IMPACT EVALUATION OF UNIVERSAL BASIC EDUCATION COMMISSION CAPACITY BUILDING PROGRAM ON MATHEMATICS TEACHER TESTING SKILLS IN AKWA IBOM STATE, NIGERIA

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(Received 16, February 2023; Revision Accepted 11, April 2023)

ABSTRACT

This study evaluated the impact of the in-service training program offered by the Universal Basic Education Commission (UBEC) in Nigeria on the testing skill of Mathematics teachers in Akwa Ibom State, Nigeria. The study adopted the expo facto research design research. A two-stage sampling involving simple random and stratified techniques were employed to select 134 from the 530 Mathematics teachers in the public secondary schools in Akwa Ibom State, Nigeria. The instrument used for the data collection was, Teacher Testing Skills Assessment Scale (TTSAS) developed by the researchers based on the objective of the study. The instrument was validated by three measurement experts and trial tested. The reliability coefficient of .77 was obtained from the inter-rater method of reliability estimate. The data collected was analyzed using mean, standard deviation and independent sample t-test. The results of the analysis revealed that the UBEC in-service training program has significant positive impact on Mathematics teachers’ testing skills. It was concluded that the UBEC teachers’ capacity development program is a profitable venture with promising national gains. It was recommended that government should continue with her support for the UBEC in sustaining regular in-service training program for teachers in secondary schools across the nation.

KEYWORDS: Mathematics Teacher, Mathematics Testing Skill, Capacity Building, Universal Basic Education

INTRODUCTION

Testing skill is a necessary attribute of a good teacher that is appropriate for holistic and effective classroom instructional process. It is a skill that is needed by teachers to evaluate, monitor and helps to make better decision on the cognitive, social, psychological and physical development of the learners. According to Ubi and Ibe (2020), being fully grounded with testing skills, as it is expected, teachers are to determine what to be learned and then define same so precisely that test item constructed by them should show the desired performance and serve useful purposes. Testing skill of mathematics teachers is of particular importance to monitor the progress of the learners in mathematics. The mathematics
teachers after giving their best in teaching mathematics, it is also imperative to assess the
learners appropriately to provide accurate feedback on the teaching and learning
effectiveness. Mathematics teachers’ testing skill is expected to help in monitoring the learner's
understanding of the mathematical language, concepts, application of the mathematical rules
and formula. Appropriate testing is capable of helping teachers, learners and even the parents
in knowing the strength and weakness of the learners and the teaching-learning process in a
school.

An effective testing skill in mathematics reflect on the teachers’ ability to developed measurable
mathematics lesson objectives, develop assessment blueprint with adequate content
coverage based on the stated mathematics objectives and construction of error free question
items that is consistent with the learning goals and objectives and as specified in the
assessment blueprint. Other requisite abilities that should be observed in a mathematics
teacher with effective testing skill is the validation of the constructed items, and determination of
other psychometric properties of the test items such as reliability of the test, item difficulties and
discriminating facilities (i). Since testing also include appropriate administration of the tests,
scoiring, grading and interpretation, mathematics teachers are highly expected to demonstrate
these abilities particularly with their new in-service training experience.

Reflecting from the Bloom’s taxonomy, a teacher should be capable of designing his curriculum
objectives and the corresponding assessment of the objectives. An appropriate test must reflect
the three domains of learning; cognitive, affective and psychomotor for all learners in respective of
their ability or disabilities (Dada & Fagbemi, 2014; Chandio, Pandhiani & Iqbal, 2016). This
means that, Mathematics test items must be logically developed in order to help develop the
students’ calculation ability, have positive attitude and interest in mathematics and be capable of
using their psychomotor abilities in areas such as drawing, graphing, and use of construction
materials (Dada & Dada, 2014). All these abilities are gradually developed in learners as they
experience them in both summative and formative testing. It therefore behooves all
teachers and especially mathematics teachers to deploy their testing skills effectively for a holistic
development and motivation of their student towards mathematics (Kuiper, Nieveen &
Berkvens, 2013).

The universal basic education commission (UBEC) has considered mathematics as a core
basic subject for all children and has regularly supported mathematics teachers within their
authority to develop appropriate capacity in mathematics. According to Akwa Ibom State
school board (ASSB,2021), more than 60% of mathematics teachers in the state have enjoy
UBEC in-service training. This is a welcome development and is appreciated. The capacity
building of the mathematics teachers is expected to help in strengthening the skills and job
motivation of the mathematics teachers in achieving high standard and better performance
in mathematics particularly for students under the UBE schools. Meanwhile, there seems to be no
better change in the performance and attitude of the students toward mathematics. The
performance of the students has been consistently dwindling over the years.

