

# **TEACHERS' PERCEPTION ON THE ADOPTION OF MICRO-COMPUTER FOR TEACHING AND LEARNING OF SCIENCES: IT'S IMPLICATION FOR NATIONAL DEVELOPMENT.**

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## **Abstract**

Science education has been conceptualized as a means of solving human problems and improving on people's living conditions. Unfortunately science seems unreal, vague, uninspiring and relatively meaningless to the Nigerian child, because of the way some teachers teach science. This study, therefore, tried to find out the perceptions of teachers regarding the adoption of microcomputers for the teaching and learning of sciences. The study was conducted in Anambra State with science teachers constituting the population. Four research questions were presented. Questionnaire was used for data collection. Data was analysed using mean scores. The results revealed, among other findings, that teachers are ready to adopt computers in the classroom. Its implication for national development was discussed.

## **Introduction**

A computer is defined as an electronic device with in-built programs (lists of instructions), which enables it to receive, store, process and produce large amounts of data for the execution of a wide range of arithmetic and logical operations (Akudolu, 1997). In other words, computer is an electronic device capable of accepting data and instructions, processing the data based on the instructions to generate results or output in- such a manner that is yet to be equalled by any other known machine to mankind. Computer can receive, process, store and retrieve data to produce desired output. Computer is used in almost all aspects of human endeavour to improve the quality of life. There are three varieties of computers which vary according to their sizes and capabilities. The largest variety of computers is called the main-frames which are used for handling a large amount of data. These may be found in banks and other big organizations. Medium-sized varieties are called mini-computers. They are used in small companies to handle personnel records, salaries and wages. Microcomputers are the smallest, portable and very cheap and this is why they are particularly useful in education. For a microcomputer, several of them could be placed in a computer room or laboratory in such a way that each student could have access to one computer, or at most two or three students per computer (Abimbola, 1988).

Several reasons are adduced to justify the introduction of computer education in Nigerian secondary schools. Six major rationales classified as: social, vocational, pedagogical, catalytic, information technology industry, special needs and cost-effectiveness (Hawkrige, 1991 as cited in Yusuf, 1998) have been proffered.

The social rationale deals with the need for computer education so that students of secondary school age and even below should be aware and unafraid of how computer works, since the computer is important to the modern world. The school should prepare students to be able to use computers, that is, at the lowest level students need to be computer literate. The rationale is that students need to be prepared adequately for the emerging computer society. It also presumes that computer skills will develop students generic problem solving or thinking skills (Harper, 1987; Hawkrige, Jaworski and Me mahon, 1990, cited in Yusuf, 1998).

The vocational rationale deals with the need to provide hands-on experience, that is, students should be able to operate a computer, at least at the basic level. This may include teaching students about programming or how to use application programmes which will give them skills that may be useful to them as students and possibly when they move into jobs.

The pedagogical rationale focuses on the improvement of teaching and learning. That is, the computer will be used to enrich existing curriculum and improve the way in which it is delivered through techniques such as simulation, drill and practice, tutorial etc. Computer Assisted Instruction (CAI) allows students to be able to use computer in learning sciences, business, social sciences, or any

art subject. The computer is used as a teaching tool meant to enhance learning of existing school subjects.

The catalytic rationale involves the use of computer for improved school teaching administrative and managerial efficiency. The computer is a catalyst as it enables the school to be prepared for desired change in education. The students move away from rigid curriculum and become less dependent on teachers as experts and they do less memorization of facts and more information handling and problem solving. Students will also be able to learn through collaboration rather than competing with other students. Teachers will also adopt more relevant curricula and bring educational opportunities to a large number of people. School administrators will change the way schools are run for better (Hawkrige et al, 1990).

The information technology rationale believes that computer education will ensure that local industry produce computer hardware and software. On the service and software side, a highly skilled workforce of data entry operators and programmers would be built up (Hawkrige et al, 1990) capable of undertaking contract work for customers within the country and other countries.

