Microcomputers in the Curricula of the Africa Regional Centre for Information Science (ARCIS)

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INTRODUCTION

Based on the assumption that 'using the microcomputer is good for us, the organizers of this conference deserve commendation for devoting considerable attention to the issues that must be addressed in efforts to promote the widespread use of microcomputers in developing countries.

By simply reading through the book of abstracts circulated to participants well ahead of the Baden-Baden Conference, one has a good idea of the problems and challenges involved in a Third World environment. It will serve no useful purpose, therefore, to repeat here the points that will be made and amply illustrated in those papers.

In particular, the papers by Rua[1] and Woodward[2] on developing countries generally; Adeyemi[3] on the West African situation; and the one by Italia[4] describing, comparatively, the situations in Australia and Nigeria, put the subject of this paper in its proper African context.

One common characteristic of most of the papers describing the environment of microcomputer utilization or non-utilization in developing countries is the paucity of empirical data. That is why the African reports in these proceedings describing actual applications, such as the ones by Inaganji[5], Musana and Lawanika[6], and Ombu[7] are so vital to our appreciation of the magnitude of the problems and challenges involved.

And yet at best, these are isolated experiences across the vast African continent; there is simply no guarantee that the Tanzanian experience will work in Nigeria, and *vice versa,* for example. Indeed, in a big country of vast cultural diversities, such as Nigeria, it is almost certain that a microcomputer application that has been successfully implemented in the far Southern parts of Nigeria will have to be modified considerably if it is to be successfully mounted in, say, Sokoto.

We need definite studies of specific applications, as well as their implications, such as are found in the doctoral study that has just been completed at the University of Ibadan under the joint supervision of the first author of this paper and a professor of computer science.

In the study, Alabi[8] considered the cost-effectiveness of designing and mounting a microcomputer-based circulation system in Nigerian university libraries. Extensive manual and computerized circulation data were collected and analyzed, using a sample population of seven out of the twenty-four university libraries in Nigeria.

The value of Alabi's study is not so much in demonstrating that the circulation functions of medium to large university libraries can indeed be automated, using an adapted systems package mounted on an Apple microcomputer, but in the implications of its conclusions.

For the first time in the Nigerian context, extra-polations were derived from empirical data to provide specific guidelines on the following key issues:

(a) microcomputer applications in Nigerian libraries generally;
(b) opting for single or integrated applications systems;
(c) factors in the selection of hardware and vendors;
(d) conversion of manual records to machine-readable ones and, perhaps most important of all,
(e) the maintenance of the new computerized system.

It should be evident by now that what is being emphasized is the urgent need for studies that cumulatively advance our knowledge of microcomputer applications in developing countries beyond the generalized and often simplistic essays on "problems and prospects ..." We need definitive answers, or at least guidelines based on verifiable data, to a host of practical and sometimes conflicting microcomputer applications environments in developing countries.

The university provides the best atmosphere for the type of studies being advocated. It is against this background, therefore, that we describe the objectives and proposed programmes of the emerging Africa Regional Centre for Information Science (ARCIS) at the University of Ibadan, Nigeria.

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ARCIS OBJECTIVES AND PROGRAMMES

The University of Ibadan's Postgraduate School[9] published a 23-page brochure in 1984 in which, among other things, the five objectives of ARCIS were clearly spelt out as follows:

(a) train and retrain high-level personnel for Africa in information science, essential through seminars, workshops and higher degree programmes, The products will

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constitute leaders in the practice of information science. as well as become trainers of information services personnel at lower levels;

(b) inculcate the spirt of service in all academic and technical staff, especially in regard to the information services components of Research and Development (R & D) programmes in Africa;

(c) engage in problem-resolution research into all aspects of information science in Africa;

(d) serve as a reservoir for consultants in information science to African Governments and institutions, both in the public and private sectors; and

(e) provide necessary expertise in the establishment, updating and application of appropriate standards for the construction, maintenance and effective utilization of manual and computerized data-banks and data-bases for the socio-economic development of Africa as a whole and ECOWAS Member-States in particular (pp.6-7).

