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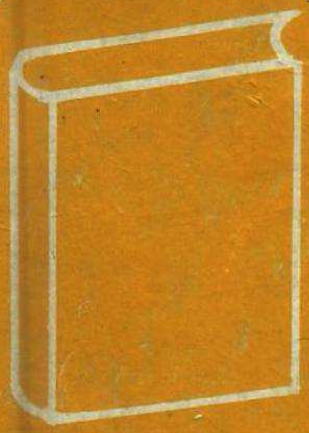

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TECHNOLOGY IN AGRICULTURE TEACHER PREPARATION AND ITS IMPLICATIONS FOR PRODUCTION OF QUALITY TEACHERS

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1.0 INTRODUCTION

The ultimate focus of agriculture teacher preparation is the production of proficient and skilful teachers who could initiate, design, develop programmes, implement, manage and evaluate for feedback for relevant adjustment. The strategies therefore, for the training of teachers must be efficient and calls for the utilization of improved approaches to ensure the production of desired quality teachers. This paper examines:

1. The concept of Technology

2. Agriculture teacher preparation

3. Application of technology in agriculture teacher preparation

4. The implications of application of technology in agriculture teacher preparation.

2.0 THE CONCEPT OF TECHNOLOGY IN EDUCATION

Technology has been defined in various ways by different authors based on backgrounds. Okorie and Ezeji[1] saw technology as a systematic study of techniques of making and doing things while Ibe–Bassey[2] viewed it as the application of scientific or organised knowledge to practical tasks. Olaitan[3] preferred technology as the use of products of creativity, inventions and scientific research in the service of man. Technology can be explained precisely as the instrument of problem-solving.

Since education is dynamic and requires development, technology therefore, occupies the pivot position as the strategy of initiating and effecting desired educational developmental processes. It implies the human created knowledge, principles and competencies and application for the development of equipment, tools, power, instrumentation, services and manipulative skills for solving various educational problems. The problems could be in the numerous areas of manpower development, programme development, delivery systems, process and product evaluation; facility development and utiliation and so on.

The relevance of technology can be seen from the following capabilities:

1. The creation and application of scientific knowledge to achieve desired goals.

2. The adoption of updated knowledge and principles to specific needs of education.

3. The capability of causing innovations in educational processes.

It could ensure maintenance and continuity of application of scientific developments to educational situations.

Technology can therefore, be defined as an integrated strategy derived from scientific knowledge, principles and practices for improving educational practices. In the preparation of agriculture teachers, technology could be explained as the scientific and updated approaches employed in effective preparation of the agriculture teacher toward the acquisition of appropriate and relevant skills, abilities and competencies, to be able to perform agriculture teaching functions proficiently. This confirms the view of Edwards[4] who described technology as a disciplined process awareness of using resources of scientific and other knowledge and skills to achieve human resource development. It could also mean a technical process of achieving practical purposes of relevant personnel development. As applied to teaching specifically, technology could be seen as the scientific principles and practices applied to teaching.

The need for the application of technology in agriculture teacher preparation becomes relevant for complete re-orientation of agriculture teachers to be in tune with modern agricultural technology, the delivery systems and practices to be effective and functional.

3.0 AGRICULTURE TEACHER PREPARATION

Teacher preparation is an all-embracing professional activity aimed at producing competent teachers for efficient performance of agriculture teaching functions. In his view, Ezewu[5] described teacher preparation as a programme designed to give professional training to those who will be engaged in teaching and other professional activities in education. Agriculture teacher preparation is therefore, the academic and vocational programme of preparing agriculture teaching personnel in the art of imparting knowledge and skill of practical value to the in- and out-of-school youths. The preparation would focus at providing the following:

- training at pre-service and/or in service levels;
- technical and professional studies consistent with the needs of a competent agriculture teacher;
- leadership training for those responsible for planning, administering and supervising agricultural education programme;
- opportunities for supervised occupational experience programme in agriculture for the trainee teachers to gain supervised participatory experience to be able to organise the same after graduation;
- training and development in technical agriculture, general education, and professional education to the overall competence of the agriculture teacher;
- training in research as a basis for development and problem-solving.

