
GENDER DIFFERENCES AND SCHOOL LOCATION ON DEVELOPMENT AND ASSESSMENT OF COMPUTER PROGRAMMED INSTRUCTIONAL PACKAGE ON ENERGY CONCEPT IN UPPER BASIC TECHNOLOGY.

¹ABE, T.O AND ²ADU E .I

¹Postgraduate School, College of Education Ikere Ekiti,

²College of Education Demonstration Secondary School Ikere Ekiti.

E-mail: dr_abe07@yahoo.com, adu.aklasco.ifedayo06@gmail.com

ABSTRACT: *This study investigated the influence of upper basic technology teachers' gender differences and location on the assessment of Computer Programmed Instructional Package on Energy Concept (CPIPEC) in Ekiti State. The CPIPEC was assessed by 152 upper basic technology teachers using the teacher feedback questionnaire (TFQ). The results revealed that there was significant difference in the assessment of CPIPEC between male and female upper basic technology teachers with $t_{cal}(2.051)$, which was greater than $t_{tab} (1.96)$. The means of 69.91 and 74.27 with $t_{cal} (3.996)$ and $t_{tab} (1.96)$ revealed that there was significant difference in CPIPEC assessment between rural and urban area upper basic technology teachers. From the findings, it was discovered that CPIPEC had been adjudged a welcome innovation, and relevant recommendations on the fact that Federal Government should provide adequate facilities to encourage the use of computers in schools were made, especially in rural areas.*

Keywords: Computer Programmed Instructional Package on Energy Concept, Gender Differences, School Location, and Basic Technology.

INTRODUCTION

Basic technology was introduced into the Nigerian educational system (6-3-3-4) in 1982 as a result of the newly defined National Policy on Education (NPE) that came to being after the National curriculum conference of September 1969. The specific objective was to develop the students manipulative skills, respect for dignity of labour and healthy attitude towards technical education with motive of actualizing the ideas to develop the sense of invention and discovery by learners in junior secondary schools in Nigeria (Fafunwa 2002, & Olaniyan & Lucas, 2008). Lee, Yen, Havelka & Koh, (2004) argued that, programmed instruction is an instructional strategy in which the student is presented with many small learning modules or pieces of information in logical sequence. The modern day programmed instruction adopted Skinner (1954) principles. The six principles of mechanism of teaching animals are as follows:

- Step by step,
- Active participation
- Success

- Immediate verification
- Logically graded progress and individual pace.

Nitks (1996), Abe (2002), Abe & Ibeh (2007) identified assessment as a process for obtaining information that is used for making decisions about students, curricula, programmes and educational policy. The decisions made with assessment information may concern the following students, such as whether a student understands a topic or needs additional instruction in the topic.

- **Programme:** such as if the programme is not achieving its objective or not.
- **Educational policy:** such as whether a policy that requires students to be promoted to the next grade is more or less detrimental than a policy that allows low achieving students to be retained.

Agwibike & Momoh (1995) defines assessment as a less restrictive decision-making process than evaluation. It involves judging the quality or worth of something based on selected attributes like evaluation, it utilizes qualitative and quantitative data and theory. Assessment is therefore the process of measuring behaviour and using the result of the measurement to take certain decisions.

Literature Review

Gender and Location Effects on Computer Based Learning and Assessment

Gender differences are the sensitivity perceived between male and female within a school environment; while a school location is the site or position of a learning institution Okereke, (2011).Williamson & Facer, (2004) stated that 33% males and just 13% of females use computer packages for their assignments. This shows that certain gender will be exposed more frequently to computer packages than others, just as teachers exposure to the assessment of computer programmed instructional package on energy concept (CPIPEC) will be influenced by their gender and location. The school location is important for the assessment of the package designed for this study because, Ingles & Jennings, (1981) stated that the disparity in resources between urban schools and rural schools in Nigeria explains higher achievement of learners from urban schools, vis-à-vis the teachers assessment of CPIPEC for this study.

