

## Relevancy of Basic Science and Technology Curriculum in Preparing Students for Science and Technology Subjects at Senior Secondary School Level

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### Abstract

*The Revised Basic science and technology (BST) curriculum was introduced at Junior Secondary School (JSS) level of Nigerian Education system recently. The objectives of the curriculum are to reduce the number of subject offered at JSS and prepare students for science and technology subjects at senior secondary schools (SSS) level. However, there has been a lot of criticism on the achievement of these objectives. This study therefore, assessed the relevancy of BST Curriculum in preparing students for SSS Science and technology subjects. Three research questions and two hypotheses guided the students. Survey research design was used for the study. The sample for the study consists of 257 science and technology teachers in Federal Capital territory, Abuja. The instrument used for data collection was Relevancy of BST curriculum questionnaire. The reliability coefficient of the instrument was found to be 0.78 using Cronbach Alpha. Mean was used to answer the research questions; while t-test statistics was used to test the hypotheses at .05 level of significance. The findings revealed major gaps in relevancy of the curriculum. The study found out that most of items included in BST Curriculum are relevant to Science and Technology Subjects at SSS level, there was no significant difference between the mean responses of male and female science and technology teachers on the relevancy of the curriculum. The study recommended review of BST curriculum by Nigerian Educational Research and Development Council to ensure its responsiveness to emerging issues in the science and technology education and also address the gaps identified by this study.*

**Key words:** *Relevancy, curriculum, science and technology, curriculum contents.*

### Introduction

Education may be seen as a process by which individuals acquire knowledge, skills and attitudes, which enables them to develop their potentials in full. One of the merits of good education is that it enables individuals to contribute to the development in the quality of life for themselves, their communities and the nation as a whole. When these dimensions of education are achieved, then science and technology learning has become meaningful and fulfilling to the learner (Anderson, 2006). The development of science and technology is also recognized worldwide as vital for a nation's overall economic development. When used effectively science and technology is able to improve productivity and meet the needs of society. This has been demonstrated in the developed nations, and more recently in the newly

industrialising nations, where science and technology have been responsible for more than half of the increase in productivity and technological development. The quest for technological advancement and industrial revolution therefore demands for a robust and inclusive science and technology curriculum at basic level of education. The curriculum should appeal to all learners and relevant to their need, regardless of backgrounds. Students are likely to learn better when they are interested in the subject and the subject is also relevant to their need, hence it becomes important to prepare a curriculum that will be relevant and adequately cater for the need and interest of the students. There is evidence that using relevant context leads to a better understanding of the concepts involved compared to traditional teaching (Ramsden, 1997; Osborne & Collins, 2001) but a curriculum that uses content that is relevant and related to familiar and interesting phenomena and experiences in the local environment of the learners may lead to a more meaningful learning (Nganunu, 1998). Curriculum should therefore be planned in such a way that it adequately equip learners for future challenges and must be implemented in ways that motivate learners, make direct use of knowledge about their interests and concerns in future.

Studies has shown that Nigeria children are offering too many subjects at basic level of education and as such there is need for subject reduction (Federal Ministry of Education, 2007). In attempt to reduce the number of subjects offered at basic level, subjects that has common concepts were matched and fused together, while the emerging issues in science and technology were also taking into consideration. This was basis for the new Basic science and technology curriculum (BST).

For instance, the new Basic Science and Technology (BST) curriculum now comprised of four subjects-basic science, basic technology physical and health education and information technology. The of objectives of the present BST curriculum are to reduce subjects overload and content repetition at junior secondary school (JSS) and also to adequately prepare students at JSS for SSS learnings and activities in science and technology subjects (Federal Ministry of Education, 2007). It is expected that this new curriculum will now serve as a preparatory (prerequisite) subject for science and technology subjects such as physics, chemistry, biology, agricultural science, health education, computer related subjects, technical drawing, basic electronic, metal work, wood work auto mechanic at SSS level. However, there has been a lot of criticism on the relevancy of the present basic education curriculum of which BST curriculum is included (Nwaubani & Azuh, 2014). In the contest of the study relevancy means that the BST curriculum must be relevant to the need and aspiration of students in science and technology subjects at SSS level. Dike (1995) cited in Ivowi, Nwifo, et al (2009) defines relevant curriculum as one that endows its learners with appropriate knowledge, skills and attitude which enable them to harness resources (materials and human) in order to improve the quality of life and the environment.

