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Pre-service Teachers’ Perceived Technological Pedagogical Content Knowledge at Selected Colleges of Education in Lagos State, Nigeria: Blessing F. Adeoye¹ & Babatunde Y. Ojo²

We currently live in a digital age, and we are raising, and teaching ‘netizens’; as a result, we must use the relevant educational tools to teach them. It is necessary for pre-service teachers to consider how these electronic technologies differ and what characteristics make them important as vehicles for teaching. To examine the perceived technological pedagogical content knowledge of pre-service teachers, Technological Pedagogical Content Knowledge (TPCK) was used as the framework to guide this study. The TPCK framework recognizes the complexity and interplay among three main components of learning environments: content, pedagogy, and technology and is designed to help instructors understand and negotiate the relationships between these three components of knowledge. The participants in this survey consisted of 400 pre-service teachers who enrolled in selected Colleges of Educations in Lagos State, Nigeria in the 2013 academic year. The results indicate that half of the teachers surveyed in this study lacked general knowledge about technology, but could learn easily. About 50% of them were knowledgeable about technologies that could be used in their subject areas.

Keywords: Pre-service Teacher, Technological, Pedagogical, Content Knowledge, Educational Technology.

Introduction

Gone are the days when the teacher stood in the front of the classroom and taught while students simply listened and took notes. For today’s learners, technology, particularly the Internet and Information Communication Technology (ICT), has assumed a substantial stake in their social and educational lives. A survey conducted by the Pew Internet & American Life Project (Hitlin & Rainie, 2005) found that roughly 21 million youths between the ages of (12-17) years approximately 87 percent of the entire age bracket use the internet. Of those 21 million teens, 78 percent (about 16 million students) indicated that they use the internet at school. According to Hitlin and Rainie (2005), this translates into 68% of all teenagers, up from 47% in 2000; most teens believe that the internet helps them do better in school. Literature to date has reported that pre-service teachers who have acquired higher level of technological skills are more willing to use technology in classroom (Hammond et al., 2009; Paraskeva, Bouta, & Papagianna, 2008). Also, Brown and Warschauer, (2006) and Lee, Chai, Teo and Chen (2008) indicated that pre-service teachers who received ICT training possed a stronger sense of self-efficacy with respect to computer use. Researchers have lamented that many pre-service teachers are not adequately prepared to use ICT in classrooms (Kay, 2006; Swain, 2006).

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In order to teach well and be relevant in today’s classrooms, technological pedagogical content knowledge is critical for teachers. The ability to use the internet and Information Communication Technology effectively has become an essential part of everyone’s education. From the Greek, the word pedagogy means “to lead the child,” but it is not just about children (Bull, 2013) but all learners. Given a certain population of students and a given context, how do students best learn? What methods and strategies might one use to help them learn? What skills does a teacher need to be effective? Pedagogy is about the methods and not the subject or content. According to Bull, it seeks to answer three important teaching and learning questions. What do I want the students to learn? How will I help them learn it? And how will I know when or if they learn it? Many different types of technology can be used to support and enhance learning. Everything from video content and digital moviemaking to laptop computing and handheld technologies, (Marshall, 2002) have been used in classrooms, and new uses of technology such as podcasting are constantly emerging. Various technologies deliver different kinds of content and serve different purposes in the classroom. (For example, see Figure 1 below). Technology integration should serve a sound pedagogical purpose and relate directly to the content which is being taught.

Productivity tools include desktop publishing, blogging, word processing, database and spreadsheet programs which promote organizational skills. Networking tools include file sharing, reading, socializing, uploading and downloading of file. Storing tools include file sharing, networking, by using various storage facilities including dropbox and google. Communication tools include e-mail, skyping, video conferencing, and chatting which promote communication skills. Since we live in a digital age and we are teaching netizens, we must use the relevant educational tools to teach them. It is important for pre-service teachers to consider how these electronic technologies differ and what characteristics make them important as vehicles for teaching.

![Figure 1 – Technology Tools for Teaching and Learning](image-url)
Rationale

Knowledge and integration of technology in the classrooms today are very important. Most universities in Nigeria make Educational Technology courses compulsory for their undergraduate students. Specifically, Educational Technology is the only compulsory technology course offered on the Nigeria Colleges of Education Syllabus. Preparing pre-service teachers to use technology is a complex job given the fast changing nature of technology and the multiple sources of knowledge which need to be synthesized. Also, the demand for technology literacy is increasing in Nigeria; employees realize that technology can enhance efficiency. On the other hand, employees have also realized that computers can be a threat to their jobs, and the only way to enhance job security is to become computer literate. With the high demand for computer literacy, the teaching and learning of these skills need to be encouraged. The young graduates must have technological literacy in order to compete in the global market. It is therefore important to understand the pre-service teachers perceived technological pedagogical content knowledge and how they will be teaching the students of this digital age.

Purpose
To examine the perceived technological pedagogical content and knowledge of pre-service teachers.

Research Questions
1. What is the status of the technological pedagogical content knowledge of pre-service teachers?
2. To what extent do the pre-service teachers prepared to teach, using educational technology tools?

Review of Literature
Several researchers have utilized TPACK to look into how to use technology for more effective educational experiences. For instance, Chai, Koh, and Tsai, (2010) examined the perceived development of pre-service teachers in terms of their technological knowledge, pedagogical knowledge, content knowledge and the synthesis of such knowledge. A questionnaire adapted from Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) was validated using factor analyses and the pre-service teachers’ TPACK perceptions before and after their ICT course was examined. The results revealed statistical significant gains with good effect sizes. Schmidt et al. analyses further revealed that technological knowledge, pedagogical knowledge and content knowledge are all significant predictors of pre-service teachers’ TPACK.

Chai, Koh, and Tsai (2012) pedagogical analyses indicated that Pedagogical Knowledge (PK) and Content knowledge (CK) are associated positively with the pre-service teachers’ TPACK. This finding is consistent with the previous research showing that teachers with better pedagogical and content knowledge had superior performance in applying technology to their teaching, after attaining ICT training (Guzey & Roehrig, 2009). Also, Anupama (2011) confirmed a strong relationship between teacher’s technology competence and effective teaching.
Patabedige (2012) in his own analysis showed that pre-service teachers have shown limited knowledge and experience of pedagogy. Pre-service science teachers’ knowledge of technology is initially as based on their own personal experience. Most of the pre-service teachers used ICT in science lessons when they were in school. More so, pre-service teachers conducted science lessons, using ICT with the TPACK model but their understanding in how to integrate the three knowledge domains was limited. This study has contributed to the understanding and implementation of the TPACK model through the development of a TPACK Scale, TPACK integration index, and the TPACK Rubric. These metrics provide descriptors of the thin and thick TPACK models that characterize variations within the model.

**Theoretical Framework**

Technological Pedagogical Content Knowledge (TPCK) was introduced to the educational research field as a theoretical framework for understanding teacher knowledge required for effective technology integration (Mishra & Koehler, 2006). The TPCK framework acronym was renamed TPACK (pronounced “tee-pack”) for the purpose of making it easier to remember and to form a more integrated whole for the three kinds of knowledge addressed: technology, pedagogy, and content (Thompson & Mishra, 2007–2008). Educational Technology Services (2011) created a framework in response to the fact that "educational research technology integration in schools has been criticized for lacking an underlying theoretical framework.” According to Educational Technology Services, the TPACK framework "recognizes the complexity and interplay among three main components of learning environments: content, pedagogy, and technology" and is designed to "help instructors understand and negotiate the relationships between these three components of knowledge". The framework is useful because it combines the ideas of Hsu, Sharma, and Cohen et. al. by demonstrating how technology, pedagogy and content can be successfully synthesized. The TPACK framework (see Figure 2) also offers educators and researchers a way to evaluate and present practical suggestions to develop the teachers’ knowledge and skills which are needed for integrating technology into teaching (Hosseini & Kamal, 2012). As a result, in this study, the TPACK framework is used to measure pre-service teachers’ perceived technological pedagogical content knowledge of a selected colleges of Education in Lagos State, Nigeria.

![Figure 2 - TPACK Framework](image_url)
Content Knowledge (CK): – It deals with teachers’ knowledge about the subject matter to be learned or taught. The content to be covered in middle school science or history is different from the content to be covered in an undergraduate course on art appreciation or a graduate seminar on Astrophysics (Koehler & Mishra, 2009).

Pedagogical Knowledge (PK): – It expresses teachers’ deep knowledge about the processes and practices or methods of teaching and learning. This encompass, among other things, overall educational purposes, values, and aims. It applies to understanding of how students learn, general classroom management skills, lesson planning, and student assessment (Koehler & Mishra, 2009).

Technology Knowledge (TK): It focuses on the knowledge about certain ways of thinking and working with technological tools and resources. It includes understanding information technology broadly enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able continually adapt to changes in information technology (Koehler & Mishra, 2009).

Pedagogical Content Knowledge (PCK): – It is similar to Shulman’s idea of knowledge of pedagogy that is applicable to the teaching of specific content. Central to Shulman’s conceptualization of PCK is the notion of the transformation of the subject matter for teaching. Specifically, according to Shulman (1986), this transformation occurs as the teacher interprets the subject matter, finds multiple ways to represent it, and adapts and tailors the instructional materials to alternative conceptions and students’ prior knowledge (Koehler & Mishra, 2009).

Technological Content Knowledge (TCK): – It is an understanding of the manner in which technology and content influence and constrain one another. Teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology—or vice versa” (Koehler & Mishra, 2009).

Technological Pedagogical Knowledge (TPK): – It is an understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies” (Koehler & Mishra, 2009).

Technological Pedagogical Content Knowledge (TPACK): – This is an underlying truly meaningful and deeply skilled teaching with technology. TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students’ prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones (Koehler & Mishra, 2009). In this study, TPACK framework deem appropriate since it provides a promising way forward for successfully integrating technology through curriculum planning.
and is appropriate for studying the development of teacher knowledge about technology (Koehler et al., 2007). Therefore, the present study tried to determine the knowledge of integrating technology of pre-service teacher through the lens of TPACK.

Methodology

This study adopted the descriptive survey research design, which investigates a phenomenon and reports on it as is and it encompasses measurement procedures that involve asking questions from respondents. Hosseini and Kamal (2012) develops an instrument to aid investigators and educators in measuring and researching the knowledge of teachers for integration of technology in teaching. Based on a review of the literature, TPCK framework was selected as the lens for examining technology integration and a new questionnaire was built upon the work of Schmidt and colleagues (2009) (as cited in Hosseini & Kama, 2012). According to their suggestion, the questionnaire was adapted by adding new items and changing some existing items in different areas to strengthen the instrument’s validity. Consequently, the initial questionnaire in Persian language included 53 items thought to be important for measuring the perceived knowledge of technology integration. These 53 items were allocated to seven categories corresponding to the components of TPCK. A sample of 236 pre-service teachers containing five groups from different instructional fields rated these items and generated a 50-item final version of the instrument. Items that were not relevant were removed from the instrument. After this modification, the instrument was left with 46 items which was administered to the participants. Each item response was scored with a value of 1 assigned to strongly disagree, all the way to 5 for strongly agree. Agree and strongly agree scores were added; disagree and strongly disagree scores were added.

Hosseini and Kamal conducted the reliability test for the instrument and found the Cronbach alpha value to be .895. The alpha reliability coefficient for each scale ranged from .851 to .906 indicating that the questionnaire had a good internal consistency. In addition, analysis using Pearson's correlation coefficient showed a significant correlation between the components of TPCK. Overall, their findings provided strong support for the reliability and validity of the TPCK questionnaire for measuring teachers’ knowledge for integration of technology in teaching (Hosseini, & Kamal, 2012). In the present research, sample was selected using a stratified sampling method (Creswell, 2008). The participants of this survey contained 400 pre-service teachers who enrolled in NCE in Lagos State, Nigeria in 2013 academic year. Out of nine Colleges of Education in Lagos State, four were selected by stratified sampling method for this study. This was done in order to consider many questions in the TPACK questionnaire which are dependent on different content areas. In order to be consistent in size across different groups, 66 participants were selected from each group to form the sample of 264 participants.

Data Analysis

A total of 264 students from four various Colleges of Education in Lagos State participated in this study. Out of the 264 participants, 61.7% are female and 35.6% are male. 

Research Question 1 - What is the status of the technological pedagogical content knowledge of pre-service teachers?
Table 1

**Technology Knowledge**

<table>
<thead>
<tr>
<th>Survey items</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 I know how to solve my own problem</td>
<td>45.5</td>
<td>14.4</td>
<td>37.9</td>
</tr>
<tr>
<td>2 I can learn easily</td>
<td>47.4</td>
<td>1.0</td>
<td>51.5</td>
</tr>
<tr>
<td>3 I keep up with important new technologies</td>
<td>51.5</td>
<td>16.3</td>
<td>32.3</td>
</tr>
<tr>
<td>4 I frequently play around the technology</td>
<td>45.8</td>
<td>12.5</td>
<td>40.1</td>
</tr>
<tr>
<td>5 I know about a lot of different technologies</td>
<td>53.3</td>
<td>14.4</td>
<td>32.3</td>
</tr>
<tr>
<td>6 I have the technical skills I need to use technology</td>
<td>48.0</td>
<td>16.0</td>
<td>34.9</td>
</tr>
</tbody>
</table>

N=264; values in the table are in %

Forty five percent of the participants indicated that they know how to solve their own problems while 37% do not know. Also, 45% frequently played around technology; 40% did not frequently play around technology. Forty seven percent could learn easily and 52% indicated that they could not. When asked if the participants keep up with new technologies, 51.5% agreed that they kept up with new technologies while 33.3% did not (see Table 2). Also, 53.3% of the participants are familiar with different technologies and 48% with technical skills needed to use technology; however, 32.3% of the participants are not familiar with different technologies and 34.9% reported that they lack the technical skills needed to use technology. It can be concluded based on the findings presented in Table 1 that 50% of all the participants are knowledgeable about technologies they could use in their subject areas. They kept up with new technologies and 50% reported having technological pedagogical content knowledge.

Table 2

**Content Knowledge**

<table>
<thead>
<tr>
<th>Content Knowledge – Mathematics</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 I have sufficient knowledge about mathematics.</td>
<td>36.0</td>
<td>22.0</td>
<td>40.9</td>
</tr>
<tr>
<td>8 I can use a mathematical way of thinking.</td>
<td>42.8</td>
<td>21.2</td>
<td>34.9</td>
</tr>
<tr>
<td>9 I have various ways and strategies of developing my understanding of mathematics.</td>
<td>44.3</td>
<td>15.9</td>
<td>51.7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Knowledge - Social Studies</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 I have sufficient knowledge about social studies</td>
<td>43.6</td>
<td>14.8</td>
<td>38.6</td>
</tr>
<tr>
<td>11 I can use a historical way of thinking</td>
<td>48.1</td>
<td>14.0</td>
<td>34.5</td>
</tr>
<tr>
<td>12 I have various ways and strategies of developing my understanding of social studies</td>
<td>47.0</td>
<td>14.8</td>
<td>34.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Knowledge – Science</th>
<th>Agree</th>
<th>Neither A/D</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 I have sufficient knowledge about science</td>
<td>41.0</td>
<td>19.3</td>
<td>35.6</td>
</tr>
<tr>
<td>14 I can use a scientific way of thinking</td>
<td>47.7</td>
<td>19.7</td>
<td>31.0</td>
</tr>
<tr>
<td>15 I have various ways and strategies of developing my understanding of science.</td>
<td>39.4</td>
<td>19.7</td>
<td>34.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Content Knowledge – Literacy</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>16 I have sufficient knowledge about literacy.</td>
<td>42.8</td>
<td>15.2</td>
<td>36.3</td>
</tr>
<tr>
<td>17 I can use a literary way of thinking.</td>
<td>40.7</td>
<td>19.7</td>
<td>31.0</td>
</tr>
<tr>
<td>18 I have various ways and strategies of developing my understanding of literacy.</td>
<td>39.4</td>
<td>23.9</td>
<td>28.1</td>
</tr>
</tbody>
</table>

N=264; values in the table are in %
Thirty six percent of the participants indicated having knowledge in Mathematics, 42.8% could use a mathematical way of thinking while 40% did not have knowledge in Mathematics and 34.9% indicated they could use mathematical way of thinking. Also, 44.3% reported having various ways and strategies of developing their understanding of Mathematics, but 51.7% did not. In the content knowledge of Social Studies, 43.6% indicated having sufficient knowledge about Social Studies, 48.1% could use a historical way of thinking and 47% have various ways and strategies of developing their understanding of Social Studies. However, 38.6% indicated not having sufficient knowledge about Social Studies, 34.5% did not believe they could use a historical way of thinking and also have various ways and strategies of developing understanding of social studies. In the content knowledge of Science, 41% indicated having sufficient knowledge, 47.7% indicated that they could use a scientific way of thinking and 39.4% have various ways and strategies of developing their understanding of Science. However, 35.6% indicated not having sufficient knowledge about Science, 31% did not believe they could use a scientific way of thinking and also 34.8% did not have various ways and strategies of developing understanding of science. In the content knowledge of Literacy, 42.8% indicated having sufficient knowledge about literacy, 40.7% could use a literacy way of thinking and 39.4% have various ways and strategies of developing their understanding of literacy. However, 36.3% indicated not having sufficient knowledge about literacy, 31% did not believe they could use a literacy way thinking and also 39.4% did not believe they have various ways and strategies of developing understanding of literacy.

Table 3

<table>
<thead>
<tr>
<th>Pedagogical Knowledge</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 I know how to assess students’ performance in a classroom.</td>
<td>46.2%</td>
<td>12.5%</td>
<td>35.9%</td>
</tr>
<tr>
<td>20 I can adapt my teaching based-upon what students currently understand or do not understand.</td>
<td>44.3%</td>
<td>15.2%</td>
<td>40.5%</td>
</tr>
<tr>
<td>21 I can adapt my teaching style to different learners.</td>
<td>42.1%</td>
<td>12.1%</td>
<td>45.8%</td>
</tr>
<tr>
<td>22 I can assess students’ learning in multiple ways.</td>
<td>47.0%</td>
<td>12.1%</td>
<td>36.4%</td>
</tr>
<tr>
<td>23 I can use a wide range of teaching approaches in a classroom setting.</td>
<td>31.7%</td>
<td>19.3%</td>
<td>34.9%</td>
</tr>
<tr>
<td>24 I am familiar with common students’ understandings and misconceptions.</td>
<td>44.7%</td>
<td>17.0%</td>
<td>33.3%</td>
</tr>
<tr>
<td>25 I know how to organize and maintain classroom management.</td>
<td>33.7%</td>
<td>12.9%</td>
<td>46.6%</td>
</tr>
</tbody>
</table>

N=264; values in the table are in %

Table 3 reveals an average perception of about 45% in the following areas that they know how to assess student performance in a classroom, can adapt their teaching based-upon what students currently understand or do not understand, can adapt their teaching style to different learners, can assess student learning in multiple ways, can use a wide range of teaching approaches in a classroom setting, are familiar with common student understandings and misconceptions, and know how to organize and maintain classroom management. The participants responses are almost equal in both scales of agree and disagree.
Table 4
Pedagogical Content Knowledge

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>26 I can select effective teaching approaches to guide student thinking and</td>
<td>48.9</td>
<td>18.2</td>
<td>29.1</td>
</tr>
<tr>
<td>learning in mathematics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 I can select effective teaching approaches to guide student thinking and</td>
<td>45.4</td>
<td>16.7</td>
<td>34.1</td>
</tr>
<tr>
<td>learning in literacy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 I can select effective teaching approaches to guide student thinking and</td>
<td>45.5</td>
<td>22.7</td>
<td>27.6</td>
</tr>
<tr>
<td>learning in science.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 I can select effective teaching approaches to guide student thinking and</td>
<td>45.4</td>
<td>16.7</td>
<td>33.3</td>
</tr>
<tr>
<td>learning in social studies.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=264; values in the table are in %

In the area of pedagogical knowledge, 48.9% of the participants indicated that they could select effective teaching approaches to guide student thinking and learning in Mathematics, 45.4% could select effective teaching approaches to guide students’ thinking and learning in Literacy, Science, and Social Studies. In same vein, 29.1% of the participants indicated that they could not select effective teaching approaches to guide students’ thinking and learning in Mathematics, 34.1% could not select effective teaching approaches to guide students’ thinking and learning in Literacy, 27.6% in Science, and 33.3% in Social Studies.

Table 5
Technological Content Knowledge

<table>
<thead>
<tr>
<th>Survey items</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 I know about technologies that I can use for understanding and doing</td>
<td>34.9</td>
<td>21.2</td>
<td>39.4</td>
<td>3.2</td>
<td>1.26</td>
</tr>
<tr>
<td>mathematics.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 I know about technologies that I can use for understanding and doing</td>
<td>39.7</td>
<td>20.5</td>
<td>51.6</td>
<td>3.4</td>
<td>1.18</td>
</tr>
<tr>
<td>literacy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 I know about technologies that I can use for understanding and doing</td>
<td>46.2</td>
<td>19.7</td>
<td>26.9</td>
<td>3.2</td>
<td>1.25</td>
</tr>
<tr>
<td>science.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33 I know about technologies that I can use for understanding and doing</td>
<td>37.9</td>
<td>21.2</td>
<td>33.7</td>
<td>3.6</td>
<td>1.08</td>
</tr>
<tr>
<td>social studies.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N=264; values in the table are in %

When asked, if the participants knew about technologies that they could use for understanding various subjects, their responses vary as shown in Table 5. Thirty four percent of the participants agreed for Mathematics, 39.7% for Literacy, 46.2% for Science, and 37.9% for Social Studies. However, some participants indicated that they do not know about technologies that they could use for understanding various subjects; specifically, 39.4% for Mathematics, 51.6% for Literacy, 26.9% for Science, and 33.7% for Social Studies.

Research Question 2
To what extent do the pre-service teachers prepared to teach using educational technology tools.Most of the participants are familiar with technologies that they could use in their subjects areas. Forty nine percent of them think critically about how to use technology in their classrooms, 47.0% could adapt the use of the technologies for different teaching activities
Table 6
Technological Pedagogical Knowledge

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>34 I can choose technologies that enhance the teaching approaches for a lesson.</td>
<td>45.1</td>
<td>10.6</td>
<td>32.2</td>
<td>3.6</td>
<td>1.15</td>
</tr>
<tr>
<td>35 I can choose technologies that enhance students' learning for a lesson.</td>
<td>42.5</td>
<td>9.1</td>
<td>33.7</td>
<td>3.8</td>
<td>1.03</td>
</tr>
<tr>
<td>36 My teacher education program has caused me to think more deeply about how technology could influence the teaching approaches I use in my classroom.</td>
<td>43.9</td>
<td>5.7</td>
<td>37.5</td>
<td>3.9</td>
<td>1.10</td>
</tr>
<tr>
<td>37 I am thinking critically about how to use technology in my classroom.</td>
<td>49.7</td>
<td>8.0</td>
<td>29.2</td>
<td>3.6</td>
<td>1.10</td>
</tr>
<tr>
<td>38 I can adapt the use of technology that I am learning about to different teaching activities.</td>
<td>47.0</td>
<td>20.1</td>
<td>24.6</td>
<td>3.7</td>
<td>2.80</td>
</tr>
<tr>
<td>39 I can select technologies to use in my classroom that enhance what I teach, how I teach and what students learn.</td>
<td>41.6</td>
<td>17.4</td>
<td>32.5</td>
<td>3.9</td>
<td>2.80</td>
</tr>
<tr>
<td>40 I can provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at my school and/or district.</td>
<td>41.2</td>
<td>18.6</td>
<td>32.9</td>
<td>3.68</td>
<td>1.74</td>
</tr>
<tr>
<td>41 I can choose technologies that enhance the content for a lesson.</td>
<td>42.4</td>
<td>16.7</td>
<td>33.3</td>
<td>4.0</td>
<td>3.77</td>
</tr>
</tbody>
</table>

N=264; values in the table are in %

Forty five percent of the participants indicated that they could choose technologies that enhance the teaching approaches for a lesson, and 32.2% indicated they could not. Forty two percent indicated that they could choose technologies that enhance students' learning for a lesson while 33.7% indicated they could not. When asked if their teacher education programme has caused them to think more deeply about how technology could influence the teaching approaches they use in my classroom, 42.5% agreed and 33.7% disagreed. Forty nine percent of the participants think critically about how to use technology in their classroom, 47.0% could adapt the use of the technologies for different teaching activities. However, 29% of the participants could not think critically about how to use technology in their classrooms, 24.6% could not adapt the use of the technologies to different teaching activities. Also, 41% of the participants claimed that they could select technologies to use in their classrooms that enhance what they teach, how they teach and what students learn. The same percentage indicated that they could provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at their schools. Also, 33% of the participants could not select technologies to use in their classrooms that enhance what they teach, how they teach and what students learn and they could not provide leadership in helping others to coordinate the use of content, technologies and teaching approaches at their schools.

Table 7
Technology Pedagogy and Content Knowledge

<table>
<thead>
<tr>
<th>Survey Items</th>
<th>Agree</th>
<th>Neither</th>
<th>Disagree</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>43 I can teach lessons that appropriately combine mathematics, technologies and teaching approaches.</td>
<td>44.7</td>
<td>20.1</td>
<td>28.4</td>
<td>3.2</td>
<td>1.25</td>
</tr>
<tr>
<td>44 I can teach lessons that appropriately combine literacy, technologies and teaching approaches.</td>
<td>46.2</td>
<td>18.6</td>
<td>28.4</td>
<td>3.5</td>
<td>1.14</td>
</tr>
<tr>
<td>45 I can teach lessons that appropriately combine science, technologies and teaching approaches.</td>
<td>47.0</td>
<td>15.5</td>
<td>30.7</td>
<td>3.3</td>
<td>1.27</td>
</tr>
<tr>
<td>46 I can teach lessons that appropriately combine social studies, technologies and teaching approaches.</td>
<td>39.0</td>
<td>15.9</td>
<td>38.3</td>
<td>3.8</td>
<td>1.07</td>
</tr>
</tbody>
</table>

N=264; values in the table are in %
In response to the Technology Pedagogy and Content Knowledge, the participants were asked if they could teach lessons that appropriately combine mathematics, technologies and teaching approaches, 33.7% indicated that they could, and 28.4% indicated they could not. When the participants are asked if they could teach lessons that appropriately combine literacy, technologies and teaching approaches, 46.2% indicated that they could, and 28.4% indicated they could not. When the participants are asked if they could combine science, technologies and teaching approaches, 47% indicated that they could, and 30% indicated they could not. Also, when the participants are asked if they could combine social studies, technologies and teaching approaches, 39% indicated that they could, and 38% indicated they could not.

