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## **Evaluation of Pedagogical Skills Acquisition among National Teachers Institute (NTI) Trainees in Basic Science and Technology in Cross River State, Nigeria**

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By

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### **Abstract**

*The study evaluated the pedagogical skills acquired by participants in National Teachers' Institute (NTI) re-training programme in Basic Science and Technology in Cross River, Nigeria. 320 primary school teachers randomly drawn from a population of 1099 constituted the study sample. The data for the study was collected using a 27 item, researchers-designed four-point likert-type instrument titled Pedagogical Skills Evaluation Questionnaire (PSEQ) and Teachers' Perception of Pedagogical Skills Inventory (TPPSI). The data were analyzed using mean standard deviation, variance, and independent t-test. The major findings of the study were that: (i) Basic knowledge and communication skills acquisition among participants were adequate (ii) manipulative skills acquisition was inadequate. Recommendations aimed at making the National Teachers Institute re-*

*training programme in Basic Science and Technology more responsive to the needs of teachers were made among which was that subsequent NTI re-training programmes should incorporate adequate hands-on activities to enable teachers acquire necessary manipulative skills.*

**Key words:** Evaluation, pedagogical skills, NTI Trainees

Science and technology have long been recognized as the instrument per excellence for nation building and every country in the world today craves for their development (Okpara, 2008, Osokoya, 2008 & Ajewole, 2005). Thus, there has been a global trend towards educational reforms to include human resource development, as a function of education and human capital formation. Human capital formation refers to the process of acquiring and increasing the number of persons who have the skill, education and experience for economic growth and development of a nation (Ibe, 2008). The reforms in education in Nigeria in recent times have been on the primary and junior secondary education sub-sectors which is known as Universal Basic Education (UBE) Programme.

Determined to improve the quality of Education at these sub-sectors, the National Teachers Institute (NTI) has over the years embarked on teacher capacity building through annual re-training workshop in some states of Nigeria. This is rooted in the realization that many teachers apart from pre-service training, do not have access to other forms of training to update their knowledge and skills.

The re-training programme therefore provides opportunity for teachers at primary and junior secondary levels to acquire new knowledge and skills needed for the discharge of their duties. Okebukola (2002) had observed, that no education system has ever risen above the quality of its teachers, and no nation can develop as rapidly as it's aspires to without significant improvement in the quality of her education.

The educational system therefore succeeds only to the extent where teachers are professionally equipped and updated. Investing in human capital formation as is done annually by the National Teachers Institutions (NTI) is meant to improve the quality of education at the primary and secondary school levels in the context of emerging global challenges. Among the subjects taught to teachers during the re-training programme is the Basic Science and Technology. It is expected, that the training in this area would keep teachers abreast of the latest developments in pedagogy and also provide opportunity for them to acquire the necessary scientific and technological knowledge, skills and attitude for optimum performance of their job. As Osokoya (2008) had noted investment in training a teacher makes him creative and productive and continuous human capital development is compulsory for any society that wishes to survive under the complex challenges of a dynamic world.

Against this background, the training module in Basic Science and technology is designed based on emerging issues in science and technology with carefully selected activities to enable trainees develop conceptual thinking, manipulative skills and scientific attitude. It is packaged to reflect the 9-year basic Education Curriculum in Science and technology for primaries 1-6, and JSS 1-3.

In particular the content of the training module is meant to enable trainees.

- i) develop interest in basic science and technology
- ii) acquire basic theoretical and practical knowledge in science & technology.
- iii) acquire basic communication and technical skills in science and technology.
- iv) develop reasonable level of competence in the use of scientific and technological equipment.
- v) develop competence and creativity in the use of the environment as resource for teaching science and technology. (NTI, MDG Project, 2010).

The concern of this study herein was to evaluate the pedagogical skills acquired by teachers in Cross River State in the National Teachers Institute (NTI) re-training module in science and technology. Interestingly, evaluation is an integral part of a systematically planned human capacity building because without it, the effectiveness and suitability cannot be ascertained. It is on this premise that the present study evaluates the adequacy of pedagogical skills namely, Basic Knowledge skills, Communication skills and manipulative skills acquired by National Teachers Institute trainees in Basic Science and Technology. Specifically teachers from the Northern Senatorial Education zone of Cross River State were the main focus of the study.

Two Research questions and two corresponding null hypotheses were posed for the study

#### **Research Questions**

1. How adequate are the pedagogical skills (Basic knowledge, communication & manipulative skills) acquired by NTI Trainees in Basic Science and Technology?
2. To what extent do male NTI trainees differ from their female counterparts in perception of pedagogical skills in Basic Science and Technology?

#### **Research Hypotheses**

1. The pedagogical skills (basic knowledge, communication, and manipulative skills) acquired by NTI trainees in Basic Science and technology are not significantly adequate.
2. Male and female NTI trainees' perception of pedagogical skills in Basic Science and Technology is not significantly different.