The activities involved in the preparation of agriculture teachers, are geared toward the achievement of specified objectives as adapted from the objectives of teacher education in the National Policy on Education in Nigeria[6] viz:

- To produce highly motivated, conscientious and efficient agriculture teachers for all levels of education.

- To encourage further the spirit of enquiry and creativity in the agriculture teachers.
- To help agriculture teachers to fit into the social life of the community and society at large to enhance their commitment to national objectives;
- To provide agriculture teachers with the intellectual and professional background adequate for their assignments and to make them adaptable to any changing situation in the life of their country and the wider world.
- To enhance agriculture teachers commitment to agriculture teaching profession.

Agriculture teacher preparation programme training system can be seen from four perspectives:

1. The formal training of pre-service teachers.

2. Professional improvement programme for the serving agriculture teachers through in-service, workshops, conferences and re-training schemes.

3. Research programmes on agriculture, agricultural education and agriculture teacher related issues.

4. General services to the education system and the public.

4.0 APPLICATION OF TECHNOLOGY IN AGRICULTURE TEACHER PREPARATION

The objectives of agriculture teacher education programme can effectively be realized with the application of technology in the preparation of the teachers. This justifies the fact that the crux of modern education in agriculture would facilitate the development of vocational and technical methods of operations in agriculture, is within the spheres of technology.

The application of technology in agriculture teacher preparation can be described as all-embracing and systematic utilization of scientific principles, techniques and facilities in preparing and updating the technical, professional knowledge and pedagogical skills, tasks execution and attitudes of pre-service or in-service agriculture teachers for effectiveness. It can also be defined as the scientific approaches employed in effective preparation of the agriculture teachers toward the acquisition of appropriate and relevant skills, abilities and competencies to be able to perform agriculture teaching functions proficiently.

Technology can be developed and applied in the following areas of agriculture teacher preparation:

- Programme planning, development and evaluation in relation to goals and objectives, course of study, follow-up programmes and evaluation strategies.
- Instructional planning associated with lesson plans, students needs and interests, performance objectives and instructional material selections.
- Instructional implementation considering how to direct students classroom and field laboratory experiences; oral questioning techniques to facilitate learning, learning entry behaviour approaches and so on.

- Instructional evaluation in the aspects of students acquisition of knowledge, skills and attitudes.
- Instructional management as concerned with the management of time and resources, enforcing self-discipline in instructional situation, stimulation of enthusiastic classroom and field practicals, the provision of health-care kits in case of emergencies during the learning process as well as good inter-personal relationships.
- School community relations focusing at harnessing co-operation with members of the institutions community for obtaining feedback from the public about the programme performance as well as the strategies for co-operating with supervising educational agencies.
- Instructional communications as it involves the utilization of visual, audio and audio-visual aids raelia, life specimens conduct of farms and home project inspection visits, the guiding of communication as well as the techniques of preparing technical reports.

5.0 STRENGTHS OF APPLYING TECHNOLOGY IN AGRICULTURE TEACHER PREPARATION

Technology applied to the preparation of agriculture teachers can be associated with the following strengths:

- It will develop in the teachers the ability to teach and educate others.
- It would create in the teachers the awareness of the principles that underlie good human relations.
- It will help instill in the teachers a sense of responsibility to make their contribution to the educational, economic, social and cultural progress of the society.
- The quality and output of agriculture teachers would be enhanced through their exposure to updated experiences.
- The teachers would acquire innovative skills and abilities as well as other professional tools to cope with changing times and new technologies in agriculture.
- The agriculture teacher will be technically and professionally sharpened to be able to manipulate the relationship between man, the environment and agriculture.
- Making the teachers more articulate in agriculture concepts, principles and practices.