Discussion

Findings on technological pedagogical content knowledge, technology integration indicate that pre-service teachers' technology-related perceptions are generally average. Specifically, in the area of technological knowledge, 51.5% agreed that they kept up with new technologies while 33.3% did not (see Table 2), but 53.3% of them are familiar with different technologies and they also have technical skills needed to use technology. This finding supported Schmidt et al. who revealed that technological knowledge, pedagogical knowledge and content knowledge are all significant predictors of pre-service teachers' TPACK. The results also indicate that half of the teachers surveyed in this study lack general knowledge about technology, but could learn easily. Specifically, 50% of them are knowledgeable about technologies they could use in their subject areas.

In the area of content knowledge, half of the participants are knowledgeable of the teaching subjects’ areas; however, less than 50% are confident with the pedagogical knowledge. Fifty one percent of the participants have various ways and strategies of developing their understanding of mathematics, 47% have various ways and strategies of developing their understanding of Social Studies. This finding also confirmed Chin and Joyce (2012) pedagogical analysis which indicated that Pedagogical Knowledge (PK) and Content knowledge (CK) are associated positively with the pre-service teachers' TPACK. Forty seven percent of the participants indicated that they could use a scientific way of thinking and 39.4% have various ways and strategies of developing their understanding of Science. Also, 42.8% indicated having sufficient knowledge about literacy and 40.7% could use a literacy way of thinking and have various ways and strategies of developing their understanding of literacy. Most of the participants in this study, know how to assess students’ performance in a classroom, can adapt their teaching based-upon what students currently understand or do not understand, can adapt their teaching style to different learners, can assess students’ learning in multiple ways, can use a wide range of teaching approaches in a classroom setting, are familiar with common student understandings and misconceptions, and know how to organize and maintain classroom management.

Conclusion and Recommendations

Technology intervention can develop teachers' TPACK level in Literacy, Science, and Social Studies According to Tee and Lee (2011); technology intervention can also develop teachers' TPACK level in language arts and social science. Therefore, professional development programs for teacher education program instructors in technology integration in
teaching should be provided. Colleges of Education in Nigeria should be supported with up-to-date educational technologies. The TPACK approach goes beyond seeing these three knowledge bases [technological-, pedagogical-, content-knowledge] in isolation. On the other hand, it emphasizes the new kinds of knowledge that lie at the intersections between them. TPACK is different from technological + pedagogical + content knowledge. The effective integration of technology with traditional education (integrating T with the PCK) requires much more than learning about technology and “adding it on. Effective integration of all TPCK components is essential in this digital age. The findings of this study suggest that Technology should be infused into the entire NCE curriculum, so that pre-service teachers have the opportunity to understand the educational reasons for using technology and experience how technology can support teaching and learning across different subject domains. Without such integrated approaches, the knowledge and the skills pre-service teachers gain are likely to remain isolated and unexploited.

References


Entrepreneurship Education and Graduates’ Unemployment in Oyo State, Nigeria. B.O. Emunemu & O.J Kasali

This study investigated entrepreneurship and graduates’ unemployment in Nigeria. The problem of unemployment in Nigeria has become endemic. There have been reported cases of under-employment, seasonal, casual and full blown unemployment. Previous studies on unemployment and factors influencing it in Nigeria identify poor educational standards, absence of industrial concerns that facilitate employment, love for white collar jobs, absence of self reliance, and mismatch between skills and available job opportunities. Recent studies also found that unemployment in Nigeria influences poverty and that the time lag between certification and first employment varies. Three research questions examined the effectiveness of policies on self reliance, and the attitudes of Oyo State graduates to white collar jobs. The study found significant perceived levels of graduates’ unemployment, and preference for white collar jobs. It was recommended that entrepreneurship education be adopted in higher institutions to enhance self reliance among graduates. The government should correspondingly strengthen small and medium scale enterprise schemes.

Key Words: Graduates’ Unemployment, Entrepreneurship, Self reliance, White Collar jobs

Introduction

Several growth indicators emerged in the 20th century, especially those that promote macro-economic equilibrium. Employment was a major index after the first and second world wars. With economic growth occasioned by increased productivity, employment rose, both in the developed and developing worlds. In the developed world, industrial production got to a peak, thereby requiring raw materials from the developing world. While productivity in the advanced world is mechanized, it is labour intensive in developing countries. In both cases, however, labour is in high demand. The turn of the century witnessed several recessions that brought about disequilibrium. The growth that resulted from productivity led to an increase in the income of some developing countries like Nigeria, Egypt, Saudi Arabia, Malaysia, etc. These countries generated considerable income from oil revenue. In the case of Nigeria, since 1970 there has been increased foreign revenue arising from oil exports. Abu-Abdulsalam (2011) explained that the coming of oil and gas since 1970 has consistently accounted for 80% of Nigeria’s Gross Domestic Product (GDP). He further explained that GDP and purchasing power in Nigeria doubled to $170.7b in 2005 and $374.36b in 2010. Abu and Usman (2010) traced the income and expenditure in Nigeria between 1977 and 2008. Government expenditure rose from N8, 819.80b in 1977 to N2.41tn in 2007. Government income rose during the same period. Since 2007 to date, government income has significantly exceeded this figure, doubling it.

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The result of this increase in oil revenue has become a challenge to Nigeria’s economy. Revisiting the works of Abu-Abdulsalam (2011), Abu and Usman (2010) Pitan (2010) and Awopegba (1995), the Federal Government of Nigeria virtually neglected vital sectors of the Nigerian economy, especially agriculture, manufacturing and industry. The same government has strongly emphasized within the same period, rapid expansion in basic education and tertiary education facilities, and in this case deregulating education. It could be explained that while government rapidly expanded education, it also rapidly contracted the means of utilizing the labour. Ribadu (2006) faulted the Government of Nigeria in this regard and questioned its level of sincerity in abating the widespread corruption. In a study of the Nigerian economy, Obadan and Odusola (2005) observed that several macro-economic disequilibrium faced Nigeria. They included rising inflation, rising graduates unemployment and dwindling per capita income which have collectively resulted in abject poverty of majority of the citizens. The problem of unemployment has risen to an alarming proportion in Nigeria. Some research findings showed that several factors determined how soon a graduate got employed, which, according to Anyanwu (2000), include age at graduation, discipline and performance at interview. The study further explained that advertisement for vacancies are often usually oversubscribed with job workers, mostly graduates, paying to apply for government jobs. The situation seems to have deteriorated that it takes about 5 years for graduates to be employed into the economy. This paper, therefore, is aimed at finding solutions to these identified problems, hence the investigation of the possibility of introducing entrepreneurship education.

Anyanwu (2000) described an entrepreneur as a business developer, thinker with a critical, creative, analytical and focused mind. The study identified characteristics of an entrepreneur to include creativity, resourcefulness, inventive, innovative, etc. Babalola (2010) further stressed the importance of entrepreneurial education. It was suggested that Nigerian universities adopt entrepreneurial education. The study observed that there were some similarities and differences in the adoption of entrepreneurial education. With discoveries on the possibilities of entrepreneurial education, Kuratko (2009), explained that in the United States of America (USA), entrepreneurial education has gained so much prominence that according to the study, over 70% of American graduates preferred to be self-employed and self-reliant. The significance and importance of entrepreneurial education to society are undoubtedly numerous. Onmonya (2011) itemized them to include the following: provision of impetus for social change and development, contribution to corporate responsibility, development of modern management and accounting practices, development of new organizations and industries, trade and commerce, increased invention, innovation, product and services, increased societal wealth, empowerment of the poor and the vulnerable, etc.

Several organizations play some part in the development of entrepreneurship and entrepreneurial education. For example, the government has a big role to play in policy formulation, regulation of the business environment, developing and expanding critical infrastructure. There is the organized private sector that has the responsibility of implementing policies. In light of the foregoing, Babalola (2010) explained that universities in Nigeria are currently developing courses where entrepreneurship education will be taught. According to the study, the University of Ibadan pioneered this in the 2004/2005 session with the establishment of a Centre dedicated to that cause. Other universities that have keyed into
this include University of Nigeria, Nsukka (UNN), University of Ilorin (UNILORIN), University of Benin (UNIBEN), Adekunle Ajasin University (AAU), Covenant University, Ota and Bowen University, Iwo. From the examples reviewed about the American universities, it is clear that entrepreneurship education holds the key to graduates unemployment problems in Nigeria. This investigation will attempt to assess how this programme is being implemented at university level in Nigeria. The title shows that the result of the study should have significant impact on the Nigerian government as well as international agencies that are dedicated to human welfare. The study should also be significant to students, since they will serve as the direct beneficiaries of such a programme.

Statement of the Problem

Graduates’ unemployment in Nigeria has been a subject of great concern not only in Nigeria, but all over Sub-Saharan Africa. Nigeria with its vast population and heavy resources has over 120 universities, comprising federal, state and privately-owned institutions. The staggering figures indicate that a large number of graduates are turned out from universities annually. With an unstable financial situation in Nigeria, massive unemployment and high social vices, employment for graduates has become a luxury. This study observed that the current phase in Nigeria’s economic development is not peculiar except that the approach is taking a cue from events in the U.S.A. This paper, therefore, investigated entrepreneurship education and graduates unemployment in Nigeria. Specifically, the study unveiled the possibilities in entrepreneurial education and the correlation between unemployment and schooling.

Research Questions:
The following research questions were raised to guide the study:
1. What is the perception of Oyo State graduates’ on white collar jobs?
2. What is the attitude of Oyo State graduates’ on the acquisition of entrepreneurial skills?
3. Does the Nigerian economy encourage entrepreneurship and self reliance of graduates in Oyo State, Nigeria?

Hypotheses
The following hypotheses were tested to determine the levels of relationship between entrepreneurship and graduates unemployment in Oyo State, Nigeria.

H₀₁: There is no significant difference between graduates’ attitude to acquisition of entrepreneurial skills and graduate unemployment in Oyo State, Nigeria

H₀₂: There is no significant relationship between entrepreneurial policy and graduate unemployment in Oyo State.

H₀₃: Attitude to skills acquisition and entrepreneurial policy has no significant joint influence on graduate unemployment in Oyo State.

H₀₄: Attitude to skills acquisition and entrepreneurial policy has no significant relative contribution to graduates unemployment in Oyo State.
Methodology

This study adopted a survey research design. The total population for this study comprised postgraduate students from the University of Ibadan (U.I), Lead City University, Ibadan (LCI), National Youth Service Corps (NYSC) members in Oyo State and captains of industry (Human Resource Managers) in companies in Ibadan, totaling 6,099. The purposive sampling technique was adopted to select 632 respondents (10.4% of total population) to keep data within the researchers’ management capacity and financial limitations. The sample comprised of 364 postgraduate students from UI and LCI, 242 NYSC members and 20 human resources managers. A researcher-developed instrument titled Influence of Entrepreneurship and Skills Acquisition in Reducing Graduate Unemployment Questionnaire (IESARGUQ). The questionnaire was validated by experts in test instrument construction at the Faculty of Education, and the Institute of Education, University of Ibadan, Ibadan. A trial test of the instrument outside the original target population of the study using Cronbach Alfa gave a reliability coefficient of \( r = 0.85 \) indicating a highly reliable instrument good for the purpose it was meant for. The answers to the research questions were analysed using descriptive statistics as mean, percentage, standard deviation, while Hypothesis 1 was tested using t-test and Hypothesis 2 with Pearson Product Moment Correlation. Hypotheses 3 and 4 were tested using multiple regression.

Findings of the Study

Research Question 1:
What is the perception of Oyo State graduates on white collar jobs?
The question was developed to find out the opinion of Oyo State graduates on white collar jobs. It was meant to find out the level of interest that graduates had on white collar jobs. Respondent responses are presented below in Table 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I prefer paid employment (white collar job) to being self employed</td>
<td>632</td>
<td>1</td>
<td>4</td>
<td>3.22</td>
<td>0.532</td>
</tr>
</tbody>
</table>

The result is quite clear with \( x = 3.22 \) out of 4 and an SD of 0.520. This shows that the interest and attitude of Oyo state graduates is poor. If there must be a change, then something has to be done.

Research Question 2:
What is the attitude of Oyo state graduates on the acquisition of entrepreneurial skills?
This research question was designed to investigate the attitude of Oyo State graduates on the acquisition of entrepreneurial skills. Descriptive statistics was used to answer this question as shown in Table 2.

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Though skill acquisition has been emphasized, I did not acquire any skill throughout the period of my university education.</td>
<td>632</td>
<td>1</td>
<td>4</td>
<td>2.84</td>
<td>0.501</td>
</tr>
</tbody>
</table>
With a mean of 2.84 tending towards 3, this indicated that about 70% of graduates did not acquire any technical or entrepreneurial skills while in the university. Preparation for the labour market was for only 30% of the graduates. In summary, this implies that Oyo State graduates have a negative disposition towards acquisition of skills for the labour market.

**Research Question 3:**
Does the Nigerian economy encourage entrepreneurship and self reliance of graduates in Oyo State, Nigeria? This research question was answered by using descriptive statistics to find out the level of external constraints being experienced by potential entrepreneur that discourage them from taking up the venture. Table 3 presents the results.

<table>
<thead>
<tr>
<th>Item</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I consider the business environment harsh for the type of business I want to embark upon.</td>
<td>632</td>
<td>1</td>
<td>4</td>
<td>3.58</td>
<td>0.420</td>
</tr>
</tbody>
</table>

With a mean of 3.58 equivalents to 90% of the total population, the realities of the Nigerian economy do not encourage the practice of entrepreneurship. This may likely be a reason why graduates are probably not interested in acquiring skills that will not be needed eventually or get involved in business that will result to heavy losses.

**Hypotheses**

The following hypotheses were tested during the study.

**H01:** There is no significant difference between graduates’ attitude to acquisition of entrepreneurial skills and graduate unemployment in Oyo State, Nigeria.

The researchers used the extent of relationship between skills acquisition and unemployment using inferential statistics as Pearson Product Moment Correlation (PPMC). The result is shown in Table 4.

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>r</th>
<th>P</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude to acquiring entrepreneur skills</td>
<td>632</td>
<td>0.632</td>
<td>0.003</td>
<td>Significant **</td>
</tr>
<tr>
<td>Graduates Unemployment</td>
<td></td>
<td>0.928</td>
<td></td>
<td>P &lt; 0.05</td>
</tr>
</tbody>
</table>

The above results showed a significant relationship between acquisition of entrepreneurial skills at $r = 0.632$, Graduates Unemployment = ‘r’ – 0.928; $P < 0.05$. In this case $r = 0.003$ $P < 0.05$ indicating a rejection of the null hypothesis. This shows that acquisition of entrepreneurial skills plays an important role in reducing graduate unemployment by 63.2%.

**Hypothesis 2**

**H02:** There is no significant relationship between entrepreneurial policy and graduates’ unemployment in Oyo State. The purpose of this hypothesis was to establish if the level of graduate unemployment was a function of the State’s entrepreneurial policy. The PPMC was
used to test the relationship between entrepreneurial policy and graduate unemployment as indicated in Table 5. Twenty (20) human resource managers of companies in Oyo State served as respondents for the study.

Table 5

<table>
<thead>
<tr>
<th>Variables</th>
<th>N</th>
<th>R</th>
<th>P</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entrepreneurial Policy on Graduates Unemployment</td>
<td>20</td>
<td>0.357</td>
<td>0.000</td>
<td>**Sig.</td>
</tr>
</tbody>
</table>

Table 5 indicated a rejection of the null hypothesis and acceptance of the alternate hypothesis that a significant relationship exists between entrepreneurial policy of Oyo State and graduate unemployment from the perception of Human Resources Managers in Oyo State. The study indicated $r = 0.357$, $P < 0.05$, 0.000.

**Hypothesis 3**

$H_{03}$: Attitude to skills acquisition and entrepreneurial policy has no significant joint influence on graduates’ unemployment in Oyo State.

The finding of this hypothesis is shown in the multiple regression result in Table 6

Table 6

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of squares</th>
<th>Df</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>30.869</td>
<td>2</td>
<td>7.717</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual</td>
<td>23.131</td>
<td>25</td>
<td>1.007</td>
<td>7.673</td>
<td>0.000</td>
</tr>
<tr>
<td>Total</td>
<td>54.000</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$R = 0.756$

$R^2 = 0.572$

Adjusted $R = 0.497$

Table 6 indicated that the coefficient of determinants is $R^2 = 0.572$ indicating that at least 57.2% of the independent variables are accountable for factors accounting for unemployment in Oyo State. There is a significant linear influence of the dependent variable and the independent variable represented thus; $Y^1 = B_0 + B_1X_1 + B_2 X_2 + +B_n X_n$ where $Y^1 = \text{Dependent variable and } X_1 – X_n = \text{Dependent variables}$.

Table 7

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficient</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardised</td>
<td>Coefficient</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-1.033</td>
<td>1.268</td>
</tr>
<tr>
<td>Attitude to acquiring</td>
<td>.155</td>
<td>.202</td>
</tr>
<tr>
<td>entrepreneurial skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organizational policy</td>
<td>-.406</td>
<td>-.271</td>
</tr>
</tbody>
</table>

Dependent Variable: Graduates Unemployment

From Table 7, the production equation therefore is; graduate unemployment = -1.033 + 0.155 (attitude to acquisition of entrepreneurial skills) + -0.406 (Oyo State Policy). Therefore, from the foregoing a significant linear relationship was found ($F (4, 23) = 7.673; P$
< 0.05). The prediction therefore is that increasing the independent variables will reduce unemployment in Oyo State.

**Hypothesis 4**

Attitude to skills acquisition and entrepreneurial policy has no significant relative contribution to graduates unemployment in Oyo State. The purpose of this hypothesis was to find out individual contributions of each of the independent variable to the dependent variable using multiple regression inferential statistics as shown in Table 8.

<table>
<thead>
<tr>
<th>Model</th>
<th>Constant 1.033</th>
<th>Unstandardised coefficient B</th>
<th>Standardized coefficient Beta</th>
<th>t</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude to Skills acquisition</td>
<td>2.521</td>
<td>0.004</td>
<td>0.039</td>
<td>0.003</td>
<td>0.091</td>
</tr>
<tr>
<td>Entrepreneurial Policy of Oyo State</td>
<td>1.258</td>
<td>0.259</td>
<td>0.045</td>
<td>0.129</td>
<td>3.234</td>
</tr>
<tr>
<td>Graduates Unemployment</td>
<td>2.86</td>
<td>0.324</td>
<td>0.258</td>
<td>-0.200</td>
<td>-1.256</td>
</tr>
</tbody>
</table>

From Table 8, Graduates unemployment = -1.033 + 0.004 + 0.259 (Attitude to skill acquisition and Entrepreneurial Policy of Oyo State) respectively. The joint influence of the independent variables on the dependent variable was predicted at $R^2 = 0.259$. Graduates unemployment = -1.033, attitude to skills acquisition = 0.004, Entrepreneurial Policy of Oyo State = 0.259. The prediction therefore is that as these independent variables increase, graduates unemployment increases.

**Findings and Discussion**

From the analyzed results it could be inferred that there is a significant relationship between attitudes to skills acquisition, and graduates’ unemployment in Oyo State, Nigeria. Entrepreneurial policies significantly influenced graduates unemployment in Oyo State, Nigeria. All the independent variables significantly influenced graduate unemployment in Oyo State. The relative contribution of both skills acquisition and entrepreneurial policy was positively significant in Oyo state, Nigeria. The findings of this study are in line with literature on graduates’ unemployment. The study found a significant relationship between skills acquisition and graduates unemployment. This is in line with the findings of Ssempebwa (2006) and Anyanwu (2000). Other scholars with this perspective are Obadan and Odusola (2005), Babalola (2010). Ssempebwa (2006) wondered that with increasing universities in Uganda, job opportunities had continued to decline with employers of labour emphasizing theoretical gratification for practical skills. In the case of Anyanwu (2000), the study explained that the number of years spent by graduates in the job market is a function of their practical capacity. In essence, one of the findings predicted that an increase in skills is
equivalent to the reduction in graduates’ unemployment as skills acquisition propels self reliance (Federal Republic of Nigeria, 2004).

However, this study further revealed that the attitude of graduates of Oyo State to skill acquisition was poor as shown in Tables 1, 2 and 3. That a mean of 3.22 out of 4 points show the extent of graduate dissatisfaction with skills acquisition. In a dimension only 30% of undergraduates in universities were humble enough to accept training in skills. Similarly, 3.58 graduates considered the business environment too harsh for successful entrepreneurial ventures. It is no wonder therefore, that other studies found out that only 30% of graduates from Nigerian universities are employable. However, it must be noted that with this level of hatred for skills acquisition, the journey of Nigerian graduates to self reliance will take a long time to achieve. The study eventually found that all independent variables jointly and relatively contributed to graduates unemployment indicating that all parties have a role to play to fight unemployment.

**Implications for Theory and Practice**

This study has several implications for theory and practice, especially for educational planners and policy makers in industry and government establishments. Policy makers should begin to emphasize skills acquisition in universities or else the rate of unemployment will continue to intensify. There should be serious awareness campaigns not to demean skills acquisition in universities. Courses should be introduced to emphasize entrepreneurship in all disciplines. The current policy of the National Universities Commission on entrepreneurship studies through the General Studies Programme in Universities is quite encouraging. The occasional workshops held by Centres of Entrepreneurial Studies in various universities where they operate are not enough.

This study recommends that medical students should be taught and allowed to practice medical entrepreneurship. Pharmaceutical students should not be deceived that they have skills on entrepreneurship, but be told how to evolve pharmaceutical entrepreneurship in their discipline. The same should apply to other disciplines. Internships, workshops, seminars and conferences should be organized to sufficiently equip undergraduates before facing the rigour of the labour market. This study, therefore recommends that skill acquisition by undergraduates should be compulsory and tailored to each discipline in the universities.

Government should transform the Nigerian business environment. Most policies do not favour small and medium scale enterprises that are the hub of economic activities to any nation via the household. Employment is a macro equilibrium factor that an economic disequilibrium could distort. Hence, the household should be empowered through favourable government policies to facilitate productivity, and by extension, through expansion, create more employment opportunities thereby increasing taxable revenue and expanding the GDP. Finally, the researchers are of the view that government should equip entrepreneurial centres in universities to discourage them from charging fees by properly funding them to attract undergraduates within such institutions to strive to acquire skills.
References
Improving Access to University Education: The Case of the National Open University of Nigeria: Chibuogwu V. Nnaka

Abstract
Higher education has proved to be a significant medium for the socio-economic, political, and technological development of any nation. It is absolutely necessary for equipping individuals with new knowledge, skills, and attitudes. Globally, higher education, especially university education, is faced with a lot of challenges and difficulties relating to access, funding, staff development, quality of teaching and research, and the challenge of new technologies. A critical issue facing Nigeria is how to increase access to university education to cater for the increasing number of students completing secondary education, diploma holders, and others who desire university education. In order to provide access to all citizens, the Federal Government established the National Open University by an Act of 1983. After being suspended for sixteen years, it was re-opened under a new name as the National Open University of Nigeria (NOUN) in 2002. This paper examines open and distance learning at the National Open University of Nigeria (NOUN), and the role it plays in enhancing access to university education for personal, community, and national development. It analyzes the challenges facing NOUN and proffers suggestions for addressing the challenges.

Keywords: Open and Distance Learning, National Open University of Nigeria, University Education, Development.

Introduction
Development is a process of structural change in the economic, political, social, and cultural aspects of a society. It commences with the people, their education and their capabilities. Development of any nation requires the availability of competent human resources. Using education as a tool, the Federal Government of Nigeria hopes to produce manpower that will serve in different capacities and contribute positively to national development. This mission is reflected in the goals of higher education as stated in the National Policy of Education. Some of these include: to develop the intellectual capability of individuals to understand and appreciate their local and external environment. To promote and encourage scholarship and community service, to acquire both physical and intellectual skills which will enable the individual to be self-reliant and useful members of the society, and to promote national and international understanding and interaction (NPE 2004). In pursuit of these objectives, institutions of higher learning such as universities, polytechnics, monotechnics, and colleges of education have been established in different parts of the country by the Federal and State governments, private organizations, and individuals. These institutions admit, train, and graduate in different fields.

University education refers to a course of study undertaken and completed at a university. This usually leads to the award of Certificates, Diplomas, Bachelor's degree, Master's, and Doctorate degrees. Higher education, especially university education has

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proved to be vital for the socio-cultural and economic development of a nation. It is a sine-
qua-non for equipping individuals with new knowledge, skills and training. However, several
studies (e.g. Okeke 2008, Okebukola, 2008) have shown that a large population of school
leavers and adults who yearn for university education in Nigeria do not have access to it, due
to lack of space in the institutions. Table 1 provides information on the demand and supply of
university education in Nigeria.

### Table 1

<table>
<thead>
<tr>
<th>Academic Session</th>
<th>No. of Applicants</th>
<th>No. Admitted</th>
<th>% Admitted</th>
<th>No. of Unplaced Applicants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999/2000</td>
<td>418,292</td>
<td>64368</td>
<td>15.39</td>
<td>353924</td>
</tr>
<tr>
<td>2000/2001</td>
<td>416381</td>
<td>45766</td>
<td>10.99</td>
<td>370615</td>
</tr>
<tr>
<td>2001/2002</td>
<td>714548</td>
<td>90769</td>
<td>12.7</td>
<td>623779</td>
</tr>
<tr>
<td>2002/2003</td>
<td>994380</td>
<td>51845</td>
<td>5.21</td>
<td>942535</td>
</tr>
<tr>
<td>2003/2004</td>
<td>1046950</td>
<td>105157</td>
<td>10.04</td>
<td>941793</td>
</tr>
<tr>
<td>2004/2005</td>
<td>841878</td>
<td>122492</td>
<td>14.54</td>
<td>719386</td>
</tr>
<tr>
<td>2005/2006</td>
<td>916371</td>
<td>65609</td>
<td>7.16</td>
<td>850762</td>
</tr>
<tr>
<td>2006/2007</td>
<td>803472</td>
<td>123626</td>
<td>15</td>
<td>679846</td>
</tr>
<tr>
<td>2007/2008</td>
<td>911653</td>
<td>119195</td>
<td>13</td>
<td>792458</td>
</tr>
<tr>
<td>2008/2009</td>
<td>1054060</td>
<td>127082</td>
<td>12</td>
<td>926978</td>
</tr>
</tbody>
</table>

*Source: Joint Admission and Matriculation Board (JAMB) Records, 2008*

In April 2013, over 1.7 million School leavers took the Unified Tertiary Matriculation
Examination (UTME), but only 500,000 could succeed in securing admission. The remaining
1.2 million could not be admitted. This confirmation was given by the former Minister of
Education, Professor Ruqayyatu Rufai who bemoaned the gross inadequate number of
universities in the country (New Now Nigeria April 27, 2013). Apart from the issue of
access, university education in Nigeria is faced with great challenges and difficulties related
to funding, staff development, quality of teaching and research, employability of graduates
and use of new technologies. The World Declaration on Higher Education for the Twenty-
First Century (1998) noted that “everywhere”, higher education is faced with these
challenges. Hence, it is not peculiar to Nigeria. Inability to meet these challenges has often
resulted in trade disputes and constant strikes and disruption of university academic calendar.
In a bid to meet the demand for university education, the Federal Government established the
National Open University of Nigeria (NOUN) as a uni-mode university, which is to operate by open and distance learning method.