Concept and the Development of Programmed Instruction

A program is a set of instructions for a computer to perform a specific task (David, 2013). Instruction is sequence of bits that tells a central processing unit to perform a particular operation and can contain data to be utilized in the operation (Webster, dictionary, 2013).The term "Software Development" may be utilized to refer to the activity of computer programming, which is the process of writing and maintaining the source code, but in a broader sense of the term it includes all that is involved between the conception of the

desired software through to the final manifestation of the software, ideally in a planned and structured process (Robert, 2006). There are three types of programmed instruction namely: linear, branching and mathetic.

Objectives and Contents of Basic Technology Curriculum

Basic technology is an integrated subject, comprising of woodwork, metalwork, building technology, auto-mechanic, electrical/electronic and technical drawing (Olaniyan & Lucas, 2008). Energy concept is an aspect of electrical/electronic offered in junior secondary school basic technology curriculum. Olaniyan et. al, (2008) asserted that basic technology was introduced into the Nigerian education system, 6-3-3-4 in 1982 as a result of the newly defined National Policy on Education (NPE) that came into being after the National curriculum conference of September, 1969.

Energy Concept

This refers to constituents of energy like its definition, types and mode of conversion from one form to another as contained in the Computer Programmed Instructional Package on Energy Concept (CPIPEC) for this study. The word energy emerged from a Greek word *energeia* (Aristotle, 4BC). Energy concept emerged out of the idea of *vis viva* which Leibniz defined as the product of mass of an object and its velocity squared (Vaclav, 1994). In 1807, Young was the first to use the term energy instead of *vis viva*, in its modern sense (Smith, 1998).

Problem of the Study

There exist a lot of inequalities in the design and development of computer packages for teaching and learning processes in Nigeria and in developing equity based CPIPEC, one must have in mind which learners will best utilize the software for learning processes. Teachers in urban locations are more exposed to information and communication technology (ICT) facilities than rural based ones. Therefore this study is out to address the digital divide that exists within Nigeria educational system.

Purpose of the Study

The purpose of this study is to determine the influence of gender and location on the development and assessment of CPIPEC by upper basic technology teachers in Ekiti State. Specifically this study is out to:

- a) Investigate the difference between male and female upper basic technology teachers assessments of CPIPEC, and
- b) Investigate the difference between rural and urban upper basic technology teachers assessment of CPIPEC.

Research Questions

1. Will there be any difference in the development and assessment of CPIPEC between male and female upper basic technology teachers?
2. Will there be any difference in the development and assessment of CPIPEC between rural and urban upper basic technology teachers?

Research Hypotheses

HO₁: There is no significant difference in the development and assessment of CPIPEC between male and female upper basic technology teachers.

HO₂: There is no significant difference in the development and assessment of CPIPEC between rural and urban upper basic technology teachers.

Methodology

The research design for this study is a descriptive research of survey type which aims at collecting data on and describing in a systematic manner, the characteristics, features or facts about a given population (Champion, 1970; Nworgu, 1991; & 2006; Gay, 1996 & Adeyemi, 2007); while the geographical scope was Ekiti State junior secondary schools, with three senatorial districts, north, central and south senatorial districts. Therefore, the target population for this study consisted of all junior secondary school basic technology teachers, and one hundred and fifty two (152) upper basic technology teachers were purposively selected from the three senatorial districts. Since, all the teachers were computer literate, and they have access to the use of computers in their various schools based on their adequate knowledge and qualifications that were related to the officially prescribed contents of basic technology curriculum on energy concept.

Procedure for Data Collection

The questionnaire and the software package developed by the researchers were produced and personally distributed by the researchers with the assistance of the principals in each of the schools visited. In most of the schools visited, the researchers went with their personal laptop computers, because most of the teachers did not have their personal computer (or refused to make their own available for use). This necessitated the need to make available to them, the researchers' personal laptop. The drafted instrument was presented to the lecturers in computer department, science curriculum experts, lecturers in the department of Science Education, and some experts on test and measurement to establish both face and content validity. In order to ascertain the content validity the two specialists in basic technology curriculum carefully studied the items on the teachers feedback questionnaire, removed some items, modified some, while others were restructured accordingly. They all agreed that the

remaining items adequately reflected a measure of the adequacy and suitability of the instrument.

