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Influence of Qualification on Development and Assessment of Computer Programmed Instructional Package on Energy Concept in Upper Basic Technology in Ekiti State

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ABSTRACT

This study investigated the influence of qualification on development and assessment of computer programmed instructional package on energy concept (CPIPEC) in upper basic technology in Ekiti State. One research question was formulated with its corresponding hypothesis in which a descriptive research method of survey type that aimed at collecting data on and describing in a systematic manner, the characteristic features or facts about a given population was adopted. A population of one hundred and fifty two (152) upper basic technology teachers was purposively selected for this study, and an instrument labelled teachers feedback questionnaire (TFQ) was utilised in gathering data for this research. The instrument was validated and the internal consistency of the instrument was determined using alpha cronbrach method of estimating reliability coefficient and the result was 0.765. The data collected were analysed using ANOVA statistical method. The results revealed that there was no significant difference among the upper basic technology teachers qualifications in the development and assessment of CPIPEC at $P<0.05$. Based on the findings of this study, relevant recommendation was made that the Government should encourage upper basic technology teachers in the design development and utilization of CPIPEC.

Keywords: *Qualification, Development, Assessment, CPIPEC, and Basic Technology*

1. INTRODUCTION

A teaching qualification or teacher qualification is one of a number of academic and professional degree that enables a person to become a registered teacher in primary or secondary school. Such qualifications include, but are not limited to, the Postgraduate Certificate in Education (PGCE), the Professional Graduate Diploma in Education (PGDE) and the Bachelor of Education (Wiki, 2013). In Ekiti State, teachers who are academically qualified and those that are professionally qualified are engaged to carry out instructional process (Ahiazu & Princewill, 2011).

Academically qualified teachers, refer to those who have academic training as a result of enrolment into educational institution and obtained qualifications such as HND, B.Sc, B.A, M.A, M.Sc and so on; while professionally qualified teachers are those who got professional training that gave them professional knowledge, skills, techniques, aptitudes as different from the general education Edu, Edu , & Kalu (2012). They hold degrees like B.Sc.Ed, B.A Ed, M.Ed and so on. Teachers qualification is considered one of the predictors of teachers ability to understand and utilise instructional packages effectively (Lingred, 1976). Similarly, teacher qualifications contributes to the way and manner they perceive instructional concepts to be taught in the classroom (Uche & Umoren, 1998). In this study, both professionally qualified and academically qualified upper basic technology teachers were allowed to assess the computer programmed instructional package on energy concept (CPIPEC) using the teacher feedback questionnaire (TFQ). Therefore, two categories of upper basic technology teachers were sampled for this study, and efforts were made in knowing how their qualifications affected the assessment of the CPIPEC developed for this study.

2. STATEMENT OF THE PROBLEM

The use of CPIPEC is very germaine to the teaching and learning processes, and it involves special knowledge and techniques for effective utilisation in the classroom. Uhumuavbi & Mamudu , (2008) asserted in their research that programmed instruction improves learners performance in science. Also, Iserameiya & Anyasi (2008) discovered that programmed instruction contributed to high academic achievements of learners, promote active learners participation, help learners to be creative and develop new learning ideas and skills independently. But, in a situation whereby the would-be users (teachers) do not have the prior knowledge or techniques needed for its utilisation for teaching and learning processes, there exist problems yet to be solved by researchers. Therefore, this study allowed the upper basic technology teachers to assess the CPIPEC developed for this study, to know the efficacy and efficiency of CPIPEC in teaching and learning processes.

3. PURPOSE OF THE STUDY

The main purpose of this study is to investigate the influence of qualification on development and assessment of computer programmed instructional package on energy concept in upper basic technology in Ekiti State. The specific objectives of this study included the following:

a. To investigate the influence of qualification on CPIPEC assessment,
b. To examine the results of the basic technology teachers assessment of the CPIPEC.

3.1 Research Question

a. What are the steps involved in the development of CPIPEC?
b. What are the basic technology teachers' assessments of the development of CPIPEC?
c. Will there be significant difference among the upper basic technology teachers qualifications in the development and assessment of CPIPEC ?