6.0 IMPLICATIONS OF APPLICATION OF TECHNOLOGY IN AGRICULTURE TEACHER PREPARATION

The test of the professionally qualified agriculture teacher is in his ability to effect learning processes proficiently both in the classroom and on the field laboratories. This is realizable through the application of technology in the preparation of the teachers. It will ultimately result in the production of the well trained, competent, conscientious and dedicated teachers with the relevant tools to initiate and manage an innovative, captivating, objective and vocational oriented agriculture and related instructions in a learning situation. The good quality teachers through application of technology in the teacher preparation is obvious. Mkpa[7] stressed that it should even be more

force ie, the more educated and the higher the skill acquired by the work force, the faster their adaptation to energizing technologies. By the year 21st century, the population of most countries in the world must have increased. It is hoped that more women will enter the work force which includes occupation previously regarded as exclusive for men. These include such trades as building, auto-mechanics etc. These will create new demands for skilled manpower needs in technical and vocational education. All these would generate changes in school curriculum. There will also be the need for training and re-training programmes for most workers to develop appropriate skills for various occupation in which trainees seek employment. Future curriculum will emphasise maintenance skills in training, leading to the development of multiple and or inter disciplinary skills. If properly conducted, it should lead to the acquisition of broad knowledge and basic skills applicable to a number of occupations within a given field so that the individual is not limited by his education in his freedom of occupational choice, and changes as he may, from time to time, deem fit.

Therefore, learning and teaching in the future will require increased cooperation between education systems and enterprises, industries, agriculture and service sector. New instructional strategies such as computer assisted instruction will endure. The teacher will be characterised by marked flexibility and versatility. He will be more amenable to innovations due to the emergence of new technologies. He will be a facilitator of learning than the present day teacher who is conservative and reluctant to change.

3.0 DIRECTION OF CHANGE: AT TECHNOLOGY LEVEL

The age we are now in the 20th century, is variously described as knowledge society, information age, mechatronic age etc. It is characterized by a striking new type of revolution, a wide range of advanced technologies and a variety of spectacular innovations and rapid changes. The value emphasis is greatly shifting from 'materials' to 'information' and 'time'.

As we enter the 21st century, the new technologies differently known as emerging, advanced, frontier, high technology and the like, are unleashing altogether new forces on the world scene. The advances made in micro-electronics, information technology, materials technology and biotechnology have an all pervasive character. The emergence of computing system, robots, numerically-controlled machines, based on this technology is accelerating the process of automation in factories and offices and are reducing the demand of traditional labour.

4.0 AT THE INDUSTRIAL LEVEL

The cumulation effect of all the new technologies is resulting in an explosive rise of new industries in areas like micro-electronics, computers, lasers, optics, robotics, remote-sensing, alternate energy, space manufacturing, ocean engineering, environmental recycling. Many developing countries have plans to achieve self-reliance in industry, catch-up with developed nations and strike a balance in external payments. New technologies are being imported through bilateral or multi-lateral agreements. They are being processed, absorbed and modified to suit the local conditions. The result is seen in the form of establishment of new industries,

modernisation of old industries, improved products and services. There are traditional products such as textiles, chemicals, metals, vehicles and other capital goods. Some of the industrialised nations are steadily shifting away from production of goods to knowledge and information-intensive services.

5.0 NATIONAL-EXPERIENCES

The foregoing startling observations do not mean that all nations are undergoing all the changes at the same time and at the same rate. The rate of absorption is governed by several factors such as historical background, social fabric, cultural ethos, geographic locations, demographic density, political system, economic policy, technological level and educational development.

Inspite of these variations, many countries are undergoing a process of restructuring in their industrial, economic, employment and educational systems, though in varying degrees. Nigeria should follow these countries' footstep especially in the area of technical and vocational education; in order to be part of the national growth and development of the 21st century.

6.0 PROBLEMS OF VOCATIONAL AND TECHNICAL EDUCATION

6.1 PUBLIC ATTITUDE

We cannot look at the future with firm intent without some reflection on our past and present circumstances. The challenge of vocational education are complex and diverse. On one hand, the programmes are battling with poor public image and grossly inadequate resources, both human and non-human (The unfinished Agenda, 1984:2). On the other hand vocational education is being called upon to provide solutions to the emerging high rates of unemployment (Nwakolo, 1997:7). The general perception about vocational programmes is that they are for less able or disruptive students, students who are not succeeding in 'academic' programmes. Essentially vocational education programmes are perceived as dumping grounds for drop-outs. For instance, the Guardian Newspapers (1996 Nov.), quoted the then Borno state Commissioner of Education as saying that the Technical Colleges at Bama, Damboa and Lassa would take care of the current drop-outs at the primary school level. What a vision for the 21st century.

