

Evaluation of Sustainable Development Goal 4 on Gender and Pupils' Academic Achievement in Basic Science in Sokoto State, Nigeria

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Article DOI: 10.48028/ijprds/ijormsse.v8.i1.13

Abstract

This study is on evaluation of sustainable development goal 4 on gender and pupils' academic achievement in basic science in Sokoto State, Nigeria. It is a descriptive study in which a survey research design is employed. The population for this study was 256 pupils (105 males and 151 females). One research question and one hypothesis was stated and analyzed. Achievement Test Questionnaire (ATQ) was the instrument used for data collection. Mean and Standard Deviations were used to answer research question while hypothesis was analyzed using Analysis of Covariance (ANCOVA). The finding revealed a significant difference between the mean Basic Science achievement scores of male and female pupils taught by teachers trained under SDG and those not trained under SDG in Sokoto State. It could be concluded that SDGs teachers retraining programme is an important exercise for teacher professional development and pupil academic achievement in Basic Science with respect to gender. It is therefore recommendation that government, NGOs and other stakeholders in education should lay emphasis on pedagogical skills assessment and follow-up evaluation after the training to ensure effective and efficient implementation and achievement the goal 4 of SDG before the expiration time.

Keywords: *Sustainable Development Goal, Gender, Academic Achievement, Basic Science*

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Background to the Study

The intergovernmental negotiations on the post 2015 Development Agenda (IGN) began in January 2015 and ended in August 2015. Following the negotiations, a final document was adopted at the UN Sustainable Development Summit September 25–27, 2015 in New York, USA (United Nations, 2016a). The title of the agenda is Transforming Our World: the 2030 Agenda for Sustainable Development. The Sustainable Development Goals – an ambitious and universal agenda to transform our world. This new global framework to redirect humanity towards a sustainable path was developed following the United Nations Conference on Sustainable Development in Rio de Janeiro, Brazil in June 2012, in a three-year process involving UN Member States, national surveys engaging millions of people and thousands of actors from all over the world. At the core of the 2030 Agenda are 17 Sustainable Development Goals (SDGs). The universal, transformational and inclusive SDGs describe major development challenges for humanity (United Nations, 2016b). The aim of the 17 SDGs is to secure a sustainable, peaceful, prosperous and equitable life on earth for everyone now and in the future. The goals cover global challenges that are crucial for the survival of humanity. They set environmental limits and set critical thresholds for the use of natural resources. The goals recognize that ending poverty must go hand-in-hand with strategies that build economic development. They address a range of social needs including education, health, social protection and job opportunities while tackling climate change and environmental protection (FME/NTI, 2016).

The goal 4 of the 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. Important stakeholders in the education industry are expected to play some basic roles in ensuring that this time around SDGs goals and objectives particularly, as they relate to education, policy makers, administrators, teachers, parents and other relevant stakeholders are expected to realize in Nigeria (FME/NTI, 2016).

In its effort and commitment to achieve the goal 4 of the SDGs and also improve and enhance quality teaching of Basic Science at Junior Secondary School with a view to arresting persistent students' failure in Basic Education Certificate Examination (BECE), the Federal Government of Nigeria through the support of different international development partners came-up with different training and re-training of teachers at basic education level (Azare, 2016). Some of the initiatives included nationwide-capacity building programme for all primary school teacher under former Millennium Development Goals (MDG) Project. United Nation Children Fund (UNICEF), the agency is funded by Department for International Development (DFID), UNICEF introduced Girls Education Project with a view to encouraging girls' participation and involvement in education through cash transfer grants to schools and capacity building training for both teachers and School Based Management Committees (SBMCs).