To establish the psychometric properties of the instrument, it was administered on sixteen (16) upper basic technology teachers in Ondo State. To determine the internal consistency of the instrument was determined using alpha cronbrach method of estimating reliability coefficient and the result was 0.765. Hence the instrument (TFQ) was considered adequate enough for use as an assessment tool in this study.

Data Analysis Technique

The two hypotheses formulated were analyzed using t-test statistic at 0.05 level of significance with the aid of SPSS computer package 2012 edition.

RESULTS

The results of the analysis from the computer printout based on the two formulated hypotheses are illustrated in the table one and two as shown below:

HO₁: There is no significant difference in the development and assessment of CPIPEC between male and female upper basic technology teachers.

Table 1: t-test Analysis Showing the CPIPEC Assessment of Male and Female Upper Basic Technology Teachers

Sex	N	Mean	SD	df	t _{cal}	t _{tab}	Remark
Male	89	73.63	0.78	150	2.051	1.96	Significant
Female	63	71.37	0.71				

At $P < 0.05$, t_{cal} is significant, this implies that there was significant difference between male and female upper basic technology teachers, hence the Null hypothesis was not upheld. However, the mean performance of male teachers was better than that of the mean of female teachers. This shows that teachers' assessment of CPIPEC by male teachers was better than that of female teachers.

Table 2: t-test Showing CPIPEC Assessment of Rural and Urban Upper Basic Technology Teachers

Sex	N	Mean	SD	df	t _{cal}	t _{tab}	Remark
Rural	55	69.91	6.38	150	3.996	1.96	Significant
Urban	97	74.27	6.51				

At $P < 0.05$, t_{cal} is significant, this implies that there was significant difference between rural and urban upper basic technology teachers, hence the Null hypothesis was not upheld. However, the mean performance of urban teachers was better than that of the mean of rural teachers. This shows that teachers' assessment of CPIPEC by urban teachers was better than that of rural teachers.

DISCUSSION

From table 1, male teachers was better than female teachers in the assessment of CPIPEC in the sampled junior secondary schools from the three senatorial districts in Ekiti State, and the same time there was no significant difference between their assessments of CPIPEC, this corroborates the findings of Okeke, (1990) and Olaniyan & Lucas (2008) but at variance to the findings of Adu, (2011) and Abe & Ibeh, (2007). While from the table 2, the assessment of CPIPEC by the urban teachers was better than that of the rural upper basic technology teachers because of the mean of urban was better than rural basic technology teachers. However, there was an obvious variation in the assessment hence significant difference existed between the assessment of CPIPEC in rural and urban basic technology teachers which led to not upholding the hypothesis formulated at $P < 0.05$. This finding is in consonance with the findings of Jegede (2007) which stated that rural areas are more apprehensive and science-phobia.

CONCLUSION

This study vividly revealed that there was significant difference between the assessments of CPIPEC among the basic technology teachers in Ekiti State in:

1. Teachers in rural areas and urban areas
2. Between female and male basic technology teachers.

RECOMMENDATIONS

Based on the finding of this study, the following recommendations were made:

1. Sensitization programme should be embarked upon by the ministry of education to rural basic technology teachers on the usage of computer in the teaching and learning in the junior secondary schools in the state
2. Female basic technology teachers should be more encouraged towards the usage of computers. In order to have better assessment towards CPIPEC

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Biographical Note: Dr. Abe T.O is an expert in Mathematics Education and Tests, Measurement and Evaluation and has to his credit over 40 publications. He bagged his first degree from University of Ilorin, and second and third degrees from Ekiti State University Ado Ekiti, Nigeria. He presently works as a lecturer and Sub-Dean in Postgraduate School College of Education Ikere Ekiti, Ekiti State Nigeria.

Biographical Note: Adu E.I is an expert in Educational Technology and He bagged his first and second degrees from University of Ilorin, Kwara State, Nigeria in 2006 and 2011 respectively, in Educational Technology. He is presently working at College of Education Demonstration Secondary School Ikere Ekiti as a Basic Technology tutor.
