

THE ROLE OF EDUCATIONAL TECHNOLOGY IN EFFECTIVE TEACHING AND LEARNING OF SCIENCE AND MATHEMATICS FOR NATIONAL DEVELOPMENT

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Abstract

This paper discusses the role of Educational Technology in Effective Teaching and Learning of Science and Mathematics for National Development of Education in Nigeria. Recommendations given include provision of modern instructional materials, periodic retraining of teachers, adequate inspection and monitoring of teaching and learning process by school administrators through sincere commitment to work.

Introduction

Science is the foundation upon which the bulk of present technological breakthrough is built. Nwosu, (2002) defined science as a systematic knowledge based on observation and test which leads to formation of laws and principles. Sule, (2003) sees science as a dynamic human activity concerned with the understanding of the working of our world. This understanding helps the scientist to probe into the nature of things and events and to control and harness such things and events for the benefit of mankind. Shaibu, (2002) sees science as a complex activity that culminates in the production of a body of universal science skills such as observation, production and experimentation. They provide the basis for the explanation of certain phenomena or events.

Mathematics in a layman's language is the science of structure, order of numbers, space and quantity and which relationship revolves around the elementary practice of counting, measurement and description of space. Mathematics is more than Arithmetic; the science of number and computation. It involves more than statistics which is the science of interpreting data and graphs. It is also more than calculus that deals with the study of variable quantity, infinite limits. Ojo, (2002) stated that

Mathematics is a systematized organized branch of science. It is a creation of human mind concerned primarily with ideas, processes and reasoning. Mathematics is the key and backbone of almost all the subjects and it has been known worldwide because it is the knowledge that is required in many professions and in our day to day activities. Ojo, (2002) described Mathematics as the gate keeper of the job market. Alutu and Erauikhuemen, (2004) stated that Mathematics has remained the base through which any true science rest and no true science can succeed without going through Mathematical demonstration. The performance of students in Mathematics and Science subjects in Nigerian schools still leaves much to be desired right from primary school through secondary school to the tertiary level of education (Kareem, 2003). This is shown in Table 1.

Table: 1 Students Performance and Enrollment in SSCE/WAEC Mathematics May/June (2005- 2007) in Niger State.

YEAR	TOTAL NO. SAT	CREDIT PASS A1-C6	PASS P7-P8	FAILURE F9
2005	14838	1604(10.81)	1559(10.51)	1167(78.68)
2006	17629	3021(17.14)	2768(15.70)	11840(67.16)
2007	18798	2963(15.76)	2182(11.60)	13657(72.62)

Source: Niger State Ministry of Education, Minna

The Association for Educational Communication and Technology, (1977) in Adekunle, (2005) defined Educational technology as an integrated process involving people, Procedures, ideas, devices and organization, for analyzing problems and devising, implementing, evaluating and managing solutions to the problems involved in all aspect of human learning. It involves the use of hardware and software. The use of hardware involves electrical and mechanical devices, such as audio-visual materials which includes slide projectors, overhead projectors, opaque projectors, filmstrip projectors, photographic cameras, video machine systems, photocopying machines, computers, audiotapes and recorders, compact disc systems etc. The soft ware includes slides, transparencies, filmstrips, video cassettes, opaque materials, slides, photographic films, duplicating ink etc.

Abdullahi, (1991) pointed out that teachers can use instructional resources to arrest and sustain attention, present facts and information, teach concepts and principles, guide thinking and induce transfer of learning. Nyanga, (2002) opined that a teacher can capitalize on media capabilities to promote the learner's perception, understanding, transfer of

learning, re-enforcement and retention of learnt media. Gana, (1997) stressed that the use of visual instructional models has significant effects on the performance of learners. He further stated that the use of instructional materials is a means of motivation that helps students to; recall earlier learning, provide new learning situation and activate learners' response.

The Role of Instructional Media in Education

Through the use of media, emphasis is placed on real learning that involves the use of sense of seeing, hearing and touch rather than rote learning. Terminologies and concepts especially in the area of sciences are best illustrated through the use of instructional media.

The performance of students in sciences; specially in Mathematics which is a prerequisite subject that needs a pass at credit level before getting admission into most disciplines like science and science related courses at the tertiary level of education has not been encouraging. However, if abstract ideas or concepts in Science and Mathematics are put in form of pictures, diagrams etc learners are more likely to understand them with more ease and it will remain permanent in their memories.

Audio visual instructional materials increase the rate of learning at the same time allow the teacher to use more time on other useful activities e g use of computer and video packages while learners are on their own.

Instructional materials motivate and arrests the attention of students; curiosity and consciousness increased thereby providing sound environment for realistic and effective teaching and learning.

Audio visual instructional materials create effective and efficient system in order to achieve the objectives of learning while visual perception among slow learners can be improved.

Audio visual instructional materials improve student's performance and also promote students teacher skills through micro teaching sessions.

Challenges in using Educational Technology in Science and Mathematics Teaching and Learning for National Development in Nigeria.

Abilu, (2005) stated that Nigerian citizens should pursue science and mathematics education to prevent Nigeria from being perpetual slave to the developed world. The Federal Ministry of Education, (2009) encouraged Nigerians to pursue science courses with the hope that a solid foundation in science would help to equip millions of Nigerian students with the opportunity for successful science-based careers

thereby contributing to the much needed scientific and technological advancement. However, the following are some of the constraints in educational technology for development in Nigeria. Ogunmilade, (1993) emphasized the limitation of using modern technological products for instruction such as computers, videotape recorder, television and multimedia which could hamper their use. One of such limitations is cost of teaching and learning equipment. Also, there is the issue of erratic electricity supply. Ogunleye, (2000) observed that in the era of technological achievement 80% of the teachers in Nigeria still use traditional teaching methods (chalkboard and text books method) stressing that most schools do not have modern equipment and materials for teaching and learning pointing out that the few schools that have are unable to use them effectively.

The National Teachers Institute, Kaduna (2007) stated that in Nigeria unlike other countries, the retraining of teachers has not received the desired attention from local, state and federal government. There has not been adequate in-service training to up-date regularly the knowledge and skills of teachers in the light of changes in curriculum and the needs of the Nigerian society. This neglect affected the quality of tuition in schools.

To effectively teach Science and Mathematics requires the application of educational technology equipment. These ranges from visual, audio and audio visual aids. The use of equipment such as computers, overhead projector, opaque projector, slide projector, motion films and multimedia equipment will lead to effective teaching and consequently national development as it will enhance students knowledge and skills.

Conclusion

In line with the discussion on this paper, it is clear that knowledge based on solid foundation in Science and Mathematics Education through the utilization of educational technological facilities will enhance comprehension by learners thereby produce quality students who will serve as future manpower-base for advancement of Nigeria as a Nation.

Recommendations

To overcome the afore mentioned constraints to development, Government should show commitment through the provision of adequate fund, periodic re-training programmes for practicing teachers and provision of modern instructional facilities.

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