The unstable performance in mathematics calls for concern among professionals as it is expected
that by now the UBEC in-service training should have helped to improve the mathematics
performance of the students. The poor performance of the students in the recent mathematics result indicates that the highest
performance in the last three years was about 39% credit pass in mathematics in NECO for
BECE in Akwa Ibom state (ASSB, 2021). This is highly questionable considering the effort of the
UBEC on the mathematics teachers in providing in-service training in the state. This was the
motivation for the researcher to investigate the impact of the UBEC training on the teachers’
effectiveness in their classroom instructional materials and curriculum delivery. It was found
that the UBEC in-service training for the mathematics teachers was very effective in
developing teachers’ use of instructional materials and curriculum delivery (Ekim, Akpan &
Dada, 2022).

The curiosity of knowing where the problem of poor performance of the students in BECE lied in
Akwa Ibom State warranted further investigation by the researchers. It was therefore found that
there is variance in the standard of question set by the mathematics teachers in UBE schools and
the expected standard of the external examination body (Anagbogu, Dada, Petters &
Owo 2022). This has significant effect on the level of preparation of the students in
mathematics and consequently their consistent poor performance in Mathematics. It is against
the backdrop that this study was motivated to evaluate the impact of UBEC capacity building
program on mathematics teachers’ testing skill in Akwa Ibom State.

According to the United Nations Office for Disaster Risk Reduction (UNDRR, 2016), capacity building is a process which enables people, organizations and society to systematically stimulate and develop their capability over time in order to achieve specific goals, including through improvement of knowledge, skills, systems, and institutions within a wider social and cultural enabling environment. In the educational system, capacity building is not taken for granted as it is considered helpful in strengthening the skills, knowledge, motivation, attitude and behavior of teachers and students. Mathematics teachers is expected to have acquired the basic knowledge in teaching and testing skills in Mathematics. They should be capable of changing the learners’ behavior, skills and attitudes toward mathematics. But becoming a better and effective mathematics teacher, demands regular in-service experiences to be abreast of professional career. So, the need for the capacity development. As viewed by Ukonze and Olaitan (2009), capacity building of Mathematics teachers should reflect on appropriate Mathematics teaching competency, and testing skills with right attitudes towards the subject and the students so as to help achieve the set goals and objectives. Therefore, for better achievement in mathematics, building Mathematics teachers’ testing skills cannot be overemphasized.

The Universal Basic Education Commission (UBEC, 2004) objectives of teacher in-service training program include:

1. Improve the overall quality of teaching and learning at the classroom level with the specific objectives to update subject scope
2. Sharpen the teachers’ skills and methodology
3. Improve the teachers' instructional skills and practices
4. Empower the teachers to have a more positive impact in the classrooms
5. Encourage the teachers to try new methods and better lesson plan development skill, develop pupil-centered techniques, critical thinking, classroom organization and conducting reliable continuous assessment of pupils' learning.

In support of this, Adebowale and Alao (2010) added that there are some basic principles guiding in-service training programs. These principles include the design of training program to meet the needs identified. For instance, the testing skills of teachers especially in Mathematics calls for more organized in-service training programs for Mathematics teachers. Thus, Mathematics teachers’ effectiveness enhances students’ satisfaction and hence, help in building their capacity including Mathematical testing skills.

The impact Evaluation of UBEC capacity building program on mathematics teachers’ testing skill is the application of formal enquiry techniques for data collection in order to conceptualize, refine and determine the effectiveness of a program with a view to making a comparative value judgment in order to continue, modify or terminate it. Owing to this background this study evaluates the impact of the UBEC capacity building program on Mathematics teachers’ testing skill in Akwa Ibom State.

Research question: How does the UBEC capacity building program impact mathematics teachers’ testing skills?

Hypothesis: There is no significant impact of UBEC capacity building program on Mathematics teachers’ testing skills in Akwa Ibom State.