The special need rationale asserts that children with special needs, including those with moderate or severe learning difficulties and those who are sensorially or physically disabled can benefit greatly from using computer. This can motivate slow learners and compensate for disability (Harper, 1987; Hawkrige et al, 1990). It will open new frontiers for the learning of the disabled, deaf, blind and orthopaedically handicapped (Yusuf, 1998).

The cost-effective rationale believes that computer hardware and software can substantially replace teachers, and be more cost-effective, under certain circumstances. Evidences have been adduced from industrialized nations where industrial and commercial training through the computer proved to be cost-effective in some selected settings (Hawkrige, Newton and Hall, 1988; Hawkrige et al, 1990). The proponents of this rationale opine that the prices of computers are falling while salaries of teachers are rising. They believe that educational software is available to do the teacher's job well, if not better than teachers can do.

Moreso, on the use of computer in today's classroom (Ezeliora, 2000) opined that using CAI in chemistry class provides the learner a different background and characteristic to benefit from the educational assistance of computer. With tutorial software, chemistry concept is presented in a clear and well organized format. A chemistry drill and practice software provides the students with practice material of previously learned concepts and at the end of the lesson, the student is given a score showing the number of correct or incorrect responses. The results of studies carried out by Akudolu (1995) and Olikeze (1999) showed that CAI enhanced the teaching and learning of French and Biology respectively.

Today's educational reform movement attempts to bring successful instructional models into the majority of our schools. One of the most important features of an innovative modern educational system is its capacity for self-renewal and continuous change (Adams and Hamm, 1994 as cited in

Ajelabi, 1998). This change must encompass what is taught, how it is taught and the relationship of our classrooms and schools to the society. This certainly is necessary for national development.

### **Computer Education and National Development.**

The present breath-taking rate of technological development is such that would make our forefathers envious of this generation. Ours is an era of technological revolution. All the technological attempts are aimed at making through the production of devices and systems that facilitate the performance of activities (Akudolu, 2001). Today, there exist machines that perform functions that were hitherto the province of man. The technological revolution has continued to shape people's lives, change the ways people do certain things and above all shrink the world and promote global economy. This technological advancement leads to national development and can only be achieved by computer literacy through computer education.

When we talk of national development, it implies conscious efforts aimed at moving the various aspects of the society towards modernization and improvement through the application of knowledge gained from a learning process. According to Eneasator (1990) "it signifies the extent to

which a society is able to overcome complex social, economic, political and cultural problems in a manner that will make life more meaningful to her citizens". Nwosu (1990) in her own view observed that national development "is a continuous improvement of the material and human resources of a nation in order to maximize and manipulate the physical environment for the benefit of the citizens". Since development per-se involves learning and the application of information, attitude, values and skills previously unavailable, it then means that education is central to any developmental process (Eneasator, 1999) of which computer education is at the optimum.

According to Oxford Advanced Learner's Dictionary, perception is defined as "the ability to understand the true nature of something". Any reform/innovation in teaching and learning must start with a clear notion of what teachers themselves think of it, what their experiences have been like and what they understand it should be like (Amadi, 1999). The introduction/adoption of microcomputers for teaching and learning of sciences in our secondary schools lies on the assertion above. Teachers are the pivots around which the educational process revolves. It is when and only when they imbibe the new technology and introduce it into the educational process that it can take off and then used for preparing learners for effective life in the society. For computers to be adopted and used effectively in teaching and learning, teachers who are the chief curriculum implementers should exhibit a positive attitude towards the use of microcomputers in the classroom.

The use of CAI for effective teaching and learning of sciences is the target of study presented in this paper. Specifically, the aim of the study was to ascertain the attitude of teachers towards the introduction of CAI in secondary school classroom. It is expected that with the introduction of computer education in the National Policy on Education (1998), appropriate arrangements should be made in this regard.

