

Evaluation of Sustainable Development Goal 4 on Gender and Basic Science Teachers' Pedagogical Skills in Sokoto State, Nigeria

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Abstract

This study is on evaluation of sustainable development goal 4 on gender and Basic Science teachers' pedagogical skills in Sokoto State, Nigeria. It was a descriptive study in which a survey research design was employed. The population for this study was 241 Basic Science teachers. The sample of teachers used in the study was 107 (51 SDG trained teachers and 56 non-SDG trained teachers). Basic Science Teachers' Pedagogical Skill Questionnaire (BSTPSQ) was the instrument used for data collection. One research question and one research hypothesis were stated and analyzed. The finding revealed no significant difference between male and female teachers' pedagogical skills of teachers trained under SDG and those not trained under SDG in Sokoto State. It was therefore recommended that pedagogical skills of male and female Basic Science teachers should be appraise periodically by the education inspectors.

Keywords: *Sustainable Development Goal, Gender, Teachers' Pedagogical Skill*

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Background to the Study

The goal 4 of the Sustainable Development Goals (SDGs) is all about quality education that seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. There are ten targets in goal 4 of the SDGs that are expected to be achieved by all nations by 2030. Sustainable Development Goals (SDGs) was embraced when it became clear and apparent that it was not possible to attain Millennium Development Goals (MDGs) at the end of December, 2015, the terminal date for the project. The United Nations general assembly met at New York, on 25th of September, 2015 and adopted 17 goals, 169 targets with motto “leave no one behind”. According to the FML/NTI (2016) Sustainable Development Goals (SDGs) are detailed far-reaching and people centered set of universal goals and targets. The world has come to realize that eradicating poverty, including extreme poverty is the number one challenge today and necessary ingredient for sustainable development. The present SDGs will last from 2016–2030. SDGs are the umbrella of different non-governmental organizations under the auspices of the United Nation, supporting training and re-training of teachers in Nigerian schools (United Nations, 2015).

It is not possible to discuss the strategies for achieving the Sustainable Development Goal 4 (SDG 4) without making reference to the teachers since they play pivotal role in advancing goals of educational systems. A plethora of literature articulates clearly how teachers are the key factors that drive the education system which help in developing the requisite manpower for accelerating national development. Since teachers are at the heart of the transformation, to do this effectively, they need to be adequately equipped (Lederman and Gess-Newsome, 2009). Thus, the teacher becomes a major factor in the strategies for achieving the targets of the SDG 4. Undeniably, without a professionally qualified and committed teacher, schools can hardly achieve their primary purpose of facilitating student meaningful learning in learners. As a matter of fact, teachers whose orientation are highly skewed towards teaching children to pass examinations and who do not utilize the teachers' Pedagogical Skills cannot positively impact on SDG 4 and consequently on the other 16 SDGs. In other words, a teacher education curriculum that emphasizes the development of cognitive competences will definitely be inadequate, as a more critical, expansive orientation to knowledge and technological pedagogical skills is required, if equitable and quality education is to be achieved. The implication is that teacher education programmes must support teacher trainees with these soft skills as well as technological pedagogical skills to effectively equip learners for sustainable development.

While the concept of teachers' pedagogical skills is debated in the literature (Lederman and Gess-Newsome, 2009), there is general agreement that the development of teachers' pedagogical skills is embedded in classroom practice (Van Driel, Verloop and De Vos, 2008). On the other hand, successful teachers in basic science who promotes pupils' learning, are likely to have well-developed pedagogical skills in that specific basic science. Grossman attributes the development of pedagogical skills in teachers to a number of factors which include observation of classes, courses in teacher education and classroom teaching/learning experiences. But Marks (2000), takes a much more integrated view of the development of teachers' pedagogical skills and states that the development of pedagogical skills revolves around interpretation of subject matter knowledge and general pedagogical skills.

Unfortunately, UNESCO (2015, 2016) found that around 250 million children are not learning basic skills, even though half of them have spent at least four years in school. Affirming this deficiency in teachers, Rose and Alcott (2015), said teachers are unable to perform numeracy and literacy tasks for which they are meant to be preparing their students. To fill this gap, Rose and Alcott (2015), called for appropriate training incorporating practical classroom experience, which will enable teachers support children to learn the basic skills and to progress at the right pace. It thus implies that if teachers in government schools often lack the proficiency to do their work, government cannot deliver inclusive, equitable quality education, if it does not improve on the capacity of teachers in all the levels of the education system.