METHODOLOGY

An expo facto research design was employed in the study. The target population of the study was 530 upper basic Mathematics teachers from 25 Local Education Committees (LEC) present in Akwa Ibom State. A sample size of 134 Mathematics teachers was drawn from 18 LECs. The sample was selected using two-stage sampling (simple random and stratified random) techniques. The researchers first used simple random technique to select 18 LECs out of the 25 presents. The teachers were stratified into those who are part of the capacity building program and those who are not. This was followed by simple random sampling technique to select 134 Mathematics teachers from each stratum. The instrument employed by the researchers to collect data for this study was “Teacher Testing Skills Assessment Scale” (TTSAS). This instrument was in two sections; A and B. Section A focused on the personal data of the Upper Basic Mathematics teacher such as Mathematics Teacher’s sex, age, teaching experience; qualification while section B was used to assess Upper Basic teachers on capacity building in terms of Mathematic teachers’ testing skills. The scale responses were scaled as 4=very good, 3-good, 2-fair and 1-poor based on the observation and document content assessment. The instrument was content validated by two experts in Educational Measurement and Evaluation using inter-rater method. The reliability, obtained
gave coefficient of 0.77 which indicated that the instrument is reliable. The researcher visited the school during the second term examination period to observe the participants. The participants testing skills were rated including their test development blueprint, items construction, administration, and scoring and item analysis. The participants were objectively rated according to the guidelines of the research instrument. Since the study is concern to find out if the training has good impact on the teachers, the data from those participants that were involved in the training was used in answering the research question. The participants who are beneficiaries of the UBEC capacity building program were considered as experimental group while the non-beneficiaries were considered as the control group. The data collected was analyzed using descriptive statistics of mean and standard deviation to answer the research question while the stated null hypothesis was tested using the independent sample t-test.

RESULTS

Research question: How does the UBEC capacity building program impact on the mathematics teachers’ testing skills? The mean and standard deviation were used to answer the research question as reported in Table 1.

Table 1: Mean and standard deviation of mathematics teachers’ testing skills in Akwa Ibom State, Nigeria

<table>
<thead>
<tr>
<th>S/N</th>
<th>Variable</th>
<th>Non-Beneficiaries of UBEC capacity building program (n = 47)</th>
<th>Beneficiaries of UBEC capacity building program (n = 87)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>X</td>
<td>SD</td>
</tr>
<tr>
<td>1.</td>
<td>Test objectives skill</td>
<td>1.64</td>
<td>.49</td>
</tr>
<tr>
<td>2.</td>
<td>Test blueprint design</td>
<td>1.34</td>
<td>.56</td>
</tr>
<tr>
<td></td>
<td>skill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Test construction skill</td>
<td>1.75</td>
<td>.44</td>
</tr>
<tr>
<td>4.</td>
<td>Test administration skill</td>
<td>2.31</td>
<td>.74</td>
</tr>
<tr>
<td>5.</td>
<td>Test scoring skill</td>
<td>1.43</td>
<td>.50</td>
</tr>
<tr>
<td>6.</td>
<td>Test analysis skill</td>
<td>1.80</td>
<td>.85</td>
</tr>
<tr>
<td></td>
<td>Weighted mean</td>
<td>1.72</td>
<td></td>
</tr>
</tbody>
</table>

From table 1, it is observed that the mean ratings of each element of the testing skills of the teachers were higher than the expected mean rating of 2.5 for the teachers who are beneficiaries of the UBEC capacity building program but lower than 2.5 for the non-beneficiaries. The weighted mean of the testing skills of the participants who are beneficiaries of the UBEC capacity building program was 3.27 while that of the non-beneficiaries was 1.72. This implies that the UBEC capacity building has to a very large extent a positive impact on mathematics teachers testing skills in Akwa Ibom State, Nigeria. Therefore, in response to the research question, there is a very good impact of the UBEC capacity building program for the mathematics teachers in Akwa Ibom State.

Ho: There is no significant impact of UBEC capacity building program on Mathematics teachers’ testing skills in Akwa Ibom State.
Table 2: Independent t-test showing the difference in the testing skills between beneficiary and non-beneficiary of UBEC capacity building program for mathematics teachers

