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# MEETING THE PERSONNEL NEEDS OF ANAMBRA STATE INDUSTRIALISTS IN NIGERIA: A CALL FOR MATHEMATICS EDUCATION REFORMS

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## Abstract

*The study examined that extent the mathematics education graduates meet the personnel needs of the industrialists in Anambra State. Ninety-four (94) out of 198 managers (employers) from the three private industrial zones in Anambra State, Nigeria were included in the investigation. A descriptive survey instrument was constructed by the researchers based on professional and ICT competencies which incorporated 25 items. Analysis of results showed that:* ***a.*** *Mathematics education graduates posses all the needed professional competencies as identified by Industrialists,* ***b.*** *41.7% of the needed ICT competencies were acquired by the graduates while 58.3% were not,* ***c.*** *There is a significant difference in the mean ratings of the Industrialists on the expected versus acquired ICT competencies of mathematics education graduates. The findings of the study suggest that Nigeria's mathematics education program should be revised to reflect the acquisition of ICT skills within the mathematics contents.*

**Introduction**

"The scientific and technological break through of various nations has a tremendous impact in revolutionizing many of the industrial and social activities of mankind," (Jayeola-Omoyeni, 1995:56). If this is true then one equally admits that there will be no scientific and technological development without proper mathematics education. Since mathematics is the backbone of science and technology, the level of mathematics understanding among Nigerians becomes a serious concern for scientific and technological literacy. This is due to the fact that if the level of mathematics education among the Nigerian populace remains low, the substance the scientific and technological developments so far attained may not hold. The scientific and technological literacy entails a functional understanding of the nature of science and technology.

The major problem of scientific and technological literacy in Nigeria today is how to adequately link scientific and technological knowledge of the citizenry with their every day life. Iji (2002) noted that a scientifically and technologically illiterate person is considerably circumscribed in playing his/her full role in the socio-economic development of his/her community. According to him, mathematics education should qualify the students in mathematical skills and abilities so that they can apply mathematics appropriately and correctly to the concrete problems they may encounter in their lives and work. Ukeje in Ogum (2007: 10) supports Iji, stating "without good teachers, we cannot have good education and without good education, we cannot meet successfully the challenges of the ever changing Nigerian world…without good teachers and good education we cannot achieve satisfactory national development".

Every employer expects his employee to give his best performance in the execution his duties. The performance of such duties must conform to the required standard so that his contribution in the industry will be felt. The Danish Ministry of Education (2001) stressed that knowledge and skills are the key factors of production in the 21st century. This justified the major reason why the Nigerian government embarked on series of education reforms and policies geared toward meeting societal needs especially in Information and Communication Technology (ICT). A reform according to Ogoamaka (2007:1), "is a change (that may be planned, perceived, conceived, spontaneously realized, induced, or deduced) to bring about improvement." It also implies bringing about a departure from the usual, status quo or established trend. In this article, the concern is reforms in university and college of education mathematics education programs.

Information and Communication Technology (ICT) focus on the use of technological tools for managing and disseminating information. In the education industry, ICT is integrated technologies for gathering, processing, delivering, and storing information. Uzoigwe (2001) pointed out that ICT involves all the technologies employed in order to facilitate the collection, storage, retrieval and communication by the fastest means. The individual's ability to search and obtain needed information makes him an educated person. This means that for one to gather enough information in the present technology age in the society and secure better employment in the competitive employment context, the individual must acquire and manipulate electronic equipment like computer system, internet system, CDROM, etc. This is important because employers now emphasize competencies and skills in these areas as pre requisites for employment (Ogbonna, 2003). The benefits of ICT are well documented by many researchers

such as Ejeh (2003), Ittigson and Zewe (2003), Clarke (2006), Duffy (2006), Akudolu and Olibie (2007) among others. The benefits of ICT as presented by these researchers include the fact that it promotes learners empowerment, enhances learning performance, promotes staff development, increases instructional resources, improves human welfare and makes it possible for people to satisfy their basic needs.