**Concept of Open and Distance Learning (ODL)**

Open and distance learning (ODL) refers to approaches to learning that focus on freeing learners from constraints of time and place, while offering flexible learning opportunities (UNESCO 2002). It is a process of education, in which all or most of the teaching is conducted by someone geographically removed from the learner. Most of the communication between instructors and learners is conducted through electronic or print media. The term open and distance learning has been described in various terms such as; correspondence education, home study, external study, independent study, continuing education, distance teaching, self-instruction, adult education, learner-centred education, open access, flexible learning and distribution learning (COL 1999). It is also regarded as
schooling in the classroom without walls, extramural studies, experimental learning, off-campus education and open learning (Egwuasi, Etim and Obott, 2006). The concept of open and distance learning has no universally accepted definition. Peratton, Robinson and Creed (2001) defined distance education as an educational process in which a significant proportion of teaching is conducted by someone far removed in space and/or in time from the learners. Adebayo (2007) defined open and distance learning as the type of education that takes place outside the conventional school system, it is imparted without necessarily having a personal interaction with learners. Alaezi (2005) refers to open and distance learning as educational patterns, approaches and strategies that permit people to learn with no barriers in respect of time and space, age, and educational qualifications—no entry qualification, no age limit, no regard to sex, race, tribe, or state of origin, etc.

Distance education transcends social economic and geographical boundaries; therefore it can meet the demands of education for all and continuing education, which the conventional education system is unable to meet. Open and distance learning breaks the barriers of opportunity and equity, hence, Calvert (1986) asserts that open and distance learning helps to extend the market of education to clients who have not been previously served with special attention. Jegede (2003) posits that open and distance education removes all barriers to educational access especially with respect to age, limited space and other restrictive laws that guide the formal education system. Open and distance learning is therefore an educational approach that uses modern communication facilities such as computers, internet connections, CD-ROMs, Radio, Television and so on, for instructional delivery. These facilities make it possible to reach the learners anywhere and anytime, in their homes, farms, offices, and shops.

**Current Status of Open and Distance Learning in Nigeria**

Many universities and some institutions in Nigeria offer distance learning, using various nomenclatures such as Correspondence Education, Distance Learning Institute and so on. Topmost on the list are: Ahmadu Bello University Zaria—Correspondence Teachers-in-Service Programme (TISEP), University of Lagos—Correspondence and Open Studies Unit (COSU), University of Ibadan—Distance Learning Centre (DLC), University of Abuja—Centre for Distance and Continuing Education. The National Teachers’ Institute is dedicated to distance education for the upgrading of teachers. Almost all the universities run sandwich programmes, continuing education programmes and other part time programmes. The National Open University of Nigeria (NOUN) is a single mode institution that operates by the open and distance learning method. The university is a single mode institution that operates by the open and distance learning method (ODL). Presently it has a population of over one hundred and thirty (130,000) registered students spread in fifty (50) study centres across the country. It is the only university in Nigeria that is mandated to operate by open and distance learning in the delivery of university education.

**National Open University of Nigeria**

The National Open University of Nigeria was first established in July 1983. However, the Act of 1983 which established the Open University was suspended in 1984 because of various defects which the Federal Government felt should be corrected. In 2001, the Act of 1983 was reactivated and this paved way for the resuscitation of National Open University of
Nigeria as we have it today, by former President Olusegun Obasanjo (NOUN 2007). The National Open University of Nigeria was designed to widen access for all Nigerians to formal and non-formal education in a manner convenient to their circumstances. It was also to cater for the continuous educational development of professionals such as teachers, accountants, lawyers, doctors, engineers, politicians, self-employed business men and business women (FME 2002). Based on the objectives of setting up the Open University, it was expected that the university would among other things be able to; raise the literacy level in Nigeria, substantially increase access to University education, and enhance and facilitate workplace training and professional development.

NOUN was further expected to reduce the pressure on conventional universities, help Nigerians to be on the right side of the digital divide, widen the catchment scope of beneficiaries of university education, thus reaching the hitherto unreached and ensuring that nobody interested in, and capable of having university education is left out (NOUN 2007). NOUN is therefore on a mission to provide functional, cost effective, flexible and quality education to all who seek knowledge. The university has recorded landmark achievements. It was rated 7th among universities in Nigeria and 86th out of the 100 universities in Africa by Webometric International. In addition, NOUN was given the European Quality Award in Education in 2011 at Oxford, United Kingdom. The University has its headquarters in Lagos, where its administrative machinery is housed. This comprises the offices of the Vice-Chancellor, Principal Officers of the University, Directorates and Units, the Schools and Academic Centres through which the academic programmes are delivered.

**Academic Programs**

Admission and registration of students into the various academic programmes of the university is online. The university gives equal opportunity in all its admission processes. New applicants have to meet the minimum entry requirements as in conventional universities. Those who do not possess the minimum requirements have opportunities to enrol in the Access, Certificate or Diploma programmes before proceeding for a degree or postgraduate programme. Currently, the following schools exist in the university; the School of Arts and Social Sciences, School of Management Sciences, School of Education, School of Law, School of Science and Technology, School of Access and General Studies and School of Postgraduate studies. The Academic centres include the Centre for Lifelong Learning and Workplace Training, and a Centre for Educational Technology and Entrepreneurial Development. NOUN offers various programmes leading to the award of Certificate, Diploma, Bachelors degree, Master’s and Doctorate degrees.

**Quality Assurance**

The National Universities Commission (NUC) has accredited thirty (30) programmes of the university. NOUN collaborates with the Commonwealth of Learning(COL) Canada, the International Council for Distance Education(ICDE), the African Council for Distance Education(ACDE) and the open and distance universities of the United Kingdom, Hong Kong, India, Australia, South Africa and the Africa Virtual University of Kenya (NOUN,2002). All these are to ensure quality assurance in instructional delivery. NOUN students study self-instructional materials independently from their homes or offices in various locations in Nigeria and their learning process is supported by a network of fifty (50) study centres spread across the country. Thirty-six (36) study centres are located in almost
all the state capitals, eight (8) special study centres are located in the Nigerian Prisons Services, Nigerian Immigration Services, Nigerian Security and Civil Defence Corps, Nigerian Army, Nigerian Air Force, Nigerian Navy and the Nigerian Police. In addition, there are six (6) Community study centres.

**Student Population**

Within the first two years of its establishment, the total number of students registered at the university was 26,923 (NOUN 2007). In the 2011/2012 academic year alone, 69,544 students were fully registered in the various schools as shown below.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Schools</th>
<th>Number of Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Access and General Studies Unit</td>
<td>1,522</td>
</tr>
<tr>
<td>2</td>
<td>Centre for Lifelong Learning and Workplace Training</td>
<td>150</td>
</tr>
<tr>
<td>3</td>
<td>School of Arts and Social Sciences</td>
<td>13,623</td>
</tr>
<tr>
<td>4</td>
<td>School of Management Sciences</td>
<td>18,405</td>
</tr>
<tr>
<td>5</td>
<td>School of Education</td>
<td>7,266</td>
</tr>
<tr>
<td>6</td>
<td>School of Law</td>
<td>8,772</td>
</tr>
<tr>
<td>7</td>
<td>School of Science and Technology</td>
<td>19,806</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>69,544</strong></td>
</tr>
</tbody>
</table>

_Source: NOUN 2011-2012 Annual Report_

Currently, NOUN has over one hundred and thirty thousand (130,000) students studying various disciplines in the fifty (50) programmes run by the university. This influx of students made up of workers, retired civil servants, traditional rulers, businessmen and women and young school leavers has justified the establishment of NOUN. The University held its second convocation ceremony on January 18, 2013 and graduated students in the several programmes as shown in Table 3 below.

<table>
<thead>
<tr>
<th>Programmes</th>
<th>No. of Graduating Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>First degree</td>
<td>4,500</td>
</tr>
<tr>
<td>Certificate courses</td>
<td>20</td>
</tr>
<tr>
<td>Diploma</td>
<td>69</td>
</tr>
<tr>
<td>Post graduate</td>
<td>1,068</td>
</tr>
<tr>
<td>Masters</td>
<td>2,507</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8,224</strong></td>
</tr>
</tbody>
</table>

_Source: NOUN 2011-2012 Annual Report_

**Instructional Delivery /Student Support Services**

NOUN instructional system necessitates students to learn independently from course materials received from the institution. NOUN has developed multimedia learning packages for its students including printed course materials supported with audio-cassettes, video tapes, CD-ROMs, web-based programmes, radio and television programmes. Student support services are provided to facilitate students learning, these include, tutorials, counselling, study groups, tutor marked assignment, and administrative services. Every study centre has at least two student counsellors who are always around to confer with the students and also
provide guidance on both academic and non-academic matters. Qualified tutors from conventional higher institutions who are part-time staff of the university and who are experts in various fields of study conduct the tutorials.

The open and distance learning system in NOUN provides a lot of benefits to conventional universities in Nigeria through mutual collaboration. NOUN collaborates with other universities in developing course materials, providing tutorials to students, supervision of students’ projects/practicals etc. Lecturers of other universities involved with NOUN get new perspectives and experiences in designing and developing course materials. These experiences are easily transferred to teaching – learning situations in their institutions and can help improve the lecturers’ skills in designing instructions in their own universities. NOUN consults with industries and employers of labour in developing courses to suit their specific needs.

NOUN open and distance learning system has made it possible for people in the rural areas to have access to university education since it enables them to do most of their studying from their homes if they wish. Many women who could not continue with education due to marriage or cultural and religious at in NOUN (Kanwar & Taplin 2001, Olakuleluin and Ojo 2006, & Nnaka 2013). Moreover, because the cost of education at NOUN is affordable many rural dwellers and low income earners (mostly women) can enrol and have access to higher education. NOUN offers opportunity for professional training and development to various categories of workers. Many teachers, nurses, accountants, bankers, lawyers, doctors, engineers, etc. have benefited from the open and distance system in NOUN. One of the most prominent beneficiaries of NOUN is a former President of Nigeria General Olusegun Obasanjo, who graduated from the university. Thus within the short period of its existence NOUN has distinguished itself in providing equal educational opportunities for all irrespective of tribe, sex, catchment area, age, location or culture.

Challenges Facing NOUN

NOUN is faced with several challenges in its bid to provide quality, cost effective and flexible education to Nigerians through open and distance learning. There is low internet connectivity in Nigeria. Nnaka (2012) found that most of NOUN study centres do not have internet facilities. Consequently NOUN still relies heavily on the use of print media and face-to-face tutorials for instructional delivery. The absence/poor access to the internet limits communication between the students and the instructors and between the students themselves. Many of the lecturers who facilitate courses at NOUN lack basic skills to operate in an open and distance learning system. They still use the same teaching style they use for students in the conventional universities. Most of them also lack knowledge and skills in delivering their courses in electronic format because they are not ICT compliant. This greatly affects instructional delivery.

Delays in production and delivery of course materials is yet another challenge. Due to the delay in the production and delivery of course materials, a lot of students get frustrated and drop out of the university. Evidence (Nnaka 2012, Patrick & Ihejirika 2012) suggests that many of the printed course materials are not available at the study centres for students to collect. A situation where a student who registered for ten courses collects only three or four course materials for the semester is very discouraging. Investigations revealed that most of the course material have been developed but are still in the electronic forms. Some of the
students, who can afford the cost, download and print the course materials from the university website. Computer illiteracy and cyber phobia on the part of the students constitute serious obstacles to the effective operation of open and distance learning (ODL) (Bakare 2009).

Osuji (2010) in his study on assessment of the computer literacy level of ODL students in Lagos State Nigeria found that 45.1% of the students were not computer literate. Nnaka (2012) equally revealed that 45.8% of NOUN students have poor knowledge of the computer. This has an adverse effect on instructional delivery by ODL method. In addition it creates a serious setback for NOUN e-examination, where the student must use the computer. Another technology related problem is the inability of most students to own a laptop or a personal computer, due to poverty. Consequently most of the students pay regular visits to the cybercafés, while others seldom have access to a computer. A lot of NOUN students are not familiar with the ODL system of studying. They even rent houses around the location of the study centres and visit the centre on a regular basis expecting face-to-face contact with the facilitators. These students are at the risk of dropping out unless they develop survival skills as rapidly as possible and settle down to independent study.

Furthermore, communication and technological tools require a steady supply of electricity to function properly. Unfortunately electricity supply in the country has remained irregular and most rural areas are yet to have electricity. This constitutes a serious problem in the use of ICT in instructional delivery in the ODL system, especially for the majority students who reside in rural areas. In addition, inadequate funding totally disrupts the open and distance learning system because it breaks communication between the students and the instructors and the university. Non-payment of facilitators, non-payment of supervisors of students projects, unavailability of course materials, staff training, lack of internet facilities, inadequate student support services and general poor infrastructure are all linked to inadequate funding.

Conclusion
Higher education, especially university education is a vehicle for socio-cultural and economic development of a nation. Open and distance learning remains the possible and effective alternative way of meeting the needs of many Nigerians for university education. The establishment of NOUN has widened access to university education. The university has dedicated itself to producing professionals in various disciplines, enhancing gender equity in higher education and alleviating poverty through open and distance learning. However, the university is faced with a lot of challenges which could prevent it from achieving its vision and mission. Some suggestions are offered on how to optimize NOUN’s potentials.

Recommendation
To ensure that NOUN achieves its mission of providing functional, cost effective, flexible and quality education to all who need it, the Federal Government needs to provide adequate funds to the universities and also improve on the supply of electricity in the country. This will enable NOUN to widen its reach and take education to the remotest areas of the country. The internet has become an indispensable tool in the delivery of ODL. NOUN must, therefore ensure that functional internet facilities are installed in its study centres.
across the country. There is need for NOUN to train its facilitators, on ODL delivery methods. They should also be trained for online facilitation.

NOUN should ensure that course materials are developed, reviewed, edited, printed and placed on the web before mounting any programme. The university should also explore other options – mainly in the area of technology for issuing course materials to students immediately after registration. The soft copies of the course materials should be forwarded to the students’ portals as soon as registration is completed. This will reduce students’ attrition rate and improve the image of NOUN.

Practical based computer appreciation tutorial should form a major component of the general computer course (CIT101- Computer in Society) for NOUN students. This will beef up the computer skills of the students and enhance their ability to use ICT equipment.

The university needs to explore various options that will enable the students to own a laptop or personal computer. For example, NOUN could collaborate with an ICT company to supply laptops to its students at an affordable cost, which they will repay instalmentally. To fully integrate students into the ODL system there is need for frequent re-orientation. Apart from the orientation exercise given to the students before matriculation, there is need to create other fora for fresh/returning students to learn more about the open and distance learning system.

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ICT Competence and Lecturers’ Job Efficacy: A Study of two Universities in Nigeria: Charles P. Akpan (PhD) 5

Abstract
The study sought to establish the influence of ICT competence on lecturers’ job efficacy in two universities in Nigeria. The sample of the study consisted of 500 university teachers randomly sampled from a population of 1,795 teachers. The results of the study revealed that male and female lecturers did not differ significantly in their level of ICT competence. Lecturers with high ICT competence were found to be more effective in classroom instruction, research/publications, and communication and record-keeping than those with moderate and low ICT competence. The findings of this study revealed that the level of ICT competence of lecturers significantly enhanced their job efficacy. Premised on these findings, it was recommended that lecturers should be motivated to develop their ICT competence as this has been found to improve job efficacy for high productivity. University management should encourage lecturers to participate in ICT training programmes and ICT facilities should be provided in lecturers’ offices to enhance their job efficacy.

Keywords: ICT Competence, Job Efficacy, Lecturers, Universities.

Introduction
University education in Nigeria is aimed at producing high level manpower to cater for the various sectors of the country’s economy. It is expected to contribute to national development by intensifying and diversifying its programmes for the development of high manpower needs of the nation and making professional course contents to reflect our national regiments (FRN, 2004). These objectives could be achieved through effective teaching, research and other allied academic activities. For university teachers to carry out their job efficiently and effectively, especially in this age of knowledge-based technology and globalization, the use of Information and Communication Technology (ICT) becomes imperative. Interestingly, universities all over the world are rapidly incorporating Information and Communication Technology (ICT) into all facets of teaching, research and management. Teachers who succeed in making use of ICT in their work processes do not only contribute to improved learning outcomes in their students, but also benefit personally from enhanced work productivity (Carlson & Gadio, 2000).

University lecturers have various tasks to accomplish and these range from teaching, research and publications, marking of tests and examinations, supervising students’ research works, supporting students through advisory roles, attending conferences, providing community services etc. In order to be effective and efficient, they need to acquire an appreciable level of ICT competence. This is necessary in order to meet up with the demands of their job. Jusuf (2005) and Daniel (2002) stated that overwhelming majority of teachers in Europe use ICT to plan lessons more effectively and more efficiently. Teachers have been

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able to communicate and collaborate with other teachers which enhance their job performance.

ICT involves a process of creating, processing, storage, retrieval and dissemination of information and data, using computers and telecommunications (Akpan, 2008). In education, it involves the application of digital equipment to all aspects of teaching and learning. Thus, ICT encompasses a combination of technologies for collecting, storing, processing, communicating and delivering of information related to teaching and learning processes (Johnson, 2007). Onuma (2007) states that ICT can be used to enhance teaching effectiveness, prepare lesson plans, collect and analyze students’ achievement. Thus, curriculum contents could be enriched through searches on the internet. Akpan (2008) states that ICT can improve the quality of research and publication in Nigerian universities through the use of information and quality materials from the internet and can facilitate record keeping by teachers. Therefore, the importance of ICT in enhancing university lecturers’ job efficacy cannot be overemphasized. Radloff (2001) identifies the importance of ICT in enhancing the quality of teaching and learning to include; providing encouragement for staff and students to reflect on how they teach and learn. Applying theory and research on learning and principles of good instructions to designing online learning environments. Making teaching and learning more visible and public. Encouraging collaboration and team work among staff and students, and offering greater access to learning for more people.

ICT competence, as used in this study, refers to the ability of a university teacher to make use of the various ICT tools such as e-mail, facsimile, internet, World Wide Web, intranets, extranets, online databases and other networking technologies in the performance of their job. Efficacy means having the ability to do what is defined as desired or to be effective in producing the desired result. It encompasses teacher efficiency and effectiveness. It is teachers’ confidence in their abilities and capabilities to produce quality outcome in the performance of their job. An effective and efficient teacher is one who does things right, attempts to solve job-related problems, avoid waste of resources and ensures quality output. Lecturers’ ICT competence can help in this direction. Radloff (2001) states that ICT increases the skills and status of teachers for job performance. Premised on this background, the study investigated the extent to which lecturers’ level of ICT competence influenced their job efficacy.

**Literature Review**

Information and Communication Technology (ICT) encompasses the effective use of equipment and programmes to access, retrieve, convert, store, organize, manipulate and present data and information (Gay & Blades, 2005). The use of ICT has been found by researchers to improve job efficiency and effectiveness of teachers. Wheeler (2000) discovered in his study that the use of ICT improves efficiency in educational process and effects changes in teaching methodology, assessment of learning, student tracking, communication and evaluation. Thus, the use of ICT by university teachers reduces workload (Omenyi, Aju & Odimegwu, 2007). In support of this finding, Balanskat, Blamire and Kefala (2006) stated that ICT is being increasingly used by teachers in their day-to-day work, leading to increased efficiency in planning and preparation of work. Similarly, Holdich (2002) stated that ICT programmes like web-based and computer-based analysis of written works save the time that the teacher spend in marking students’ scripts. Thus, in this era of
information and communication technology, institutions should start investing in modern educational technologies, which will provide innovative learning environment where both teachers and students could move beyond the limits of school building for information, interaction and enrichment. This is what job efficiency of university lecturers is all about. According to Becta (2004), ICT equips teachers with new innovations in education and in teaching and research.

In a study conducted by Omenyi, Agu and Odimegwu (2007), it was found that on average, teachers feel that ICT have helped them to increase their classroom efficiency. They discovered in their study that teachers’ perceptions of their increased job efficiency was associated with the level of ICT competence possessed by the teachers. This finding suggests that ICT is effective in improving instructive delivery to students. In a related study, Soffer and Raban (2003) and Ramajah, Jantan and Aafagi (2003) discovered a significant difference in ICT competence between male and female teachers. This finding was supported by the work of Dholakia, Dholakia and Kshetri (2003), who reported low level of ICT competence among female teachers. Omenyi, Agu and Odimegwu (2007), attributed this finding to the societal role expectations of the African women, which places a lot of restrictions on them. However, these findings were at variance with the work of Wong, Sidek, Aida, Zakaria, Kamariah, Hamidah and Hanafi (2005) who stated that females rated themselves to be more competent than males in ICT, especially in inserting and editing texts for word processing, inserting texts and deleting slides for presentation, using search engines and downloading files from web and using e-mails for communication. The researchers attributed these findings to the fact that the majority of the female academicians used in the study were younger than their male counterparts. Thus younger age has been found to be associated with more favourable attitudes towards ICT (Jennings & Ongwugbuzie 2001).

Jusuf (2005) and Olulube (2006) in their studies observed that teachers’ ICT competence in Nigeria is below expectation and access to ICT resources like the internet and computer is mostly limited in campuses of various higher institutions. This finding is supported by the work of Akpan (2008) who reported that lecturers’ perception of the role of ICT in management of university education was significantly low. The implication of these findings is that the level of university teachers’ ICT competence could greatly impact upon their job efficiency in classroom teaching, communication, students’ record keeping, and research/publications. In this era of globalization, job efficacy of academic staff in higher institutions cannot be divorced from the level of ICT proficiency which is necessary for quality academic output. Unfortunately, some university teachers still do not recognize the opportunities that ICT presents for improving the efficiency and effectiveness of their job. Some of them lack knowledge that would aid the application of ICT skills in instructional delivery, research and record management. This results into the overall utilization of ICT, among teachers in the teaching/learning situation, being low (Jusuf, 2005). Research reports have shown that overwhelming majority of teachers in Europe use ICT to plan lessons more efficiently (Jusuf, 2005 & Daniel, 2002). Although, many research works have been carried out on the impact of ICT competence on job efficacy of teachers in the western world, little or no research have been done in this area in Nigeria. This study therefore, investigated the extent to which lecturers’ level of ICT competence influence their job efficacy.
Hypotheses

H01: Male and female lecturers do not differ significantly in their level of ICT competence.

H02: The level of ICT competence of university lecturers do not significantly influence their efficacy in classroom instructions research/publications communication and record-keeping.

Methodology

The survey design was adopted for this study. This design was appropriate because it deals with the study of a large population by collecting and analyzing data from only a sample of the population. The design studies the opinion, attitude and behaviour of people. The study population consisted of 1,795 lecturers from the University of Calabar and Cross River University of Technology, Calabar, Nigeria. A breakdown of the population revealed that there were 1,284 lecturers at the University of Calabar and 511 lecturers at Cross River University of Technology, Calabar. (Office of Director of Academic Planning, 2013). The simple random sampling technique was used in selecting the study sample. This method was necessary to ensure that every member of the population had equal and independent chance of being selected. Using this technique, 300 academic staff were randomly selected from University of Calabar and 200 academic staff from Cross River University of Technology, Calabar. This gave a total sample size of 500 lecturers from the two institutions. A breakdown showed that 187 were females and 313 were males. The instrument for data collection was a questionnaire developed by the researcher and titled “ICT competence and Job Efficacy Questionnaire (ICTCJEQ) for lecturers. The instrument consisted of two sections. Section I dealt with personal and demographic data such as gender, educational qualification, age, and years of working experience. Section II consisted of two parts, A and B. Part A measured lecturers’ level of ICT competence in terms of ability to use e-mails, facsimile, browsing of internet, spreadsheet, download files and ability in word processing, use of computer, power point, store and retrieve information, etc. Each item had 4 response options of highly competence, moderately competence, lowly competence and not competence. The respondents were required to tick one option against an item. Part B was also a 4-point Likert type scale consisting of 20 items. Each item had 4 options ranging from Strongly Agree (SA), Agree (A) to Disagree (D) and Strongly Disagree (SD).

The variables under consideration were lecturers’ efficacy in classroom instruction, research/publications, communication and record-keeping. Each of these variables was measured with 5 items. The respondents were required to indicate the extent of their agreement or disagreement with each item by ticking one of the 4 options against each item. To determine the reliability of the instrument, a trial test was carried out. The research instrument was administered to 40 lecturers who were not part of the actual study. A reliability coefficient of 0.77 was obtained using test retest method. This was high enough for the instrument to be considered reliable. The instrument was administered to the respondents in their respective institutions with the help of a research assistant. All copies of the questionnaire were correctly filled and returned. With a 4-point Likert scale, items that were positively worded were scored 4 points for Strongly Agree, 3 points for Agree, 2 points for Disagree and 1 point for Strongly Disagree responses respectively. For negatively worded items, the scoring technique was reversed.
Results

**HO₁**: Male and female lecturers do not differ significantly in their level of ICT competence. To test this hypotheses chi-square (x²) statistical technique was used for data analysis. The result as presented in Table 1 reveals that the calculated x² – value of 3.43 is less than the critical x² value of 5.99 at .05 level of significance and 2 degrees of freedom. Given this result therefore, the null hypothesis is upheld. This means that male and female lecturers do not differ significantly in their level of ICT competence.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Level of ICT Competence</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High</td>
<td>140</td>
<td>100</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>110</td>
<td>(89.76)</td>
<td>165</td>
</tr>
<tr>
<td></td>
<td>Low</td>
<td>63</td>
<td>(59.47)</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Marginal</td>
<td>313</td>
<td>187</td>
<td>500</td>
</tr>
</tbody>
</table>

The figures in parentheses are expected frequencies. Calculated Chi-square (x²) value = 3.43, DF. = 2. Critical x² value = 5.99  P > .05

**HO₂**: The level of ICT competence of University lecturers does not significantly influence their efficacy in classroom instruction, research/publications, communication and record-keeping. The data for this hypothesis were analyzed using One-way Analysis of Variance. The result as presented in table 2 reveals that the calculated F-values for lecturers job efficacy in classroom instruction (F = 14.41), research/publication (F = 9.78), communication (F = 3.11), record-keeping (F = 3.66) are each greater than the critical F-value of 3.04 at .05 level of significance with 2 and 497 degrees of freedom. With this result, the null hypothesis for these sub-variables is therefore rejected, while the alternate hypothesis is upheld. This means that lecturers’ level of ICT competence significantly influences their job efficacy in classroom instruction, research/publication, communication and record-keeping.