Moreover, Northern Education Initiative Plus (NEI+), the initiative is funded by the United State Agency for International Development with aim of revival reading culture

at lower basic education level in Bauchi and Sokoto States through Early Grade Reading (EGR). The initiative has procured and distributed reading materials to supported schools in addition to training of teachers on how to use the materials. Japanese International Corporation Agency (JICA) is funded by Japanese Government. The agency is supporting quality basic education in two component areas; first, grants in aids for school construction, procurement of instructional materials and capacity building training for mathematics and science teachers with sole aim of improving the capability of primary pupils in mathematics and science through a project known as (SMASE) Strengthening Mathematics and Science Education (ESSPIN, 2010). The programme is funded by Department for International Development (DFID) with objective of ensuring that more Nigerian children complete a full basic education cycle of acceptable quality, leading to meaningful learning outcomes. The programme directly supports school head teachers on lesson processing and lesson planning. State Education Programme Investment Project (SEPIP). The project is funded by the Department for International Development (DFID) with focus on strengthening the educational system by supporting need-based teacher development and improved school-level management and accountability, United Nation Education Scientific and Cultural Organization (UNESCO, 2014). The main focus of all these agencies was to develop and build the teachers' capacity to teach pupils effective in order to achieve improved pupils' academic achievement.

Achievement as concept has been defined in different ways by different educationists depending on the situation at hand. Broadly speaking, achievement simply means accomplishment or proficiency of performance in a given task or body of knowledge. Academic achievement is the knowledge attained or skill developed in the school subject, in most cases designated by test score or by means assigned by teacher (David and Stanley, 2000). Pupil's Academic Achievement could be broadly categorized into two, achieve or under achieve. Under achieve is regarded as performance that is below minimum standard (Okebukola and Jegede, 2006). Under achievement according to Abbas (2009) is a level of achievement below expected intelligent quotient (IQ) of an individual. He continues to maintain that a student may be under-achiever even though he/she is performing as well as overachiever, whose average mental ability not withstanding has put up a relatively good show. Pupils' academic achievement according to Musa (2000) refers to achievement as the quality of result produced by students as reflected in the quality of their examination scores. Despite the efforts of government and other concern stakeholders towards reviving the teaching and learning of Basic Science through SDG training programs to Basic Science teachers, there is still disparity in the academic achievement of male and female pupils in Basic Science. What has remained the main focus of great concern in the field of science education are the biases and misconceptions about women and science, i.e., Science is a male enterprise (Erinosho, 2005).

Researches had been carried out on gender issues in science education (Erinosho, 2005; Bilesanmi-Awoderu, 2002, Kennedy, 2000). Many researchers have provided reports that there are no longer distinguishing differences in the cognitive, affective and psychomotor

skill achievements of students in respect of gender (Arigbabu and Mji 2004; Bilesanmi-Awoderu, 2006; David and Stanley, 2000; Din, Ming, and Esther, 2004; Freedman, 2002; Sungur and Tekkaya, 2003). However, Aguele and Agwugah (2007), Billings (2000), Kolawole, (2007) in their studies found that male students performed better than female students in the cognitive, affective and psychomotor skill achievements. There is a 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). In Nigeria, and perhaps the whole of Africa, gender bias is still very prevalent (Arigbabu and Mji, 2004). This is a view to which Kabeer (2004) has also alluded in pointing out that sex roles are somewhat rigid in Africa particularly in Nigeria, gender differences are emphasized. It is common place to see gender stereotypes manifested in the day-to-day life of an average Nigerian.

Gender issues, both on the part of the teachers and students, have been documented to affect achievement generally (Erinosho, 2005; Kennedy, 2000). Girls are being encouraged and sensitized into developing positive attitudes towards science. However, some researchers still found that there are still significant differences in the cognitive, affective and psychomotor skill achievements of students in respect of gender (Aguale and Agwugah, 2007; Billings, 2000; Kolawole, 2007). Chin-chau (2007) study revealed no significant gender effects on the variables of goal orientation, mathematics achievement, intrinsic motivation, and beliefs about failure. As we have entered the exciting era of the full implementation of the 2030 Agenda for Sustainable Development. This Agenda comes together with a follow-up and review mechanism to ensure the Sustainable Development Goals (SDGs) are systematically monitored and reviewed to help countries implementing the 2030 Agenda. This means evaluation should play a crucial role to support effective and efficient SDG implementation. Hence, the need to evaluate SDG 4 on gender and pupils' achievement in Basic Science in Sokoto State, Nigeria.