Considering the fact that teachers tend to teach as they were taught the need to institutionalize in-service training that equips teachers with reflective practice and peer collaboration becomes an imperative so that these new skills germane to the SDGs will be acquired. It is a truism that the achievement of the SDG 4 rests on teachers' use of pedagogical skills associated with sustainable development and this requires them to move from teacher-centred to student-centred methods and strategies; from rote memorization to participatory learning. The use of learner-centred or participatory pedagogies empowers students to become learners today and later in life as lifelong learners who will be active community participants in decision-making (Adeosun, 2012).

The use of pedagogical skills of male and female teachers for active participatory teaching and learning strategies stimulate students to think deeply and to ask questions, analyze, think critically and make decisions. Erinoshio (2005), opined that there is a strong association between gender and response to science education. He concluded that there is likely influence of gender factors on students' academic achievement in Basic Science when they are taught using the cooperative and conventional learning methods. According to Ogunkola and Bilesanmi-Awoderu (2000), issue of gender is an important one in Science education especially with increasing emphasis on ways of boosting manpower for technological development as well as increasing the population of females in science and technology fields. The fact is that there is no clear-cut evidence that proves the superiority of male over the females when it comes to science learning.

In order to achieve the SDGs 4 which specifically targeting education and seek to ensure inclusive and equitable quality education and promote lifelong learning opportunity for all, National Teachers' Institute was mandated by Act No. 7 of 1978 of the National Policy on Education (NPE) to organize programmes for the upgrading of teachers at all levels, a duty which it has been discharging since its establishment, and more evidently so since 2006, initially in respect of MDG and now with inception of SDGs. According to Ahmed (2006), the National Teachers Institute (NTI) which started in 2006, had re-training 145,000 primary school teachers across the nation between 4th and 29th September 2006; training which covered innovative ways of teaching primary schools core subjects (English, Mathematics, Science and Social Studies), improvisation of instructional materials, school-based assessment and basic computer skills, sensitization of teachers on 9-year Basic Education Curriculum. Since 2006 capacity building programme for primary school teachers has continued on a yearly basis except in 2007, with the aim of re-training 145,000 teachers every year.

The teacher education programme prepares teachers to achieve the sustainable development goals used for best practices in teaching and learning. The teachers in the primary and junior secondary schools understand the need to teach for sustainability. They understand the crucial role they are to play to help the country achieve the SDGs considering the fact that they interpret and implements the policy using the school curriculum (Aguale, and Agwugah, 2007). Although, there are thousands of teachers still yet to be re-trained from the latest development in subject matter content, knowledge and innovative best practice in pedagogical skills. The re-training of teachers under SDG according to Azare (2016), is significant because it hopes to reverse the trend in falling standards of education through better effective teaching by providing some relevant ideas and skills at the SDG workshop, and teachers need to be constantly updated in the latest best practices in the methods and techniques of teaching as well as their classroom management skills.

Previous workshops of MDGs had focused on the subjects: English, Mathematics, Basic Science and Technology and Social Studies. However, SDG workshop where 16,350 teachers were trained in the whole federation was broader in scope, and mainly paid attention to teaching methods and techniques to teaching, classroom management, teacher language communication skills and how ICT can best contribute to teachers' knowledge and teaching effectiveness (Adeosun, 2012).

However, since the inception of the SDGs training programme in Sokoto State, emphasis has not been lay on the assessment of the programme. Whereas, evaluation is an aspect of follow up to assess Sustainable Development Goal 4 on basic science teachers' pedagogical skills. According to Education Sector Support Programme in Nigeria (ESSPIN, 2010) evaluation refers to the assessment of participants where the focus is on the outcome of a programme. Evaluation of SDG training programme through the responses of the teachers will enable the sponsors know the next line of action to take, either to continue with the programme or make some modification aimed at improving the quality of the training. Likewise, it will enable the government to assess the level of pedagogical skills acquired by the teachers that participated in the training programme.