It is expected that science education program should help its graduates to acquire competencies which are very crucial for gainful employment in many fields of work because the program provides knowledge, attitudes, skills and understanding needed to perform certain jobs. Okigbo and Okeke (2008) posited that graduates of science education are useful in various professional fields available in the labor market. In addition, science education graduates acquire practical and verbal competencies which enable them to work as teachers, bankers, marketers, industrial workers, computer operators, contractors and other related fields where scientific knowledge could be applied. In particular, mathematics education graduates are versatile because they can establish their schools, businesses and companies which make them employers of labor instead of job seekers. Notwithstanding the competencies and skills acquired by mathematics education graduates, Schoepp (2005), Akudolu and Olibie (2007), and Omenka (2007) noted that one of the major reforms needed in teacher education in Nigeria is the area of teacher education ICT competencies. Also, Agbalogun (2006) found that some teachers have a negative attitude toward the integration of computer education into the secondary school curriculum because of their lack of competencies and skills in computers. Computers are a very important tool in almost every work place, school, and in life of individuals. The recent introduction of the current ICT standards into mainstream schooling was widely expected to penetrate and transform teaching and learning across the curriculum. The International Society for Technology in Education (ISTE) and other organizations recommended that students learn to use generic tools. The generic tools here represent the ICT tools useful in many disciplines for teaching most students. Researchers indicate that relatively few teachers are integrating ICT into subject teaching which motivates students and enriches learning or stimulates higher-level thinking and reasoning (Goodson & Mangan, 1995; Pickersgill, 2003). In addition, much importance is attached to ICT in Nigeria, so that the National University Commission (NUC) and National Commission for Colleges of Education (NCCE) made this knowledge a prerequisite for employment and job retention. Also, the National Policy on Education and Teachers Registration Council of Nigeria (TRCN) law emphasized the acquisition of ICT skills as a necessary condition for registration and professional practice (Olakulehin, 2007). Moreover, competencies and skills in manual office work are gradually giving way to modern office technology (Okolocha & Ile, 2007). Other researchers (Newhouse, 2002; Lewis, 2003; Olakulehin, 2007) also showed that ICT can be used to support a variety of teaching and learning approaches so that teachers do not need to change their methods. Implementation of ICT calls for the update of mathematics education programs and their training of students. The mathematics education programs therefore should form part of this new training arena.

Science and mathematics education are noted as important and indispensable tools in achieving sustainable development for any nation. By this, it becomes obvious that science and mathematics education and ICT are two sides of the same coin. Mathematics education involves training in skills and competencies which are very important for gainful employment, yet the unemployment rate is on the increase. The universities and colleges of education continue to

produce graduates who join the queue of the unemployed. In view of this, the research seeks to discover whether these graduates actually meet the personnel needs of the industrial sectors where they will be gainfully employed. This study is conducted with the goal to suggest some reforms on the program that may help correct this anomaly.

**Research questions**

The study was guided by four research questions:

1. What are the professional competencies expected of mathematics education graduates by Industrialists in Anambra State?
2. What are the ICT competencies expected of mathematics education graduates by the Industrialists in Anambra State?
3. What are the mean ratings of the Industrialists on the ICT competences acquired by mathematics education graduates while in school?
4. Is there any significant difference in the mean ratings of the Industrialists on the expected and acquired ICT competencies of mathematics education graduates.

**Method**

The research adopted a descriptive survey design because it sought the opinions of Industrialists managers (Industrialists) in private industries in Anambra State, Nigeria, regarding the professional and ICT competencies expected of mathematics education graduates. Ninety-four (94) Industrialists were selected from a total population of 198 Industrialists of Awka, Nnewi, and Onitsha Industrial Zones. The researchers constructed a 25 item questionnaire based on the professional and ICT skills required of mathematics education graduates from the Industrialists. The instrument consisted of a scale using five options of Highly Expected (HE), Often Expected (OE), Sometimes Expected (SE), Rarely Expected (RE), and Not Expected (NE) with points 5, 4, 3, 2, and 1 assigned respectively. Six experts, three in mathematics education and three in computer science education, validated the instrument. Any item accepted by 2/3 of these experts was included in the final production of the instrument. The data collected were analyzed using mean, percentage, and t-test statistics. Any item with a mean (X) score of 2.50 and above was regarded as an expected competency to be possessed by mathematics education graduates. Conversely, any item with a mean below 2.50 was regarded as an unexpected competency.

**Results**

The analysis of the research results are presented in Tables one through four.