## **Method**

The study employed descriptive survey design. Cross River State was the area of the study but specifically Northern Senatorial Education Zone was purposefully selected because of the large number of participants in the NTI Re-training programme. 320 primary school teachers comprising 192 males and 128 females constituted the study sample. Stratified sampling method was employed to draw the sample from a population of 1099 primary school teachers that participated in the 2011 NTI re-training workshop in Basic Science and Technology. Two instruments namely Pedagogical Skills Evaluation Questionnaire (PSEQ) and Teachers Perception of Pedagogical Skills Inventory (TPPSI) were used for data collection.

The pedagogical Skills Evaluation Questionnaire (PSEQ) comprised 27 items designed based on four point response options of Very Adequate (VA) 4 points, Adequate (A) 3 points, Inadequate (IA) 2 points, and Very Inadequate (VIA) 1 point.

The Teachers' Perception of Pedagogical Skills Inventory (TPPSI) had 18 items designed based on 4 point likert type format of Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points and Strongly disagree (SD) 1 point.

The PSEQ measures three aspects of teacher pedagogy namely Basic knowledge, communication and manipulative skills, with each having 9 measurable sub skills. The Teachers' Perception of Pedagogical Skill Inventory (TPPSI) was used to evaluate teachers' perception with respect to acquirable skills in Basic Science and Technology. The instruments were face validated by experts in measurement and evaluation and following a trial test with 35 teachers who were not part of the main study, the reliability of the instruments were established to be 0.78 for PSEQ and 0.63 for (TPPSI) using the Cronbach alpha method.

## **Procedure for Data Collection/Analysis**

The instruments were administered in pair to the respondents in two training centres in the Northern Senatorial Education Zone of Cross River State, Nigeria. A total of 320 paired questionnaires were administered by the researchers and 316 were retrieved. Data collected was analyzed using mean, variance and standard deviations and t-test. For hypothesis one, a mean score of 2.50 was considered a significant mid-point for decision taking based on the four point rating scale of PSEQ.

Thus, an item with a mean score of 2.50 and above was judged significant and therefore an acquirable skill while an item with a mean score of less than 2.50 was considered to be non-significant and non-acquirable skill. However, the variance ( $S^2$ ) and standard deviation (SD) were also presented to show how the individual raw scores from which the mean was computed were dispersed or scattered about the mean.

## **Result**

### **Hypothesis One**

Pedagogical skills (Basic knowledge, communication and manipulative skills) acquired by NTI Trainees in Basic Science and Technology are not significantly adequate. The result is presented in table 1.

**Table 1: Pedagogical Skills Acquired by NTI Trainees in Basic Science and Technology. N = 316**

<b>Assessed skills</b>	<b>X</b>	<b>S<sup>2</sup></b>	<b>SD</b>	<b>Decision</b>
<b>A Basic knowledge skills</b>				
1 Concepts, principles and facts are presented beyond textbook interpretation	3.22	0.42	0.69	Adequate
2 Apply known laws and principles to unfamiliar problems in daily life.	2.78	0.63	0.81	Adequate
3 Adopt experiences that facilitate working principles and ideas	2.66	0.37	0.59	Adequate
4 Integrate science & technology concepts with personal knowledge of the world	3.91	0.72	0.97	Adequate
5 Use evidence to support ideas and discoveries	2.99	0.61	0.72	Adequate
6 Interpret structures and designs constructively.	2.73	0.91	1.24	Adequate
7 Adapt resources from immediate environment to explain concepts.	2.40	0.91	1.09	Inadequate
8 Demonstrate creativity in science and technology issues.	3.86	0.76	0.89	Adequate
9 Use home practices to illustrate science and technology concepts.	2.73	0.30	0.55	Adequate
<b>B Communication Skill</b>				
1 Use unambiguous language to demonstrate science and technology concepts	4.36	0.61	0.92	Adequate
2 Use classroom ideas and opinions in resolving problems associated with science and technology concepts	3.90	0.89	1.09	Adequate
3 Adopt classroom procedure that encourages the learning of science and technology concepts.	3.33	0.71	0.88	Adequate
4 Design classroom activities that portray identified science and technology concepts.	2.70	0.66	0.99	Adequate

5	Interpret professional materials after listening	3.01	0.47	0.66	Adequate
6	Design curricula to reflect the basic structure of science & Technology	2.88	0.57	0.72	Adequate
7	Provide justifications for scientific and technological experiences	3.17	0.93	1.09	Adequate
8	Gives explanations that are consistent with accepted scientific and technological views.	2.61	0.41	0.69	Adequate
9	Gives attention to words that reflect science and technology.	3.06	0.77	0.96	Adequate
<b>C Manipulative Skills</b>					
1	Organize group work and investigations	2.07	1.69	0.93	Inadequate
2	Apply theoretical knowledge to laboratory observations	2.33	1.33	0.88	Inadequate
3	Use scientific equipment, tools and materials to expand awareness of concepts.	1.98	1.29	0.72	Inadequate
4	Design usable instructional materials to teach concepts.	2.20	1.20	0.99	Inadequate
5	Resolve pattern of relationships between concepts through practical demonstrations.	2.09	1.03	0.88	Inadequate
6	Provide supervision for instructional activities.	2.56	0.63	0.91	Adequate
7	Give alternatives to practical exercises	2.39	1.01	0.66	Inadequate
8	Show correct use of materials and tools.	2.36	0.99	0.68	Inadequate
9	Use scientific concepts to create procedure for resolving practical problems.	2.39	1.71	1.78	Inadequate