Objectives (a), (c) and (e) are clearly the most directly relevant to the subject of this paper. Consequently, the remainder of the paper will concentrate on the elaboration of these objectives as they relate to the use of microcomputers in ARCIS curricula, beginning with the regular master's level curriculum.

MICROCOMPUTERS IN THE MASTERS IN INFORMATION SCIENCE CURRICULUM

The major components of the Master's in Information Science (MInfSc) degree curriculum were put together in November 1984 by an international team of experts drawn from Africa, Asia, Europe and North America (10). Important contributions were subsequently made to the curriculum by participants of an ARCIS Curriculum Assessment Conference in June 1985 (ii) and, in particular, by the academic staff of the Department of Library Studies of the host university from November 1984 to February 1986.

We now have a master's degree programme in information science that Unesco should be pleased to note has been carefully harmonized with the existing Master's in Library Studies (MLS) degree programme of the same university.

An important aspect of any information science curriculum, especially at the Master's level, is a small, dedicated demonstration microcomputer-based information system. Such a system is particularly important in Africa, where it is likely to form the basis of most operational information systems, given the high cost and general lack of dedicated main frame systems, in higher institutions of learning.

Consequently, an IBM-Compatible hard-disk microcomputer, with letter-quality printer and high-speed modern is being selected to achieve the objectives of this important aspect of the curriculum. Courses have been designed to reflect a careful balance between theoretical instruction and practical sessions where the microcomputer will be used to provide the vital demonstrations by academic staff as well as necessary hands-on experience by students.

In particular, each of the following eight courses is expected to have considerable microcomputer-oriented practicals;

* Automation of Libraries, Archieves and Information Centres (R)
* Information Technologies (R)

* Man-Machine Interface (E)
* On-Line Information Retrieval (C)
* Systems Analysis and Evaluation (C) -
* Telecommunication and Networking (R)
* Programming for Text Manipulation (E)
* Systems Software Packages (E)

In addition, the following computer-based courses will be available at a later stage in the development of ARCIS, as advanced courses for research students in information science:

* Principles of Information Systems Design (E)
* Management Information System/Decision Support Systems (E)
* Planning and Implementation of Information Systems (E)

(The Annex at the end of this paper gives the full list of all courses available to MInfSc. students).

The upper case letter in brackets at the end of each course title denotes the status of the course: C= Compulsory; (R) = Required; and (E) = Elective. Under the regulations of the Post-graduate School of the University of Ibadan, a student must take and pass all compulsory coures in order to qualify for the award of the MInfSc degree.

Out of a minimum of 40 course units that a student must have in order to graduate in a three-semester programme, 24 of them, or 60 percent, are in the compulsory category. Required courses are those that all students must take but need not pass all of them, provided they can pass at least three of them. There are eight courses of 16 course units in this category. Elective courses are those that may be taken and failed, provided the student has enough course units from other courses to make up the minimum of 40 units.

The effect of these regulations in the context of the subject of this paper is that all MInfSc students must offer at least five courses, each of which has substantial microcomputer-oriented practicals: the two compulsory courses must be passed, and at least one of the three required courses will have to be passed in addition.

We consider these provisions for exposure to, and use of, microcomputers adequate in a harmonized professional training programme to provide African leaders in the information professions.

MICROCOMPUTERS IN THE CONTINUING EDUCATION PROGRAMMES

It will be recalled that one of the five objectives of ARCIS, already cited in this paper, is "to train high-level personnel ... essentially through seminars, workshops ..." or through what may collectively be described as continuing education programmes. The need for such programmes is particularly urgent in most African countries where the concept of information as a vital resource is largely unappreciated among their policy-makers.

Moreover, the rapid advances in information technologies tend to exacerbate rather than reduce the chasm between developed and developing countries in their mastery and application of information technologies, especially the computer.

Thus, two of the thirteen recommendations of the ARCIS Curriculum Design Experts Group Meeting (10) dealt specifically with continuing education programmes. The seventh and eigth recommendations of that report are quoted in full as follows:

Continuing Education Programme (C.E.P.)