Statement of the Problem

Despite the fact that professional teachers have undergone NCE and undergraduate programme in education to enable them adequately prepare for the teaching of basic science, still there is persistent failure in Basic Education Certificate Examination (BECE), MOE Sokoto (2017). Scholars like Haggis (2003), and Gagne (2007), were of the opinion that poor Basic Science teaching and learning emanate from lack of activity-oriented method of teaching. Inability of teachers to improvise learning materials and the inability also to involve students in Basic Science activities both outside and inside the class. Other problems identified include low morale and poor preparation of teachers, overcrowded classroom/inadequacy of laboratory and workshop facilities, poor attitude of students to work, gross under-funding and inadequacy of rewards for excellence in science teaching and learning among others (Okebukola, 2006; Obamanu and Nbina, 2010). In order to improve teachers' pedagogical skills and capacity to effectively deliver in classroom teaching situations, one of the

mechanisms put in place is the training and re-training of teachers under SDG programme. This study is therefore instituted to evaluate Sustainable Development Goal 4 on basic science pedagogical skills of teachers (male and female) that were exposed to training under the SDGs training programme in Sokoto State, Nigeria

Objective of the Study

The objective of the study is to determine the pedagogical skills of male and female basic science teachers trained under Sustainable Development Goals (SDG) 4 and those not trained under SDG 4 in Sokoto State.

Research Question

The research question raised to guide the study was:

To what extent is the pedagogical skill of male and female Basic Science teachers exposed to Sustainable Development Goals (SDG) 4 training and those not trained under SDG 4 in Sokoto State?

Research Hypothesis

The research hypothesis formulated for the study was:

There is no significant difference between male and female basic science teachers trained and untrained under SDG (4) with regards to their mean pedagogical skills scores in Sokoto State.

Methodology

Research Design

This study was instituted to evaluate the Sustainable Development Goal (SDG) 4 on male and female basic science teachers' pedagogical skills in Basic Science in Sokoto State, Nigeria. The study employed survey research method in which treatment by subject design was used. The researcher selected the basic schools whose Basic Science teachers had SDG training and no SDG training. The Basic Science teachers selected to participate in the study were given the instruments to fill. The researcher visited the selected schools using one week to collect the data from each of the zonal offices.

Population of the Study

The population for this study made up of all the Basic Science teachers in Upper Basic level in Sokoto State. According to SUBEB (2018), there were 222 Upper Basic level schools in Sokoto state with a population of 241 Basic Science teachers.

Sample and Sampling Techniques

A sample of 107 Basic Science teachers was used in this study. The sample contained 51 SDG trained teachers (41 males and 10 female) and 56 non-SDG trained teachers (45 male and 11 females). The 56 non-SDG teachers that participated in the study were selected using simple random sampling technique. The selection of the sample teachers was based on Central Limit Theorem which according to Sambo (2008), a sample as big as 30 is enough to produce a normal result and represent a given population. In order to have basis for fair analysis of the data to be collected, purposive sampling technique was used to select two schools each from

the four Education Zones. In each zone, one of the schools selected have a male teacher and the other one a female teacher who either receives SDG training or otherwise.

Instrumentation

The instrument used for data collection was a self designed questionnaire termed Basic Science Teachers' Pedagogical Skills Questionnaire (BSTPSQ). The instrument is a 5-likert type with options such as SA=Strongly Agree, A=Agree, U=Undecided, D= Disagree, SD=Strongly Disagree containing 43 item. The instrument was divided into two sections, Section A deals with the participants bio-data while Section B ask questions about basic science teachers' pedagogical skills in Basic Science.

Validation of the Instrument

The instrument BSTPSQ was given to some experts in the academia for both qualitative and quantitative measure. The initial draft of the instrument consisting of 50 items was modified and reduces to 43 after which the expert adjudged the instrument to have face, construct and content validity.

Reliability of the Instrument

The instrument was administered once to 10 teachers who are not part of the study sample using split-half method. The result of the data collected was subjected to analysis using Cronbach alpha statistical tool to compute the internal consistency of the items which yielded reliability coefficient of 0.79, which signified that the instrument was reliable.

Data Analysis

The data collected for the study was analyzed using descriptive and inferential statistics. The research question was answered using descriptive statistics of means and standard deviations while the hypothesis was tested using ANOVA at $p \leq 0.05$ level of significance.

Data Analysis

This section presents the results of the analysis conducted to answer research questions. Descriptive statistics of mean ranks, sum of ranks, means, and standard deviations were used to interpret the results.