How competent and experienced are secondary school science teachers to accept the use of computers in the classroom? Are these teachers computer literate enough to manipulate the computer? Are there material resources available for the teaching and learning of sciences via computer? These questions present problems that necessitated this study. The study was expected to find answers to the following questions:

1. To what extent are secondary school science teachers exposed to basic computer literacy?
2. To what extent can computer displace teachers from their work?
3. To what extent can CAI enhance effective teaching and learning of sciences?
4. How available are computers in secondary schools?

## **Method**

### **Area of the Study**

The study covered all the state- owned secondary schools in Onitsha and Aguata education zones of Anambra State. In Aguata education zone there are 49 schools and 32 schools in Onitsha education zone.

### **Sample and Sampling Technique**

Simple random Sampling was used to select 50% of the schools in each zone. Thus 40 schools were used. Six (6) science teachers were selected from each school and this gave a sample size of 240. All science teachers in Biology, Chemistry, Physics, Mathematics, Integrated Science, Agricultural Science, Geography and Introductory Technology were included in the sample.

### **Instrument**

A structured questionnaire which contained twenty- eight (28) items was used for the study. The items were structured to elicit the extent to which science teachers agree or disagree with the items based on a 4 -point Scale such as 4 = strongly agree, 3 = agree, 2 = disagree, 1 = strongly disagree.

### **Validation**

The instrument was content validated by two lecturers of University of Nigeria, Nsukka.

One lecturer was from Computer Science Department and the other from Measurement and Evaluation.

**Reliability**

The questionnaire was administered to 30 science teachers in six secondary school in Nnewi education zone. Split- half method was used to obtain an internal consistency of 0,70, while Spearman Brown Prophecy formula was used to step up the coefficient to 0.82. (Nworgu,1992).

**Data Analysis**

The data obtained were analysed using mean scores. Based on the 4 - point scale of the instrument, a mean of 2.55 was adopted as the minimum score an item can obtain before it can be accepted as being a perceived criterion for the adoption of microcomputers for teaching and learning of sciences.

**Results and Discussion**

**Table 1: Mean Response of Teachers on Teachers' Knowledge and Use of Computer.**

	Teachers' knowledge and Use of Computers	Mean score	Remark
1.	Teachers should be able to discuss the importance of the computer, citing uses in education.	3.48	Agree
2.	Teachers should know the basic operational scheme of a computer.	3.36	Agree
3.	Teachers must know the uses and limitations of computers in the classroom.	2.94	Agree
4	Teachers must be able to operate at least a micro-computer hardware in order to run prepared programmes.	3.12	Agree
5.	Computer education should be taught at all levels of education.	3.33	Agree
6.	Teachers like using computer to teach their lessons.	2.64	Agree.
7.	The use of computer will maximize teachers' productivity in the class.	2.58	Ag_ree____

The high mean scores indicate that teachers perceive to a large extent the need for secondary school teachers to be computer literate.

Table 2 Mean Responses of Teachers on Teachers' Job Security and Retention.			
	Teachers' Job Security and Retention	Mean score	Remark _____
8.	Teachers have the fear that computer will replace their job.	2.07	Disagree
9.	Use of computers in the classroom will reduce teaching load and hence create redundancy.	2.39	Disagree
10.	Teachers will be retrenched due to redundancy.	2.10	Disagree
11.	Use of computers in teaching will lead to increased unemployment to newly graduated teachers	2.14	Disagree
12.	With the use of computer in teaching, students will no longer have respect/regards for their teachers.	1.74	Disagree
13.	Lack of teachers' experience and competence will make them feel inferior and ineffective.	2.14	Disagree

Table 2 shows that the respondents were of the opinion that introduction of microcomputers for teaching and learning of sciences will not have any adverse effect on their job.