**Table 1: Professional Competencies expected of Mathematics Education Graduates by the Industrialists in Anambra State**

| S/N | Professional competencies | Mean | Remark |
|---|---|---|---|
| 1 | Ability to teach mathematics | 4.52 | Highly Expected |
| 2 | Numerate skill | 4.76 | Highly Expected |
| 3 | Ability to get along with others | 2.91 | Sometimes Expected |
| 4 | Creative skill | 3.08 | Sometimes Expected |
| 5 | Ability to manipulate industrial equipment | 2.81 | Sometimes Expected |

| | | | |
|---|---|---|---|
| 6 | Ability to keep accurate records | 4.62 | Highly Expected |
| 7 | Problem solving skill | 1.35 | Not Expected |
| 8 | Leadership/Managerial skill | 2.61 | Sometimes Expected |
| 9 | Ability to communicate effectively | 3.85 | Often Expected |
| 10 | Critical thinking/Enquiry skill | 1.98 | Rarely Expected |

Table one shows that the Industrialists highly expected the mathematics education graduates to teach mathematics, keep accurate records, and posses numerate skill. However, they rarely expected them to possess critical thinking skill.

**Table 2: ICT Competencies expected of Mathematics Education Graduates by the Industrialists in Anambra State**

| S/N | ICT competencies | Mean | Remark |
|---|---|---|---|
| | Ability to: | | |
| 1 | Start up, log off or shut down a computer system and its peripherals | 4.82 | Highly Expected |
| 2 | Create a document | 4.55 | Highly Expected |
| 3 | Edit typed work, add or delete data using different function keys | 3.56 | Often Expected |
| 4 | Copy, cut, paste or insert in another location | 4.15 | Often Expected |
| 5 | Use icon menu effectively | 4.76 | Highly Expected |
| 6 | Key in user password and connect to internet | 3.22 | Sometimes Expected |
| 7 | Open a website and download important information from it | 3.28 | Sometimes Expected |
| 8 | Use desktop video conferencing | 4.06 | Often Expected |
| 9 | Access different computer packages | 3.80 | Often Expected |
| 10 | Dictate viruses in computer and other electronic devices | 2.08 | Rarely Expected |
| 11 | Use computer for mathematical calculations and drawings | 4.86 | Highly Expected |
| 12 | Use file compression utility and linear multimedia presentation | 3.02 | Sometimes Expected |
| 13 | Use borders and different colors in designing, decorating, and producing | 1.25 | Not Expected |
| 14 | Identify, open, and use a spreadsheet environment | 3.38 | Sometimes Expected |
| 15 | Use scanner | 1.12 | Not Expected |

Out of 15 ICT competencies used in the study, Table 2 reveals that Anambra State Industrialists highly expected the mathematics education graduates to posses four (start up and log off, create a document, use icon menu and computer for mathematical calculations and drawings). They rarely expected them to dictate viruses in computer and other electronic devices. However,

Graduates of mathematics education were not expected to use scanner, borders and different colors in designing.

**Table 3: Mean ratings of the Industrialists on the ICT Competencies Expected and Acquired by the Mathematics Education Graduates**

| S/N | ICT competencies | Needed | Acquired | Remark |
|---|---|---|---|---|
| | Ability to: | | | |
| 1 | Start up, log off or shut down a computer system and its peripherals | 4.82 | 4.02 | Needed /Acquired |
| 2 | Edit typed work, add or delete data using different function keys | 3.56 | 3.96 | Needed/Acquired |
| 3 | Create a document | 4.55 | 4.02 | Needed /Acquired |
| 4 | Copy, cut, paste or insert in another location | 4.15 | 3.96 | Needed /Acquired |
| 5 | Use icon menu effectively | 4.76 | 3.52 | Needed /Acquired |
| 6 | Key in user password and connect to internet | 3.22 | 2.05 | Needed/ Not acquired |
| 7 | Open a website and download important information from it | 3.28 | 2.05 | Needed/ Not acquired |
| 8 | Use desktop video conferencing | 4.06 | 2.00 | Needed/ Not acquired |
| 9 | Access different computer packages | 3.80 | 1.16 | Needed/ Not acquired |
| 10 | Dictate viruses in computer and other electronic devices | 2.08 | 1.04 | Not needed/ Not acquired |
| 11 | Use computer for mathematical calculations and drawings | 4.86 | 2.25 | Needed/ Not acquired |
| 12 | Use file compression utility and linear multimedia presentation | 3.02 | 1.32 | Needed/ Not acquired |
| 13 | Use borders and different colors in designing, decorating, and producing | 1.25 | 1.04 | Not needed/ Not acquired |
| 14 | Identify, open, and use a spreadsheet environment | 3.38 | 1.52 | Needed / Not acquired |
| 15 | Use scanner | 1.12 | 1.01 | Not needed/ Not acquired |

