



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

EKIM, ROSELINE E. DICK AND DADA, OLUSEYI AKINTUNDE

(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

Ekim, Roseline E. Dick, Department of Psychological Foundations of Education,
Faculty of Education, University of Uyo, Uyo, Nigeria

Dada, Oluseyi Akintunde, Department of Special Education, Faculty of Educational Foundation
Studies, University of Calabar, Nigeria

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 (). Since testing also include appropriate administration of the tests, scoring, 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 (LECs) 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 involve 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

S/N	Variable	Non- Beneficiaries of UBEC capacity building program (n = 47)		Beneficiaries of UBEC capacity building program (n =87)	
		\bar{X}	SD	\bar{X}	SD
1.	Test objectives skill	1.64	.49	3.04	.20
2.	Test blueprint design skill	1,34	.56	3.17	.81
3.	Test construction skill	1,75	.44	3.30	.46
4.	Test administration skill	2.31	.74	3.44	.72
5.	Test scoring skill	1.43	.50	3.39	.49
6.	Test analysis skill	1.80	.85	3.28	.45
	Weighted mean	1.72		3.27	

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

Variable	Group	N	Mean	Std. Deviation	Std. Error Mean	t-value	p-value
Test objectives skill	Non-beneficiary	47	1.74	.607	.089	-17.52	.000
	Beneficiary	87	3.03	.239	.026		
Test blueprint design skill	Non-beneficiary	47	1.51	.831	.121	-10.88	.000
	Beneficiary	87	3.14	.824	.088		
Test construction skill	Non-beneficiary	47	1.85	.551	.080	-15.72	.000
	Beneficiary	87	3.30	.485	.052		
Test administration skill	Non-beneficiary	47	2.38	.768	.112	-7.93	.000
	Beneficiary	87	3.45	.728	.078		
Test scoring skill	Non-beneficiary	47	1.62	.768	.112	-15.15	.000
	Beneficiary	87	3.36	.549	.059		
Test analysis skill	Non-beneficiary	47	1.94	.919	.134	-10.68	.000
	Beneficiary	87	3.25	.511	.055		
	Non-beneficiary	11.0426	3.02135	.44071	.44071	-22.18	.000
	Beneficiary	19.5287	1.40464	.15059	.15059		

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 Shrinke 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, Guberman & 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..

REFERENCES

Adebowale, O. F. and Alao, K. A., 2010. Continuous assessment policy implementation in selected local government areas of Ondo State (Nigeria): Implications for a successful implementation of the UBE program. *Journal of Education Policy* 5 (1) 3-18.

Anagbogu, G., Dada, O. A., Peters, and Owo, 2021. [An Assessment of Social Media Immersions and Undergraduate Students' Academic Performance in Research Methods in University of Calabar, Nigeria](#). *Journal of Humanities and Social Science*, 2(4), 15-21

Alkaria, A., and Alhassan, R., 2017. The effect of in-service training of computer science teachers on scratch programming language skills using an electronic learning platform on programming skills and attitudes towards teaching programming. <https://www.reserachgate>.

Ball, D., 2011. Knowing mathematics well enough to teach-mathematical knowledge for teaching. A paper presented in the preventative for the initiative for applied research in education expert committee at the Israel Academy of sciences and humanities, Jerusalem, Israel.

Bello, C., 2008. Conference of Strengthening, Mathematics, and Science Education (SMASE, Nigeria) project Kenya.

Chandio, M. T., Pandhiani, S. M. and Iqbal, S., 2016. Bloom's Taxonomy: Improving Assessment and Teaching-Learning process. *Journal of education and educational development*. vol 3 (2) 203-221.

Dada, O. A. and Fagbemi, O. O., 2014. [Education for the gifted/talented students in Nigeria: A justification](#). *International Journal of Education and Practice* 5 (33), 9-11

Dada, O. A. and Dada, O. E., 2014. [Efficacy of co-operative and self-directed learning strategies in enhancing Mathematics achievement of underachieving gifted students in Nigeria](#). *Journal of Humanities and Social Science* 19 (9), 41-50

- Ekim, R. E. D., Akpan, S. M. and Dada, O. A., 2022. Mathematics teachers' in-service training towards attitude to work and students' interest in mathematics in Akwa Ibom State, Nigeria. *Asia-Africa Journal of Education Research* 2, 113-125
- Guberman, R., and Gorer, D., 2012. What elementary school mathematics teachers should know and able to do- from the point of view of the teachers of mathematics in elementary schools. Achva Academic College of education, Israel. (Hebrew).
- Kuiper, W., Nieveen, N. and Berkvens, J., 2013. Curriculum regulation and freedom in the Netherlands - Apuzzling paradox. sematicscholar.org
- Levenberg, I., and Patkin, D., 2014. The contribution of in-service training programs to the professional development of mathematics teachers. *International Journal of learning, Teaching and educational research* Vo. 7. (1), Pp. 93-104.
- Levy-Keren, M., 2014. "Assessment of the program:" for mathematics of teachers at elementary and junior high schools within the framework of professional development for educational practitioner final report. Tel Aviv Kibbutzim college of education, research and assessment unit. (Hebrew).
- Mapodelo, D. C., and Akinsola, M. K., 2015. Preparation of mathematics teachers. Lessons from Review of literature on teachers' knowledge, belief and teacher education. *America journal of educational research*. Vol. 3 (4), 505-513.
- Shrike, A., and Patkin, D., 2016. Elementary school mathematics teachers' perception on their professional needs. In D. Patkin and A. Gazit (Eds). *Who are you- the elementary school mathematics teachers?* Pp. 187-230. Tel Aviv, Israel: Moffet Institute. (Hebrew).
- UBEC, 2004. Universal Basic Education Commission standard action plan: Based on the UBE Act, 2004-Abuja: Universal Basic Education Commission.
- Ubi, I. O., Ibe, O., 2020. An assessment of the application of testing skills among secondary school teachers in Calabar education zone of Cross river state, Nigeria. *Journal of educational research and evaluation* pg. 145-149.
- Ukonze, J. A. and Olaitan, S, O., 2009. Professional Competency Capacity Building Need of Teachers for Effective Teaching of Agricultural Science in Anambra State. Being a paper presented at the 11th Annual Conference of Nigeria Association of Educational Researchers and Evaluators on Educational Research School supervision, July 8th to 11th.