6.2 INADEQUATE FUNDING

It has been realised that the disciplines of science are the most affected by miserable funding. Of the lot, engineering is worst hit. The tools, instruments and machines required for workshops are not always available and sometimes have to be imported at great costs. This applies to the spare parts required to maintain the equipment. Inadequate funding leads to inadequate facilities, laboratories and workshop equipment.

6.3 STAFFING

The demand for qualified and experienced professionals and the type that are required to teach technology education is very high and majority of them prefer to go to industries where the pastures are greener. Teaching is now the awaiting pool from where people get to other employment.

It is not possible for anyone to teach the skill he does not possess no matter how good he may be in a teaching methodology. Therefore, institution must have staff development programme. Another way out is

to improve salaries and condition of service of teaching staff so as to be comparable with what is obtainable in industries. This will bring out the best in the teacher and the nation will be best for it.

7.0 IMPLICATIONS FOR NATIONAL GROWTH AND DEVELOPMENT

Development is a change which is both forward looking self-fulfilling; it is the exploitation and utilization of both human and material resources to improve the lot of members of a giving community. Todaro (1979) defines development as "a multi-dimensional process involving the reorganisation and reorientation of entire economic and social system". Development involves radical changes in institutional, social and administrative structures, popular attitudes and sometimes customs and beliefs. Its realization may, infact, involve fundamental modifications of the international economic and social systems.

The economic, political and demographic world that is enveloping education as we enter the 21st century will differ significantly from the 20th century. To achieve greater heights in national development, therefore, we must encourage and develop our own technology.

Technology education must be properly backed up by the basic sciences such as Mathematics, Physics, Chemistry, Biology and other related sciences. At the NCE level, each of the five programmes (Agriculture, Business, Fine and Applied Arts, Home Economics and Technical Education) utilizes one or more of these basic sciences.

To this extent, there are inter-relationships among the sciences, technology and national development. For instance, Japan has been able to build herself up from the defeat and ruins of world war II and has even become the strongest economic power in one generation because she has been able to replace her devastated physical facilities and update her managerial and research development capacities.

What all these suggest is the known fact that technology education is a sine qua non for both national growth and development.

For vocational education to perform its role of retooling Nigeria for national development in the years ahead, its present unsatisfactory status must be enhanced in terms of its objectives, curricular, delivery and evaluation procedures. The following issues are major concerns that need to be addressed:

(a) A major part of the frustration of vocational education teachers is in the area of equipment. The need for the establishment, equiping and maintenance of workshops/studios, laboratories and other facilities in vocational institutions cannot be over-emphasized.

(b) An improved welfare package will not only inspire and motivate serving teachers, it will also attract others to the classrooms.

(c) Retraining of vocational teachers and reorientation of policy makers will have to be pursued vigorously because of emerging technologies.

(d) Closer ties should be developed and sustained between vocational education institutions and industry and business to

facilitate the implementation of programmes and also open opportunities of employment for their products. Employers should be seen to be playing definite roles in establishing and maintaining the value of educational credentials through employment policies and recruitment practices.

(e) There is need for a curricular shift to all levels of the education enterprise from theoretical platforms to more job related approaches. Students need to acquire skills to be utilized in establishing and managing their own small scale business with available local resources.

(f) Computer education should be a major/core subject in all vocational education programmes. All serving teachers today should undergo inservice training in the use of computers.

(g) Adequate funding from government and non-governmental organisations is absolutely needed.

(h) More government commitment to vocational and technical education is required. This commitment should include a specific legislation; budgetary allocation and establishment of Vocational Education Boards and Advisory Committees at both the state and local government levels respectively.

(i) All institutions offering both vocational and technical eduation should run consultancy services to exploit their human and material resources in generating revenue the institutions.

(j) The institution should also market its expertise to all neighbouring companies and government agencies as a means of attracting consultancy and other services in this drive for revenue.

(k) Industries should be encouraged to patronise the neighbouring higher institutions for their research and development projects.

(l) Equality of educational opportunities for all sex and of professional treatment and pay in working life must be constantly pursued by the leaders and decision makers in all fields of education.

(m) Vocational and technical programmes are expensive to establish, therefore, government should substantially improve the monitoring of its implementation strategies not only to ensure accountability of funds but also to achieving effectiveness in teaching and learning.