3.2 Research Hypothesis

The only research hypothesis formulated is as follow:

HO_1: There will be no significant difference among the upper basic technology teachers qualifications in the development and assessment of CPIPEC.

3.3 Scope of the Study

This study was limited to all teachers teaching basic technology within the three (3) senatorial districts in Ekiti State (Adu, 2011). The content scope was energy concept and the schools of study was purposively selected, so as to provide the enabling environment in terms of facilities and the samples required, because it was observed that not all the schools had facilities for basic technology.

3.4 Significance of the Study

This study is significant because it allowed basic technology teachers to assess the usefulness adequacy and relevance of CPIPEC in teaching and learning processes. The findings of this study serves as support for all academically and professionally qualified upper basic technology teachers for improved teaching through the use of CPIPEC.

4. LİTERATURE REVİEW

4.1 Influence of Teachers Qualification on the Development and Assessment of CPIPEC

A teaching qualification or teacher qualification is one of a number of academic and professional degree that enables a person to become a registered teacher in primary or secondary school. Such qualifications include, but are not limited to, the Postgraduate Certificate in Education (PGCE), the Professional Graduate Diploma in Education (PGDE) and the Bachelor of Education (Wiki, 2013). In Ekiti State, teachers who are academically qualified and those that are professionally qualified are engaged to carry out instructional process (Ahiazu & Princewill, 2011).

Academically qualified teachers, refer to those who have academic training as a result of enrolment into educational institution and obtained qualifications such as HND, B.Sc, B.A, M.A, M.Sc and so on; while professionally qualified teachers are those who got professional training that gave them professional knowledge, skills, techniques, aptitudes as different from the general education. They hold degrees like B.Sc.Ed, B.A Ed, M.Ed and so on. In knowing the influence of qualification on the development and assessment of CPIPEC, both categories of upper basic technology teachers were involved to find out if there exist any significant difference among their qualifications.

4.2 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 utilised 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.

4.3 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.

4.4 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 work 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).

5. METHODOLOGY

5.1 Research Design

The research design for this study was a descriptive research of survey type which aimed 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).

5.2 Sample and Sampling Techniques

The population for this study consisted of one hundred and fifty two (152) upper basic technology teachers, purposively selected for use in this study.

5.3 Research Instrument

For the purpose of data collection, the researchers made use of an instrument labelled teacher feedback questionnaire (TFQ). This instrument was utilised by the researcher to obtain feedback from the teachers assessment of CPIPEC.

5.4 Validity and Reliability of Instrument

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.

6. PROCEDURE FOR DATA COLLECTİON

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.

6.1 Data Analysis Technique

Research question one was answered descriptively by highlighting the necessary steps vividly as contained in the software package, while research question two was answered using item by item percentage statistical analysis, out of the three research questions generated while the only one hypothesis formulated was analysed using Analysis of Variance (ANOVA) statistic at 0.05 level of significance, with the aid of SPSS computer package 2012 edition.

7. RESULTS

7.1 Descriptive Analysis

7.1.1 Research Question One

What are the steps involved in the development of computer programmed instructional package on energy concept (CPIPEC)?

The following steps were involved in the development of CPIPEC:

Step One:

Selection of instructional design models. To achieve this the following models were taken into consideration:

(i) Crowder, (1963) model of intrinsic programming, which support the use of multiple choice questions and allows for mastery of concepts before proceeding to the next module.

(ii) Britain & liber (2004) viable system model, which allows the researcher to individualise all the learning experiences through the use of modules.

(iii) Swadley et.al (2006) visual basic 6.0 enterprise edition. This involves how the researcher can utilize his computer practical strength (skills) such as:

(a) Code programming, and
(b) Visual programming to create the programmed instructional package.
(c) For the code programming the researcher only made use of text. This was composed of statements written in the visual basic programming language only.
(d) In creating visual programming for this software package, there was no code writing, all the researcher did was to operate the software tools of visual basic.

(iv) Cater, (2004) rapid assessment for process improvement for software development model (RAPID). It is based on international standard organization 15504 and includes eight processes like: requirements elicitation, software

development, configuration management, quality assurance, project management, problem resolution, risk management, and process establishment.

