INFORMATION AND COMMUNICATION TECHNOLOGY TRAINING NEEDS OF SECONDARY SCHOOL MATHEMATICS TEACHERS AS PERCEIVED BY EDUCATIONAL ADMINISTRATORS IN ENUGU STATE.

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Abstract
The purpose of this study was to ascertain the Information and Communication Technology training needs of secondary school mathematics teachers as perceived by educational administrators in Enugu state. Descriptive survey research design was adopted for the study. One research question and one hypothesis guided the study. Proportionate stratified random sampling technique was used to draw a sample of 465 respondents consisting of 155 and 310 educational administrators in rural and urban secondary schools respectively. Instrument used for data collection was an inventory titled Mathematics Teachers’ ICT Training Needs Inventory (MATICTTNI). It was validated by three research experts. Mean with standard deviation were used to answer the research question while z-test statistic was used to test the hypothesis at .05 level of significance. Major findings of the study revealed that ICT training needs of secondary school mathematics teachers in Enugu state include proficiency in; word processors, utility packages, presentation packages, computer spreadsheets, programming languages, web browsers, virtual reality applications, Wide Area Networks (WAN), Local Area Networks (LAN), system security applications, system profilers, scientific visualization application, computer-aided instruction, data base management systems, computer graphics, digital art softwares, info graphics, computer-aided design, information visualization application and software development applications. It was recommended among other things that educational administrators should foremost identify training needs of mathematics teachers in particular and entire staff generally.

Keywords: Information and Communication Technology, Training Needs, Secondary Education, Educational Administrators, Enugu State.
Introduction

A vital aspect of personnel management practice is staff training and development. Cater (2013) alleged that many heads of organizations erroneously think that they have nothing to gain from staff training and development programmes. This is because it costs some organizations so much to train and retrain their staff. However, Cater hinted that staff training and development benefits organizations maximally as it improves and enhances workers’ productivity and dedication. Cater therefore defined staff training and development as the process of developing qualities in human resources that will enable them to be more productive and thus contribute more to organizational goal attainment. Staff training and development vary in type and extent and according to the nature and skills of the jobs involved, as well as the experiences of the employees concerned.

Fame (2015) defined staff development as the process of increasing the knowledge, skills and capacity of the staff in the organization for promoting its economic, political, and social or any other desired growth. Fame contended that the best staff training and development programme for a secondary school is on the job training. Oshinebo (1992) in Udoh (2012) suggested five on-the-job training methods that may be very useful. They are;

1. Coaching, that is, the trainee is put under the guidance of an experienced employee who shows the trainee how to do the job;
2. Job rotation, that is, the trainee given several jobs in succession so as to gain experience on wide range of activities.
3. Temporary promotion, that is, an individual is promoted into his/her superiors position whilst the superior is absent, due to some reasons. This gives the individuals an idea and experience of a more senior position;
4. Assistant to, that is, a junior officer with good potentials may be appointed as assistant to another top officer in this way, the individual gains experience of how the organization is managed at the top.
5. Committees, that is, trainees might be included in the membership of committees to enable them to gain an understanding of inter-departmental relations.

On the objectives of staff training and development, Rex (2011) stated that training aims at equipping the workers with the necessary skills to enable them remain employed, to gain promotion and to have reasonable expectation of re-employment in the event of their being made redundant. Adeleke (2011) added that since staff training and development aim at increasing the productivity of employee by influencing their behavior, concerted efforts should be made to determine adequate training programmes designed and training evaluation administered. The first step in the training process is the determination of training needs. It involves the information or skill areas of an individual or group that requires further development in increasing the productivity of that individual or group. It should also be noted that the training or organization of members is typically a continuing activity, to the extent that even employees who have been with the organization for some time and who have undergone initial orientation and skills training need continuous training to improve their skills. After determining the training needs of the workers, the personnel manager now designs a training programme aimed at meeting those needs.