<table>
<thead>
<tr>
<th>Lecturers’ Efficacy</th>
<th>Source of Variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Classroom Instruction.</td>
<td>Between</td>
<td>398.16</td>
<td>2</td>
<td>199.13</td>
<td>14.41*</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>6865.25</td>
<td>497</td>
<td>13.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>7263.41</td>
<td>499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Research / publications.</td>
<td>Between</td>
<td>231.08</td>
<td>2</td>
<td>115.54</td>
<td>9.78*</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>5869.87</td>
<td>497</td>
<td>11.81</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6100.95</td>
<td>499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Communication</td>
<td>Between</td>
<td>46.16</td>
<td>2</td>
<td>23.08</td>
<td>3.11*</td>
</tr>
<tr>
<td></td>
<td>Within</td>
<td>3683.01</td>
<td>497</td>
<td>7.41</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>3729.17</td>
<td>499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Record –keeping</td>
<td>Between</td>
<td>70.65</td>
<td>2</td>
<td>35.33</td>
<td>3.65*</td>
</tr>
<tr>
<td></td>
<td>within</td>
<td>4810.10</td>
<td>497</td>
<td>9.68</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>4880.75</td>
<td>499</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .05, DF (2 & 497); critical F = 3
To determine the direction of significant difference, Fisher’s Least Significance Difference (LSD) test was carried out. The result of analysis is presented in Table 3.

Table 3  
**Fishers’ Least Significance Difference (LSD) test among means**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level of ICT Competence</th>
<th>Low (n=95)</th>
<th>Moderate (n=165)</th>
<th>High (n=240)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom Instruction</td>
<td>Low</td>
<td>14.76*a</td>
<td>-0.75*b</td>
<td>-2.56</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>-1.60*c</td>
<td>15.51</td>
<td>-1.81</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>-5.81*</td>
<td>4.89*</td>
<td>17.32</td>
</tr>
<tr>
<td>MSw =13.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research and Publications</td>
<td>Low</td>
<td>15.05*a</td>
<td>-0.11*b</td>
<td>-1.12</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>-0.26*c</td>
<td>15.16</td>
<td>-1.01</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>-2.80*</td>
<td>-2.97*</td>
<td>16.17</td>
</tr>
<tr>
<td>MSw =11.81</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td>Low</td>
<td>15.16*a</td>
<td>-0.58*b</td>
<td>-0.71</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>-1.71*c</td>
<td>15.74</td>
<td>-0.31</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>-2.22*</td>
<td>-0.48</td>
<td>15.87</td>
</tr>
<tr>
<td>MSw =7.41</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Record-keeping</td>
<td>Low</td>
<td>14.92 a</td>
<td>-0.33*b</td>
<td>-0.92</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>-0.85c</td>
<td>15.25</td>
<td>-0.59</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>-2.47*</td>
<td>-1.90</td>
<td>15.84</td>
</tr>
<tr>
<td>MSw =9.68</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*p<.05  
(a) All means are along the diagonal  
(b) Differences between means are above the diagonal  
(c) Fisher’s t-values are below the diagonal  
MSw is Mean square within.

The data in table 3 reveals that lecturers with high ICT competence are more efficacious in classroom instruction (t = -5.82) than those with moderate ICT competence (t = -4.89) and than those with low ICT competence. This means that the higher the level of ICT competence, the more efficacious lecturers are in classroom instruction. Similarly lecturers with high level of ICT competence are significantly more efficacious in research/publication than those with low ICT competence (t = - 2.80) and significantly more efficient than those with moderate level of ICT competence (t = - 2.97). In the same vein, academic staff with high ICT proficiency are significantly more efficient and effective in communication (t = - 2.22) than those with moderate and low ICT proficiency. Also, academic staff with high ICT competence are significantly more efficacious in record – keeping and management (t = - 2.47) than those with moderate and low ICT competence. The trend is that, the higher the level of ICT competence among academic staff, the more efficacious they are in their job performance. Generally, academic staff with high ICT proficiency is significantly more efficient and effective in their job performance than those with moderate and low ICT competence.
Discussion of Findings

One of the findings of this study reveals that gender does not significantly influence lecturers’ level of ICT competence. In other words, male and female lecturers do not differ significantly in their level of ICT proficiency. This finding suggests that both male and female lecturers used in the study are familiar with the use of ICT tools on a regular basis for academic work. The finding also suggests that gender should not be considered as a major factor that can hinder or promote ICT competence among lecturers. Further explanation to this finding is that perhaps both male and female lecturers must have seen the need to acquire ICT skills to enable them to reduce pressure of work in terms of time and energy and to enhance their job efficacy. The acquisition of appropriate ICT competence enables academic staff to meet up with the demands of their job. The finding of this study corroborates the research findings of Jusuf (2005) and Daniel (2002), who stated that overwhelming majority of teachers (males and females) in Europe use ICT to plan and teach their lessons more efficiently and effectively. However, the findings are in contrast with the works of Soffer and Radan (2003), Ramajah, Jantan and Aafaqi (2003), Omonyo, Agu and Odimogwu (2007) that reported, a significant difference in ICT competence between male and female teachers.

Another finding of the study shows a significant influence of teachers’ level of ICT competence on their efficacy in classroom instruction, research/publication, communication and record-keeping. The trend is that the higher the level of ICT competence of teachers, the more efficacious they are on their job. Thus, lecturers’ job efficacy is a function of their level of ICT competence. This finding could be attributed to the fact that majority of university teachers in recent times have realized the importance of ICT in achieving job efficiency and effectiveness because it facilitates quicker and easier communication and network which allows them to perform their tasks more quickly and thoroughly. Furthermore, majority of university lecturers now have their personal laptops connected to the internet through the use of their personal modems. With this, they can access information easily in the world-wide web and in databases, communicate quickly with both students and colleagues through the use of text messages, mobile phone calls, e-mails and facsimile and keep tracks of students records.

This enhances their ability to produce the desired result in the discharge of their professional responsibilities. This finding is in consonance with the work of Wheeler (2000) who stated that ICT competence improves efficiency in educational process and effect changes in teaching methodology, assessment of learning, students’ tracking, communication and evaluation. Thus, ICT equips teachers with new skills and innovations in education and in teaching and research (Becta, 2004). The present finding is also corroborates the research finding of Omenyi, Agu and Odimegwu (2007) who stated that teachers’ perception of their increased job efficiency was associated with the level of ICT competence possessed by the teachers. This helps them to increase their efficacy in classroom teaching, research and publications. Thus, lecturers who are competence in the use of ICT tools can easily download new materials from the internet, which can be used for lecture preparation and teaching. They can also search for research materials in the internet and publish research findings in reputable international journals of their choice.
Conclusion

In light of the findings of this study, it could be concluded that male and female university teachers do not differ significantly in their level of ICT proficiency. This indicates that gender is not a major factor that can hinder or promote lecturers’ ICT competence. Thus, male and female lecturers are favourably disposed towards the positive effect of ICT competence. The study discovers that the level of ICT competence of lecturers enhances their job efficacy in classroom teaching, research and publications, communication and record-keeping. Therefore, lecturers’ job efficacy is a function of lecturers’ level of ICT competence.

Recommendations

This paper recommends that management of universities should encourage both male and female lecturers to participate in ICT training programmes. Acquisition of ICT skills from such training programmes would help to improve lecturers’ job efficacy and this would lead to high productivity. The management of universities should also ensure that academic staff offices are provided with ICT facilities and connected to the internet. This would enable the lecturers to access and download information or materials quickly and easily for lecture preparation, teaching, research and other allied duties. It would enhance job efficiency.

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Lecturers’ Perception of Research Activities for Knowledge Production in Universities in Cross River State, Nigeria: Uchendu, C. C., Osim, R. O., Odigwe, F. N. & Alade, F. N.

Abstract
This study examined lecturers’ perception of research activities for knowledge production in universities in Cross River State, Nigeria. Two hypotheses were isolated to give direction to this investigation. 240 university lecturers were sampled from a population of 1,868 from the two universities in Cross River State, using stratified random sampling technique. Results revealed that lecturers’ perception of research activities has a significant relationship with knowledge production. Lecturers’ perception of research activities for knowledge production is not significantly influenced by university type. It was recommended that government should support research activities in universities through funding to promote knowledge production which pays them back in terms of contributing to the development of the economy, political and social systems.

Keywords: Lecturers, Research Activities, Knowledge Production, Universities.

Research is one of the major principal functions of universities in addition to teaching and community service. Apart from teaching, it attracts a central stage in activities that take place in universities. Research is one of the pivotal means of pursuing the goals of tertiary education (FRN, 2004). In addition lecturers appear to give it adequate attention like the teaching component; this is so because it forms the major aspect for their promotion requirement. Research is a systematic attempt, search or investigation to find solutions to problems or questions in order to increase the sum of knowledge (Bako, 2005). It consists of a study and investigation to discover facts, insight and other element central to the matter at issue. It is so critical and crucial that it constitutes an essential ingredient in determining the quality of any higher institution. It constitutes a key criteria for the promotion of lecturers, and as such, it is highly valued, sought after and requires high level participation and quality work (Akuegwu, Udida & Bassey, 2006).

Because of its central role in determining lecturers’ promotion, they are likely to have a positive attitude towards it. It is natural that one is likely to have a positive perception towards something that contributes immensely towards his or her wellbeing. Apart from this, research tends to add value to knowledge by exposing people to be familiar with hitherto unknown facts, thus increasing knowledge production. Knowledge production is a complex and time consuming process. For knowledge to be produced, someone must think of an idea and decide to pursue it further. Thomas (2012) maintained that original research is research that is not exclusively based on a summary, review or synthesis of earlier publications on the subject of research. This material is of a primary source character. The purpose of the

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original research is to produce new knowledge, rather than to present the existing knowledge in a new form. It therefore means that the quantity of knowledge produced is a function of the intensity of research activities. Knowledge production helps to build a strong nation because it affects every facet of national life. People need new knowledge to function effectively in education, economy, health, politics, social and religious sector. It is on this that countries especially developed countries invest heavily on research since it gives them advantages over others.

However, despite this enviable position of research in national growth, development and production of knowledge, lecturers’ perception of research tend not to have met the required mark. Research activities requires somebody’s engagement of personal time and effort in searching for materials, sorting them as well as assembling them together. In addition, it requires putting the materials together according to similarities and sourcing for financial expenditure. But what tends to be making progress is the “put my name” syndrome where some lecturers are only interested in their colleagues including their names as authors without actually participating in research activities. Thus, a lecturer can be credited with many research articles without actually contributing towards the successful execution of those studies. This causes a culture of lousiness on the part of some lecturers. In addition, the “publish or perish” cliché has encouraged all forms of malpractices in research. Where researches that are meant to be carried out by many lecturers, end up being executed by few thereby, affecting the quality of such research activities. It therefore follows that a research output with poor quality will no doubt contribution to knowledge production, but such knowledge will not be useful to anyone. In the Nigerian context, little emphasis has been placed on research by the ruling class. This poor attitude has contributed to many researches ending up in book shelves of university libraries and lecturers can only perceiving research as a mere tool for promotion purposes. In this case, such a person is not really prepared to invest his time and effort in research. From the above background, this paper seeks to investigate lecturers’ perception of research activities for knowledge production in universities in Cross River State, Nigeria.

Statement of the Problem

Research has suffered some setbacks in the Universities as a result of governmental attitude caused by poor funding. This has made some lecturers not to perceive it as what while, as such they are ready to cut corners by adopting the “put my name syndrome”. Because engagement in research without money to publish is only tantamount to waste of effort, energy and time. As such, some lecturers are ready to mark time in one position without bothering themselves about research. Furthermore, the practice of allowing research work to end in library book shelves has also made some lecturers not to see the need to engage actively in it. However, despite this drawback, research activities tend to be on the increase, especially among young and junior lecturers. In addition, University and other organizations such as Tertiary Educational (ted) fund support has added more motivation to research. The problem still remains that the inability to get the funds as at when do has resulted to lecturers not showing adequate interest on it. In the light of this, the problem of this study is to investigate lecturers’ perception of research activities for knowledge production in universities in Cross River State.
Hypotheses
1. Lecturers’ perception of research activities has no significant relationship with their knowledge production.
2. Lecturers’ perception of research activities for knowledge production is not significantly influenced by university type

Literature Review
Research is one of the major responsibilities of university lecturers and they are expected to be active researchers, since it produces new knowledge for growth and development. Akuegwu, Udida and Bassey (2006) studied the attitude towards quality research among lecturers in universities in Cross River State, Nigeria and revealed that lecturers’ attitude towards sourcing for research materials, funding research work personally and conference attendance is significantly positive. These scholars suggested that a conducive environment should be provided in the universities in order to facilitate the production of quality research works. Yusuf (2005) stated that the saying “publish or perish” is quite popular in the university setting. According to him, this phrase underscores the importance attached to research in any university. Research is the major work of a university lecturer, in term of quality and the determinant of advancement. Bogue and Saunder (1992) and Erwin (1991) observed that less attention has been directed towards other aspects of an institution’s mission including research. Obibuaku (2005) contended that research entails a lot of effort and demands a great deal of money to execute it. If a lecturer is to carry out a research with the purpose of publishing it in a reputable journal outside the country, the person will invest a lot of effort and money. If Nigeria is going to catch up with and get into the main stream of development, her universities must be alive to their research responsibilities because research is essentially the cutting edge of scientific, technological and economic development. Without quality research activities there will be no knowledge production for growth and development in the universities.

Hermans and Castiaux (2007) reported that the origin of research ideas will have an impact on the way individuals involved in research activities develop competencies. They further reported that ideal knowledge process is composed of several concurrent phases: tacit knowledge sharing leading to the development of common concepts which are crystallized in a first time into written agreement and lately into publications reports or new processes. Research has established several benefits of strong ties relevant to knowledge production. Individuals who have a history of interactions with one another are more helpful and accessible (Cross & Sproull, 2004). The literature on knowledge production and universities focuses on the role of universities as producers of new knowledge through research and education (Scott, 1997; Sizer, 2001). Downess, (2012) stated three models of knowledge production including knowledge production as mining, knowledge production as construction, and knowledge production as growth. The mining approach stresses accuracy and purity. Getting the right data, getting accurate data and validating data are of critical importance. It is an approach that focuses on “best practices” or on demonstrated reliability.

The study on knowledge production among university research scientists as a function of their professional (ego) networks by Mefadyen, Semadeni and Cannella (2009) proposed that knowledge production relied, in part on two attributes. These are a researcher’s professional network structure and the average tie strength and ego network density. They
provided insights into how these attributes jointly affect knowledge production. Their study of over 7,300 scientific publications by 177 research scientists working with more than 14,000 others over a period of 11 years provided evidence that the relationship between research scientists professional network and knowledge creation depends on both ego network density and average strength link. Their evidence suggests that both attributes affect knowledge production. It also says that average tie strength interacts with density to affect knowledge production such that researchers who maintain mostly strong ties with research collaborators who themselves comprise a sparse network have the highest level of new knowledge creation (Production).

Methods
This study was carried out in Cross River State, Nigeria. The state is one of the six states that make up the South-South geopolitical zones of Nigeria. It is one of the oil producing states with political and economic capital in Calabar city. The study focused on two universities in the state- one conventional and the other specialized. 1,868 lecturers in the two universities constituted the population. With the help of stratified random sampling technique, 240 lecturers were drawn for the sample size. Data collection was carried out by means of a researchers’ constructed instrument titled “Lecturers’ Perception of Research for Knowledge Production Questionnaire” (LPRKPQ). It had two sections A and B, Section A was made up of demographic variables containing 6 items, while Section B was made up of 30 items, arranged on 4 – point Likert Scale. Each of the five sub variables was measured by six items in the questionnaire. The instrument was validated by experts in measurement and evaluation; while the pilot test gave a reliability coefficient of 0.62 to 0.86 which was considered well enough for use in this study. The researchers personally administered the questionnaire to the sampled subjects, which ensured 100 percent return rate. The data collected were analyzed with Pearson’s Product Moment Correlation and Independent t-test.

Results
Hypothesis 1
Lecturers’ perception of research activities has no significant relationship with knowledge production.

Table 1:
Pearson’s Product Moment Correlation Analysis of Lecturers’ Perception of Research Activities and Knowledge Production.

<table>
<thead>
<tr>
<th>Variables</th>
<th>X</th>
<th>SD</th>
<th>rxy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching for materials X₁</td>
<td>10.46</td>
<td>3.26</td>
<td>0.43</td>
</tr>
<tr>
<td>Sorting materials X₂</td>
<td>9.82</td>
<td>3.08</td>
<td>0.05</td>
</tr>
<tr>
<td>Assembling materials X₃</td>
<td>10.86</td>
<td>2.74</td>
<td>0.38</td>
</tr>
<tr>
<td>Research writing X₄</td>
<td>10.92</td>
<td>3.32</td>
<td>0.58</td>
</tr>
<tr>
<td>Sourcing for fund X₅</td>
<td>11.04</td>
<td>3.03</td>
<td>0.46</td>
</tr>
<tr>
<td>Knowledge production Y</td>
<td>11.42</td>
<td>3.54</td>
<td></td>
</tr>
</tbody>
</table>

Results presented in table 1 indicate that the calculated r values were higher than the critical r value of 0.138 at 0.05 level of significance and 238 degree of freedom in respect of
searching for materials \((r = 0.38)\), sorting materials \((r = 0.54)\), assembling materials \((r = 0.38)\), research writing \((r = 0.58)\), sourcing for fund \((r = 0.46)\). The above result showed that the null hypothesis was rejected, which means that lecturers’ perception of research activities has a significant relationship with knowledge production.

**Hypothesis 2**

Lecturers’ perception of research activities for knowledge production is not significantly influence by university type.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Conventional</th>
<th>Specialized</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Searching for materials</td>
<td>X=17.28, SD=5.46</td>
<td>X=17.46, SD=6.54</td>
<td>-0.361</td>
</tr>
<tr>
<td>Sorting materials</td>
<td>X=18.36, SD=3.84</td>
<td>X=18.48, SD=3.42</td>
<td>-0.540</td>
</tr>
<tr>
<td>Assembling materials</td>
<td>X=17.41, SD=3.94</td>
<td>X=17.84, SD=4.64</td>
<td>-0.124</td>
</tr>
<tr>
<td>Research writing</td>
<td>X=18.72, SD=4.64</td>
<td>X=18.55, SD=3.31</td>
<td>-0.342</td>
</tr>
<tr>
<td>Sourcing for fund</td>
<td>X=18.66, SD=6.58</td>
<td>X=18.42, SD=3.44</td>
<td>-0.196</td>
</tr>
</tbody>
</table>

Results presented in table 2 indicated that the calculated t-values were lower than the critical t-value of 1.972 at 0.05 level of significance and 238 degree of freedom in respect of searching for research materials \((t = -0.361, p > 0.5)\), sorting materials according to similarities \((t = -0.540, p > 0.5)\), assembling material \((t = -0.124, p > 0.5)\), research writing \((t = 0.342, p > 0.5)\) and sourcing for fund \((t = 0.196, p > 0.5)\). With this result, the null hypothesis was not rejected. This means that conventional university lecturers do not differ from their counterparts in specialized university in perception of research activities for knowledge production.

**Discussion of Results**

The analysis of hypothesis one suggests a significant relationship between lecturers’ perception of research activities and knowledge production. With this result, the null hypothesis was rejected and in its place the alternate hypothesis was upheld. This finding suggests that the perception of lecturers towards research makes contributions to knowledge production, that is lecturers opinion or feelings or thinking about research can make or mar knowledge production. By this position, it implies that knowledge production is not a function of itself. The reason for this finding can be linked to the fact that each research activity adds something positively or negatively to knowledge that means it brings about new knowledge. The point being made here is that when a person searches for materials, sort’s them according to similarities, and brings them together, to bring out a research work, in this process something new that has not been found or discovered before is produced. This agrees with Downess (2012) that the mining approach stresses accuracy and purity. Getting the right data, getting accurate data and validating data are of critical importance. This follows that research activities must always lead to the production of knowledge. Thus, the more the intensity of the research, the more the intensity of production. However, some research activities may not necessarily lead to the production of new knowledge. What matters is that
research activities add to existing knowledge, that is increasing the knowledge that has been in existence either by given it wide publicity or disseminating it to areas where it has not been known. It is on this basis that research activities can be said to be positively or negatively.

The outcome of this finding is supported by Mefadyen, Semaderi and Cannella (2009) study that researchers who maintain mostly strong ties with research collaborators, who themselves comprise a sparse network have the highest level of new knowledge production. Similar the outcome of Cross and Sproull (2004) disclosed that research has established several benefits of strong ties relevant to knowledge production. The outcome of hypothesis two had it that Conventional University lecturers’ do not differ in their perception of research activities for knowledge production from their counterparts in specialized university. This suggests that the perception of lecturers in both conventional and specialized universities is the same and so their input to knowledge production is the same. Since the two groups of lecturers perceive research the same way there is tendency that their level of involvement in it will be the same. This means that the intensity at which they engage in research activity will also produce the same intensity in knowledge production.

The reason for this finding could be that conventional and specialized university lecturers are exposed to the same work environment in universities, work with the same facilities and enjoy the same condition of service. It therefore follows that since they are in the same university setting despite their classification, work under the same climate, there is tendency that they will not also differ in the performance of the one of the core functions of the university which is research. So this finding does not pose any surprise. This finding is consistent with that of Akuegwu, Udida & Bassey that lecturers’ attitude towards research activities is the same, which means that whether conventional or specialized universities they perceive research activities the same way, it therefore follows that university type does not determine how lecturers perceive research activities for knowledge production.

Conclusion

In light of the findings of this study, it was concluded that lecturers’ perception of research activities has a significant relationship with knowledge production. Lecturers’ in conventional universities do not differ in their perception of research activities for knowledge production from their counterparts in specialized universities in Cross River State, Nigeria. Government should support research activities in universities through adequate funding, to promote knowledge production, which pays them back in terms of contributing to the development of the education, economy, political and social system.

References

School Managers’ Perception of Teachers’ Preparation for Basic Education in Nigeria: Implications for Teachers’ Preparation in Nigerian Tertiary Institutions: Shofoyeke, A. D (PhD), Omotayo, O. T (PhD), & J. R Ikuerowo

Abstract

The National Policy on Education (2013) describes education as an instrument for national development and social change. Teachers are very important in implementing quality education that can bring about national development. However, no education can rise beyond the quality of its teachers. Pre-service teachers are produced by colleges and faculties of education in Nigeria. Hence, the quality of teachers in the education system is largely dependent on the quality of their preparation. This study investigated school managers’ perception of teachers’ preparation for basic education. The study found no significant difference between the perception of urban, semi-urban and rural school managers on admission process, curricula issues, educational facilities and teaching/learning process. It was recommended that Unified Tertiary Matriculation Examination (UTME) scores for education courses be as high as other courses to ensure that quality students are admitted with scholarships and other incentives being offered to encourage them. Furthermore, teacher educators need refresher courses on modern methodologies of teaching to enhance their teaching skills to produce quality teachers that are fit for 21st century education.

Keywords: School Managers, Teachers, Basic Education, Tertiary Education, Nigeria

Introduction

A nation’s development depends largely on the quality of her education. Perhaps, it is against this background that the National Policy on Education (2013) describes education as an instrument for national development and social change. Teachers are very important in implementing quality education that can bring about national development. However, no education can rise beyond the quality of its teachers. According to the United Nations Education Scientific and Cultural Organisation (UNESCO, 1966, p.3), “the word teacher covers all those persons in schools who are responsible for the education of pupils”. Teachers are people who formally impact knowledge, attitudes and skills in pupils with a view to bringing about positive change in the behaviour of the recipient. Global developments require that teachers’ preparation reflect changes so as to enable modern teachers to fit into the labour market and to contribute meaningfully to development (National University Commission, 2012).

Teachers’ education is the process which nurtures prospective teachers and updates qualified teachers’ knowledge and skills in the form of continuous professional development (Nakpodia and Urien, 2011). It revolves around the policies and procedures designed to equip prospective teachers with the knowledge, attitude, behavior and skills required in the performance of effective duties in the classrooms and other social gatherings. According to

7 National Institute for Educational Planning and Administration (NIEPA) Ondo State, Nigeria
Nakpodia and Urien (2011) teachers’ education is often divided into three stages. Pre-service training is an induction process involving the training and supports of the trainees during the first few years of teaching or the first year in a particular school. Focus is on teacher development or continuing performing development and intensive process for practicing teachers. This may include in-service training. Tertiary institutions are involved in all the stages of teacher education. Specifically, teachers’ institutions have statutory roles of producing teachers through pre-service training which begins with admissions, followed by lecturing, supervising, examining, and certifying.

In the recent years, the quality of pre-service teachers has been questioned because of their poor service delivery. This can be traced to a number of factors such as; quality of students admitted, availability of instructional facilities for the training of teachers, pre-service teacher curriculum, and teaching learning processes in colleges/faculties of education. Studies have shown that intake into teacher education is of low quality and candidates have no genuine desire of becoming teachers after graduation (Adeleke, 1999; Akinbote, 2007; and Ikeotuonye, 2010). Besides, Oladosu (2007) identified inadequate infrastructure, educational facilities, and instructional materials across all levels of the educational system in Nigeria as one of the factors militating against quality of education. There is no doubt that the contents of teacher training institutions have continued to be aligned to the changing needs of the society yet they do not empower teachers to efficiently teach all subjects in primary schools. Adesulu (2013) buttressed this by citing Wike (2013) who asserted that the two major challenges that have confronted the nation’s education over the years, in terms of quality attainment and sustainability, are lack of regular review and updating of existing curricula to meet changing societal needs and inadequate funding for regular curriculum development and review.