Step two: The Layout

The computer programmed instructional package on energy concept (CPIPEC) evolved following the underlisted layout:

(a) Creating the software content by culling out the energy concept subject matter of the upper basic technology curriculum.
(b) Creating a learning management system (LMS). In this process, the learning management mechanism was designed for control of the learning process, while using the CPIPEC.
(c) Creating the module presentation mechanism for each module to indicate correctness or otherwise of the responses so as to navigate with ease to the next module.
(d) Presenting the content as a lesson unit. This involves displaying the content script (scope) and then setting them out for perusing in line with the researcher content network mechanism.
(e) The script was typed into the personal computer of the researcher using Microsoft word 2007 edition.
(f) Proof reading of the draft.
(g) Burning of the final draft content into an empty compact-disc-read-only-memory (CD-ROM) using 6.0 visual basic enterprise as the final production platform of the computer programmed instructional package on energy concept (CPIPEC).
(h) Production of the CPIPEC software.
(i) Assessment of the CPIPEC by the basic technology teachers in Ekiti State.

7.1.2 Research Question Two

What are the basic technology teachers' assessments of the development of computer programmed-instructional package on energy concept (CPIPEC)?

This research question was answered descriptively by analyzing the twenty two items of questionnaire using simple percentage as shown in table 1 as follow.

Table 1: The basic technology teachers' assessment of CPIPEC

S/N	Item Statements	SA	%	A	%	D	%	SD	%	Remarks
1.	The subject matters on energy concept in the package are academically relevant	122	80.3	28	18.4	1	0.7	1	0.7	SA
2.	Illustrations in the package are very meaningful	72	47.4	76	50.0	4	2.6	-	-	A
3.	Illustrations in the package are related	81	53.3	51	33.6	19	12.5	1	0.7	SA
4.	Navigation on the package from one module to another module is very accurate	54	35.5	85	55.9	5	3.3	8	5.3	A
5.	Navigation on the package is very easy to understand	77	50.7	61	40.1	12	7.9	2	1.3	SA
6.	The subject matter in the package is in line with the basic technology curriculum	52	34.2	93	61.2	6	3.9	1	0.7	A

7. The modules in the package are self explicit	67	44.1	65	42.8	19	12.5	1	0.7	SA
8. The modules in the package are simple for comprehension	45	29.6	78	51.3	26	17.1	3	2.0	A
9. The operations in the package can achieve its objective	79	52.0	63	41.4	9	5.9	1	0.7	SA
10. The package gives room for accurate feedback	44	28.9	90	59.2	15	9.9	3	2.0	A
11. The package gives room for correct feedback	61	40.1	60	39.5	26	17.1	5	3.3	SA
12. Effectiveness of the use of the package is automatic	41	27.0	67	44.1	29	19.1	15	9.9	A
13. Reinforcement of the learning outcome is automatic	58	38.2	58	38.2	28	18.4	8	5.3	SA
14. The use of the package is technical	59	38.8	77	50.7	14	9.2	2	1.3	SA
15. The package can achieve its goal as a computerized learning tool	70	46.1	71	46.7	7	4.6	4	2.6	A
16. The package is consistent with visual basic format	64	42.1	81	53.3	7	4.6	-	-	A
17. The package needs much technical support for its integration	71	46.7	71	46.7	10	6.6	-	-	SA
18. Teachers will need requisite training on the use of the package as a learning tool	70	46.1	62	40.8	18	11.8	2	1.3	SA
19. The use of the package as a learning tool will need government initiative	73	48.0	66	43.4	9	5.9	4	2.6	SA
20. The package may be too expensive for use as a learning tool	65	42.8	57	37.5	26	17.1	4	2.6	SA
21. With adequate facilities the use of the package as a learning tool will be effective	70	46.1	70	46.1	11	7.2	1	0.7	SA
22. The use of the package cannot replace the skills of the teachers as an instructional mediator	76	50.0	60	39.5	11	7.2	5	3.3	SA

From table 1, item 1 which relate to whether the subject matters on energy concept in the package were academically relevant. The responses recorded that 80.3% strongly agreed, 18.4% agreed, while 0.7% disagreed and 0.7% strongly disagreed. Item 2 solicited information on the meaningfulness of illustrations in the package. The

responses recorded that 47.4% strongly agreed, 50.0% agreed, and 2.6% disagreed while no one strongly disagreed.