That continuing education programmes form a desirable component of the ARCIS programmes. Two types of continuing education programmes (C.E.P.) are recommended as follows:

(a) One geared towards upgrading the skills of qualified information specialists; and

(b) the other designed for people who have no qualifications in information science but who wish to benefit from short-term seminars and workshops devoted to specific areas of information science and who would expect certification at the end of such programmes.

Target Groups for C.E.P. and the Role of the Consultative Committee on ARCIS

That specific target groups for C.E.P. be identified as follows:

(a) regular ARCIS students seeking to supplement their elective courses;

(b) academic staff of ARCIS who wish to update their knowledge in particular fields;

(c) practitioners of library and information sciences who wish to update or upgrade specific skills, and

(d) non-information worker: managers, policy-makers, etc.

It is further recommended that the proposed Consultative Committee on ARCIS be involved in determing and monitoring the nature and content of continuing education programmes to these groups in the form of workshops, seminars and colloquia.

It should be noted that one implication of harmonizing the existing MLS programme with the new MInSc programme is that Recommendation 8(a) and (b) would have to be modified to read:

8(a) "regular MInfSc and MLS students seeking to ..."

(b) "academic staff of ARCIS and the Department of Library Studies who wish ..."

The details of implementing these recommendations are yet to be worked out in the specific environment of the University of Ibadan. However, their thrust is quite clear: the environment for academic staff, regular as well as occasional students, to learn new skills and to upgrade their knowledge in specific areas of inforamtion science is being created under the auspices of ARCIS.

It can be expected that microcomputer applications will feature prominently in such continuing education programmes, given the high level of enthusiasm among African librarian to learn about computerization in particular and library automation generally.

CHALLENGES OF MAINTENANCE, RESEARCH AND DEVELOPMENT

The refusal of International Business Machines (IBM) to comply with legislation by the Nigerian Federal Government legislation which, incidentally, was far less stringent than the one imposed in Brazil (12) - forced the giant American manufacturers and vendors of microcomputers off the Nigerian market in 1978.

International Business Machines computers and dominated the Nigerian market by that date, according to a 1979 survey by Enilolobo (13) which showed that 63 percent of all types of computer installed were manufactured by IBM. The lucrative vacum created by IBM'S departure from Nigeria has been more than adequately filled by indigenous microcomputer vendors, such as Data Processing Management Services which now "overseas" IBM products in Nigeria; Joint Komputer Kompany whose activities are shifting increasingly away from mini to microcomputers; Datastar, an Ibadan-based microcomputer vendor with branches in at least four other state and SCOA Nigeria Ltd - both dealing essentially in IBM compatibles; DEBIS and Telecomputers, Nigeria Ltd., both specializing in the marketing and servicing of Apple microcomputers. A recent, incomplete list of computer vendors in Nigeria contains 73 registered companies (14).

One serious weakness of these indigenous computer vendors is the severely limited level of servicing they can offer their clients. As Murphy (15) puts it in a recent magazine article, "they are often short of supplies and have little idea of how to go inside the machine and attend to problems". The 'servicing' provided often comprises no more than locating malfunctioning components and replaing them with imported ones.

Indeed, many users of mini and mainframe computers have long-term retainership agreements with foreign-based servicing agencies. Thus, when these vendors claim to have "adequate back-up services" for the products they sell, what they actually mean is that the application packages developed abroad and sold with the computers have back-up manuals for their operations.

Very rarely are modifications made to these ready-made packages to suit local requirements. Consequently, Research and Development is, so far, not a recognizable component of the activities of any of the vendors.

This situation is hardly surprising, considering the rudimentary technological culture in the country. Nigeria has also not been as lucky as Brazil where definitive and results-oriented government legislation is esuring that an indigenous computer industry indeed develops.

Against the background sketched in this section of our paper, we can now focus attention on the third and fifth ARCIS objectives already cited[9]. For it is already clear that ARCIS will depend rather heavily on the microcomputer for "the establishment, updating and application of appropriate standards for the construction, maintenance and effective utilization ... data-banks and data-bases...

Research is the key to the successful realization of this vital development-oriented objective. Thus, we have a combination of microcomputer and research in an environment where the necessary technological infrastructures are short and funds are even shorter. Obviously, ARCIS cannot expect to make much headway in this regard without substantial supplementary assistance to the resources of the University of Ibadan and of the Africa region.