Statement of the Problem

In order to achieve the goal 4 of Sustainable Development Goals (SDGs), the Federal, State and Local Government of Nigeria in conjunction with some NGOs and development partners put in place a mechanism to training and re-training basic science teachers under SDGs programme, aimed at improving their skills and capacity to effectively deliver in classroom teaching situations. The current study was instituted to evaluate the progress or otherwise of the training and retraining programme as a criterion for the follow-up procedure for the achievement and implementation of the goals 4. Therefore, this study evaluated Sustainable Development Goal 4 on gender and pupils' academic achievement in basic science in Sokoto State, Nigeria.

Objective of the Study

The objective of the study was to determine Basic Science achievement of pupils taught by teachers trained under Sustainable Development Goals (SDG) 4 with respect to gender.

Research Question

The research question raised to guide the study is:

What is the difference between the mean Basic Science achievement scores of male and female pupils taught by teachers trained under Sustainable Development Goals (SDG) 4 in Sokoto State?

Research Hypothesis

The research hypothesis tested at $p \leq 0.05$ level of significance was:

There is no significant difference between male and female pupils taught by trained teachers with regards to their mean achievement score in Basic Science in Sokoto State.

Methodology

Research Design

The study was a survey research method in which treatment by subject design was employed. This enabled the researcher to obtain and assess JS II students' academic achievement in Basic Science.

Population of the Study

The population for the study was 54,612 JSS II pupils spread across 222 Upper Basic schools in Sokoto State out of which 35,486 are male and 19,126 are female.

Sample and Sampling Procedures

A sample for the study was 256 pupils containing 105 males and 151 females. In each of the 4 selected schools, a single class was randomly selected to participate in the research. The pupils were selected according to the Cochran's formula and table of sample size determination.

Instrumentation

The Achievement Test Questionnaire (ATQ) was the instrument used to collect data for the study. The instrument contains 20 items with 4 options from where the student picks the correct answers to each question. Each correct answer attracts 5 marks while wrong answer attracts 0 (zero) mark. The maximum score is 100, the mid score is 50, while the least mark is zero (0) mark.

Validation of the Instrument

All the items on the instrument were past questions from BECE in Basic Science. The questions were based on curriculum of JSS II. The instrument was given to Basic Science teacher to validate, and they adjudged the instrument to have content, construct and face validity after making and effecting necessary corrections and adjustments.

Reliability of the Instrument

The reliability of an instrument is the capability of the instrument to measure what it is supposed to measure. The reliability measure is part of the quantitative procedure of validating an instrument. The instrument reliability indices were computed using split-

half method employing odd and even number procedure by employing Cronbach's alpha statistical tool to compute the alpha coefficient. The reliability coefficient “r” = 0.86 was obtained which signified that the instrument was reliable.

Data Analysis

Descriptive and inferential statistics tools were used in the data analysis procedures. The research question was analyzed using descriptive statistics of means and standard deviations. The hypothesis on the other hand, was tested using parametric statistic of Analysis of Covariance (ANCOVA) at $p \leq 0.05$ level of significance.

Data from Achievement Test of the Pupils by Gender

Table 1: Mean Basic Science Achievement Scores of Male and Female Pupils Taught by Research Hypothesis

Teachers Trained Under SDG

Training	Gender	N	Mean	Std. Deviation	Mean difference
Trained	Male	63	56.73	27.787	-16.79
	Female	89	73.52	8.231	
Untrained	Male	42	47.24	17.530	-0.89
	Female	62	48.13	21.311	