Item 3 sought to know whether the illustrations in the package were related. The responses recorded that 53.3% strongly agreed, 36.6% agreed, while 12.5% disagreed and 0.7% strongly disagreed. Item 4 sought to know the accuracy of navigation from one module to another module. The responses recorded that 35.5% strongly agreed, 55.9% agreed, while 3.3% disagreed and 5.3% strongly disagreed. Equally item 5 obtained information on whether navigation on the package would be easy to understand. The responses recorded 50.7% strongly agreed, 40.1% agreed, while 7.9% disagreed, and 1.3% strongly disagreed.

Item 6 sought to know whether the subject matter in the package was in line with the basic technology curriculum. The responses recorded that 34.2% strongly agreed, 61.2% agreed, while 3.9% disagreed and 0.7% strongly disagreed. Item 7 recorded that 44.1% strongly agreed, 42.8% agreed, 12.5% disagreed, and 0.7% strongly disagreed as to the self-explicit of the modules in the package. While item 8 was on the ease of comprehension. The responses recorded on this item indicated that 29.6% strongly agreed, 51.3% agreed, 17.1% disagreed and 2.0% strongly disagreed. Item 9 was on whether the operation in the package can achieve its objective. The responses recorded that 52.0% strongly agreed, 41.4% agreed, 5.9% disagreed, and 0.7% strongly disagreed.

Item 10 solicited information on whether the package could give room for accurate feedback. The responses recorded that 28.9% strongly agreed, 59.2% agreed, 9.9% disagreed, and 2.0% strongly disagreed. Item 11 was on the correctness of the feedback given by the package. The responses recorded that 40.1% strongly agreed, 39.5% agreed, 17.1% disagreed and 3.3% strongly disagreed. Item 12 solicited information on the automatic effectiveness of the use of the package. The responses recorded that 27.0% strongly agreed, 44.1% agreed, 19.1% disagreed, and 9.9% strongly disagreed.

Item 13 was on the reinforcement of the learning outcome. The responses recorded that 38.2% strongly agreed, 38.2% agreed, 18.4% disagreed, and 5.3% strongly disagreed with this ability of the package. Item 14 was on the technicality of the package. The responses recorded that 38.8% strongly agreed, 50.7% agreed, 9.2% disagreed, and 1.3% strong disagreed.

Item 15 sought assurance on whether the package can achieve its goal as a learning tool. The responses recorded that 46.1% strongly agreed, 46.7% agreed, 4.6% disagreed, and 2.6% strongly disagreed. Item 16 solicited information on whether the package was consistent with the principle of visual basic format on which it was built. The responses recorded that 42.1% strongly agreed, 53.3% agreed, 4.6% disagreed, while no one strongly disagreed. Item 17 was on whether the package needs experts support for its integration. The responses recorded that 46.7% strongly agreed, 46.7% agreed, 6.6% disagreed, while no one strongly disagreed. Item 18 was on whether the users will need requisite training on the use of the package as a learning tool. The responses recorded that 46.1% strongly agreed, 40.8% agreed, 11.8% disagreed, and 1.3% strongly disagreed.

Item 19 was on whether the use of the package as a learning tool would require government initiative. The responses recorded that 48.0% strongly agreed and 43.4% agreed, 5.9% disagreed, and 2.6% strongly disagreed. Item 20 was on whether the package may be too expensive for use as a learning tool. The responses recorded that 42.8% strongly agreed, 37.5% agreed, 17.1% disagreed, and 2.6% strongly disagreed.

Item 21 was on the provision of adequate facilities and the effectiveness of the package. The responses recorded that 46.1% strongly agreed, 46.1% agreed, 7.2% disagreed, and 0.7% strongly disagreed. Finally, item 22 was on whether the use of the package can replace the skills of the teachers.