8.0 IMPLICATIONS OF TECHNICAL AND VOCATIONAL EDUCATION

The role and functions of technical and vocational educators must undergo radical transformation in order to cope with the demands of the anticipated growth and development in the 21st century. The current compulsions of advanced technology will lead to restructuring in industry and economy, reorganisation in workforce, and reformations in technical-vocational education. The technical and vocational educators of the 21st century can no longer be a mere information dispenser. They will be expected to play several roles at the same time. They will be expected to be knowledge specialists, vocational practitioners, course designers, curriculum developers, resources material producers, performance evaluators, students' guides and counsellors, community and social

workers, facilitators of learning, and above all, educational managers.

Concerted efforts should, therefore, be made to enhance the competence of technical teachers to enable them rise to the occasion. Greater stress should be laid on: recruiting technical teachers with proven academic briliance and long years of technical and vocational experience; training them in pedagogy, andragogy, instructional technology, educational management and retraining them periodically for continual development.

The 21st century is bound to create more complex situations in technical and vocational education. The work-force for advanced technology must therefore be knowledge-intensive and multi-skilled. In order to prepare such work-force, the curriculum of technical and vocational education should consist of broad-based education, basic training, education and training in specialised areas, and in industrial upskillings.

The 21st century, with its concomitant advanced technologies, will bring about revolutionary changes in all walks of life generally and in technical and vocational education in particular. Its effects on industry and economy will assume crises proportions. The value emphasis will shift from **materials** to **information** and **time.** Muscle power and machine power will be replaced by **brain power** and **mind skills.** Knowledge-intensive and multi-skilled workers will be increasingly required. Technical and vocational courses must, of necessity, be restructured for preparing work-force for advanced technology. Broad-based education, industrial upskilling, and resource-based learning will become imperative in technical and vocational education in order to meet the enhanced level of technology of the 21st century. Technical teachers will be required to perform a variety of roles. Their training programmes would be relevantly recognised and modernised.

As we approach the 21st century and the world prepares to take over the major industrial tasks, we must move on to the new enterprises. The implication of this for technical and vocational education can be seen in the effect of advanced technology in the changing mix of the work-force, the proportion of unskilled workers, operatives and craftsmen. As new technology jobs call for relatively higher level of cognitive and judgement skills, the share of technicians is increasing and that of those below is correspondingly decreasing. The need for highly qualified engineers, technologists and information specialists is also on the increase as they are required to contribute to a wide variety of possible applications of new technologies.

On the rising demand for technicians, work-force flexibility requirements will almost certainly demand a higher base level of technical and vocational education especially in the industrial sector where there will be the greatest need of technician.

As we enter the 21st century, technical and vocational education programmes must have a critical role to play in ensuring an on-going provision of adequately skilled technicians work-force through initial training, upskilling and retraining.

In other words, for an enhanced national growth and development in the 21st century, Nigerian technical manpower must be trained to be more independent, more resourceful and

no longer be mere appendages to plants and machines.

In the context of the 21st century, cognitive, analytical and abstract thinking skills are needed in the place of practical and manual skills, and more computer-related knowledge and skills are required rather than more engineering skills. In short, the work-force for advanced technology of the 21st century is required to posses deeper technical knowledge, broad versatile skills, wider applicability, penetrating judgement and faster rate of adaptability.

9.0 CONCLUSION

It is the position of this paper that all is not well with vocational technical education. Vocational education is a pre-condition for the technological .and industrial development of the nation. The programme has been less than successful because of implementation problems such as dearth of vocational teachers and absence of functional workshops and workshop tools and machines.

In most countries of the world, vocational education has been given a pride of place because of the realisation of its importance in the growth and well being of any nation. We must look for ways to enhance vocational technical education in our country.

To this extent, the author recommends that incentives (financial and otherwise) should be given to vocational teachers in order to reduce their exodus from the classroom. It is also recommended that affordable hand tools like hoes, hammers, sewing machines, typewriters, etc., can be affordable by the schools or the students themselves, while the more sophisticated vocational machines be provided in Area Vocational Centres to serve groups of schools on rotational basis. Finally, we contend that a successful technological education programme will enhance the national economic and social well-being of any nation.

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