On the quality of teacher trainers, FME (2007) reported that not all teacher educators are professionally qualified for their job. While some of the academic staff did not possess relevant pedagogy to serve as teacher trainers, a significant number of the professors in the system are not professionally qualified to teach. Thus, the situation fails to keep up with the provisions of the National Policy on Education (FGN 1981, 2004 and 2013), which provides that all teachers from pre-primary to university should be professionally qualified. This gap according to Ogar and Aniefiok (2012) implies that the teacher education programme does not prepare teachers to face the challenges of the 21st century. There is no doubt that teachers are the pivot of the education system in any nation. However, the quality of education depends largely on the quality of the teachers which is dependent on the inputs and processes during pre-service training in tertiary institutions. Although quality pupils’ learning outcomes is one of the means of assessing teachers’ quality, it can also be determined by their service delivery which is better observed by school managers. Thus, the school managers’ perception of quality and competence of teachers for implementing basic education at primary school sub-sector serves feedback on how effective teacher preparation is by colleges/faculties of education. The school managers’ perception is, however mediated by school location which is urban, semi-urban or rural and gender. Studies have shown that school location has significant influence on perspective of school managers and teachers’ performance (Frame, 1990; Anam, 2003).
Statement of the problem

The quality of teachers at basic and post basic education has not kept pace with the expansion in enrolment. According to UNESCO (2012) low teacher quality is becoming a global dimension. Poor teacher quality is reflected in pupils’ low learning achievement in literacy, numeracy and life skills for useful living as well as poor value inculcation. Within the Nigeria context, this situation can be traced to many factors, but majorly the preparation of teachers which is best assessed by school managers who supervise and coordinate service teachers. Thus, the study sought to analyze school managers’ perception of teacher preparation for basic education and its implications for tertiary institutions. To effectively do this, school managers’ gender, school location (urban, semi-urban and rural) were considered as variables that could influence their perception.

Research Questions

The study was guided by the following research question

To what extent does the admission process, educational facilities, curricula and pedagogy influence the quality of teacher production for basic education?

Hypotheses

The following hypotheses were tested at 0.05 level of significance

1. There is no significant difference between the perception of urban, semi-urban and rural school managers on the causes of the low quality of teachers.
2. There is no significant difference between the mean response of male and female school managers on the causes of low quality of teachers.

Methodology

The study employed a survey research design to investigate primary schools managers’ perception of teachers’ preparation for implementing basic education in terms of quality service delivery to meet educational needs in the 21st century. The populations of the study was primary school managers in public schools in Nigeria. There are 54,434 school managers in public primary schools in Nigeria out of which 198 were selected using multi-stage sampling techniques; Abia state was selected as primary units while the local governments were selected as secondary unit. Abia state has 800 school managers out of which 198 were randomly selected for the study which represents 24.8 percent. The school managers were drawn from urban, semi-urban, and rural areas respectively. However, 182 actually participated in the exercise which is shown in table 1.

<table>
<thead>
<tr>
<th>Location</th>
<th>Number Sampled</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>7.7</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>17.6</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>74.7</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>100</td>
</tr>
</tbody>
</table>

Most schools sampled were from the rural areas because the rural area has significant percentage of the schools in the state.
A questionnaire was developed by the researchers to generate information on teachers’ preparation for implementing basic education in terms of quality and employability. The questionnaire contained 30 items which were sub-divided into four sections; A, B, C, and D respectively. Section A was on the background information of the school managers. Section B probed into the causes of low quality of teachers trained in recent year. It was a four point Likert scale that is, Strongly Agree, Agree, Strongly Disagree and Disagree which was meant to elicit information on causes of low quality of teachers trained in colleges/faculties of education. Specifically, it contained the sub-themes of admission process, curricula issues, and educational facilities, teaching and learning processes. Section C was also a four point Likert scale meant to elicit information on the employability of teachers (in terms of quality service delivery). It contained information on recruitment process and teachers competence. Section D was an open ended questionnaire, which was meant to elicit suggestions from respondents on how to improve the quality of teachers trained by tertiary institutions (colleges/faculties of education).

The questionnaire was developed by the researchers and was given to experts in teachers’ education to establish the face and content validity of the items. The draft questionnaire was administered to 20 school managers in Ondo west local government area to serve as pilot study. Data generated from the pilot study was analysed, using Cronbach’s coefficient alpha to establish its reliability coefficient. Reliability coefficients of 0.79 and 0.76 were obtained for internal consistency of items in section B and section C respectively. Thus, the items are reliable in that Onocha and Okpala (1995) posited that the high value of reliability coefficient is an indication of the extent to which the items in the inventory hang together or measure the same construct. The researchers personally administered the instruments to the school managers and collected them back the third day. The collected questionnaires were analysed using the SPSS software. Statistics employed for the analysis include frequency count, ANOVA, t-test and descriptive statistics. The ANOVA was used to compare the mean perception of school managers in urban, semi-urban and rural areas while the t-test was used to compare mean responses of male and female school managers.

Results
Ho 1: There is no significant difference between the perception of urban, semi-urban and rural head teachers on the admission process as a cause of low quality of teachers. Table 2(a) shows that the perception of urban, semi-urban and rural head teachers on admission process as a cause of low quality of teachers was not significant (F (2,179) = 1.285, P> .05). H01 is therefore not rejected.

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Sum of squares</th>
<th>DF</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admission process</td>
<td>15.390</td>
<td>2</td>
<td>7.695</td>
<td>1.285</td>
<td>.279</td>
</tr>
<tr>
<td>Error</td>
<td>1071.912</td>
<td>179</td>
<td>5.988</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1087.302</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2(b)

Descriptive statistics of Urban, Semi-urban and Rural School managers based on Admission process

<table>
<thead>
<tr>
<th>Admission process</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>11.4286</td>
<td>2.3110</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>12.6563</td>
<td>2.4044</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>12.4265</td>
<td>2.4695</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>12.3901</td>
<td>2.4510</td>
</tr>
</tbody>
</table>

In the above table, urban, semi-urban and rural school managers had a mean score of 11.4286, 12.6563 and 12.4265 respectively. School managers in semi-urban have highest perception admission process as cause of low quality of teachers than rural and urban counterparts respectively.

Ho 2: There is no significant difference between the perception of Urban, Semi-Urban and Rural school managers on Curricula issues as a cause of low quality of teachers

Table 3(a)

ANOVA of school managers’ perception of curricular issues as a cause of low quality of teachers

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Sum of squares</th>
<th>DF</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular issues</td>
<td>12.084</td>
<td>2</td>
<td>6.042</td>
<td>2.219</td>
<td>.112</td>
</tr>
<tr>
<td>Error</td>
<td>487.416</td>
<td>179</td>
<td>2.723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>499.500</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The perceptions of urban, semi-urban and rural school managers on curricula issues as a cause of low quality of teachers was not significant (F (2,179) = 2.219, P> .05). Therefore, there is sufficient reason not to reject Ho 2

Table 3(b)

Descriptive statistics of Urban, Semi-urban and Rural School managers based on Curricula issues

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>4.2143</td>
<td>1.8472</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>4.0000</td>
<td>1.3678</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>4.6471</td>
<td>1.6889</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>4.5000</td>
<td>1.6612</td>
</tr>
</tbody>
</table>

Urban, semi-urban and rural head teachers have a mean score of 4.2143, 4.0000 and 4.6471 respectively. School managers in rural areas have highest perception that pre service teachers un-updated curricula account for low quality of teachers than their urban and semi-urban counterparts.

Ho 3: There is no significant difference between the perception of Urban, Semi-Urban and Rural school managers on Educational facilities as a cause of low quality of teachers

Table 4(a)

ANOVA of school managers’ perception of educational facilities as a cause of low quality of teachers

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Sum of squares</th>
<th>DF</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational facilities</td>
<td>2.639</td>
<td>2</td>
<td>1.320</td>
<td>.141</td>
<td>.869</td>
</tr>
<tr>
<td>Error</td>
<td>1679.454</td>
<td>179</td>
<td>9.382</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1682.093</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table (4a) shows that the perception of urban, semi-urban and rural school managers on Educational facilities as a cause of low quality of teachers was not significant $F(2, 179) = .141, P > .05)$. Therefore, there is sufficient reason not to reject $H_0$.

Table 4 (b)
Descriptive statistics of urban, semi-urban and rural school managers based on Educational facilities

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>10.000</td>
<td>2.7175</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>10.406</td>
<td>3.0039</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>10.456</td>
<td>3.1076</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>10.412</td>
<td>3.0485</td>
</tr>
</tbody>
</table>

Table 4(b), urban, semi-urban and rural teachers have a mean score of 10.0000, 10.4063 and 10.4559 respectively. School managers in rural areas are most of the opinion that inadequate instructional facilities are responsible for low quality of teachers than semi – urban and urban counterpart respectively.

$H_0$: There is no significant difference between the perception of Urban, Semi-Urban and Rural school managers on Teaching/learning process as a cause of low quality of teachers

Table 5(a)
ANOVA of school managers’ perception of teaching/learning process in teachers’ colleges as a cause of low quality of teachers. School managers’ perception of admission process as determinant of low teacher quality by gender

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Sum of squares</th>
<th>DF</th>
<th>Mean square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching process</td>
<td>.746</td>
<td>2</td>
<td>.373</td>
<td>.020</td>
<td>.980</td>
</tr>
<tr>
<td>Error</td>
<td>3263.809</td>
<td>179</td>
<td>18.234</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3264.555</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (5a) shows that the perceptions of urban, semi-urban and rural on teaching/learning process as a cause of low quality of teachers are not significantly different $F(2, 179) = .020, P > .05)$. Therefore, there is sufficient reason not to reject $H_0$.

Table 5(b)
Descriptive statistics of urban, semi-urban and rural school managers based on Teaching/learning process

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>17.000</td>
<td>4.5064</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>16.812</td>
<td>4.2307</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>16.977</td>
<td>4.2557</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>16.950</td>
<td>4.2469</td>
</tr>
</tbody>
</table>

Urban, semi-urban and rural school managers have a mean score of 17.0000, 16.8125 and 16.9779 respectively. School managers in urban most perceived inadequate teaching learning process in colleges/faculties of education as being responsible for low quality of teachers than their counterparts in rural and semi – urban.

$H_0$: There is no significant difference between the perception of Urban, Semi-Urban and Rural Head teachers on Recruitment process as a cause of low quality of teachers
Table 6(a)
ANOVA of school managers’ perception of recruitment process as determinant of low quality of teachers

<table>
<thead>
<tr>
<th>Sources of variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recruitment process</td>
<td>9.178</td>
<td>2</td>
<td>4.589</td>
<td>1.816</td>
<td>.166</td>
</tr>
<tr>
<td>Error</td>
<td>452.272</td>
<td>179</td>
<td>2.527</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>461.451</td>
<td>181</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6(a) shows that the perception of Urban, Semi-Urban and Rural school managers on Recruitment process as a cause of low quality of teachers is not significantly different (F(2,179) = 1.816, P>.05). Therefore there is sufficient reason not to reject Ho 5.

Table 6(b)
Descriptive statistics of Urban, Semi-urban and Rural school managers based on Recruitment process

<table>
<thead>
<tr>
<th>Location</th>
<th>N</th>
<th>Mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>14</td>
<td>6.4286</td>
<td>2.0273</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>32</td>
<td>6.9688</td>
<td>1.2044</td>
</tr>
<tr>
<td>Rural</td>
<td>136</td>
<td>6.3750</td>
<td>1.6190</td>
</tr>
<tr>
<td>Total</td>
<td>182</td>
<td>6.4835</td>
<td>1.5967</td>
</tr>
</tbody>
</table>

Table 6(b), urban, semi-urban and rural school managers had a mean score of 6.4286, 6.9688 and 6.3750 respectively. School managers in semi-urban most perceived recruitment process of teacher as a determinant of low quality of teachers than urban and rural counterparts respectively.

Ho 7: There is no significant difference between the mean response of Male and Female school managers on Admission process as a cause of low quality of teachers.

Table 8(a)
School managers’ perception of admission process as determinant of low teacher quality by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Crit-t</th>
<th>Cal-t.</th>
<th>DF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>11.8372</td>
<td>2.3898</td>
<td></td>
<td></td>
<td>1.96</td>
<td>1.702</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>12.5612</td>
<td>2.4528</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 8 shows that there is no significant difference in the mean response of male and female school managers on Admission process as a cause of low quality of teachers (Crit-t = 1.96, Cal.t = 1.702, DF = 180 P > .05 level of significance). Therefore there is sufficient reason not to reject Ho 7.

Ho 8: There is no significant difference between the mean response of Male and Female school managers on Curricula issues as a cause of low quality of teachers.

Table 9
School managers’ perception of pre-service teachers’ curricular as determinant of low quality of teacher by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Crit-t</th>
<th>Cal-t.</th>
<th>DF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>4.6744</td>
<td>1.7144</td>
<td>1.96</td>
<td>.787</td>
<td>180</td>
<td>.432</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>4.4460</td>
<td>1.6470</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 9 shows that there is no significant difference in the mean response of male and female school managers on Curricula issues as a cause of low quality of teachers (Crit-t = 1.96, Cal.t = .787, DF = 180 P > .05 level of significance). Therefore there is sufficient reason not to reject Ho 8. However, male school managers are relatively more of the view that pre-service teacher curricula are not designed to enable teachers effectively teach all subjects in primary schools than the female counterparts.

Ho 9: There is no significant difference between the mean response of Male and Female Head teachers on Educational facilities as a cause of low quality of teachers

Table 10

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Crit-t</th>
<th>Cal-t.</th>
<th>DF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>10.5814</td>
<td>3.4588</td>
<td>1.96</td>
<td>.416</td>
<td>180</td>
<td>.678</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>10.3597</td>
<td>2.9217</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table shows that there is no significant difference between the mean response of male and female school managers on Educational facilities as a cause of low quality of teachers (Crit-t = 1.96, Cal.t = .416, DF = 180 P > .05 level of significance). Therefore, there is sufficient reason not to reject Ho 9. However, Male school managers have relatively higher mean opinion of insufficient educational facilities as one of the causes of low quality of teachers than females.

Ho 10: There is no significant difference between the mean response of Male and Female school managers on Teaching/learning process as a cause of low quality of teachers

Table 11

<table>
<thead>
<tr>
<th>Gender</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Crit-t</th>
<th>Cal-t.</th>
<th>DF</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>43</td>
<td>16.9767</td>
<td>4.7484</td>
<td>1.96</td>
<td>.046</td>
<td>180</td>
<td>.963</td>
</tr>
<tr>
<td>Female</td>
<td>139</td>
<td>16.9424</td>
<td>4.0980</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The table shows that there is no significant difference in the mean response of male and female school managers on Teaching/learning process as a cause of low quality of teachers (Crit-t = 1.96, Cal.t = .046, DF = 180 P > .05 level of significance). Therefore there is sufficient reason not to reject Ho 10. However, Male school managers have relatively higher perception of inadequate teaching/learning preparation as a cause of low quality of teachers than females.

Discussion of Results

The study found that irrespective of school managers’ location, their perception on admission process into colleges/faculties of education as one of the determining factors of low quality of teachers is unique. School managers in urban, semi-urban and rural areas believed that unwilling students who could not secure admission of choice in other courses are admitted to study education. This findings are in line with FME (2007) and Ike Otunoye...
In most cases, students with low performance at UTME and Post UTME as well as SSCE are admitted for teacher education, particularly Colleges of Education. It suffices to say that students who are not willing to be professional teachers are admitted. School managers perceived curricula of colleges/faculties of education as inadequate to prepare teachers to teach all subjects in primary school time table. In primary school, a single teacher attached to a class is expected to teach all the subjects, whereas the curricula at pre-service training did not prepare teachers for such task. The teaching of Primary Education Studies (PES) at NCE notwithstanding, the knowledge and skills to teach all subjects in a particular class at primary is missing. Both NCE and B.Ed for primary education are not broad based and more so, teach education curricula are not being reviewed in line with the review in primary and junior secondary school curricula. It is disheartening that only one college of primary education exists in the country out of over 72.

Teachers’ preparation suffers from inadequate use of requisite educational materials such as books and journals for students’ consultation in libraries. There are challenges of inadequate use of instructional materials for training of teachers. Besides, modern instructional materials are not in existence and where they do lecturers’ capacity to use them efficiently is missing. School managers perceived teaching and learning process as one of the determinants of low quality of teachers. This could be traced to recruitment of professionally unqualified lecturers, low preparation for teaching, irregular attendance of lectures by lecturers, lecturers demanding gratification from students to pass examination, frequent industrial actions embarked upon by lecturers and students’ unrest. Education Sector Analysis report conducted in 2007 by Federal Ministry of Education confirms that a significant proportion of lecturers do not have requisite qualification to lecture while professors have apathy for acquiring professional educational qualification. Most lecturers in other schools than education are colleges of education and those in other faculties in universities where pre-service teachers’ learn teaching subjects do not acquire requisite teaching methods. Recruitment process is perceived by school managers for contributing to low quality teachers. Recruitment process is bedeviled with politicized and favourtism leading to employment of incompetent teachers in schools. While industries and other organizations embark on long induction as re-training for newly recruited staff, state universal education boards hardly do or give inadequate orientation. School manager also perceived that some teachers are incompetent and are not employable. Such teachers are unable to write lesson notes correctly, possess poor mastery of subjects, poor teaching methodologies and unable to use curriculum to prepare scheme of work effectively. The weak teachers are not trainable by school heads and constitute liability to the school system. School managers’ perception of determinants of low quality of teachers is not significantly mediated by their gender.

However, relative gender differences were observed in their responses. Female school managers had higher perception of admission process as one of the causes of low quality of teachers than male counterpart; on the other hand, male school managers were more of the opinion that un-updated pre-service teacher education curricula is responsible for serving teachers’ inability to teach all subjects in school time table effectively and efficiently. In the same view, male school managers contended that insufficient educational facilities for training teachers are partly responsible for low teachers’ quality. The same view was shared by female school managers. On teaching/learning process as one of the determinants of
teachers’ quality, male school managers had higher perception of this factor than female counterparts.

Conclusion and Recommendations

Quality teachers are an important factor in the implementation of educational programmes especially basic education because it is the foundation upon which other levels of education is built on. No education can rise beyond the quality of its teachers and hence the perception of school managers on teacher preparation for basic education was investigated. The study found that school managers in urban, semi-urban and rural areas were not significantly different in their perception of causes of low quality of teachers. The causes include admission of students lowest post UTME scores or unwilling students rejected from other courses, un-updated teacher education curricula, insufficient educational facilities for training pre-service teachers, teacher educators’ incompetence in teaching using modern teaching methodologies due to lack of re-training, and recruitment of unqualified teacher educators, all of which constituted to production of incompetent teachers. The study found that school managers’ perception of the causes of low quality of teachers was not significantly mediated by their gender though relative differences were observed.

In view of the findings, it is recommended that; qualified and willing students should be admitted for NCE and education degree courses. Besides UTME and Post-UTME scores for degree courses should be as high as other courses. It is important that pre-service teachers can be encouraged and motivated by offer of scholarship and regular bursary awards. Teacher education curricula at NCE and degree need be reviewed to reflect changes in basic and post basic education curricula. If Nigeria is desirous of being one of the 20 world economies by the year 2020, then the teacher curricula need be reviewed while teacher educators should be retrained in modern teaching methodologies. The NCE curricula need be more broad-based to enable pre-service teachers acquire knowledge and skills necessary to effectively and efficiently teach all subject in primary school time table.

Teacher education programme for lower and middle basic need to be reviewed to build competence in pre-service teachers to teach teachers subjects in school time table. Colleges of Education through National Commission for Colleges of Education (NCCE) need to access more Tertiary Education Trust Funds (TETF) and seek for other financial support to provide adequate educational facilities to teaching and learning. Adequate instructional materials, books, journals need be provided in colleges education resource centers and libraries for teacher educators and students’ use respectively. In-service trainings sponsored by Universal Basic Education Commission, (UBEC) and state.

Universal Education Board (SUBEB) and other school based training should focus on enhancing the competency of teachers in subject mastery and modern methodologies for effective teaching and learning. In the words of Henry Carr cited by Aleyideino (2000, p. 25) ‘the teacher should be groomed in the methods of teaching but that should always be in advance of his pupils in the subject of instruction. Furthermore, it is important that some of the recommendations made by UNESCO on the status of teachers be adhered to. The staff of teacher-preparation institutions should be qualified to teach in their own discipline at a level equivalent to that of higher education. The staff teaching pedagogical subjects should have had experience of teaching in schools and wherever possible should have this experience periodically refreshed by secondment to teaching duties in schools.
Research and experimentation in education and in the teaching of particular subjects should be promoted through the provision of research facilities in teacher-preparation institutions and research work by their staff and students. All staff concerned with teacher education should be aware of the findings of research in the field with which they are concerned and endeavor to pass on its results to students.

References

Tertiary Educational Institutions for Teaching, Research and Development: Sikiru A. Amoo (PhD) 8

Abstract
This paper examines the quality of teaching and research in developing human resources to facilitate the development of tertiary education in the nation. It discusses the challenges and the roles of research in higher education. The author argues that the combination of content and pedagogical knowledge could help to develop human resources for the development of a nation. It discusses the goals of higher education institutions, and identifies teaching, research and development as pertinent to the achievement of the goals of tertiary education.

Keywords: Higher Education, Research, Human Resources Development

Introduction
The development of the higher education sector, teaching and use of university research publications are the most important factors of any developing/developed society. This could also be one of the instruments of change, especially in this fast changing world. The evidence from developed societies is evident in the founding philosophy and how developed the tertiary educational institutions are. To achieve the goals guiding the establishment of those institutions, one thing is to have goals, the other thing is to pursue the goals for the development of the nation. The recent developments in tertiary institutions, especially that of teacher education programmes and related policy processes in international context have been discussed (Amoo & Onuka, 2011). The need to focus on the university teaching, research and development as stated in our National Policy on Education (NPE) as listed had been partially neglected (FRN, 2004:37). Research on university teaching, research and development are avenues, but not limited to ways of achieving some of the goals tertiary education.

One goal of tertiary education is to contribute to national development through high level relevant manpower (FRN, 2004). In this paper, the author analyses and examines the role of the quality of teaching, research and development in developing human resources to facilitate the development of the nation. It discusses the challenges and the role of research in higher education. The paper argues that content and pedagogical knowledge combined could help develop human resources for the development of a nation. It discusses the goals of higher educational institutions and identifies teaching, research and development as pertinent issues needed to be addressed to achieve the roles of tertiary education. This paper emphasizes the higher education teachers/lecturers researches should be relevant to the needs of Nigeria in developing the human resources. Dynamics of research should focus on national needs and therefore proposes a kind of transformation in higher education research to cover fluid and analytical dynamics. It recommends the future collaboration among international institutions and academics.

University Education and Teaching

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University teacher education is an aspect of tertiary institutions that is empowered to provide quality education to effect much needed change in our society (Amoo & Onuka, 2011). In providing such change, research into this aspect of tertiary education should be geared towards national development, since education has become a weapon through which one can rise to prominence, and as well as development any country’s citizens. It means that the educational practice in any country including Nigeria should depend on a sound philosophy and guiding curriculum. The awareness and the demand for a philosophy of education upon which the Nigeria government fashions the curriculum have made the society to plan for accelerated educational development as well as the expansion of educational opportunities in recent times. As a result of this, the establishment and participation of private universities to accommodate more students and more employment opportunities ensured (Jubril, 2013). The awareness and demand of the philosophy and curriculum by the stakeholders in education (including researchers in higher education teaching for national development) will go a long way to help develop our citizens. Research in higher education teaching for development is one of the thrust of this paper and in order to teach in the university, we must think of the quality of the teaching. The quality of teaching in developing human resources to facilitate the development of the nation in tertiary education should be the one is to help the crop of students admitted nowadays to grow in terms of content knowledge acquisition as well as the focus of developing professionally a high level manpower to help the nation to grow.

Effort is made to reflect on the methods of disseminating knowledge to the students. NPE requires that all teachers in tertiary institutions to undergo training in methods and techniques of teaching (FRN, 2004:37). The kind of teaching going on in our universities has not accommodated or found it difficult to studying the students admitted for different courses, absence clear orientation to match students’ career aspiration with the courses students were admitted for. This probably arose as a result of non-awareness of such or undermining such methodology as to helping them to classify those students with their career aspirations. The available research reports show that teaching as a profession is held in low esteem (Jubril, 2013). The crop of academics found in tertiary institutions took up the job of teaching mathematics simply there was no alternative as at the time they were searching for one. Most recruited were not originally interested in the profession hence they might not think of being professional. Those that had interest were not having the opportunity to get the job even when they have requisite qualifications. The people left with the decisions of who are to do the actual teaching are left in the hands of non-professionals. In other words, the fundamental problem of teachers and teaching in Nigeria is that it is now the profession of last resort, that quality cannot be found or sustained, where only those who have no other choice join the teaching profession.

Efforts to raise the quality of teachers through in-service training are half-hearted and even when successful amount to a waste as the trained teachers are likely to migrate to better non-teaching jobs at the first opportunity. For example, according to the Education Roadmap (2009), in Polytechnics and Colleges of Education only 44% of the required teachers were available around the same period and the shortfall of required teachers in the universities was 39%. In addition, over 60% of the teachers in universities were junior academic staff whose proportion should not exceed 45%, thereby indicating a shortage of senior and more
experienced lecturers. Similarly, over 40% of lecturers in the polytechnics did not possess the Master's degree, which is the minimum qualification for teaching at that level.

In addition, according to the Nigerian Education Sector diagnosis- a Platform for Re-engineering the Education Sector (2007), 94% of professors in the Nigerian University system are not professionally qualified teachers. Also, 32% of all lecturers in Nigerian Universities had no teaching qualifications. According to Nigerian Education Sector Diagnosis (2007), in 2000, the NCCE found that 56.5% of basic education teachers it sampled taught all subjects but their specializations were 8.2% English, 7.8% French, 3.6% Mathematics and 1.1% Primary Science, so it is obvious that the sciences are short-changed. In 2008, the National Commission for Colleges of Education commissioned a survey of the condition of service of primary and secondary school teachers nationwide. The result of survey was summarized as the condition under which they serve the nation requires using tremendous improvement in order to make their working environment a place that has the capacity to provide and enhance greater confidence, motivation, commitment and appropriate task performance facilities to ensure an acceptable quality of teaching and learning (Jubril, 2013). The findings indicate that teachers at any level have very low public recognition and they do not have respectable and acceptable office accommodation. Teachers appear not to have access to instructional materials or ICT equipment for their work. They also appear not to have much support for professional development and training. Therefore, University education will only contribute to national development of high level relevant manpower training through teaching activities that had content and pedagogical orientations, the atmosphere that is inviting and encouraging the ethics of professionalism, professional development of the present university staff among others.