Data from Pedagogical Skills by Gender

Table 1: Mean Pedagogical Skills Scores of Male and Female Basic Science Teachers Trained Under SDG and Those not Trained Under SDG

Training	Gender	N	Mean	Std. Deviation	Mean difference
Trained	Male	44	128.4545	22.19413	8.4545
	Female	7	120.0000	25.88436	
Untrained	Male	41	115.5854	26.11511	6.0521
	Female	15	109.5333	23.92210	

Table 1 shows the mean rank pedagogical skills scores of male and female Basic Science teachers exposed to training under SDG and those not trained under SDG. The mean rank

pedagogical skills score of male Basic Science teachers exposed to training under SDG of (128.4545) was higher than that of female Basic Science teachers (120.0000). The mean rank pedagogical skills score of male Basic Science teachers not exposed to training under SDG of (115.5854) was higher than that of female Basic Science teachers (109.5333). The total mean rank pedagogical skills score of male and female Basic Science teachers exposed to training under SDG of (127.4400) was higher than that of male and female Basic Science teachers that did not receive any SDG training (113.9643). The total mean rank pedagogical skills scores of male Basic Science teachers exposed and not exposed to training under SDG of (122.5238) was higher than that of female Basic Science teachers (112.5238). This implies that male Basic Science teachers exposed to training under SDG shows more pedagogical skills in teaching Basic Science than female teachers not exposed to SDG training.

Hypothesis

There is no significant difference between the mean scores of male and female Basic Science teachers' pedagogical skills trained under SDG and those not trained under SDG in Sokoto State.

The hypothesis was tested using parametric statistic of ANOVA II Test. The result of the analysis is presented in Table 2.

Table 2: Summary of ANOVA II Test on Pedagogical Skills of Male and Female Basic Science Teachers Trained and Not Trained Under SDG

Source	Type III Sum of Squares	Df	Mean Square	F	P	Remark
Corrected Model	5576.501 ^a	3	1858.834	3.169	.028	S
Intercept	799682.433	1	799682.433	1363.492	.000	S
Training	1941.737	1	1941.737	3.311	.072	NS
Gender	750.366	1	750.366	1.279	.261	NS
training * gender	20.581	1	20.581	.035	.852	NS

a. R Squared = .085 (Adjusted R Squared = .058)

Table 2 presents summary of Multivariate Analysis of Variance on pedagogical skills scores of male and female Basic Science teachers trained and not trained under SDG. The pedagogical skills scores for the type of training showed that $F(1,102)=3.311$, $p=0.072$; the hypothesis that states no significant difference is retained. The pedagogical skills scores for gender was $F(1,102)=1.279$, $p=0.261$; the null hypothesis that states no significant difference is retained. When the interaction of the training and gender were considered together, $F(1,102)=0.035$, $p=0.852$; the null hypothesis which states no significant difference is retained. Therefore, there is no significant difference between the mean Basic Science teachers' pedagogical skills scores of male and female teachers trained under SDG and those not trained under SDG in Sokoto State. That is, the pedagogical skills of male and female Basic science teachers whether they receive SDG training or not, does not differ towards teaching of Basic Science.

Discussion

The result of the hypothesis that says there is no significant difference between the mean scores of male and female Basic Science teachers' pedagogical skills trained under SDG and those not trained under SDG in Sokoto State, indicates that SDG retraining has no effect on genders in the improvement of pedagogical skills in Basic Science teaching. This is shown by p-value of 0.261 greater than alpha value at 0.05. The finding of this study is consistent with the findings of researches such as Bilesanmi-Awoderu (2002) and Erinoshio (2005), their studies revealed no strong association between gender and response to science education. The issue of gender is an important one in Science education especially with increasing emphasis on ways of boosting manpower for technological development as well as increasing the population of females in science and technology fields (Ogunkola and Bilesanmi-Awoderu, 2000). The fact is that there is no clear-cut evidence that proves the superiority of male over the females when it comes to science learning.

In Nigeria, and perhaps the whole of Africa, gender bias is still very prevalent (Arigbabu and Mji, 2004). In the same vein, Kabeer (2001), explained that gender roles are some extents more rigid in Africa especially in Nigeria where gender differences are accorded priority. It is common place to see gender stereotypes manifested in the day-to-day life of an average Nigerian. However, certain studies and meta-analyses have found that the effect of teachers' Pedagogical Skills on pupils' academic achievement outcomes is positive and significant in some cases (Santillan, 2008) and this is across the gender line.

Conclusion

Based on these evidences from the finding of the study, it could be concluded that SDGs teachers retraining programme is an important exercise for Basic Science teacher professional development hence, the need for its continuity.

Recommendations

The study therefore recommends that pedagogical skills of male and female Basic Science teachers should be appraise periodically by the education inspectors.

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