Training of the employee begins with the orientation programme. According to Amusan (2012) orientation is the process of informing new employees about what is expected of them in the job and helping them to cope with the stresses of transition. Orientation involves
introducing and guiding the new employees to the organization and the various units. It is important that new employees become familiar with the organizations policies, procedures and performance expectations. Staff training and development may involve refresher courses, sandwich or part time courses, full time sponsored courses, attendance of workshops, seminars and conferences that build capacity. Educational administrators play vital roles in staff training development starting from recommending staff that should be trained or staff that should benefit in any form of development to serving as resource persons in capacity building workshops, seminars and conferences. Some educational administrators are also consultants in various academic professional bodies that train secondary school staff, mathematics teachers inclusive. In this jet age of technological advancement, it is obvious that Information and Communication Technology has become indispensable in teaching and learning process.

In attempt to give the etymology of the phrase Information and Communication Technology (ICT), Grant (2015) stated that the phrase Information and Communication Technology has been used by academic researchers since the 1980s, and the abbreviation ICT became popular after it was used in a report to the UK government by Dennis Steveson in 1997, and in the revised National curriculum for England, Wales and Northern Ireland in 2000. But in 2012, the Royal society recommended that ICT should no longer be used in British schools as it has attracted too many negative connotations and with effect from 2014 the British National Curriculum uses the word computer which reflects the addition of computer programming into the curriculum. Variations of the phrase have spread worldwide, with the United Nation’s creating United Nations Information and Communication Technologies task force and an internal office of information and communications technology. Iguma (2011) held that Information and Communication Technology (ICT) is an extended term for Information Technology (IT) which stresses the role of unified communications and the integration of telecommunications (Telephone lines and wireless signals), computers as well as necessary enterprise software, middleware, storage, and audio-visual systems, which enable users to access, store, transmit, and manipulate information. According to Uji (2011), the term ICT is also referred to the convergence of audio-visual and telephone networks with computer networks through a single cabling or link system.

There are large economic incentives (huge cost savings due to elimination of the telephone network) to merge the telephone network with the computer network system using a single unified system of cabling, signal distribution and management. However, ICT has no universal definition as the concepts; methods and application involved in ICT are constantly evolving on an almost daily basis. To Plum (2015), the broadness of ICT covers any product that will store retrieve, manipulate, transmit or receive information electronically in a digital form, eg. Personal computers, digital television, email, robots. For clarity, zuppo provided an ICT hierarchy where all levels of the hierarchy contain some degree of commonality in that they are related to technologies that facilitate the transfer of electronically mediated communications. Samuelson gave another definition of ICT as systems or technologies for processing information in text, data image and voice form and extends to international telecommunication network.

Nneji (2010) in Adeleke (2011) described ICT as the use of scientific tools and techniques for developing, documenting and communicating information when needed especially as they concern solving problems or providing needed services in the various areas of human endeavor. Information and communication technology is also seen as a product of
information revolution. Thus, ICT is the application of science to information handling. It consists of the hardware, software, processing, transmission and presentation of information (voice, data, text images) as well as related services. In modern society, ICT is ever-present with over three billion people having access to the internet. With approximately 8 out of 10 internet users owning a smart phone, information and data are increasing by leaps and bounds, (Kuntu, 2013). This rapid growth, especially in developing countries, has led ICT to become a keystone of everyday life, in which life without some facet of technology renders most of clerical, work and routine task dysfunctional. According to Clerk (2015) authoritative data released in 2014, shows that internet use continues to grow steadily at 6.6% globally in 2014 (3.3% in developed countries, 8.7% in the developing world); the number of internet users in developing countries has doubled in five years (2009-2014), with two thirds of all people online now living in the developing world.