University Research in the Developing Human Resources

Most research and development projects are examples of a project, or one-shot, production system i.e. on family health, HIV, economic growth, appreciating human life and governance (Babalola, 2011). Babalola (2011) notes that research and development received the lowest attention with an allocation of 1.2% of the total loan received in 1990 from World Bank support for Nigerian higher education. In attempt to have or conduct quality research to develop human resources to facilitate the development of the nation, the higher education requires serious funding. Unfortunately, social benefits of university research have been entirely ignored by the proponents of the rate of return (Jubril, 2013). The present time is a world of knowledge economy, a society where a strong system for research and generation of knowledge is of increasing importance. The well-developed teacher education and university system are necessary to generate new knowledge and also to engage in scholarly scientific and commerce with other nations. Knowledge can be generated and stored through private means as in commercial investments (World Bank, 2002, 2009). The basic research and fundamental knowledge construction require an environment where new findings are widely shared and are available for testing and refinement within an open forum as provided by a university environment.

Nevertheless, open research can be located in national laboratories, government agencies, and private sector research institutes, but universities are the best location for such open research (Jubril, 2013). This is suggested because of interpersonal research practice and the way of topic selection, partnering (national and international) through interdisciplinary
engagements, peer review system, presentation (in seminars and classroom teaching) as well as publication of scholarly findings. In order to achieve quality research in developing human resources, there is need to design teacher education programme to produce highly motivated, conscientious and efficient personnel to handle the higher education aspect of teacher education to achieve such development (Amoo & Onuka, 2011). There is need to encourage quality research by training university teachers to achieve further spirits of enquiry and creativity. To provide personnel at teacher education level with intellectual and professional background adequate for their assignment and make them adaptable to ever changing situations. These personnel must have requisite content and professional knowledge capable of developing needed personnel to help the nation. It is when these are put in place, the facilitation of development of human and knowledge economy can be ensured.

**University Education and the Development of Professionals**

The tertiary education sector is composed of all universities; colleges of education and technology and other institutes of post-secondary education (Amoo & Onuka 2011, Jubril 2013). In some countries, Odeyemi (2004) noted that the difference between universities and other tertiary institutions is the fact that research takes place in universities. In such countries accordingly, universities have research culture in which it is assumed that most lecturers will engage in research. It also may also include all research institutes, experimental campuses and schools operating under the direct control of, or administered by, or associated with, the higher education establishments. Higher Education is any of the various types of education given in postsecondary institutions of learning and usually affording, at the end of a course of study, a named degree, diploma, or certificate of higher studies (FME, 2009). Higher educational institutions include not only universities and colleges, but also various professional schools that provide preparation in such fields as law, theology, medicine, business, music, and art. Higher education also includes teacher-training schools, junior colleges, and institutes of technology (FRN, 2004). The basic entrance requirement for most higher-educational institutions is the completion of secondary education, and the usual entrance age is about 18 years in advanced countries (College University, 2010, Higher education, 2010).

Higher education in Nigeria according to FRN is synonymous with tertiary education. It is the education given to Nigerian citizen after secondary education in universities, colleges of education, polytechnics, monotechnics including those institutions offering correspondence courses (FRN, 2004). In the NPE, it is stated that ‘the teaching and research functions of higher educational institutions have an important role to play in national development particularly in the development of high level manpower’ (FRN, 2004). Furthermore, universities are one of the best means for developing national consciousness. In Nigeria, higher education aims at the acquisition, development and inculcation of the proper value orientation for the survival of the individual and society. The development of the intellectual capabilities of individuals to understand and appreciate their environments; the acquisition of both physical and intellectual skills which will enable individuals to develop into useful members of the community; and the acquisition of an objective view of the local and external environments (FRN, 2004). The NPE represents the document on which the operations of sound educational practice in Nigeria rest. Teacher Education plays
the critical roles of infusing in the individual knowledge; skills, competences and these have spillover effects on the development of the society (Onyenwe (2009).

For education to effectively do this, quality teachers must be utilized as they are crucial in the social-economic transformation of the nation. The rationale for the investment in education stems from the fact that the development of human capital which only teacher education can provide is the key determinant of the socioeconomic growth of the nation, one then wonders which other parameter Nigeria needs to achieve this other than unfettered access to quality education and at the same time funding the researches in higher education. Confirming this, Onyenwe (2009) adds that the quality and strength of staff are indices of successes and failure of any organization and in education in particular, the quality of teachers is crucial to effectiveness and efficiency. As a matter of fact the quality of education can be determined from the quality of teacher education programme as it is the products of this system (teachers) that interpret and implement policies. It is based on these obvious facts that the philosophy of teacher education in Nigeria is anchored on five value objectives. FRN (2004:39) specifies the objectives of teacher education to include to produce highly motivated, conscientious, and efficient classroom teachers for all levels of our educational system; encourage further the spirit of enquiry and creativity in teachers. To help teachers to fit into social life of the community and the society at large and enhance their commitment to national goals; provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situations; enhance teachers’ commitment to the teaching profession. These objectives underlie the calibre of teachers Nigeria wants to drive its education system given to crucial role of teachers in education-led development. The questions are how many researchers have been funded to check the levels of achievement the stated objectives? Except only for academic exercises, some of which most reports are never used to improve the system. And to ensure that the desired quality is produced the FRN (2004:40) states that Teacher education shall continue to take cognizance of changes in methodology and the curriculum. Teachers shall be regularly exposed to innovations in their profession.

The above clearly shows that apart from ensuring that pre-service teacher education programmes produce quality, conscientious and committed teachers, effort will be put in place to ensure that they are kept abreast with innovations in teaching and developments in their subject area. As for the university would be teachers in any faculty should as matter of professionalism have at least a two year professional teaching qualification. Even at that, the Federal Government does not rest in its oars as it is not oblivious of the harlotans that parade as teachers in the country’s education system as it goes ahead in FRN (2004) clearly states that since no education system may rise above the quality of its teachers, teachers’ education shall continue to be given major emphasis in all educational planning and development. The above decision stems from the fact that national development is predicated on the quality and strength of teachers that operate the education system. Consequently, the curriculum of teacher education was designed to reflect these needs and expectation of effective and efficient teachers for the Nigerian education system, but these have not catered for teachers teaching at the university except those professionals spread at faculties and institutes of education in our universities.

The National University Commission regulates all that go on in the university education system. The researches into this area of higher education to verify the challenges
of infrastructures, adequate professional personnel and academics ratio vis-à-vis students are minimal. The other challenges are in the areas of accreditation of courses and the whole system of teacher preparation. The list of some areas where the author feels the challenges can be overcome as suggested in this paper are that there should be researches into the rate of teachers produced to cater for teacher education at lower and higher education. There should be studies validating the truth about infrastructures and professional personnel in the university sector. If there are reports on the inadequacy of infrastructures and personnel, the ways to mend the inadequacies should be devised. Why are higher institutions understaffed? This area too needs collaborative research and all listed areas can be achieved, if university institutions are funded to do the research. In order to develop and meet international standards there is need to research and implement such in Higher Institution teaching and research for development. The next section describes the challenges and the role of research in tertiary institutions.

**Challenges and the Role of Research in Tertiary Institutions**

The concept and goals of higher education, as perceived by the Government of Federal Republic of Nigeria and the people are provided in the NPE (FRN, 2004:36). Higher education is designed to embrace all forms of education given to the individual after secondary education or its equivalent from the 6-year primary school to the end of the three-year junior secondary school at the formal level. In the non-formal, it includes basic functional literacy and post-literacy programmes planned for children, youths and adults out of school (FRN, 2004). After identifying its ultimate goal to be the eradication of illiteracy within shortest possible time the approaches to its implementation are described (FME, 2009). Achieving quality of basic education according to Federal Government is the responsibility of all and sundry from the Federal Government to the Non-Governmental Organizations and the media down to individuals. According to the NPE, access to tertiary education institutions is fairly open though their quality varies unduly between private and public. With this enthusiasm, certain indicators, of more of promising note, to increase growth are reported.

While spelling out overall strategies, some major constraints according to (FME, 2009, Odeyemi, 2004, Amoo & Onuka, 2011) are, poor teacher preparation; inadequacy of relevant material guides; lack of reliable education data for planning; poor funding; and non-implementation of research reports. As mentioned earlier, the need of low-income countries for higher education and research should no longer be questioned. The question is how to realise our objectives in various university courses fields? In order to provide answers, several issues need to be addressed, such as how to balance investments across various levels of the education system, and how to balance investments in increased access versus those in improved quality. Differentiating higher education institutions: professional development centres academic research universities, colleges, etc. The role of research in universities as opposed to research institutes needs to be defined and scarce resources have to be optimized.

Some challenges facing university teachers presently in Nigeria include (but not limited to) inadequate personnel to handle some newly introduced courses in the primary and secondary education levels, inadequate professors to handle newly introduced courses at Master and PhD levels, inadequate funding of research works for development (Odeyemi, 2004, Babalola, 2011, Amoo & Onuka, 2011), inadequate personnel to handle research needs
of the nation and the quality of non-professional university teachers (Jubril, 2013). Teacher education is subsumed in higher education as could be found in NPE (FRN, 2004). Numerous studies have found in recent years that significant areas must be addressed if teacher education is to meet the goals identified in the NPE (FME, 2009). These areas include recruitment, admissions and graduation requirements which are found to be inadequate for any would be university lecturers. The following areas were identified to be inadequate for achievement of university teaching and development of professional university teachers. Professional and Content knowledge in university teaching courses except those of education and allied institutes. No skill development in the application of ICT and modern media teaching. Universities have inadequate infrastructure, lecture rooms are overcrowded, and there is insufficient students’ supports in the areas of scholarship, medical, housing and counselling services (FME, 2009). In order to help solve these problems of professional teachers in the university system in Nigeria, research in higher education will go a long way to device solution, thereby development of right personnel for university education job. This paper calls and suggests more funding for research in higher education for national development.

**Transformation Research in Fluid Dynamics to Meet National Needs**

NPE is the umbrella policy formulation body in Nigeria. FRN (2004) recognises the pivotal role of quality teachers in the provision of quality education at all levels, it means that efforts must be geared towards achieving quality expected by implementing the policy statement about university education. The policy further explains that ‘teacher education shall continue to be emphasised in all educational planning and development’. Since no education may rise above the quality of its teachers, policy development and implementation to achieve such statements are important. Likewise in the statement of (Odeyemi, 2004: 31) that no nation can develop above its mathematics education and that no field of human endeavour is safe from the onslaught of mathematics. Mathematics as a rapidly developing research field is continuously undergoing changes with new fields arising, changes of emphasis, and so on. At present, there is strong interaction between different branches, an increasing interest in applications, and the development of experimental approach among others. To what extent should this evolution be reflected in the teaching of the courses at undergraduate level? Many students meet some areas of mathematics and other courses before they gain admission to university and the approaches they have met in school may well be quite different from those that are common in universities. Mathematics majors, for example, have to meet more formal approach to calculus and analysis for example. What are the best ways to effect this change of approach? Pedagogy of course is the answer. This is the best way to accomplish the students’ transitions to university. The pedagogical and content knowledge combined as teacher of university courses will go a long way to help develop all students at university for the achievement of development of our nation.

The research helping to ameliorate these aspects to help meet the needs of nation is a joint responsibility of academics across all disciplines in the university. There are some collaborative areas of research that the FRN and other developing nations should fund so as to meet National needs one of such areas is the fluid dynamics. The science of fluid dynamics describes the motion of liquids and gases and their interaction with solid bodies. It is a broad, interdisciplinary field that touches almost every aspect of our daily lives, and it is
central to science and engineering. Fluid dynamics impacts defence, homeland security, transportation, manufacturing, medicine, biology, energy and the environment. Predicting the flow of blood in the human body, the behaviour of microfluidic devices, the aerodynamic performance of airplanes, cars, and ships, the cooling of electronic components, or the hazards of weather and climate, all require a detailed understanding of fluid dynamics, and therefore substantial research.

Fluid dynamics is one of the most challenging and exciting fields of scientific activity simply because of the complexity of the subject and the breadth of the applications. The quest for deeper understanding has inspired numerous advances in applied mathematics, computational physics, and experimental techniques. Fluid dynamics is exciting and fruitful today in part because newly available diagnostic methods for experiments and parallel computers for simulations and analysis allow researchers to probe the full complexity of fluid dynamics in all its rich detail. The outcomes from this future research will have enormous impact. For instance, they will lead to improved predictions of strong winds and environmental landfall and strength by understanding the mechanisms that govern their formation, growth, and interaction with the global weather system. They will speed the development of fusion power by helping to understand and control the instabilities that currently limit the energy densities that are achieved. They will lead to more efficient vehicles, by reducing the friction between the vehicle surface and the surrounding air. They will lead to a new generation of micro-scale devices that will include combustors to replace batteries, advanced flow control devices to cool electronic systems, and labs-on-a-chip to manipulate and interrogate DNA. Already, the number of channels in micro-fluidic devices is growing at a rate faster than the exponential growth in electronic data storage density. Research in fluid dynamics (applied mathematics) is expected to have major impacts on important national needs. These include improvements in transportation and energy efficiency, prediction and mitigation of environmental problems, development of novel technologies based on microfluidics, improvements to security and defence, and major contributions to health. Finally, fluid dynamics research makes a large contribution to the training of future engineers and scientists. The next section describes the mechanisms to overcome the challenges in university teaching and research.

Mechanisms to Overcome the Challenges in University Teaching and Research

In order to overcome challenges facing university teaching in Nigeria, efforts should be made to attract competent people to university teaching with adequate incentives. Admission and graduation requirements are important, this should be reviewed to meet international standards. Impact evaluation research should be conducted to verify the university teaching and research needs. Exploring the issues raised in this text would assist to tailor the areas needed to facilitate the development of professionals. This would invariably raise a generation of Nigerians who can compete globally. In concrete terms, this entails broadening and deepening the scope of university education curriculum to ensure lifelong learning skills, a broad general education, a sound foundation in specific professional disciplines, and a broad spectrum foundation in education and pedagogy. Also a solid grasp of subject matter, methodology, and practical competence in managing teaching and learning (World Bank, 2009, FME, 2009, Osuji, 2009)
Developing the essential pedagogical behaviour skills, values and attitudes required of today’s university teachers’ love for learning, a caring disposition, versatility and creativity are necessary to realise the vision of NPE (FRN, 2004:36). In order to effect changes in the university teaching and research, the following challenges have to be readdressed and these according to Odeyemi, 2004 are: major pedagogical and curriculum changes that have taken place at pre-university level; the increasing difference between mathematics education and other courses regarding purposes, goals, teaching approaches and methods, rapid development of technology; and demands on universities to publicly accountable. Presently, there have been content changes in curriculum, with increased emphases in some universities on applications (fluid mechanics, dynamics, etc) and modelling of mathematics, and so on. But a general perception remains in some quarters that teaching of mathematics and related courses at the undergraduate level has not to date made sufficient effort deal with the backgrounds and needs of present day students. There is often perceived to be discontinuity between mathematics education at secondary schools and mathematics education in universities.

Certainly the levels of ambition and demand placed on students are increased at tertiary level. There is not the same attention paid to learning theories in the delivery of university courses as there is in teaching of subjects at lower levels. University teaching methods tend to be more conservative. Often teachers have joint responsibility for research and teaching. Teachers at university mathematics courses have not been trained to, (except those with backgrounds in bachelor and postgraduate diploma in education) and do not often consider educational, didactic or pedagogical issues beyond determination of the syllabus; few have been provided with incentives or encouragement to seek out the results of mathematics education (Odeyemi, 2004). Since the climate of today is that of academic staff that have greater responsibility to determine the success or failure of students, the role of instructions of lectures and staff accountability should be reconsidered. Research and teaching on mathematics at university level has to be encouraged because of the importance it has in different university careers. The next section is about recommendations around this discussion.

Recommendations

From the foregoing ICT integration into university education was recommended to cater for the analysis of studies. Funding of research into different aspects of university training education; monitoring and evaluation of existing university education models and practices. Additionally dissemination and diffusion approaches of university research reports issues, impact studies of university development programmes on quality teaching, research and development. Examine both current and future states of the teaching and learning mathematics at university level. Development of special training of existing university teachers without requisite teaching and professional qualifications. Research in fluid dynamics and the outcome of these should include improvements in transportation and energy efficiency, prediction and mitigation of environmental problems. Development of novel technologies based on micro fluidics, improvements to security and defence, and major contributions to health. Fluid dynamics research is necessary and important in order to make a large contribution to the training of future mathematicians, engineers and other scientists. Finally, the future collaborations among international institutions and academics for achievement of university teaching, research and development.
Conclusion

This paper examined the tertiary institutions ways to achieve NPE goals through teaching, research and development. It included university in providing quality teaching, research and development in developing human resources to facilitate the development of the nation. It discussed the challenges and the role of research in higher education in support for teaching in university education programmes. The paper argued that content and pedagogical knowledge combined could help develop human resources for the development of a nation. It discussed the goals of higher educational institutions and identified teaching, research and development as pertinent issues needed to be addressed to achieve the roles of tertiary education. Finally, fluid dynamics research makes a large contribution to the training of future engineers and scientists with this presentation; we can ensure university aspect of tertiary institutions for teaching, research and development.

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Abstract
In Less Developed Countries (LDCs), most graduates from higher institutions of learning are absorbed in the informal sector and/or micro and small enterprises. Knowledge development through training, research and experiential learning may lead to creating or discovering new knowledge/technology or creating new value, by applying knowledge/technology to societal or business challenges. While the Small Manufacturing Enterprises (SMEs) do not have the capacity to develop knowledge through Research and Development (R&D), it is not clear how universities and institutions of higher learning should help bridge this gap. There is need to develop strategies that enhance acquisition and development of technologies among SMEs in LDCs that in turn makes them competitive in the global market. This paper explores the five (I) Importation, Imitation, Improvement, Innovation and invention in technology acquisition and development by SMEs and the role played by institutions of higher learning in Kenya. The paper establishes significant relationships and concludes that for Kenya and other LDCs to become knowledge based economies, SMEs have to be looped in through empowerment and capacity building, roles universities and institutions of higher learning should brace themselves to undertake. For the SMEs to be innovative and technologically savvy, the five (I) model would come in handy.

Key words: Technological Development, Importation, Imitation, Improvement, Innovation and Invention.

Introduction
Youths’ unemployment continues to be a challenge in the world. According to the United Nations (2012) 75.8 million youths globally were unemployed as at 2012. Statistics indicate that the problem is experienced in both developed and developing countries. In Spain, youths’ unemployment stood at 51.45%, 46.6% in Greece, 30.7% in Portugal and 22% in the UK (Economist, 2011). In Africa, youths’ unemployment stood at 26.6% in 2010, Middle East 24.0% and South East Europe 22.6% (ILO, 2011). In Kenya, overall unemployment stood at 12.6% with urban unemployment rate 19.9%, higher than rural unemployment that was 9.8% (ILO, 2008). Refuge has been sort in the informal sector and in Small and Micro Enterprise (SME) sector. According to the 2003 Economic Survey by the Government of Kenya, employment within the SMEs sector increased from 4.2 million in 2004 to 5.1 million in 2006; with the informal sector accounting for 70.4% of total

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employment opportunities. In 2005, the informal sector accounted for 72.8% of total employment opportunities. This percentage rose to 74.3% in 2006 and 76.5% in 2008 (GoK Economic Survey, 2008). The ability of youths to engage in productive activities has both social and economic consequences for an economy. This underscores the importance of Higher education preparing their graduates for self employment in the informal and SME sector.

**Problem Statement**

In its vision 2030 blueprint Kenya aims to transform into a newly industrialized, middle class income country that will provide high quality life to all her citizens in a safe and secure environment by the year 2030. To achieve this, generation and management of a knowledge based economy and the contribution of inventions and technologies has been recognized as vital. The Universities, Research Institutions and other institutions of higher learning are expected to encourage research, innovation and contribute to community service among other objectives (Kenya, 2012). That the main employer in Kenya has emerged to be the informal and the SME sector, graduates need to be prepared specifically for this market. While research institutions, Universities and other institutions of higher learning continue to conduct research, create and disseminate new and innovative technologies, their impact does not seem to subdue the grim statistics of unemployment. The technology developed, innovations created and documented do not seem to percolate and reach the “critical masses” that need to adopt it and change their lot. This paper presents findings of a study designed to look at the model adopted by the SME sector in technological development that would enhance the growth of the enterprises and competitive advantage in a liberalized global market.

**Purpose of the Paper**

This paper explores the extent to which the five (5I) model (Importation, Imitation, Improvement, Innovation and Invention) is employed in technological development among SMEs in Kenya and the role higher education plays to influence it and SMEs growth. The specific objectives were to investigate the extent to which the five (1) s are employed by SMEs in technology acquisition and development and the relationship between enterprise growth and the five (1) s. It also investigated the extent to which the level of education affects the adoption of the five (1) s.

**Literature Review and Conceptual Framework**

This section presents brief literature on the youths’ unemployment status, their role in economic development and the role of the university and higher education in general in preparing them for self employment. It reviews literature on the Constructivists Learning Environment, the 5I and the small and micro enterprise development and incubation concepts that would facilitate inculcation of entrepreneurial skills and foster technological development once micro enterprises are started by the young entrepreneurs.

**Youth, Unemployment, Economic Development and the role of Higher Education**

ILO (2007) indicates that 400 million new jobs would be needed to absorb today’s youths. Unfortunately, labor markets in many countries are unable to accommodate the
expanding pool of skilled young school, college and university graduates. In Kenya, youths (aged between 18-35 years) account for more than 30% of the total population with only 41% employed and about 12,824,624 economically inactive (KNBS, 2010). This situation forces young people into the informal and small and micro enterprise sector in self employment. Horn (2006) observes that school leavers and graduates of institutions of higher education are forced to be more enterprising create their own job opportunities, thus enterprising mindsets need to be inculcated that favor formation of employers not employees. Entrepreneurs are people who are able to take risks, break new ground and play an innovative role in the economy, thereby effectively addressing unemployment by revitalizing the economy and creating jobs for themselves and for others (Horn, 2006). The education system and higher education in particular have to play a significant role in developing entrepreneurial skills and shaping attitudes towards entrepreneurship (Horn, 2006; Mare, 1996; Shay and Wood, 2004).

Higher education institutions are urged to provide quality teaching in order to enhance employment skills (Hénard, 2008). Furthermore, there exists a broad consensus as to the nature of the pressures on higher education throughout the world to become more entrepreneurial or enterprising (Gibb & Hannon, 2006). Consequently, it has become imperative on higher education decision makers and takers alike to embed entrepreneurship education in their pedagogies. Volery and Mueller (2006) emphasize the importance of encouraging and fostering entrepreneurship. Several business schools, institutions and universities have set up initiatives to create awareness about entrepreneurship and to train prospective entrepreneurs. In this paper, the institutions of higher education are urged to create a Constructivists Learning Environment (CLE), establish Small and Micro Enterprise Development and Incubation Centres (SMEDIC) that will foster Technology Adoption Facilitation and seek to employ the 5-I (Importation, Imitation, Improvement, Innovation and Invention) model for technology acquisition and development.

Constructivists Learning Environment

Constructivism is a theory of learning and an approach to education which lays emphasis on the methods that people use to create a meaning of the world through a series of individual constructs (Glaserfeld, 1996). The constructivism focus on social nature of cognition, gives learners the opportunity for concrete, contextualise meaningful experiences through which they can search for patterns, raise their own questions and construct their own models; facilitate a community of learners to engage in activity, discourse and reflection and encourage students to take on ownership of the ideas and move to pursue autonomy, mutual reciprocity of social relations and empowerment to pursue the goals (Bruner, 1986). The International Society for Technology in Education (ISTE) (2007), says learning should provide educators with a blue print for designing educational and technological experiences to equip students to thrive in the modern, connected world. The categories of skills emphasized include creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving and decision making, digital citizenship and technology operations and concepts (ISTE, 2007). When undergraduates and graduates undertake projects, several constructivists learning activities may include experimentation, research on topics and presentations, field activities or trips, films or role play as well as classroom discussions. In a University and other institutions of higher education, the constructivists learning environment would be conceptualized as in figure 1.
Figure 1: Constructivist learner transformation process

Source: Ng’ang’a et al 2012.

Constructivism learning envisages that, the learning activities are anchored in teaching methods that emphasize interactive and experiential learning that addresses the needs and goals of the society and the labor market with emphasis to the sector that absorbs the critical mass.

The five I (5I) Model in Technological Development

Firms in developing countries have to compete not only with suppliers in advanced economies, but also among themselves. Competitiveness generally refers to the comparative ability of a nation or company to bring products or services to the market. This depends on technology employed which may be more comparatively expensive for Small Manufacturing Enterprises that is unable to accumulate capital for enterprise development. Infrastructure and technology are a challenge for SMEs in LDCs who are hard put to accumulate capital hence can do little on their own to support infrastructure and technology development. Infrastructure offers supportive structure for the growth of other sectors raises growth of enterprises and reduces income inequity (Lopez, 2004). However LDCs have not fully succeeded in creating a direct connection between infrastructure development, technology acquisition, adoption and development and thus the growth of individual SMEs. In these circumstances, the innovativeness of Small Manufacturing Enterprises is influenced to a large extent by the technology they import in the form of equipment, efforts made to adopt and adapt the machinery, efforts to imitate the functioning of the machinery and replicating
them, improvements made on such imitations and innovations arising there from, leading eventually to the ability to come up with a completely new-invent. This is represented through the 5Is model (Importation, Imitation, Improvement, Innovation and Invention).

**Technology Importation**

A technology importation is the most important sources of knowledge acquisition by enterprises in developing countries. Technology importation may be in the form of capital goods. Imports of goods that embody foreign technology can raise a country’s output in two ways. Firstly, use of more advanced foreign technology directly increases domestic output. Secondly, reverse engineering of these goods should positively affect domestic imitation and innovation. Spillovers from imports of high technology goods from developed countries to domestic imitation and innovation in both developed and developing countries allow gradual technological development on the part of the developing country. Technology acquisition through external sources does not confer competitive advantages on all firms automatically and equally. Firm-specific technology absorption and development capabilities are crucial in determining performance-enhancing effects of technology acquisition and improving international competitiveness (Lall 1992; Bell and Pavitt 1997; Mowery and Oxley 1997). Most developed and developing countries used foreign technology at the beginning. They imported technology and with time, imitated it.