**Table 3 Mean Responses of Teachers on the Use of Computer - Assisted Instruction (CAI).**

	Computer-Assisted Instruction (CAI) Enhances Effective Teaching and Learning	Mean Score	Remark
14.	Tutorial mode of CAI will lead to more coverage of science syllabus.	2.75	Agree
15.	Encourages thinking, reasoning, evaluating and seeking logical answers to scientific problems.	2.71	Agree
16.	Incorporates practical into theory for increased understanding.	2.94	Agree
17.	Increased productivity through immediate assessment and feedback.	3.04	Agree
18.	Provides remedial lessons for poor performance of a particular topic.	2.67	Agree
19.	Improves students' achievement in sciences.	2.88	Agree
20.	Individualised nature of computer will lead to less coverage of the syllabus^	2.14	Disagree
21.	Induces students' natural urge to discover and work out things for themselves.	2.94	Agree
22.	Stimulates students' self-activity and concretize science.		
I		I 2.80	Agree.

Results in Table 3 show that a great number of the respondents were of the opinion that CAI enhances effective teaching and learning of science.

**Table 4 Mean Responses of Teachers on the Availability of Computers in Schools**

	Availability of Computers in Schools	Mean Score	Remark
23.	Computers are provided by government to only Federal government schools.	2.00	Disagree
24.	Computers are provided by government to all secondary schools in Anambra State.	1.42	Disagree
25.	The computers in my school were supplied by philanthropists and non-governmental organizations.	2.00	Disagree
26.	Computers and its peripherals (printers, UPS, software programs) are supplied to my school.	1.70	Disagree
27.	There is steady source of power supply in my school.	1.45	Disagree
28.	There is a computer laboratory well-equipped with air-condition in my school.	1.32	Disagree

Results in Table 4 show acute lack of resources such as computers, suitable software and power supply.

### Discussion

The findings of this study in Table 1 show that teachers need to learn how to use computer technology in the classrooms. They need to learn how to use the software and hardware but above all how to integrate the new technology into the curriculum. In fact, Underwood and Underwood (1990) as cited in Akudolu (2001) declare that computers are invading our classrooms but to achieve their potential we need a revolution in educational practice. The use of computers in the class will maximize teachers' productivity.

It was also revealed in Table 2 that the introduction of computers in the classroom will not have adverse effect on teachers' job security and retention. Teachers views show that they would neither be redundant nor their prestige be impaired.

It is interesting to note that secondary school teachers were of the opinion that CAI enhances effective teaching and learning. The most frequent response was that CAI enhances increased

productivity through immediate assessment and feedback. The importance of CAI cannot be over-emphasized. All the advantages in Table 3 had positive response indicating that teachers agree with the facts.

#### Table 4

This study also exposed the acute lack of resources such as computers, and its peripherals like printers, UPS, steady power supply from NEPA and an air-conditioned computer laboratory. Above all it revealed governments' inability to equip schools with computers. The fact that lack of human and material resources militate against effective use of computer instruction in schools is well documented in Hawkins (1994), Siegel (1994) and Akudolu (2000). The lack of information technology facilities is depriving learners of the much-desired multimedia learning opportunities provided by computers.

#### **Implications for National Development**

The teachers are willing and ready to teach their lessons via the computer. What follows is that concerned efforts would be geared towards implementing Computer- Assisted Instruction (CAI) on a large scale. In order to really encourage our students and develop their potentials towards meeting the challenges of this 21<sup>st</sup> century, teachers should make use of the computer that is capable of exciting the students in an environment dominated by indigenous technology (Jegede, Okebukola and Ajewole, 1992). The actual utilization of CAI will bring about national development.

Moreso, if the computer is widely applied to instruction, it is certain that we are going to catch up with the rest of the world. Furthermore, we would survive in this 21st century of high technology where computer is undoubtedly at the centre of everything. In addition, our school products will be able to land on jobs demanding computer knowledge. All these would lead to national development.

Therefore, positive efforts should be made by teachers, teacher educators and the government in bringing about effective teaching and learning of sciences in a stimulating way to achieve national development.

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