However, hurdles are still at large of the 4.3 billion people not yet using the internet, 90% live in developing countries. In the world’s 42 least connected countries (LCCs), which are home to 2.5 billion people, access to ICT remains largely out of reach, particularly for these countries with large rural populations, (Clerk, 2015). ICT has yet to penetrate the remote areas of some countries, with many developing countries dearth of any type of internet. This also includes the availability of cellular coverage, and other forms of electronic transmission of data. The increase in the aforementioned cellular data coverage, according to Clerk (2015), is that many users have multiple subscriptions, with global growth figures sometimes translating into little real improvement in the level of connectivity of those at the very bottom of the pyramid; as estimated 450 billion people worldwide live in places which are still out of reach of mobile cellular service. ICT continues to take a new form, with no technology set to usher in a new wave of ICT electronics and gadgets. ICT nearest editions into the modern electronic world include; smart watches, smart wristbands, smart phones and smart TVS.

With desktops soon becoming part of a bygone era, and laptops becoming the preferred method of computing, ICT continues to insinuate and alter itself in the ever changing globe. Information communication technologists play a role in facilitating accelerated pluralism in new social movements today. ICTs in the word of Lee, are tools for enabling social movement leaders and empowering them in promoting societal change. From the forgoings, secondary school mathematics teacher who wants to make positive impact must be ICT compliant. The problem with this is that the educational administrator who trains or organizes training for staff must identify the training needs. Consequently, if the mathematics teacher must be trained in ICT, the ICT training needs must be identified so that the training process will not be an effort in futility.

**Purpose of the Study**

The purpose of this study was to ascertain the Information and Communication Technology training needs of secondary school mathematics teachers as perceived by educational administrators in Enugu state.

**Research Question**

The following research question guided the study.

1. What are the Information and Communication Technology training needs of secondary school mathematics teachers as perceived by educational administrators in Enugu state?
Hypothesis
The following hypothesis was tested at .05 level of significance;

1. Educational administrators in urban and rural schools do not differ significantly in their ratings of ICT training needs of secondary school mathematics teachers in Enugu state.

Methodology
Descriptive survey research design was adopted for the study. The study was conducted in Enugu state. Proportionate stratified random sampling technique was used to draw a sample of 465 respondents consisting of 155 and 310 educational administrators in rural and urban secondary schools respectively. Instrument used for data collection was an inventory titled Mathematics Teachers’ ICT Training Needs Inventory (MATICTTNI). The inventory had 20 items. It was validated by three research experts. Using the Cronbach’s Alpha method, the inventory yielded an internal consistency reliability coefficient of .77. Mean with standard deviation were used to answer the research question while z-test statistic was used to test the hypothesis at .05 level of significance.

Results
Research Question 1
What are the Information and Communication Technology training needs of secondary school mathematics teachers as perceived by educational administrators in Enugu state?