Exploratory talks aimed at attracting the external resources required to initiate the implementation of these objectives are being directed, simultaneously, at two fronts. In meetings between officials of the University of Ibadan and Canada's International Development Research Centre (IDRC) August 1985 the prospects of microcomputer applications in teaching specific ARCIS courses were discussed.

The idea was to explore how IDRC's considerable in-house research and field experience in the application of both mini

and microcomputers in bibliographic data processing and information retrieval could be adapted in developing applications package for specific ARCIS programmes. It is hoped that further discussions on this subject would soon lead to a definite 'Systems Research Component' in the overall packages being developed to enable IDRC continue its most valued assistance to ARCIS in the implementation of its objectives.

The second front is aimed at exploring the possibilities of an Educational Resources Exchange Programme (or Link Programme) between ARCIS and established Schools of Information Science in Canada, England and the USA. A working document, developed jointly by Syracuse University's School of Information Studies and ARCIS[16] constitutes the basis of on going discussions between the specific areas of short-term assistance to ARCIS in the implementation of its teaching and research objectives.

One of the specific provisions of that document is to:

"provide opportunities for hands-on experience for personnel from developing countries in the creation, management and evaluation of computerized data-bases, as well as learning to handle basic trouble-shooting functions in operational information system" (p. 9).

Evidently, microcomputers will feature prominently in this and in several other specifications of the proposed Link Programmes designed to enhance the effective implementation of both the regular and short-term training programmes of ARCIS.

Already, substantial progress has been recorded with the University of Western Ontario's School of Library and Information Science, with the Canadian International Development Agency as the most likely source of funding. It is our hope that similar progress will soon be reported as a result of continuing discussions with Syracuse University's School of Information Studies and The City University' Department of Information Science.

CONCLUDING REMARKS

This paper has tried to demonstrate the inevitability of the use of microcomputers in both the regular and short-term training programmes of ARCIS. It has also been shown that microcomputers will feature prominently in the research and public service functions of the regional centre.

The suggestion was also made that an indigenous computer industry is the only long-term solution to the meaningful application of computers towards the attainment of the educational and development objectives of Africa. As regards the use of microcomputers specifically, it is no longer enough to be told, for example, that the Nigerian Federal Agricultural Coordinating Unit, a project of the World Bank and the Federal Ministry of Agriculture now used not less than 25 Apples and IBM PCs.

Rather, we must determine whether the choice of Apples or IBM PCs or both was the best in the circumstances and, in particular, whether these fashionable machines are being used optimally and integratively in the context of appropriate information technologies in a developing economy.

However, neither the host university for ARCIS nor the collaborating African countries in the operationalization of ARCIS objectives have the resources to evolve the right environment in which the cost-effective use of microcomputers can flourish. Africa needs substantial injection of resources from the United Nations agencies and the industrialized nations - resources that must be carefully managed by local expertise to ensure their continued relevance to demonstrable institutional, national and regional objectives.

We remain firmly convinced that ARCIS offers a positive enviroment for such mutually beneficial collaboration. Thus, it would be expected that important Unesco-supported research, such as the TV + V project, would have definite African inputs at the development as well as the applications stages.

ARCIS should soon be in a demonstrable position to provide the forum for such inputs, thereby establishing a firm basis for helping to correct the endemic errors of omission and compromise in Africa's search for a meaningful technological takeoff.

ACKNOWLEDGEMENTS

REFERENCES
(UNPUBLISHED MANUSCRIPTS)