The responses recorded that 50.0% strongly agreed, 39.5% agreed, 7.2% disagreed, and 3.3% strongly disagreed. Generally, there was greater percentage of strongly agreed than agreed on items 1 to 22. Few percentage of disagreed was also recorded on items 1 to 22. There was also few percentage of strongly disagreed on items 1,3,4,5,6,7,8,9,10,11,12,13,14,15,18,19,20,21, and 22 except items 2, 16, and 17. Precisely there was strong agreement on items 1,3,5,7,9,11,13,14,17,18,19,20,21 and 22; while the teachers agreed on items 2,4,6,8,10,12,15,16 and 17. This was indicative of the fact that most of the teachers strongly agreed on their assessment of standard of the development of the computer programmed-instructional package on energy concept (CPIPEC).

The results of the analysis based on the formulated hypothesis is illustrated in table 1 as follows :

Hypothesis Testing

HO_1: There will be no significant difference among the upper basic technology teachers qualifications in the development and assessment of CPIPEC.

Table 2: ANOVA summary showing significant difference in CPIPEC among the NCE, B.Sc and M.Ed teachers.

	Sum of Squares	Df	Mean Square	F-cal	F-tab	Remark
Between Groups	322.425	4	80.606	1.793		No significance
Within Groups	6610.042	147	44.966			
Total	**6932.467**	**151**				

At $P < 0.05$, there was no significant difference among the teacher's qualifications in the development and assessment of CPIPEC among the NCE, BSc, BSc .Ed and M.Ed teachers, hence, the Null hypothesis was upheld.

8. DİSCUSSİONS

The result of the analysis of hypothesis one indicated that there was no significant difference among the teachers qualifications in the development and assessment of CPIPEC. This shows that academic qualification did not really have much influence on upper basic technology teachers assessment of the developed CPIPEC. However, this result disagrees with Ahiauzu & Princewall (2011) who asserted that professionally trained teachers tend to stimulate themselves more than academically trained teachers in terms of individualisation of teaching and learning processes in the classroom.

The findings of this research effort showed that most of the basic technology teachers who participated in the assessment of CPIPEC strongly agreed on the quality and relevance of the development of the software package. The outcome of this research effort was in line with the findings of Oloyede & Adekunle, (2009) that computer has a wide range of application in the classroom, and educators should look in its way as a panacea to solving pedagogical challenges. Along this view, Onasanya & Adegbija, (2007) agreed that computer plays a central role in information and data collection, processing and dissemination and thus should be allowed to invade all spheres of the instructional mediation. Hence it could be concluded that this research effort has justified this position.

This confirms the view of Yusuf, (2005) that successful use of computer by teachers depends on them being convinced of the relevance, as a means of providing better access to richer range of resources for themselves and their pupils. The emphasis must be on using appropriate technologies to enhance and support effective learning and not just on qualification alone (Udo, 2005).

9. CONCLUSİON

From the findings of this study, it was discovered that qualification had no influences on the upper basic technology assessment of the CPIPEC in Ekiti State. It can be seen that the development of CPIPEC had been adjudged a welcome innovation. Although people had previously thought that programmed instruction (PI) was an obsolete method of instruction, the development of CPIPEC has constituted a way forward to bridging the old and the new world of instructional mediation.

The use of computer no doubt has dominated human activities through its computer message system that have evolved into electronic networks, for information, business services and education. Hence, computer has been utilized to transform the outmoded paper and pencil PI into a contemporary computer divide, which is believed will better prepare learners independent self-instruction.

10. Recommendations

Based on the findings, the following recommendations were made :

1. Since qualification did not influence the assessment of CPIPEC by upper basic technology teachers, efforts should be made by the Government in encouraging upper basic technology teachers in the design, development and utilisation of CPIPEC for teaching and learning processes in Ekiti State.
2. All upper basic technology teachers in Ekiti State should be mandated to be computer literate as this will influence the use of new packages.
3. Basic infrastructures and facilities should be made available to schools in order to encourage upper basic technology teachers in the use of CPIPEC for teaching and learning processes.

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