Table 1 presents the mean achievement scores of male and female pupils taught by Basic Science teachers exposed to training under SDG and those not trained under SDG. The mean achievement score of male pupils taught by Basic Science teachers exposed to training under SDG of (56.73) was lower than that of female (73.52). The mean achievement score of male pupils taught by Basic Science teachers not exposed to training under SDG of (47.24) was lower than that of female pupils (48.13). The total mean achievement scores of male and female pupils taught by Basic Science teachers exposed to training under SDG of (66.56) was higher than that of male and female pupils taught by Basic Science teachers that did not receive any SDG training (47.77). The total mean achievement score of male pupils taught by Basic Science teachers exposed and not exposed to training under SDG of (52.93) was lower than that of female pupils (63.10). This implies that female pupils taught by Basic Science teachers exposed to training under SDG achieve better than male pupils.

There is no significant difference between the mean Basic Science achievement scores of male and female pupils taught by teachers trained under SDG in Sokoto State. The hypothesis was tested using parametric statistic of Analysis of Covariance. The result of the analysis is presented in Table 2.

Table 2: Summary of Analysis of Covariance on Basic Science achievement scores of Male and Female Pupils Taught by Teachers Trained and Not Trained Under SDG

Source	Type III Sum of Squares	Df	Mean Square	F	P	Remark
Corrected Model	32230.959 ^a	3	10743.653	28.760	.000	S
Intercept	759226.739	1	759226.739	2032.413	.000	S
Training	18151.278	1	18151.278	48.590	.000	S
Gender	4663.816	1	4663.816	12.485	.000	S
training * gender	3771.262	1	3771.262	10.095	.002	S

a. R Squared = .255 (Adjusted R Squared = .246)

The table 2 presents summary of Multivariate Analysis of Variance on Basic Science achievement scores of male and female pupils taught Basic Science by teachers trained and not trained under SDG. The Basic Science achievement scores of pupils taught under different types of training shows that $F(1,252)=48.590$, $p=0.001$; the null hypothesis that states no significant difference is rejected. The Basic Science achievement scores for pupils of different gender are $F(1,252)=12.485$, $p=0.001$; the null hypothesis that states no significant difference is rejected. When the interaction of type of training and gender are considered together, $F(1,252)=10.095$, $p=0.002$; the null hypothesis which states no significant difference is rejected. Therefore, there is a significant difference between the mean Basic Science achievement scores of male and female pupils taught by teachers trained under SDG and those not trained under SDG in Sokoto State. This shows that the training is not gender bias.

Discussion

The result indicates that SDG retraining has gender effect on achievement in Basic Science in Sokoto State. This finding is in agreement with the studies of (Kennedy, 2000, Bilesanmi-Awoderu, 2002; Erinosh, 2005). In addition, Billings (2000), Kolawole, (2007) and Aguele and Agwugah (2007), have provided reports that there are no longer distinguishing differences in the cognitive, affective and psychomotor skill achievements of students in respect of gender. Their studies found that male students performed better than female students in the cognitive, affective and psychomotor skill achievements. This may not agree with other studies before now but this is only truth with Basic Science. Gender issues, both on the part of the teachers and students, have been documented to affect achievement generally (Erinosh, 2005; Kennedy, 2000). Girls are being encouraged and sensitized into developing positive attitudes towards science. However, some researchers still found that there are still significant differences in the cognitive, affective and psychomotor skill achievements of students in respect of gender (Aguele and Agwugah, 2007; Billings, 2000; Kolawole, 2007). Likewise, Chin-Chau (2007), study revealed no significant gender effects on the variables of goal orientation, mathematics achievement, intrinsic motivation, and beliefs about failure.

Conclusion

Based on these evidences the study concludes that SDGs teachers retraining programme is an important exercise for teacher professional development and pupil academic achievement in Basic Science with respect to gender.

Recommendations

Based on the finding from the study, it recommended that government, NGOs and other stakeholders in education should lay emphasis on pedagogical skills assessment and follow-up evaluation after the training to ensure effective and efficient implementation and achievement the goal 4 of SDG before the expiration time.

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