Table three reveals that most of the ICT competencies were needed but not acquired by the Graduates of mathematics education., They include: key in user password and connect the internet, open a website and download, use of desk top video conferencing, access computer packages, use computer for calculation, drawing, file compression, and use of spreadsheet environment. Also, all the acquired competencies of the Graduates is needed by the Industrialists

**Table 4: The t-test comparison of the Expected and acquired ICT competencies**

| Responses (Subjects) | N | Mean | Standard deviation | $\propto$ | df | t-cal | t-crit |
|---|---|---|---|---|---|---|---|
| Expected | 15 | 3.46 | 1.16 | | | | |
| | | | | 0.05 | 13 | 2.861 | 2.160 |
| Acquired | 15 | 2.33 | 1.18 | | | | |

Table four shows that the calculated- t (2.861) is greater than the t- critical value (2.160). Therefore, the null hypothesis that there is no significant difference in the mean ratings of the Industrialists on the expected and acquired ICT competencies of mathematics education graduates is rejected. The study thus concludes that there is a significant difference in the mean ratings on the expected compared to the acquired ICT competencies.

**Discussion**

The results of this study demonstrated all the expected professional ICT competencies as identified by the Industrialists in Anambra State that mathematics education graduates should possess for employment. Also, the findings from Tables 2 and 3 revealed that 41.7% of the expected ICT competencies were acquired by the mathematics education graduates, while 58.3% of these expected competencies were not acquired. To find out if there is any significant difference in the mean rating of the Industrialists on the expected versus acquired ICT competencies of the graduates, the null hypothesis was tested. The results from the test exposed a significant difference in their mean ratings on the expected compared to the acquired ICT competencies. That is to say that not all the expected ICT competencies were acquired by the mathematics education graduates.

The findings from this study gave credence to the following findings of Agbatogun (2006), Schoepp (2005), Akudolu and Olibie (2007), and Omenka (2007). Agbalogun found that some teachers have negative attitudes towards the integration of computer education into secondary school curriculum because of their lack of competencies and skills in computers. Schoepp (2005), Akudolu and Olibie (2007), and Omenka (2007) reported that one of the major reforms needed in teacher education in any developing country is in the area of teacher ICT competencies. However, the findings of this study deviated from the results of Okolocha & Ile (2007) and Okigbo & Okeke (2008). Okolocha and Ile (2007) reported that business education graduates acquired sufficient computer operation and desktop publishing competencies while in school. Also, it deviated from Okigbo and Okeke (2008), who found that employers agreed that graduates of science and mathematics education possess all the competencies required to meet their job demands, and were competent and efficient workers that effectively utilized these competencies in the workplace.

The results of this study have some educational implications for mathematics educators, university and college of education administrators, and government officials. This is because when students are equipped with the requisite computer skills, they will be in a better position to perform their tasks using fast and accurate communication networks like ICT. By implication, universities and colleges of education have to modify mathematics education programs to meet the ever-changing ICT trends in the country.

**Conclusion and Recommendations**

Based on the findings of this study, the following conclusions were drawn:

1. Mathematics education graduates should possess all the expected professional competencies identified by the Industrialists.
2. 41.7% of the expected ICT competencies were acquired by the mathematics education graduates while 58.3% of these competencies were not acquired.
3. There is a significant difference in the mean ratings of the Industrialists on the expected and acquired ICT competencies of mathematics education graduates.
4. Not all the expected ICT competencies were acquired by the mathematics education graduates.

From the findings of study, the following recommendations were made:

1. Efforts should be made by mathematics educators in tracking new ICT technological trends. This requires that mathematics educators update their knowledge in the area of ICT.
2. Mathematics education programs should be reviewed and revised to reflect the acquisition of ICT skills together with mathematics content. That is to say that ICT education should be properly integrated within the existing mathematics education programs in Nigeria's universities and colleges of education.
3. Mathematics educators should expose the students to the rudiments of ICT education by giving them assignments and projects that involve the use of computers and internets.
4. Mathematics educators and their graduates should be encouraged to attend ICT workshops and conferences to update their knowledge in ICT competencies and skills.

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