With continuous research and development that they instituted in their firms; they improved the technology and later became innovative. The entire process has been recommended for any developing nation which wants to develop technologically (Chambua, 1996). International technology diffusion is therefore an important condition for economic growth. This approach, to technological development in LDCs needs to be anchored in national policies. The growing technological diversification of companies makes successful integration of new external knowledge into the innovation process increasingly important. Such successful integration fosters further innovation. The factors that also explain the accelerating trend of using external sources of knowledge include, among other things, technological convergence, declining costs to acquire external R&D inputs, and shortening product cycle times (Narula, 2003).

**Technology Imitation**

Technology imitation is like a free transfer of part of the innovator’s technology to non-innovators who will simply copy what has been made. Successful imitation allows for the diffusion of technology embodied in a product, as imitators’ do reverse-engineering of that good. Imitation, like innovation, facilitates learning. Entrepreneurs gradually acquire the skills, initially on how to use the technology, then how to repair and maintain and finally how to replicate. In particular, successful imitation by a firm increases that firm's insight into how goods are engineered and improved upon. So, imitation not only makes a firm better at future imitation, but also improves its chances of successfully improving, innovating and finally inventing the next quality level on its own. Bell and Pavitt (1992, 1995) notes that acquiring new technology is not simply a matter of purchasing new machinery or product designs but that learning how to use and adapt technologies to local circumstances and imitating existing products and processes takes considerable effort. Ulhoi (2012) distinguishes four types of imitative strategies namely; Replica (Legal through links obtained from the pioneer or illegal
through copying); Mimicry (often produced through reverse engineering where the imitative products resembles closely the original or at least reproduces some key elements of the original); Analogue (either functional or structural and; Emulation (creative imitation where the follower tries to equal or suppose the pioneer product or process).

Technology Improvement

From the imitation stage, comes the improvement stage. At this stage, the imported technology is adapted – localization process which makes technology suitable to firm’s environment and improved. Xu et al (1997) opines that this strategy is what has actually propelled China, Korea, India and Japan to greater heights of technology advancement. A variety of approaches and theories have been employed over time to enhance technological development through improvement. Advocates for total quality management (TQM) and Just-in-Time (JIT) systems, often emphasize the importance of continual gradual process improvement (Ebrahimpour and Cullen, 1993). Manufacturing excellence is often based on a foundation of overlapping practices, such as employee involvement, preventive maintenance, supplier relationships, and attention to quality and advanced manufacturing technology (Raffaela and Giancha, 2000). Continuous improvements make a firm more competitive and adaptive to the dynamic market expectations.

Technology Innovation

From improvement stage, follows the innovation stage. It is also at times called generation stage. The critical event here is the innovation of products and processes which at the time are not in use in the target market. Innovation means introduction, establishment, institution, commencement, novelty, departure from the old, and introduction of new and improved methods and things into an existing market or new market. It involves the use or development of an addition, extension, simplification or adapting something for some useful and specific purpose for a target consumer. According to Schumpeter (1934), entrepreneurship is a creative activity. An entrepreneur is basically an Innovator who introduces something new into the economy. Accordingly, innovation is the commercialization of all combinations based upon the application of new materials and components, introduction of new processes, opening of new markets and the organization of new organizational forms. Wagner (2001), recommends that the development of productive capacities, including policies to promote technological learning and innovation, need to be put in place that will in turn promote sustained economic growth and poverty reduction in the LDCs.

Technological Invention

An invention is a novel composition, product, tool or process. An invention may be derived from a pre-existing model or idea, or it could be independently conceived, in which case it may be a radical breakthrough. Invention is the most important product of scientific knowledge. Invention, often involves a leap into the unknown, where trial and error, the unexpected or even chance can have a substantial influence on the outcome. The high risk of invention can act as a deterrent to many organizations and individuals, particularly when rewards cannot be clearly anticipated (Cohen and Klepper, 1996). The accumulation of creativity, knowledge, skills and experience is a vital prerequisite for any nation or region to
become a major source of invention, innovation and new technology. This process of accumulation requires time, since the talents and intangibles needed may not be widely known, are usually difficult to specify, or may not be marketed at all (Taehyun and John, 2010). The key challenge for SMEs is how to best exploit and transform the promising technologies into new products and processes (Zahra and Covin, 1993) rather than be inventive. SMEs have neither the exposure, skills resources nor organizational capacity to engage in efforts that would lead to invention such as Research and Development (R&D), which is only gradually being adopted by some manufacturing firms in LDCs but mostly left to research institutions and Universities.

Small and Micro Enterprise Development and Incubation Center (SMEDIC)

According to Bridges (2005) technology adoption is a process that progresses through a series of steps that include creating awareness where potential users learn enough about the technology and its benefits and decide whether to investigate further. The second step is assessment where potential users evaluate the usefulness and usability of the technology and the ease or difficult of adopting it. This is followed by acceptance at which point the potential users decide to acquire and use the technology or not to adopt it. After acquiring, the users develop skills and knowledge required to use the technology effectively. The final step is usage when users take up, apply and demonstrate appropriate and effective use of the technology that benefits the individual, the enterprise, the house hold, the society and the Nation. This is the process Institutions of Higher Education are expected to facilitate in a constructivists learning environment (CLE). Effective technology and skills acquisition is based on multifaceted interaction between internal education, research and development and the Enterprise Accelerator (incubator for student entrepreneurs), processes (Laine & Lähdeniemi 2003), and constant interaction with customers and other external actors. True industrial research and development projects are offered to students as platforms for learning. The lecturers/facilitators have opportunities to work in projects as experts and as mentors for the student entrepreneurs. Projects are seen as an important tool for the continuous personal development for teachers.

Effective implementation includes the integration of the innovation chain where research, development and application are connected to each other (Laine 2004). In open innovation different channels for innovation creation and commercialization are considered equal (Chessbrough 2003). Innovation created at incubation process may be commercialized by regional firms or a firm created by a student (Laine 2006) and the student is expected to carry on with the line of the project in real life work situation and also use skills developed in an innovative way in different situations. A typical technology adoption facilitation model in an institution of higher education would work as illustrated in figure 2.
The Technology Adoption Facilitation model (TAFaM) in a Constructivist Learning Environment (CLE) and managed via a small and micro enterprise development and incubation center (SMEDIC) in an institution of higher learning will play a pivotal role not only in creating and disseminating technologies but also in anchoring and overseeing technology adoption, transfer and diffusion by SMEs. The role of higher education in technological development by SMES based on the concepts on constructivists learning environment, technology adoption and facilitation in small and micro enterprise development and incubation centers in institutions of higher education and their effect on SMEs 5-Is and enterprise growth is schematically shown in figure 3.

Figure 2: Technology adoption and facilitation model in a SMEDIC.
Figure 3: Higher Education, Constructivist Learning Environment, Business Incubation Centre and the Small Enterprise Growth.

Research Methodology

Data for this paper were obtained by a combination of survey and case study approaches. Triangulation was employed in data collection instruments, administrators and analysis to facilitate collaboration and cross checking of data for accuracy and validation. Denzin (1987c) as quoted in Patton (1990:555) observes that by combining multiple observers, theories, methods and data sources, researchers can hope to overcome the intrinsic bias that comes from single – methods, single-observer and single-theory studies. The target population was Jua Kali firms owner/managers in the Municipalities of Eldoret, Kisumu, Nakuru, Nairobi and Nyeri that actually fabricate (manufacture) capital equipment (Products that are used for further processing of goods in other enterprises) through various innovative strategies. A multistage sampling strategy was employed. The sampling frame could not be established, since the Jua Kali Enterprises who engage in this type of activities are licensed in the municipalities as workshops. It is only on literally going to them; one establishes the nature of their activities and whether or not they qualify to be included in the sampling frame. These activities are observed in all towns, municipalities and urban centres in Kenya.

The sampling procedure employed in this study included cluster sampling based on the geographic location of the town and municipality, stratified sampling where enterprises were segregated by the nature of operations they undertake focusing mainly on those that
produce artifacts that are bought and used by other enterprises as tools/equipment for manufacturing other products for use by consumers. An example is the enterprises that fabricate welding machines or make egg incubators. Simple random sampling was used in selecting the towns/municipalities to be included in the study and Snow balling sampling in selecting target enterprises in each municipality where one SME owner would lead and enumerator to the next enterprise who engage in activities of interest to the study. Data was obtained from 137 SME owner/managers, coded and indices developed for the five (i)s. Linear and multivariate regression analysis was used in testing the relationships between each of the five (i)s and SME growth as well as their combined effect. Case study narratives and photographs are also used to illustrate findings and performance of exemplary respondents with their approval.

**Study Findings**

Findings on the SME owner/managers bio data, descriptive statistics for are the SME growth and technology development variables are presented as follows.

**SME Owner/Managers Bio Data**

The respondents were either owners 61(44.5%) or employees 76(65.5%) who also work and manage the enterprise with the higher proportion 118(86.1%) being male. Most 81(59.1%) of the Owner/Mangers are middle aged (36-45 years) with a significant 54 (39.4%) being youths aged between 15 and 35 years. The mean age is 34.3 years, standard deviation 0.60 with the majority 104(75.9%) being married. On the level of education, most 63(46.0%) of the owner/managers have attained secondary education, 22(16.1%) primary education but most importantly, a significant 45(32.4%) have college/university education. Asked where they acquired the skills they use in their enterprises, 69(50.3%) indicate they either learnt on the job 41(29.9%) or got artisan training 28(20.4%) while 68 (48.6%) were in institutions of higher education that include institutes of technology 34(24.8%), Polytechnics 16(11.7%) and universities 18(13.1%).

**Enterprise Growth and the five (i) s in SMEs Technological Development**

Descriptive statistics of all the variables, enterprise growth; technology importation; imitation; improvement; innovation and invention show low performance in the sector with a mean index lying below 0.32 on a 0-1 continuum as shown in figure 4.
Enterprise growth and the five (i)s in SMEs Technological development

This shows that the SMEs are not doing well in all fronts of technology development, as well as enterprise growth. This position is further shown in figure 5, after all enterprises were grouped according to the measure and score of variable and it can be seen they are almost all position in the predominant low performance category.

![Figure 5: SMEs grouped according to performance in growth and mode of technology development](image)

The data shows that the sector is performing poorly in terms of enterprise growth and very little exist to support technology development thus preparing to build competitive advantage. A multivariate regression analysis shows that a significant combined effect of the 5Is on the enterprise growth (R=0.349, R²=0.122) at the 95% confidence level as shown in figure 6.

<table>
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</tr>
<tr>
<td>Invention of Technology Index</td>
<td>-.059</td>
<td>.354</td>
<td>-.157</td>
<td>-.166</td>
</tr>
<tr>
<td>Importation of technology Index</td>
<td>.141</td>
<td>.106</td>
<td>.158</td>
<td>1.335</td>
</tr>
<tr>
<td>Imitation of technology Index</td>
<td>.048</td>
<td>.064</td>
<td>.122</td>
<td>.747</td>
</tr>
</tbody>
</table>

Figure 6: Multivariate regression analysis coefficients of the 5Is on enterprise growth.

While the effect of the 5Is on technology development and hence enterprise growth is significant, it is however low with only 12.2% of a unit change in enterprise growth being
attributed to the combined effect of the 5Is. A possible regression model is suggested in the form of:

\[ y = 0.112 + 0.136x_1 - 0.082x_2 - 0.059x_3 + 0.141x_4 + 0.048x_5 + 0.027 \]

Where

\[ Y = \text{Dependent variable (Enterprise growth index)} \]

\[ X = \text{Independent variables;} \]

\[ X_1 = \text{Imitation of technology Index} \]

\[ X_2 = \text{Importation of technology Index} \]

\[ X_3 = \text{Innovation of Technology Index} \]

\[ X_4 = \text{Improvement of duplicated technology Index} \]

\[ X_5 = \text{Invention of Technology Index} \]

\[ \varepsilon = \text{Error term} \]

**Challenges Hindering SMEs Competitiveness and Innovativeness**

Asked to indicate the challenges they encounter that hinder the SMEs competitiveness and innovation, most of the owner/managers said the main challenges include harsh conditions 43(31.4%), lack of customers 40(29.2%) and expensive raw materials 38(27.7%). The other challenges that need to be addressed are as in figure 7.

<table>
<thead>
<tr>
<th>Challenges hindering SMEs competitiveness and innovation</th>
<th>Freq</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh conditions including weather vagaries</td>
<td>43</td>
<td>31.4</td>
</tr>
<tr>
<td>Few customers for the products</td>
<td>43</td>
<td>31.4</td>
</tr>
<tr>
<td>Some raw materials being purchased are expensive</td>
<td>40</td>
<td>29.2</td>
</tr>
<tr>
<td>Copying by other firms lower number of customers</td>
<td>38</td>
<td>27.7</td>
</tr>
<tr>
<td>Products are inferior to imported ones</td>
<td>31</td>
<td>22.6</td>
</tr>
<tr>
<td>High competition especially from imported products</td>
<td>31</td>
<td>22.6</td>
</tr>
<tr>
<td>Inadequate skills to innovate</td>
<td>27</td>
<td>19.7</td>
</tr>
<tr>
<td>Inadequate raw materials that are locally available</td>
<td>26</td>
<td>19.0</td>
</tr>
<tr>
<td>Little government support on the Jua kali sector</td>
<td>26</td>
<td>19.0</td>
</tr>
<tr>
<td>Inadequate capital for expansion due to high interest on loans</td>
<td>24</td>
<td>17.5</td>
</tr>
<tr>
<td>Lack of advanced machinery</td>
<td>23</td>
<td>16.8</td>
</tr>
<tr>
<td>Erratic power supply(black outs) interfere with innovation and competitiveness</td>
<td>23</td>
<td>16.8</td>
</tr>
<tr>
<td>High cost of renting the premises</td>
<td>20</td>
<td>14.6</td>
</tr>
<tr>
<td>Limited workspace and also inadequate land for expansion</td>
<td>17</td>
<td>12.4</td>
</tr>
<tr>
<td>Security is not guaranteed</td>
<td>17</td>
<td>12.4</td>
</tr>
<tr>
<td>The unclean environment under which jua kali products are made discourage customers from purchasing the products</td>
<td>16</td>
<td>11.7</td>
</tr>
<tr>
<td>Frequent machinery breakdown</td>
<td>14</td>
<td>10.2</td>
</tr>
<tr>
<td>High government taxes</td>
<td>12</td>
<td>8.8</td>
</tr>
<tr>
<td>High cost of transportation</td>
<td>12</td>
<td>8.8</td>
</tr>
<tr>
<td>Poor infrastructure</td>
<td>12</td>
<td>8.8</td>
</tr>
<tr>
<td>Poor medication interfere with being innovative</td>
<td>11</td>
<td>8.0</td>
</tr>
<tr>
<td>Blisters from trainees discourage some of them from continuing with the same job</td>
<td>3</td>
<td>2.2</td>
</tr>
</tbody>
</table>

This suggests that SMEs experience a wide range of problem that need to be addressed by policy makers and other support institutions.
Cases that Illustrate these General Findings
Two cases are used in this paper to show the situation in the SME sector in Kenya.

Case one: Production of Incubators
A family owned enterprise in Nyeri Municipality has turned out to be of sustainable business benefit for poultry farmers in the County and beyond. This is a brain child of a former self-employed mechanical engineer who ventured into manufacturing incubators early 2010. The entrepreneur has never been formally employed since leaving college. He studied how an incubator imported from South Africa worked. Out of inability to raise enough money to buy one, he used his mechanical engineering skills and imitated the imported one using scrap metal from his garage and other locally available materials to make small sized incubator as shown in figure 8. The success rate of his incubator proved higher than the imported one. Two years later he designed an improved incubator that could use solar energy and car batteries as alternative sources of energy at a competitive price of Ksh.38,000 for an incubator holding 50 eggs. The success rate kept on improving to 160 -170 for every 200 eggs. He ventured into using the incubators to hatch quail eggs that occupied 1/3 times less of space.

Figure 8: Imitation and improvement of imported incubators
The major challenge is to meet the demand for the incubators. This type of technology that has been a result of research and experiential learning can be improved if institutions of higher learning assist such entrepreneurs by building their capacity in operational management. This will go a long way in helping such brilliant entrepreneurs to be more innovative and inventive.

Case Two: Technology Adoption in the Automobile Industry
With absolutely no formal education a Nyeri blacksmith has since 1974 been using technology to innovate and invent new products to solve problems observed in his neighborhood. Inspired by the memories of the colonial struggle for independence, he uses scrap metal from imported machines such as tractors, motorcycles, cars, power saw and
generators. Out of these, he has modified and improved the old scrap metal into working machines such as a dummy helicopter, a car, an engine bicycle, electric wood plane, cross bows some of which are shown in figure 9.

![Figure 9: Imitation of automobile technology in production of farm machinery](image)

The entrepreneur innovates through observation and creativity. He has since trained over 2,000 artisans through apprenticeship and are now working as entrepreneurs in Nyeri and its environs. He indicates that his greatest challenge is access to capital and proper record keeping.

**Discussion of Findings**

Small Manufacturing Enterprises owner/managers are youthful with a mean age of 34.3 years. With secondary level education (46.0%) of whom 32.4% have higher education exposure at college and university levels and married (75.9%) although only 9.5% are female. These background characteristics of SME owner managers are as observed in Kenya and other developing countries (Ng’ang’a, 2011; Bowen et al, 2009; Kimuyu, 2001; Pogue, 2008 and Bala Subrahmanya et al, 2003 among others). It reinforces the need to refocus education systems towards the reality that the majority of the graduating youths will end up in the informal and micro and small enterprises sectors. As noted earlier, 76.5% of all employment in Kenya is in the informal sector hence the importance of higher education to prepare graduates for self employment in these sectors.

On the SME growth, the findings indicate very poor performance putting them in very precarious position in terms of competition in a liberalized global market. Despite the high proportion of SMEs owner/managers with exposure to higher education training, the SMEs are not able to build competitive advantage hence the demand for quality education that enhances entrepreneurial skills necessary for self employment (Kowalkiewicz, 2007; Gibb & Hannon, 2006; Volerly and Muller, 2006). This will best be done, if the institutions of higher learning create constructivists learning environment and in-build business incubations that facilitate technology adoption in their programmes, methods and activities. Technology
acquisition has been established to be mainly through skill training and importation of technology embodied in equipment and machinery. It has been shown that there is a link between general imports and technological diffusion (Keller, 2001; Wang and Xu, 2000). Although a significant amount of imitation, improvement and innovation has been shown to take place in the SME sector, it is however minimal but necessary. Technological imitation has been shown to improve existing technologies in firms and some countries such as Japan, Korea, Taiwan, and China, Malaysia, Indonesia and Thailand have been known to formulate policies that support technology imitation (Corolan et al, 1998). Amisden (2011) observes that imitation has been a key dimension of technology diffusion and is still a basic input in the catching up in developing countries. Often, imitation in LDCs precede improvement of technology and innovation.

Although this study has shown low levels of technology improvement and innovation, it is still important in bringing market innovative products ahead of competitors (Robinson and Min, 2002). Invention, on the other hand may be a tall order to the SMEs given the limited infrastructure and in capacity to sustain research and development programmes as shown by the minimal existence in the study. On the whole, it has been noted that the 5-I model exists and influences significantly the growth of SMEs. The applications of the findings of this study are however limited to least developed countries and the firms (Micro and Small) that engage in the production of capital equipment. The circumstances and the condition in which they operate is significantly different from similar firms in developing and developed countries that have fairly well developed infrastructure, access modern technology and support both in capital for investment and also for R&D.

Conclusion and Way forward
According to UNESCO (2006) Education for Sustainable Development (ESD) is a dynamic concept that should encompass a new vision of education that seeks to empower people of all ages to assume responsibility for creating an enjoyable and sustainable future. Since in LDCs means of livelihood, as shown in this paper are mainly in the informal and SME sector, higher education graduates should be prepared to enter, survive and grow in this sector. Technological innovation and development is crucial for SME competitiveness. Thus, institutions of higher learning should play a role in facilitating technology adoption. It is recommended that institutions of higher education should re-engineer their programmes to enhance preparation of graduates for self employment in the MSE sector, create Constructivists Learning Environment (CLE) and manage Small and Micro Enterprise Development Incubation Centres (SMEDIC) engaging participation and input from all stakeholders. Policies should be formulated to facilitate technology development through the five (I)s (Importation, Imitation, Improvement, Innovation and Invention) model.

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Co-relational Study of Achievement in Mathematics and Students’ Academic Performance at the Federal College of Forestry: 
Appah, O.R.; Ojo, M.O. Adegbite, R.A. & Adeniyi, O.S; Oluwatayo, G. K.

Abstract
Mathematics serves as a strong reinforcement to most of the courses being offered at the Federal College of Forestry Ibadan, Oyo state, Nigeria. The knowledge gained from mathematics is expected to be applied to the courses offered in the College of Forestry. This study investigated the relationship between the students’ score in mathematics and their academic performance. Three research questions guided the study. The sample consisted of students from three departments. Pearson Product Moment Correlation formula and linear regression were used in analysing the questions posed. The results showed that significant relationships exist between students’ achievement score in mathematics and students’ academic performance.

Keywords: Mathematics Achievement, Academic Performance,

Introduction
Mathematics is a subject that is indispensable for any scientific and technological achievement, thereby making knowledge of mathematics relevant for everyday living. Mathematics is the language of science and central intellectual discipline of the technological society (Odeyemi 1995; Ale & Adetula 2010). Hence, for students to perform well in science and technology courses, they need to perceive mathematics as part of scientific endeavour. Also, according to Akinsola and Ogunleye (2003), students could only find the study of mathematics more appealing when they perceive the subject as interesting, useful and relevant to their daily living. Thus, mathematics has been employed in all aspects of engineering, industrial works, agriculture, communication, transportation, space travels and indeed in practically every aspect of modern living. Proficiency in mathematics is of fundamental importance to the study of courses such as Agriculture technology, Forestry Technology, Wood and Paper Technology, which involve mostly science subjects; not only at the advanced stages, but also in the understanding of the elementary principles of these science subjects. Hence, mathematics, which is an essential tool for advancement of science and technology, should be taken seriously.

Many studies have been carried out on the relationship between mathematics and science. Kurumeh, Igyu and Mohammed (2013) carried out a study on achievement in mathematics as a correlate of achievement in sciences in secondary schools. The research showed that there is significant relationship between mathematics and each one of Chemistry, Physics and Biology. The importance of Mathematics to science requires that Mathematics should be regarded as basic to teaching and learning of science, (Eraikhuemen & Oteza, 2008; Olayemi, 2009). In addition, different Mathematics topics such as vectors,
calculus, logarithms and arithmetic are applied in solving scientific problems (Onwuka, Onwuka & Iweka, 2010). Oyedeji (2011) equally stated that students need basic knowledge of Mathematics to understand major topics that are in science courses such as Biology, Chemistry and Physics. Moreover, these science subjects are the major courses offered at year one National Diploma level in Federal College of Forestry. In addition, Helfgott (2006) reported that important branches of chemistry depend on mathematics knowledge. Apart from science subjects like Physics, Chemistry and Biology that require Mathematics knowledge, the planting of roots and tree crops which involves knowing the dimension and spacing needed for adequate propagation of the crops can only be calculated mathematically. In fishery and poultry farming, application of Mathematics is equally important. Measuring the quantity of chemicals needed to induce the hatching of the eggs of fingerlings and the number of fingerlings each pond will contain depends solely on the mathematical knowledge of the individual. Hence, it can be categorically stated that the study of Mathematics enhances the knowledge of the students of Federal College of Forestry.

According to Fletcher (1998), students’ prior achievement contributes significantly to the prediction accuracy of the model that predicts student academics’ performance. Prior knowledge and achievement (such as GPA) are significant predictors of student academic performance and they support learning of new information, appreciably (Dochy, 1992; Tobias, 1994, Thompson & Zamboanga 2003). This emphasizes the critical role of mathematics as it lays the foundation for the students to excel in their achievement in various courses, which is reflected in the cumulative grade point average. It should be noted that if prior knowledge is insufficient or even incorrect, learning and understanding of new information will be hindered (Dochy, Segers, & Buehl, 1999). Luguterah and Apam (2013) found out that entry requirement and students’ department significantly determine the academic performance of students in Polytechnics. Thus, students’ performance in Mathematics is, and should be, an important factor that should build their CGPA. As such, any course in Mathematics that is offered by the student should be supportive enough in making the student score high in the tests and examinations. However, the student, whose background in Mathematics is weak, stands the risk of poor understanding of many scientific concepts. For instance, most experiments in physics involve the drawing of graphs and vector quantities which require a great deal of Mathematics. This implies that any student, who aspires to perform well in Physics, must have a good mastery of Mathematics.

Apart from the importance of mathematics to science courses offered at the Federal College of Forestry, it is widely accepted to have originated from the practical problem of counting and recording numbers, such as the quest by ancient farmers to count their harvest and herd, to measure land and to device a calendar that indicates the proper time to plant crops. (Burton, 2003 as cited by Ugbechie, 2009). This invariably explains why Mathematics is compulsory in Federal College of Forestry in the first year of study at both Ordinary National diploma and Higher National diploma levels. For instance, Logic and Algebra is a compulsory course for all year one National Diploma (ND1) students irrespective of their departments. Also, at Higher National Diploma (HND) level, business mathematics is a core course for the entire 300 level students. Meanwhile, wood and paper technology student of the college offer other mathematics courses such as Algebra and elementary trigonometry as well as calculus. Consequently, this current study is designed to assess whether relationship that exists between the students’ performance in mathematics and academic achievement of
the students at Federal College of Forestry Ibadan, Oyo state. It will also ascertain if the students of Wood and Paper Technology perform better than other students in other departments.

Statement of the Problem

Quite a number of courses offered at the Federal College of Forestry require mathematics competence. However, students are required to take mathematics courses seriously. Despite the importance of mathematics in the career of students of this college, the students are exposed to only logic and algebra in just one semester out of four semesters. However, different mathematics topics such as vectors, calculus, logarithms and arithmetic that are applied to solve scientific problems are not offered by the students of Federal College of Forestry. One might wonder, as a scientist, if the absence of these all-important aspects of Mathematics in technology or engineering oriented courses would not lead to poor performance of students in the courses offered in the school. Therefore, this study is carried out with a view to finding whether the students’ performance in mathematics is associated to students’ academic performance in Federal College of Forestry, Ibadan, Oyo State, Nigeria.

The following research questions were asked to guide the study.

1. Is there any relationship between mathematics achievement score and academic performance of Forestry students?
2. What is the contribution of mathematics achievement score to academic performance of Forestry students?
3. What is the contribution of mathematics achievement score to the academic performance of each of the three departments used for this study?