## METHODOLOGY

The design of the study was a survey research design. The population comprised of all the science and technology teachers teaching in public schools in Federal capital Territory (FCT), Abuja. The sample for the study consisted of 257 science and technology teachers drawn from secondary school teachers in FCT, Abuja. A list of science and technology educators sorted by teaching/professional fields was obtained from the School Board. Survey research was used to obtain specific information from a representative sample of these teachers about BST Curriculum relevancy. The final population consisted of all science and technology teachers in FCT who were teaching or working at Secondary schools and Technical Colleges, A stratified random sample of 257 teachers (25%) was selected from the total population of nearly 1028 teachers. The instruments used for data collection was questionnaire. To ensure validity of the instrument, the instrument was subjected to face validation by three experts in science and technology. The trial test for determining the reliability coefficient of the instrument was carried out using 30 Science and Technology Teachers in Bosso Local Government Area, Niger State. The reliability coefficient computed for the instrument was found to be 0.78 using Cronbach Alpha. All 257 teachers were sent the survey, along with a letter of explanation of this study. In order to preserve anonymity, the survey package was not marked or numbered in any way. The return rate was (216) 84%. Of the returned packages, (175) 80.8% provided usable data. Data were considered unusable if one or more of the questionnaire were incomplete or completed incorrectly. Data were analysed using mean and standard deviation to answer the research questions while hypotheses formulated were tested using t-test statistics at .05 level of significance.

## Results

The data analysis was carried out in line with research questions and hypotheses formulated

### Research Question 1

What are Teacher's views on the relevance of Basic science and technology for preparing students for SSS?

**Table 1:** Mean and Stand Deviation of the Respondents (Male and Female Teachers) on Relevance of BST for preparing students for senior secondary ( $N_1=105, N_2=70$ )

S/N	Item Statement	$\bar{X}_1$	$SD_1$	$\bar{X}_2$	$SD_2$	$\bar{X}_A$	$SD_A$	Remarks
1.	The contents of the BST curriculum are enough to mold student's behaviour in a positive way towards science and technology subjects at SSS level.	2.77	0.76	2.89	0.66	2.83	0.71	Agree
2.	The content of the BST curriculum is overloaded for students to learn at Junior	3.23	0.69	3.13	0.75	3.18	0.72	Agree

secondary Schools.								
3.	The BST curriculum at JSS does not adequately covered the basic areas that are needed for science and technology subjects at SSS level.	2.43	0.67	2.47	0.68	2.45	0.68	Disagree
4.	The curriculum at JSS does not contain the basic rudiments of science and technology.	3.23	0.89	3.12	0.72	3.18	0.81	Agree
5.	The themes of the curriculum are not sequentially arranged.	2.31	0.78	2.18	0.69	2.25	0.74	Disagree
6.	The components of the Basic science aspect of the curriculum are adequate to assist students in selecting or developing interest in science subjects like physics, chemistry, biology etc. at SSS level	3.22	0.88	3.31	0.72	3.27	0.80	Agree
7.	The components of the Basic technology aspect of the curriculum are adequate to assist students in selecting or developing interest in technical and vocational subjects like technical drawing, applied electricity, metalwork, wood work etc. at SSS level	2.85	0.62	2.99	0.92	2.92	0.77	Agree
8.	The components of the Physical and Health Education aspect of the curriculum are adequate to assist students in selecting or developing interest in health education at SSS level	3.22	0.73	2.81	0.63	3.02	0.68	Agree
9.	The components of the Information technology aspect of the curriculum are adequate to assist students in selecting or developing interest in ICT subjects like computer application, data processing, data management, etc. at SSS level	2.89	0.61	2.56	0.65	2.73	0.63	Agree
10.	The new BST curriculum if well implemented teach students about you and environment which is foundation of science and technology.	3.32	0.78	3.15	0.74	3.24	0.76	Agree
11.	The new BST curriculum if well implemented teach students about pathogen, diseases and prevention which is an important aspect of health education at SSS level	3.11	0.77	3.34	0.92	3.23	0.85	Agree
12.	The new BST curriculum if well implemented teaches students about science and development.	2.98	0.83	2.79	0.73	2.89	0.78	Agree
13.	The new BST curriculum if well implemented teach students about computer operation, ethics, concepts and technology.	2.67	0.75	2.88	0.64	2.76	0.70	Agree
14.	The new BST curriculum if well implemented teach students about you and environment.	2.66	0.67	2.85	0.62	2.76	0.65	Agree
15.	BST seek to promote mutual understanding and unity by teaching students about games and sports.	2.95	0.78	2.92	0.66	2.94	0.72	Agree

16.	BST teach students about respect for the environment and human life	3.35	0.69	2.97	0.91	3.16	0.80	Agree
17.	BST teach students about safety, materials, processing and drawing practice.	3.13	0.73	3.27	0.76	3.20	0.75	Agree
18.	BST teach students about basic human movement	3.21	0.69	3.19	0.68	3.20	0.69	Agree
19.	BST teach students about health Education.	3.33	0.82	3.24	0.89	3.29	0.86	Agree
	Grand Mean ( $\bar{X}_g$ ) and Standard Deviation ( $SD_g$ )	3.06	0.79	2.96	0.71	3.01	0.75	Agree