Table 1 shows the mean rating of three types of pedagogical skills namely; Basic knowledge, communication and manipulative skills. For basic knowledge skills, the mean rating of 8 out of the 9 items of measure ranged from 2.66 to 3.86 and this is above the cut-off mean of 2.50, thereby indicating that NTI trainees acquired adequate basic knowledge skills. For communication skills, all the 9 items of measure had mean score above the acceptable mean of 2.50 which implies that communication skills are significantly acquired by NTI trainees. For the manipulative skills, 8 out of 9 items of measure had mean scores ranging from 2.02 to 2.39 and are below the cut-off mean of 2.50. Only one item (item 6) had a mean score of 2.56 that is above the cut-off mean and represents 11.11% of the manipulative skills.

The implication here is that 88.89% of the manipulative skills are not acquired by the NTI trainees in Basic Science and Technology.

The mean rating of 1.98 for item 3, (use scientific equipment, tools and materials to expand awareness of concepts) implies the least acquired manipulative skill among NTI Trainees in Basic Science and Technology.

## **Hypothesis 2**

Male and female NTI Trainees' perception of pedagogical skills in Basic Science and Technology is not significantly different. The result is presented in table 2.

**Table 2: Independent t-test Analysis of the Male and Female NTI Trainees' Perception of Pedagogical Skills in Basic Science and Technology**

<b>Variable</b>	<b>N</b>	<b>X</b>	<b>SD</b>	<b>t-value</b>
NTI male trainees	127	4.11	3.02	1.09
NTI female trainees	189	3.99	2.99	

\* P. > .05, df = 316, critical t-value = 1.96.

Result from table 2 showed the calculated t-value 1.09, while the critical t-value is 1.96 at 0.05 alpha level and 316 degrees of freedom. With this result, the Null hypothesis is retained. This implies that there is no significant difference between the male and female NTI Trainees' Perception of Pedagogical Skills in Basic Science and Technology.

## **Discussion of Result**

The findings from table 1 suggest that the NTI retraining programme in Science and Technology is yielding significant impart in teachers' pedagogy particularly in the aspect of Basic knowledge and communication skills but not in manipulative skills. The inadequate acquisition of manipulative skills as revealed in the study is in agreement with Uzoagulu, in Onweh (2005) when he stated that where equipment and tools are not adequate or functional, technical training programmes suffer and more often than not lead to poor acquisition of manipulative skills, that a trainee can only acquire the desired manipulative skills through active involvement in hands-on activities.

Therefore, the teacher capacity building workshop on science and technology as packaged by the National Teachers Institute (NTI) may not have been given desired attention to inclusion of necessary instructional materials and tools for hands-on activities and this accounts for the in adequate acquisition of manipulative skills by trainees as evidenced in this study.

Result from table 2 indicates that there is no significant difference between male and female NTI trainees' perception of the pedagogical skills acquired in Basic Science and Technology. The findings suggest that female and female NTI trainees perceived the pedagogical skills in Basic Science and technology positively. This may be because since the training programme is geared towards making teachers acquire better skills, knowledge and perhaps subject-specific pedagogy, they are most likely to have the same perception.

However, non of the studies cited herein dealt on teachers' sex and perception of pedagogical skills but there is unanimous agreement among NTI trainees that pedagogical skills acquisition are positively perceived since they acquaint them with new knowledge, skills and attitude. It therefore follows that the perception of NTI trainees with respect to pedagogical skills transcends sex.

### **Conclusion**

Arising from the findings of this study, the following conclusions are drawn.

The NTI capacity building workshop for primary school teachers on basic science and technology impart positively on some aspects of teacher pedagogy particularly basic knowledge and communication skills but certainly not on manipulative skills. There is no significant difference between male and female primary school teachers' perception of pedagogical skills. Therefore the teachers' perception of pedagogical skills transcends sex.

### **Recommendation**

Based on the findings, the following recommendations are made as strategies for strengthening teachers' capacity building:

1. Capacity building programmes should be designed to adequately include hands-on activities to enhance knowledge of content areas and also improve pedagogy most particularly manipulative skills.
2. Teacher capacity building should transcend beyond traditional model of professional development that focuses on expanding a teacher's repertoire of well defined classroom practices.
3. More emphasis should be placed on practical demonstrations and practices in subsequent capacity building workshop for science and technology teachers to enable them be doers of science rather than being passive listeners.
4. Government and all stakeholders in science education should endeavour to support science teacher capacity building through provision of needed instructional resources for optimum result.



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