Method

This study adopted an ex-post facto research design. The target population for this study comprises all the year one National Diploma (ND1) students of Federal College of Forestry, Ibadan Oyo state of South West Nigeria. From the population, the academic session of 2011/2012 was used for this study. Purposively, 210 ND1 students made up of 105 Agricultural Technology students, 44 Wood and paper Technology students and 61 Forestry Technology students were used for this study. The choice of ND1 students is that Mathematics is compulsory for all ND1 students of the institution. The data for this study consist of the college approved cumulative grade point average CGPA result that reflects the overall academic performance for the session for each student and each student’s performance in Mathematics. The data of these students were collected from the records of the department. The research questions were answered using, Pearson’s product moment correlation and simple regression analysis at 5% significance level.

Results

Research Question One:
Is there any relationship between mathematics achievement score and academic performance of Forestry students?
The two variables were highly correlated significantly, \( \sigma_{(210)} = 0.798, p < 0.05 \). The table further shows positive, direct and significant relationship between mathematics achievement score and academic performance of the students.
Research Question Two
What is the contribution of mathematics achievement score to academic performance of Forestry students?

Table 1
Summary of Simple Regression Analysis for Forestry students’ mathematics achievement to their academic performance (N = 210)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>0.585</td>
<td>0.123</td>
<td></td>
</tr>
<tr>
<td>Achievement Score</td>
<td>0.662</td>
<td>0.035</td>
<td>0.798</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.637</td>
<td></td>
</tr>
<tr>
<td>$R^2$ Adjusted</td>
<td></td>
<td>0.635</td>
<td></td>
</tr>
<tr>
<td>$F$</td>
<td></td>
<td>364.658*</td>
<td></td>
</tr>
</tbody>
</table>

*$p < 0.05$ (Significant at 0.05)

Achievement score in mathematics significantly predicted their academic performance, $R^2 = 0.637$, $R^2$ Adjusted = 0.635, $\beta = 0.798$, $F_{(1, 209)} = 364.658$, $p < 0.05$. The result shows there was significant linear relationship between the score in mathematics achievement and grade in academic performance. In addition, the students’ achievement mathematics accounted for 63.5% variation in their academic performance.

Research Question Three
What is the contribution of mathematics achievement score to academic performance of each of the three departments used for this study?

Table 3
Summary of Simple Regression Analysis for departmental students’ mathematics achievement to their academic performance

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Forestry Technology</th>
<th>Wood and Paper Technology</th>
<th>Agricultural Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>$R^2$</td>
<td>0.616</td>
<td>0.639</td>
<td>0.638</td>
</tr>
<tr>
<td>$R^2$ Adjusted</td>
<td>0.612</td>
<td>0.631</td>
<td>0.632</td>
</tr>
<tr>
<td>df</td>
<td>104</td>
<td>43</td>
<td>60</td>
</tr>
<tr>
<td>$F$</td>
<td>164.997*</td>
<td>74.490*</td>
<td>104.101*</td>
</tr>
<tr>
<td>$\beta$</td>
<td>0.785</td>
<td>0.800</td>
<td>0.799</td>
</tr>
</tbody>
</table>

*$p < 0.05$ (Significant at 0.05)

The result indicated that the three departments had significant relationship between mathematics achievement score and academic performance. The result also shows that the three departments recorded significant contribution of mathematics achievement to the students’ academic performance but the department of agricultural technology has the highest by recording 63.2% variation in the students’ performance. The department of Forestry Technology shows the least predictive validity by contributing 61.2% of the students’ variation in their academic performance because of mathematics achievement of the students.

Discussion and Conclusion
The study shows that there is a significant relationship between the students’ achievement in mathematics and their academic performance. This shows that mathematics oriented courses are good predictors of the success rate of students. A student’s academic output could be said to depend on the academic ability of the student in mathematics. This result indicates that students who had high achievement in SSCE and JAMB Mathematics may perform excellently in the school of forestry as students. The study established
significant composite contribution of students’ achievement in mathematics to their academic performance. Implicit in this finding is the fact that, students’ achievement in mathematics, as strong as it is could not account for 100-percent variation in the performance of the students. It means that other variables are responsible for the total students’ performance. The basis for the significant prediction could stem from the fact that the courses mostly offered in the College of Forestry, Ibadan, are mostly mathematics oriented. The finding therefore corroborates the earlier position by Thompson and Zamboanga (2003) who reported that prior knowledge and prior achievement (such as GPA) are significant predictors of students’ academic performance. Furthermore, the study revealed that the students’ mathematics achievement and their performance differ in relation to their department. This might be attributable to different lecturers and curriculum characteristics. This position was affirmed by Luguterah and Apam (2013), who reported that students’ department is a predictor of students’ performance in polytechnics.

**Educational Implications**

The findings of this study have meaningful implications for higher institution, teachers and students. The attitude of most students need to be improved upon in order for them to commit more study time to studying mathematics, most especially in their early semesters in the higher institution. There is need for proper orientation of the students focusing on studying mathematics very well, in order to acquire the desired capacity and competence to perform well in their chosen courses of study. Based on the findings of the study, the following are suggested. The counselling unit of each higher institution should organise special orientation programmes for fresh students focusing on the importance of knowledge in mathematics in colleges of agriculture or technical related courses. The low achieving students in mathematics who made the admission list should be assisted by the school by organising supporting classes for them where they can undergo extra-tutorials in order to improve their mastery and meet up with the mathematical demands of the courses. The teachers should, if possible enforce the students in bringing relevant mathematics textbooks to the class, such that the students can work out the exercises at the back of each relevant chapter.

**Conclusion**

The findings of this study go beyond being an additional data for understanding educational theories, but as a part of research endeavour in higher institution education. The significance of this study is that it has further strengthened the fact that mathematics courses and knowledge are necessary to science and technology achievement in an institution like the college of forestry. Thus, considering the goals and objectives of the College of Forestry, the emphasis placed on the study of the courses is strengthened by moving towards science and technology, which mathematics is its bedrock. The College of Forestry students should be informed of the predictive power of mathematics in their academic performance in the school. If the students are properly oriented, they will be more zealous in learning mathematics and this will go a long way in achieving the dream of technological advancement of which Nigeria is yearning for. Consequently, mathematics as an essential tool for advancement of science and technology should be taken seriously at students’ preparatory levels.
References


Appraisal of the Availability and Utilization of Information and Communication Technology in the Higher Education System: Ogbuozobe, J. E. (PhD) & Okeke Emeka Paul

Abstract
The availability and functionality of Information and Communication Technology (ICT) provides a productive academic platform for both students and staff of institutions of higher learning. ICT use for educational purposes has enhanced teaching and learning through its dynamic, interactive and engaging academic course content. In application, it provides opportunities for individual instruction and group networking in actualizing educational and institutional goals. However, the extent of availability and utilization in the Nigerian educational system has been a subject of discourse among the academia, government and other stakeholders. This paper examines the availability and utilization of information and communication technology in the Nigerian higher education system and its implication for national development. The data for the study were mainly from secondary sources on ICT and national development through higher education. The findings of the study revealed that inadequate funding; insufficient skilled human resources, poor power supply, and inadequate infrastructure were the major constraints to the application and utilization of ICT in the Nigerian higher education system. It was recommended that a portion of the Tertiary Education Trust Fund (TETF) be directed towards ICT facility provision to enhance institutional capacity building anchored on ICT driven systems.

Keywords: Information and Communication Technology, Higher Education, Teaching, Research and Students.

Introduction
Information and Communication Technology (ICT) involves processing, analyzing and integration of information as well as maintenance and use of all forms of computer, communication network and mobile technologies to transmit information. It includes all media used to convey video, audio, multimedia, computer and network technologies (internet, intranet, campus area network, and mass area network, among others) (Iloanusi & Osuagwu, 2006). The availability and functionality of these communication and technology components provides a prolific academic platform for both students and staff of the institutions. ICT use for educational purposes has enhanced teaching and learning through its dynamic, interactive, flexible, and engaging content. It has provided real opportunities for individual instruction and group networking in actualizing educational and institutional goals. Besides, information and communication technology has been proved to have accelerated, enriched, and deepened skills among students in learning which have

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helped them to relate school experiences to work practices (Kwache, 2007). The pervasiveness of ICT has also brought about rapid technological, social, political, and economic transformation, which has eventuated in a network society organized around ICT (Yusuf, 2005).

Accordingly, the application of ICT makes institutions more efficient and productive, thereby engendering a variety of tools to enhance and facilitate teachers’ pedagogical activities. For instance, e-learning is becoming one of the most common means of using ICT to provide education to students both on and off campus by means of online teaching offered via web based systems (Yusuf, 2005; & Mutula, 2003). This technology, no doubt has become a veritable tool for acquisition of knowledge and skills for development all around the world. The penetration in all life activities and education in particular has made an unprecedented impact on quality and quantity of teaching, learning and research. This includes the dissemination of knowledge through the conventional institutions, open and distance learning programmes. The major thrust of ICT policy in Nigeria as premised on her vision statement, is to make Nigeria an Information Technology (IT) capable country in Africa, and a key player in the information society by the year 2015, using IT as the engine for sustainable development and global competitiveness.

On the other hand, Nigeria’s mission statement is to use IT for education, creation of wealth, poverty alleviation, job creation, and to increase global competitiveness. The policy relies on human capacity building as the major strategy for realizing its vision and mission (Isoun, 2003). Krubu and Osawaru (2011) observed that ICT in Nigeria is still at the groundwork phase. This is largely due to a number of factors (internet network failure, inadequate ICT skilled personnel, difficulty in ICT integration, inadequate software, cost of equipment etc.) that limit the infusion of ICT in the Nigerian higher education system. In effect the approach to ICT adoption at the higher education level in Nigeria is centered only on instructional applications and ignores research applications and community services, which has grossly affected the academic needs of both students and teachers. Rather than using ICT as a tool for data sets and as a means of learning new methods for disseminating knowledge produced in the academia, the major emphasis has been on instructional application, thus, leaving a number of the tertiary institutions in the old traditional method of information delivery and usage patterns in the education domain.

**Application and Utilization of Information and Communication Technology in Higher Education**

The application and utilization of information and communication technology in Nigeria’s higher education system has not met the international best practice standards. The application has remained on instructional purposes rather than being an interface for academic and non-academic functions. This gives a clear understanding why the emphasis at the basic and secondary education levels as stipulated by the Nigerian Education and Research and Development Council (NERDC) exclude research application of ICT. The primary responsibility of the teachers at these levels is defined exclusively in terms of teaching. However, at the higher education level, lecturers primarily engage in theoretical approaches to teaching rather than practical application and utilization of ICT components to enhance the skills if the students. It can be suggested that any approach to ICT adoption at the higher education level that stresses only instructional applications and ignores research
applications and utilization of ICT devices will be grossly inadequate in meeting the needs of both students and lecturers as observed in most of Nigerian tertiary institutions (Nwabueze & Ozioko, 2010).

Hence, the indispensability of ICT in education research cannot be overemphasized as it provides the basis for accessing various kinds of research information which would necessitate a link to libraries around the world and optimize the creativity of indigenous scientists through participation in national and international networks. It also provides an avenue for learning new methods for disseminating knowledge produced within the nations’ higher education system and using them for economic development (Nworgu, 2007). An example of ICT innovation is the automation of academic activities such that registration of students is now online and delivery of lectures, seminars, conferences and workshops through projectors. Electronically, lecture delivery and administration are supported via computer network and web-based technology (Akinyemi et al, 2007). This covers a wide range of systems, from students using e-mail to accessing course work on-line to analysis of research output. E–learning in this fold can be of different types depending on their application and utilization. These include; Web-supplemented, Web-dependent and mixed mode (OECD, 2005). Application and processes of e-learning include; web-based learning, computer-based learning, virtual classroom, video-conferencing and digital collaboration where contents are delivered via the internet, intranet/ extranet, audio/ or video tape, satellite TV, CD-Rom. This mode of learning and information sharing (e-learning) creates a self-centered approach to learning by relaxing time and space and enriches learning content as well enhances wider access to information resources.

When the potential of e-learning is fully harnessed, it could advance knowledge by expanding and widening access, improving the quality of education and reducing cost. When academic demands are huge, online learning can be crucial and possibly the only realistic means of increasing and widening access to tertiary education. Some developing countries like Nigeria have many young people craving for tertiary education with small size of academic workforce to meet the huge demand. In this case training new teachers would take much time and cost, but with e-learning many potential students will overcome admission bottlenecks (World Bank, 2007). Institutions worldwide now adopt Learning Management System (LSM) software developed for administration and teaching in tertiary education. The software enables the treatment of enrolment data electronically, offer electronic access to course materials and carry out assessments as well offering online interaction between faculty and students (OECD, 2005).

Apart from e-learning, other ICT infrastructures also aid effective teaching and learning in the traditional classroom setup. According to Anakwe, (2003), the availability of personal computers and its accessories enhances the output of teachers and students. He submitted that Computer Aided Instruction (CAI) software, which is also tutorial software is widely available to complement classroom work. This software sometimes has limited capabilities, but very useful in presentation of graphics that aid learning as well as interpretation and analysis of data through statistical ICT enabled packages. In a related manner, handheld devices like mobile note takers are available to aid learning in term of mobility. Interactive White Board is another infrastructure that allows the projection of images generated by computer onto a touch sensitive screen that is of the size of the traditional white board. It provides instant access to materials from variety of sources and
possibility of using pre-prepared lectures that move without apparent from visual to verbal and vice versa. Intranet on the other hand provides web-based collaboration among members of the same group. In education system, it aids collaboration among staff and students of the same department, faculty or institution (Obaniyi and Soroyewun, 2007). This serves as a repository of academic materials and knowledge available for use by members of the same academic group, which makes collaboration faster.

**The Imperatives of ICT on Higher Education in Nigeria**

For a country like Nigeria to meet her numerous aspirations, the nations’ tertiary education system through government intervention need to develop the culture that places high value on education and training. These training must be ICT based technology, akin to e-learning, which has great potential to supplement traditional learning. This is so because ICT enhanced learning provides prospects to discover high level cognitive activities such as creativity, independence, problem solving ideas and team work while providing lecturers/instructors with the means to take into consideration the needs of the learner, especially while using web-based technology. Sequel to this, the basis for premium emphasis on ICT based higher education is that Information and Communication Technology will facilitate the lecturers/instructors and students’ ability to manipulate and contribute information to learning, research and teaching with the aid of interactive books, journals, as they are made available via Internet (Oxfam Education Report, 2002). Secondly, the use of new multimedia technologies and Internet will improve the quality of teaching and learning related activities in all the nations’ Universities, Polytechnics and Colleges of Education and by extension, open avenues for knowledge sharing and integration of ideas among institutions in sub-Saharan Africa. It makes it possible for individuals to combine work and learning irrespective of their locations through e-learning, e-mail, face book, twitter and other multimedia facilities, thus enhancing easy accessibility to education. These as observed by Isoun (2003), have lifelong value to quality education and to all who seek knowledge irrespective of age, geographical location and time. With this evolution on ICT, higher education institutions will be able to provide a flexible and more open learning environment for students and teachers alike.

There are indications that increased enrollments at all levels of education (distance and conventional classroom) learning shall continue to grow, which calls for immediate technology support (Kwache, 2005). On academic Research, scientific research remains the core activity in the institutions of higher learning all around the world. This activity has been revolutionized by the possibilities offered by ICT from digitization of information to new recording, simulation and data processing possibilities. It also offers the resources, information and collaboration needed to solve fundamental scientific problems. This has resulted in finding solutions to challenges, such as accurate weather forecasting, building more energy efficient automobiles, designing life-saving drugs and lots more (Adedoyin and Akinnuwesi, 2006). ICT infrastructures have also provided researchers with high performance computer, software and high-speed networks which enable them to access more computational resources. This has resulted in the achievement of grand feats such as accurately modeling earth’s climate, design and simulates high-speed civic transport, improve detection of cancer and enhance the recovery of oil and gas from reservoirs through auto card software.
Information Technology (IT) has also provided researchers with enabling remote access to scientific instruments such as network electron microscope and radio telescope to control and share scientific resources among scientists. These have facilitated the acquisition of new skills which have been enhanced and transmitted through educational television programmes such as Project Fame West Africa, Who Want be a Millionaire and Dragon Net which have enlightened millions of Nigerians through questions that cut across all works of life ranging from religious, cultural, Educational, entrepreneurial to contemporary issues, thereby facilitating the acquisition of basic skills amongst populace www.mtnonline.net.

The Role of ICT in National Development

Improving the quality of education and training is a critical issue, particularly when used as an economic tool for social transformation. The application of ICT to education in this context would enrich the delivery, access to knowledge and improved curriculum which would produce rich learning outcomes compared to education without ICT. It will encourage critical thinking and offer unlimited means to achieving educational goals. The use of information and communication technology for imparting knowledge, research and administration has been proved to be faster, easier and with better outcome (Iloanusi and Osuagwu, 2006). The relevance and necessity of ICT on individual and national development is therefore very evident, as it improves people’s ability to shape their lives, strengthen their functioning in the society and contribution to their welfare (Ekeocha, 2008). Investing in human capital development, if well distributed and more importantly among the indigent students will build a strong base for capacity building which will facilitate social inclusion and help to manage resources equitably.

The use of the internet in human capital development has also proven to be the most valuable vehicle for accelerated information flow. According to Yusuf (2005), it is a network of computers that communicate with each other, often over telephone lines, e-mail, World Wide Web, etc. The potential of the internet lies in the provision of a global platform for information sharing among institutions and individuals. Information sharing creates awareness, ensures continuous use of products and services, provides feedback and support for institutional growth. The contention here is that any institution or government that has current and useful information is empowered to enhance productivity and good governance. Countries that have adopted and applied electronic services (ICT) in their educational system operations have witnessed dramatic improvement in their development efforts (Donald, 2006). For countries such as Singapore, United States, Canada, Japan and most European nations, ICT is a strong tool for sustainable development, increased productivity, administrative effectiveness and cost savings (Iloanusi and Osuagwu 2006). It is not surprising therefore that the application of ICT in education for capacity building is engendering much concern in many countries of the world.
Growth of the ICT Sector and its Impact on Higher Education in Nigeria

Investment in the ICT sector rose from $50 million in 1999 to about $11.50 billion in 2008 thereby opening more opportunities for the entrance of Internet Service Providers (ISP) which aided independent internet access to individual students and lecturers both in schools and at home (NCC, 2009). Also in a bid to move Nigeria beyond the digital divide to foster economic explosion of ICTs, the Nigerian Communications Commission (NCC) came up with, Wire Nigeria project (WiN) aimed at using ICTs to develop other sectors of the economy particularly Education. This opportunity for the use of ICTs in the development of other sectors has positioned Nigeria as the fastest growing mobile market in Africa till date, resulting to huge access to telecom facilities, empowerment of Nigerian citizens and as an economic stimulation to other sectors (NCC, 2009). Today some of the institutions of higher learning in Nigeria have wireless internet service coverage within their campuses, others have V Sat, which were provided to connect the institutions to the knowledge world (Akinyemi, et al 2007). In that regards, Universities in Nigeria have a critical role to play in stimulating national economic and social development and serve as leaders of innovation to which only access to technology and full participation in today's marketplace of ideas through the Internet can position them to achieve the prospect. ICT is therefore the essential mechanism to enhance the capacity of universities to provide quality training and conduct ground breaking research. Hence, higher education institutions in Nigeria need to step into action in tune with the growth of ICT to develop high-speed internet access to acquire and disseminate the right technology within the test of time.

Problems Militating against the Application and Utilization of ICT in Nigeria Universities

The digital divide between the advanced and developing countries like Nigeria is well established. Like most African countries, Nigeria as a nation is still slow in the use of ICT in almost all sectors of the nation’s life, particularly in the education sector, despite the huge investment and entrant of service providers recorded between 1999 to 2008 (Ibrahim, 2009). Accordingly, common challenges associated with the application and utilization of ICT in Nigerian Universities are discussed. Inadequate funding is the major problem confronting the application and utilization of ICT in Nigerian tertiary education. In as much as the funding of
the education sector in the country remains below 9% of the national budget, the budget for research, technology innovations and electronic mode of teaching/learning will suffer setback (Aboribo, 1999). However, much of the budget released for the education sector is cast on recurrent and overhead cost, leaving little or no fund for capital development such as ICT, Research and Development. In this situation no educational manager will be willing to invest the little fund available to them on e-learning projects.

Another serious factor is that in the academia, some faculty members and students are not willing to take the yielding (electronic) approach to teaching and learning. Rather, they stick to the old traditional method. For this reason, an OECD (2005) report stated that the motives behind the resistance to e-learning among these groups include the fact that e-learning development with its regularity might conflict to some extent with the professional culture of academic, based on autonomy and reward system attached to research activities. Another grave concern is about intellectual property rights and shared rights between faculty, institutions and technologies. Furthermore most institutions of higher learning in Nigeria lack computer literate teachers and ICT experts that would support and manage the Internet connectivity and the application of computing in the teaching/learning process. This is evidence in online registration and course/academic programme upload, which are often difficult to access. This as a matter of fact is as a result of non-inclusion of ICT programmes in teachers’ training curricula at the basic levels of training.

Institutions of higher learning in Nigeria are also short of adequate ICT infrastructure to effectively tap into the opportunities offered by the cyber world. Computers are available in most institutions, but they are not readily accessible to all students because of the small quantity available. In most of these institutions the basic software needed for practical works are also not available and where they are available, they are not accessible because of the low ratio. The use Computer Aided Instruction (CAI) tutorial software and other specialized software to support some areas of teaching, learning and research are also not common. Internet connectivity is available in most tertiary institutions in Nigeria with the aid of Internet Service Providers’ (ISP) expansion, but in most cases the bandwidth subscribed to which determine the speed of access is too small to support any meaningful academic activity during peak period. Some institutions have subscribed to Virtual Library sites whereby members can access electronic academic materials such as journals. Also, some institutions have CD-Rom collections on specialized fields, but the currency of the information on the CDs cannot be guaranteed as no effort is made to update them whereas, ICT infrastructures like multimedia projectors are available in Nigerian tertiary institutions to support teaching, learning and research, other infrastructures like Interactive White Boards and mobile devices are lacking.

The attitudes of various managements in and outside institutions towards the development of ICT related facilities, such as the procurement of computers and installation of internet is sometimes unhelpful. Some of the managers claim that provision of ICT enabled teaching and learning as well as internet facilities are not part of the institution’s budget. On the other hand, there are no aids or support by the government and multinationals as corporate social support. (Albiririni, 2006). The increasing power outage in the country is adversely affecting the Nigerian academic community and their output. The situation has greatly hindered the productivity and progress of researches being conducted by universities, academic groups and individuals. As the shortage affects scientific research that requires
technology input, so has it affected the gestation period of observation research in Biological and Agricultural sciences, which subjects some of the researchers to alternative power supply (generator). It will be difficult to embark on an extensive ICT project within the academic community without fixing the poor power situation in the country. Though, the average power supply differs from one city to another, but none can boast for eight hours power supply without an outage. The situation has subjected many universities to the use of generators which many cannot maintain.

Discussion
The study reveals that the availability and utilization of information and communication technology in the nation’s higher education system is low. This implies that the students and teachers as well as the administrative staff of the institutions of higher learning have limited access to ICT facilities. This is consistent with the observations of Krubu and Osawaru (2011) who noted that inadequate availability and utilization of ICT facilities in our schools are responsible for the nation’s poor innovative approach. Given these dilemma, there is no way the institutions of higher learning in Nigeria in this regards can advance as a base for national development, owing to the fact that most of the Institutions lack functional website, internet facilities, media teaching facilities and other ICT components that enhances teaching and learning. Even when these ICT facilities are available, the system will continue to suffer a slow-pace development if the problems of poor power supply, attitudes of some institutional Managers, inadequate ICT personnel, poor academic infrastructures and poor funding of the institutions are not addressed to enhance proper utilization and innovative ideas.

Conclusion
The use of Information and Communication Technology has changed the approach to teaching, learning and research, which have turned the world into a global village. The Nigerian higher educational system cannot afford to be left out in the crusade of using ICT to bring education to the door steps of the beneficiaries. This approach will ultimately make education widely available and accessible at reduced cost both in the urban and rural centres. Though there is a gradual increase in the application and utilization of ICT resources in the nations’ tertiary education system, but some man-made problems inhibit the rapid takeoff of this scientific approach that is readily available in our midst. Using ICT as an assessment criteria for the top 10 African regional universities webometrics 2011 ranking, no Nigerian universities made it to the top 20 (world universities ranking on the web (TopAfrica-wikipedia2011). The reason is that not many of the tertiary Institutions in Nigeria have a functional website. Secondly, only few tertiary institutions in the country have their academic staff strength and research output on the institutions’ website. Despite these factors that have beclouded the application and utilization of ICT in the nation’s ivory towers; there is hope that, if chunk of the Tertiary Education Trust Fund is directed towards ICT facility provisioning within a five year term, it will enhance institutional capacity building anchored on ICT driven system in the country.
Recommendations

The following recommendations were made as a way forward to improving the use of Information and Communication Technology in the higher education system, which will possibly engender national development through its operation. There is an urgent need for the government and its agencies to support ICT acquisition and utilization in the tertiary education to enhance staff development, research and development on learning and innovations. Infrastructural upgrade and funding of research work is very critical for national development through higher education, hence, the need for increased funding of the education sector. Institutions of higher learning should exploit alternative sources of funding for ICT infrastructure development; such as collaborations with private organizations for provision of infrastructure and manpower development among staff and students for research purposes. They could also embark on human capital outsourcing to industries and corporate organization to generate funds to enlarge their ICT proficiency base. Tertiary institutions in the country should be proactive to adopt and utilize open source software, which is available at no cost.

For the nation to grow through higher education there is the need for institutions of higher learning in Nigeria to recruit a wide range of staff to complement ICT academic staff, such as technologists, instructional designers and learning scientists. There should be collaboration among institutions, which will serve as spring board for knowledge sharing and as well improve the quality of academic curriculum and promote good practices. There should be a monitoring, inspection, and evaluation division in all the levels of education in the country to ensure that the ICT curricula are strictly adhered to and as well the monies allocated for such purposes are not diverted for other purposes. For any development to take place and be improved upon, the Nigeria government must address seriously the issues of the unreliable electricity power supply to create enabling environment for teachers and students to thrive. Above all, there should be an attitudinal reorientation of expected users of the ICT related facilities so that the academic community will be in a better position to adopt new ICT innovations such as new pedagogical methods, access to remote resources, collaboration between individuals/groups in the learning community, which will in turn bring about the development sought for. It is however, the belief of the researchers that if the above recommendations are given due consideration, it will go a long way to engender national development.

References