Table 1: Mean with standard deviation for responses on research question 1

<table>
<thead>
<tr>
<th>Items</th>
<th>ICT training needs of mathematics teachers include proficiency in;</th>
<th>Urban</th>
<th>Rural</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Decision</td>
<td>Mean</td>
</tr>
<tr>
<td>1</td>
<td>Word processors</td>
<td>3.1</td>
<td>0.14</td>
<td>A</td>
</tr>
<tr>
<td>2</td>
<td>Utility packages</td>
<td>2.9</td>
<td>0.14</td>
<td>A</td>
</tr>
<tr>
<td>3</td>
<td>Presentation packages</td>
<td>3.2</td>
<td>0.22</td>
<td>A</td>
</tr>
<tr>
<td>4</td>
<td>Computer spreadsheets</td>
<td>3.3</td>
<td>0.12</td>
<td>A</td>
</tr>
<tr>
<td>5</td>
<td>Programming languages</td>
<td>3.1</td>
<td>0.11</td>
<td>A</td>
</tr>
<tr>
<td>6</td>
<td>Web browsers</td>
<td>2.7</td>
<td>0.17</td>
<td>A</td>
</tr>
<tr>
<td>7</td>
<td>Virtual reality applications</td>
<td>2.9</td>
<td>0.09</td>
<td>A</td>
</tr>
<tr>
<td>8</td>
<td>Wide Area Networks (WAN)</td>
<td>3.1</td>
<td>0.21</td>
<td>A</td>
</tr>
<tr>
<td>9</td>
<td>Local Area Networks (LAN)</td>
<td>2.7</td>
<td>0.13</td>
<td>A</td>
</tr>
<tr>
<td>10</td>
<td>System security applications</td>
<td>2.6</td>
<td>0.13</td>
<td>A</td>
</tr>
<tr>
<td>11</td>
<td>System profilers</td>
<td>3.2</td>
<td>0.14</td>
<td>A</td>
</tr>
<tr>
<td>12</td>
<td>Scientific visualization application</td>
<td>3.3</td>
<td>0.16</td>
<td>A</td>
</tr>
<tr>
<td>13</td>
<td>Computer-aided instruction</td>
<td>3.1</td>
<td>0.14</td>
<td>A</td>
</tr>
<tr>
<td>14</td>
<td>Data base management systems</td>
<td>2.7</td>
<td>0.11</td>
<td>A</td>
</tr>
<tr>
<td>15</td>
<td>Computer graphics</td>
<td>2.9</td>
<td>0.21</td>
<td>A</td>
</tr>
<tr>
<td>16</td>
<td>Digital art softwares</td>
<td>3.1</td>
<td>0.30</td>
<td>A</td>
</tr>
<tr>
<td>17</td>
<td>Info graphics</td>
<td>3.1</td>
<td>0.31</td>
<td>A</td>
</tr>
<tr>
<td>18</td>
<td>Computer-aided design</td>
<td>2.9</td>
<td>0.13</td>
<td>A</td>
</tr>
<tr>
<td>19</td>
<td>Information visualization application</td>
<td>3.2</td>
<td>0.42</td>
<td>A</td>
</tr>
<tr>
<td>20</td>
<td>Software development applications</td>
<td>3.3</td>
<td>0.20</td>
<td>A</td>
</tr>
<tr>
<td><strong>GRAND</strong></td>
<td><strong>3.0</strong></td>
<td><strong>0.18</strong></td>
<td><strong>A</strong></td>
<td><strong>3.0</strong></td>
</tr>
</tbody>
</table>

From table 1 the grand mean for responses of educational administrators in urban schools was 3.0 and that of rural was 3.0 similarly the overall grand mean was 3.0. This result indicates INFORMATION AND COMMUNICATION TECHNOLOGY TRAINING NEEDS OF SECONDARY SCHOOL...
that educational administrators in both urban and rural schools perceived that the Information and Communication Technology training needs of secondary school mathematics teachers in Enugu state include proficiency in word processors, utility packages, presentation packages, computer spreadsheets, programming languages, web browsers, virtual reality applications, Wide Area Networks (WAN), Local Area Networks (LAN), system security applications, system profilers, scientific visualization application, computer-aided instruction, data base management systems, computer graphics, digital art softwares, info graphics, computer-aided design, information visualization application and software development applications.

**Hypothesis 1**

Educational administrators in urban and rural schools do not differ significantly in their ratings of ICT training needs of secondary school mathematics teachers in Enugu state.

**Table 2: z-test analyses for hypothesis 1**

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>( \bar{x} )</th>
<th>SD</th>
<th>z-calculated</th>
<th>z-critical</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>155</td>
<td>3.0</td>
<td>0.18</td>
<td>0.35</td>
<td>1.96</td>
<td>Not Significant (Do not reject hypothesis)</td>
</tr>
<tr>
<td>Rural</td>
<td>310</td>
<td>3.0</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From table 5, \( z \)-calculated (0.35) is less than \( z \)-critical (1.96). Hence, at .05 significant level, the mean ratings of the two groups (urban and rural) differed significantly. Consequently, hypothesis one is not rejected as stated, indicating that educational administrators in urban and rural schools did not differ significantly in their ratings of ICT training needs of secondary school mathematics teachers in Enugu state.