1. Rua, I. Application of Microcomputers in Developing Countries.
2. Woodward, A.M. Finding the Right Role for Microcomputers in Information Systems in Developing Countries.
3. Adeyemi, N.M. Issues in the Application of Microcomputers in Information, Documentation and Libraries in English-speaking West Africa, this volume.
4. Italia, S.J. Use of Microcomputers in Australian and Nigerian Libraries.
5. Inaganji, F. The Pan African Documentation and Information System's Experience in Education and Training for Librarians, Information Professional and Users in Africa
6. Musana, A. and Lawanika, K.M. Computerization of Libraries and Documentation Centres: the ESAMI Case.
7. Ombu, J.A. Microcomputers: Applications and Problems in Libraries in Developing Countries with Particular Reference to the Rivers State University of Science and Technology, Port Harcourt.
8. Alabi, G.A. The Design of a Cost-Effective Computer-based Circulation System for Nigerian University Libraries (Ph.D. Thesis, University of Ibadan, 1986).
9. University of Ibadan, Post-graduate School. The Establishment of an Africa Regional Centre for Information Science at the University of Ibadan (The Postgraduate School, Ibadan, 1984).
10. University of Ibadan, Postgraduate School. Report of the ARCIS Curriculum Design Experts Group Meeting, 26 Oct. - 2 Nov. 1984 (The Postgraduate School, Ibadan, 1985).
11. University of Ibadan, Postgraduate School. Report of the ARCIS Curriculum Assessment Conference, 26-28

June, 1984 (The Postgraduate School, Ibadan, 1985).

12. Sohaf, S. Implementing Microcomputer System in a Systems in a Developing Country; Brazil as an Example.

13. Enilolobo, A. Report of a Survey of Computer Distribution and Usage in Nigeria (National Policy Development Centre, Lagos, 1979).

14. Murphy, Brian. The Micro Comes to African Business No. 70 (1984) 76.

15. University of Ibadan, The Postgraduate School, Educational Resources Exchange Programme: Proposals for a Pilot Project in Information Science (The Postgraduate School, Ibadan, 1985).

ANNEX: Courses in the New MInfSc Curriculum, to be Run Jointly by ARCIS and the Department of Library Studies, University of Ibadan, Nigeria.

A: COMMON COURSES (i.e., Common to the existing MLS and the new MInfSc degree programmes)
 *History of Archieves, Libraries and Information Centre (R)
 *Theory of Knowledge and Classification (C)
 *Indexing and Abstracting (R)
 *Reprography and Micrographics (R)
 *The Information User (R)
 *Scientific and Technical Information Sources and Systems (R/E)
 *Social Sciences Information Sources and Systems R/E)
 *Humanities Information Sources and Systems (R/E)
 *Energy Information Sources and Systems (E)
 *Environmental Information Sources and Systems (E)
 *Agricultural Information Sources and Systems (E)
 *Industrial and Business Information Sources and Systems (E)
 *Demographic Information Sources and Systems (E)
 *Educational Information Sources and Systems (E)
 *Legal Information Sources and Systems (E)
 *Information Products and Services (C)
 *Automation of Libraries, Archives and Information Centres (R)
 *Information Technologies (R)
 *Audio-Visual Resources (E)
 *Oral Archives (E)
 *Practice of the Profession (C)
 *Research Methods (C)

 *Quantitative Methods for Library and Information Science (E)
 *Independent Style (C)

B. Information Science Courses (i.e., courses designed primarily for MInfSc Students)
 *Introduction to Information Science
 *Man-Machine Interface (E)
 *Bichometrics (E)
 *Systems Analysis and Evaluation (C)
 *On-Line Information Retrieval (C)
 *Data Structures (E)
 *Organization of Information and Data Sources (C)
 *International Information Systems (R)
 *African Development Information Sources and Systems (C)
 *Technical Writing and Presentation (E)
 *Management of Information Resources and Centres (C)
 *Telecommunications and Networking (R)
 *Programming for Text Manipulation (E)
 *Systems Software Packages (E)

C. Advanced Information Courses (i.e., courses designed primarily for research students in information science)
 *Principles of Information Systems Design (E)
 *Information Policies (E)
 A*Planning and Implementation of Information Systems (E)
 *Information and Society (E)
 *Management Information Systems, Decision Support Systems (E)
 *Economics and Marketing of Information (E)
 Linguistics in Information Science (E)

NOTES

1. Only one of the three R:E courses may be taken.
2. Not all of the sectoral, subject-oriented elective courses in category A will necessarily be available in any one session.
3. The 'Advanced Information Science Courses' may be available to some MInfSc and MLS students under certain conditions.
4. A Master's in Archival Studies (MAS) degree programme is being actively developed by the Department of Library Studies. Category A courses will also be common to MAS students whenever the programe takes off.