, fewer graduates continue with postgraduate studies in computer science. In fact, there has been a growing concern recently about an impending crisis brought about by a decrease in the number of computer science postgraduates produced. Fewer and fewer postgraduates go into teaching and an exodus of current faculty to industry is occurring.

As industrial applications become increasingly complex and require broader and/or deeper knowledge of computer science, students will find their undergraduate education increasingly inadequate. They will see a need for further education in the discipline. So it is important to stress the need for a well-designed continuing education programme for professional who are already in the field. Such professionals - be they lecturers in tertiary institutions or top executives in the public or private sectors of the economy - need to periodically update their knowledge in IT in order to keep abreast with developments in a fast moving IT world. We believe that a viable computer education programme for Nigeria must, apart from addressing the global developmental needs of all sectors of our economy, have an in-built mechanism to fill the gaps existing between sectors and within sector. A continuing education programme for professionals, who are already active

participants in the economy, is an ideal instrument for this purpose. This can take the form of sponsorship to local and international seminars as well as conferences, other specialized short-term courses and symposia. Other strategies for continued education can also be employed.

Creativity

Another problem is the need for Nigeria to develop a real computer culture which goes beyond merely learning to use or even repair computers. A computer culture involves getting Nigerians to imbibe the values of the computer as a tool that can be used by all in problem solving, no matter their profession. Cultivating a computer culture means getting the entire populace to appropriate for itself the potential that the computer offers for problem solving. It is a process of internalization rather than mere learning. The fine line that separates computer culture from mere computer literacy can be likened to a man who knows how to solve difficult mathematical problems without knowing that he can use mathematics to solve everyday problems. It seems to me that IT Education and training in Nigeria lacks creativity.

This deficiency is most visible in our tertiary institutions where the computer science curriculum is straightjacketed. While computer science must include programming, it is not equivalent to programming. Similarly, while it is true that a computer scientist who can only program has no future, it is equally true that a computer scientist who cannot program has no present. Therefore, our IT curriculum must provide for both the present and the future.

5 CONCLUSION

One can say that IT education and training in Nigeria may finally be emerging from its first 25 years of difficulties and uncertainties stronger in its scope and penetration. Our governments are responding, albeit slowly, to the obvious need for computer technology acquisition for the overall benefit of our national development.

It is hoped that as the economy opens up in response to market forces and the awesome potential of the private sector is unleashed in the Nigerian economy, industry and other private sector players will take over from government as prime movers and initiators of the National Computer Policy. Then Nigeria will be a force to reckon with in IT education and training.

6 REFERENCES

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7 BIOGRAPHY

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