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test objectives skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>1.74</td>
<td>.607</td>
<td>.089</td>
<td>-17.52</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.03</td>
<td>.239</td>
<td>.026</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test blueprint design skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>1.51</td>
<td>.831</td>
<td>.121</td>
<td>-10.88</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.14</td>
<td>.824</td>
<td>.088</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test construction skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>1.85</td>
<td>.551</td>
<td>.080</td>
<td>-15.72</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.30</td>
<td>.485</td>
<td>.052</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test administration skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>2.38</td>
<td>.768</td>
<td>.112</td>
<td>-7.93</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.45</td>
<td>.728</td>
<td>.078</td>
<td></td>
<td></td>
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<tr>
<td>Test scoring skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>1.62</td>
<td>.768</td>
<td>.112</td>
<td>-15.15</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.36</td>
<td>.549</td>
<td>.059</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test analysis skill</td>
<td>Non-beneficiary</td>
<td>47</td>
<td>1.94</td>
<td>.919</td>
<td>.134</td>
<td>-10.68</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>87</td>
<td>3.25</td>
<td>.511</td>
<td>.055</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-beneficiary</td>
<td>11.04263 02135 44071</td>
<td>1.40464</td>
<td>.15059</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Beneficiary</td>
<td>19.5287 1 40464 15059</td>
<td>3.02135</td>
<td>.44071</td>
<td>.000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2 reveals that the pretest is significantly different between mathematics teachers who are beneficiaries and non-beneficiaries of the UBEC capacity building program. In all the sub-skills and the overall testing skills, there are significant difference between the beneficiaries and non-beneficiaries of the program with the beneficiaries showing better skills than the non-beneficiaries. This implies that the UBEC capacity building program is significantly impactful on the mathematics teachers in Akwa Ibom State of Nigeria.

**DISCUSSION OF FINDING**

The result of research question revealed that Universal Basic Education Mathematics capacity building program has significantly developed teachers' capacity building in relation to their teaching and testing skills in Akwa Ibom State to a high extent. This result is in line with the assertion of Alkaria, & Alhassan (2017), that capacity building of computer science teachers in scratch language using an electronic learning platform influences the acquisition of skills and attitudes towards teaching programming, also that teachers that were exposed to extra training after they were employed significantly demonstrated skills and better attitude than teachers who were not exposed to any form of capacity building. They viewed that capacity building makes up for the inadequacies of the teachers as they are particularly trained to be better in all the areas of their job. They observed that, a teacher who is expected to teach Mathematics may not have sufficient skills/concept to teach all the topics in the mathematics syllabus, but the capacity building will be a cure.

The result also conforms to the findings of Levy-Keren (2014) that, at the end of the first year of the capacity building program the participants demonstrated a slight improvement in perceiving their capabilities of understanding Mathematics and skill for teaching it. In the second year there was significant improvement. Levy-Keren stated that beneficiaries of a detailed, long time in-service program have more influence on developing teachers’ Mathematical skills and concepts while any capacity building program that is short and narrow do not have significant influence on teachers.

Although, the result of this study contradicts Shrike and Patkin (2016), statement who said that, the capacity building and other forms of training had no influence on participants of such training since they did not perform above their average daily outputs. The possible explanation why this present study contradicts the study of Shrinkle and Patkin could be that, their study exposed its participant to a very short program regimen which is not sufficient to cause a significant change.

The result also conforms with the findings of Mapolelo and Akinsola (2015), that capacity building program can influence teachers' performance, their findings also revealed that teacher participation in induction program, ICT training and seminar/workshop significantly related to quality Universal Basic Education in Lagos State. In-service training acts as a
catalyst for teacher’s development in mathematical skills and concept. Base on this, the result corroborates Levenberg and Patkin (2014) in their study made a supportive statement that the teaching profession is a continuous learning process for those who practice it. No wonder Ball (2011), dealt with a question of knowing Mathematics well to teach it. As a result of these three questions were raised: How much Mathematics do teachers need to know? What Mathematics do teachers need to know and why? What Mathematical knowledge and skills are involved in teaching? In addition to this, Gberman & Gover (2012) optioned three important components: the component of Mathematics knowledge, Mathematical pedagogical knowledge and the component of knowledge about curricula. Hence, the reason why Bello (2008) in his speech during the enlightenment of Strengthening, Mathematics, and Science Education (SMASE, Nigeria) project explained the need to develop capacity of teachers by shifting teaching paradigm from a chalk and talk/teacher-centered method to an activity-based/student centered approach.

CONCLUSION:
With respect to the findings, in-service training program organized for Upper Basic Mathematics teachers in Akwa Ibom State for Upper Basic Mathematics teachers has significantly developed the mathematics teachers’ ability on testing skill.

RECOMMENDATIONS
Base on the positive impact of UBEC capacity building program to Mathematics teachers in Junior Secondary School, it is recommended that government should ensure that the program is made available to all the mathematics teachers..

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