**Summary of Findings**

Findings of this study can be summarized thus;

1. Educational administrators in both urban and rural schools perceived that the Information and Communication Technology training needs of secondary school mathematics teachers in Enugu state include proficiency in; word processors, utility packages, presentation packages, computer spreadsheets, programming languages, web browsers, virtual reality applications, Wide Area Networks (WAN), Local Area Networks (LAN), system security applications, system profilers, scientific visualization application, computer-aided instruction, data base management systems, computer graphics, digital art softwares, info graphics, computer-aided design, information visualization application and software development applications.

2. Educational administrators in urban and rural schools did not differ significantly in their ratings of ICT training needs of secondary school mathematics teachers in Enugu state.

**Discussion of Findings**

The finding of this study revealed that educational administrators in both urban and rural schools perceived that the Information and Communication Technology training needs of secondary school mathematics teachers in Enugu state include proficiency in; word processors, utility packages, presentation packages, computer spreadsheets, programming languages, web browsers, virtual reality applications, Wide Area Networks (WAN), Local
Area Networks (LAN), system security applications, system profilers, scientific visualization application, computer-aided instruction, data base management systems, computer graphics, digital art softwares, info graphics, computer-aided design, information visualization application and software development applications. Interestingly, the administrators in urban and rural schools did not differ significantly in their perceptions.

Zeph (2012) and Ohanusi (2012) found same in their separate studies. But Adeleke (2011) and Lee (2014) found the contrary. The importance of ICT in staff training cannot be over emphasized. Not only is ICT used to facilitate training in mathematics and indeed any field, ICT training itself is very important for secondary school mathematics teachers. This is because so many of these teachers were employed when emphasis on ICT literacy was not as high as it is today. Thus, greater percentage of the older staff in most secondary schools in Nigeria in general and Enugu state in particular depends on in-service and on-the-job training to acquire ICT literacy and competences. The findings made in this study have some serious educational implications for the government, educational administrators/managers, secondary school mathematics teachers and secondary school students. ICT will bring efficiency in the secondary school system consequently helping the government to achieve the laudable goals of secondary education. Hence, governments’ involvement and investment in educating the citizenry is worthwhile.

According to Nneji (2017) mathematics is an empirical activity, hence, mathematics learners are in position of constructing their own mathematical knowledge regardless of how different the methodology may be, mathematics teachers with the aid of ICT will be empowered to teach for understanding of mathematical concepts and procedures. The ‘why’ something works and not only ‘how’ should be emphasized. Mathematics teachers should bear in mind that it is often possible for learners to learn the ‘how’ (that is procedures) mechanically without understanding ‘why’ it works (that is conceptual knowledge). Procedures learnt this way are often forgotten easily. Conceptual and procedural understanding actually helps each other. Nneji added that conceptual knowledge is important for the development of procedural fluency. While fluent procedural knowledge, supports the development of further conceptual understanding. The findings of this study show that ICT skills can facilitate both conceptual and procedural understanding when properly utilized.

Conclusion

Based on the findings of this study, the following conclusion was reached:

1. ICT training needs of secondary school mathematics teachers in Enugu state include proficiency in; word processors, utility packages, presentation packages, computer spreadsheets, programming languages, web browsers, virtual reality applications, Wide Area Networks (WAN), Local Area Networks (LAN), system security applications, system profilers, scientific visualization application, computer-aided instruction, data base management systems, computer graphics, digital art softwares, info graphics, computer-aided design, information visualization application and software development applications.

Recommendations

Consequent upon the findings made in this study, the following recommendations are deemed necessary:

1. Educational administrators should foremost identify training needs of mathematics teachers in particular and entire staff generally.
2. Proprietors of secondary schools should train their mathematics teachers in ICT proficiency using the identified training needs identified in this study
3. Proprietors of secondary schools should provide ICT facilities for their staff training and for instructional aids

References