Key:  $\bar{X}_1$  = Mean of male teachers,  $\bar{X}_2$  = Mean of female teachers,  $\bar{X}_A$  = Average mean of the respondents,  $SD_1$  = Standard deviation of male teachers,  $SD_2$  = Standard deviation female teachers,  $SD_A$  = Standard deviation,  $N$  = Number of respondents

The data presented in Table 1 revealed that 17 of 19 items had average mean values ranged from 2.76 to 3.28. This showed that the mean value of each of the items was above the cut-off point of 2.50, indicating that BST Teachers are of the views that those items are relevance to senior secondary school science and technology subjects and learning. However, two of the items (item 3 and 5) had their average mean values below the cut-off point of 2.50, indicating that the teachers disagreed on those items; therefore the items are not relevant to learning of any science and technology subjects or activities at SSS level of education. In addition, Table 1 further revealed that the grand mean ( $\bar{X}_g$ ) value (3.01) of all the items is above the cut-off point (2.50). This an indication that all the respondents agreed that BST curriculum is relevance for preparing students for SSS. Lastly, the table also showed that the average standard deviation (SD) of the items ranged from 0.63 to 0.85. This indicated that the respondents were not very far from the mean and one another in their response.

### Research Question 2

What are Teacher's views on the need to review the content of BST curriculum in order to make it relevance at SSS?

S/N	Item Statement	$\bar{X}_1$	$SD_1$	$\bar{X}_2$	$SD_2$	$\bar{X}_A$	$SD_A$	Remarks
1	Students can develop positive behaviour towards science and technology through a comprehensive, unloaded with content and motivating curriculum.	3.18	0.65	2.96	0.94	3.07	0.80	Agree
2	BST teach students about respect for the environment. Students can acquire knowledge about respect for environment through a comprehensive,	2.98	1.05	3.12	0.83	3.05	0.94	Agree

	unloaded with content and motivating curriculum.							
3	Considering the importance of athletics, games and sports to National unity and integration, the BST curriculum content be increased to include more topics in PHE in order to enhance students' participation in games and sports at Senior Secondary school level.	3.13	0.67	3.17	0.88	3.15	0.73	Agree
4	There is a need to restructure the BST Curriculum to allow for a more detailed content such as applications of ICT tools and social media	2.32	0.74	1.89	0.84	2.05	0.79	Disagree
5	There is a need to remove the Physical and Health Education component of the Curriculum to allow for other contents in Basic Science and Technology, since science and technology is the bedrock of the nation	3.11	0.78	3.01	0.73	3.06	0.76	Agree
6	There is a need to remove the IT component of the Curriculum to allow it to stand out as another subject at Junior Secondary School.	2.97	0.78	2.87	1.02	2.92	0.90	Agree
	<b>Grand Mean (<math>\bar{X}_g</math>) and Standard Deviation (SDg)</b>	<b>2.95</b>	<b>0.79</b>	<b>2.91</b>	<b>0.88</b>	<b>2.93</b>	<b>0.83</b>	<b>Agree</b>

**Key:**  $\bar{X}_1$  = Mean of male teachers,  $\bar{X}_2$  = Mean of female teachers,  $\bar{X}_A$  = Average mean of the respondents,  $SD_1$  = Standard deviation of male teachers,  $SD_2$  = Standard deviation female teachers,  $SD_A$  = Standard deviation,  $N$  = Number of respondents

The data presented in Table 2 revealed that 5 of 6 items had average mean values ranged from 2.92 to 3.17. This showed that the mean value of each of the items was above the cut-off point of 2.50, indicating that science and technology Teachers are of the views that those items need to be review in order to make them relevance at senior secondary schools. However, one of the items (item 4) had its average mean values below the cut-off point of 2.50, indicating that the teachers disagreed on those items; therefore the items does not require any review to make them relevance at senior secondary school. In addition, the table further revealed that the grand mean ( $\bar{X}_g$ ) value (2.93) of the items is above the cut-off point (2.50). This is an indication that all the respondents agree on the need to review the content of BST curriculum in order to make it relevance at SSS level. Lastly, the table also showed that the average standard deviation (SD) of the items ranged from 0.63 to 0.85. This indicated that the respondents were not very far from the mean and one another in their response.

### Research Question 3

What are Teacher's views on the right structure for the BST curriculum to make it relevant?

**Table 3: Frequency and Percentage of Respondents on Types of Structure for BST Curriculum**  
( $N_1 = 105, N_2 = 70$ )

Types of Structure		Freq	Percent
A	Basic Science, Basic Technology, Physical and Health Education and Information Technology	Current Structure	28 29.47
B	Each Component stand alone as a subject	Previous Structure	12 12.63
C	Basic Science and Basic Technology stand as a subject while Physical and Health Education and Information Technology also stand as a subject	1 <sup>ST</sup> Alternative Structure	16 16.84
D	Basic Science and Physical and Health Education stand as a subject while Basic Technology and Information Technology also stand as a subject	2 <sup>ND</sup> Alternative Structure	00 0.00
E	Basic Science, Basic Technology and Information Technology stand as a subject while physical and Health Education stands alone as a subject.	3 <sup>ND</sup> Alternative Structure	16 16.84
F	Basic Science and Basic Technology stand as a subject, Physical and Health Education stand alone as a subject and Information Technology also stand alone as a subject	3 <sup>ND</sup> Alternative Structure	23 24.22
Total			95 100

Table 3 revealed that majority of the respondents 29.47% of the respondents were in favour of allowing the current status to remain, 12.63% agreed that the restructure should be reversed to former structure, while 16.84% suggested that an alternative structure compose of basic science and basic technology as subject while physical and health education and information as a subject should come on board. 16.84% of the respondents suggested that another structure compose of basic science, basic technology and information technology as subject while physical and health education stand alone should come on board and 24.22% agreed that another structure that compose of basic science and basic technology as a subject and information technology stand alone as a subject and physical and health education also stands alone as a subject. No respondent (0.00%) agreed to composition of Basic Science and Physical and Health Education as a subject while Basic Technology and Information Technology to also stand as a subject.

#### Hypotheses

$H_{01}$ : There is no significant difference between mean response of Male and Female Science and technology Teachers on relevance of BST for preparing students for SSS.

The hypothesis was tested using t-test statistical technique. Results were presented in table 4  
**Table 4: t-test analysis of the mean response of Male and Female Social Studies Teachers on the relevancy of BST for preparing students for SSS.**

Male Teachers	105	3.06	0.76	93	1.98	0.6540	0.015	
Female Teachers	70	2.96	0.71				0.000	Accepted

*Key: N = Number of respondents; SD = Standard Deviation;  $\bar{X}$  = Mean of respondents; Df = Degree of Freedom*

The t-test analysis on table 4 showed that there was no significant difference between mean response of Male and Female Science and Technology Teachers on relevance of BST for preparing students for SSS. This was indicated by overall calculated t-value of 0.6540 which is less than the t-table of 1.98 at degree of freedom 93 and 0.05 level of significance. As a result, the hypothesis was accepted. In other words, male and female science and technology teachers did not differ significantly in their responses on the relevancy of BST for preparing students for senior secondary schools.

**Ho<sub>2</sub>:** There is no significant difference between mean response of Male and Female Science and technology Teachers on the need to review the content of BST curriculum in order to make its relevance at SSS level

**Table 5: t-test analysis of the mean response of Male and Female Social Studies Teachers the need to review the content of BST curriculum in order to make its relevance at SSS**

Category	N	$\bar{X}$	SD	Df	t-value	t-cal	Std. Error	Sig.	Decision
Male Teachers	105	2.95	0.79	93	1.985	0.2326	0.019	0.000	Accepted
Female Teachers	70	2.91	0.88						

*Key: N = Number of respondents; SD = Standard Deviation;  $\bar{X}$  = Mean of the respondents; Df = Degree of Freedom*

The t-test analysis on table 5 showed that there was no significant difference between the mean response of Male and Female science and technology Teachers on the need to review the content of BST curriculum in order to make it relevance at SSS. This was indicated by overall calculated t-value of 0.2326 which is less than the t-table of 1.96 at degree of freedom 93 and 0.05 level of significance. As a result, the hypothesis was accepted. In other words, Male and Female Science and Technology teachers did not differ significantly in their responses on the need to review the content of BST curriculum in order to make its relevance at SSS.

### Discussion of Findings

The results in table 1 revealed the view of science and technology teachers on relevance of BST for preparing students for senior secondary. The result showed that majority of the teachers ( $\bar{X}_g = 3.01$ ) agreed that BST curriculum is relevant to SSS learning and activities in science and technology and the curriculum can adequately prepare Junior secondary schools students for SSS activities. This is in line with the opinion of Mandal (1984) who carried out a similar study on adequacy and relevance of the undergraduate curriculum for agricultural economics at the Bangladesh agricultural university and revealed that curriculum is relevant though the teaching of these courses has been by and large inadequate and less effective. Similarly, Nwaubani & Azuh, (2014) also conducted a study on the adequacy of Civic



contents in the Basic Education social studies curricula for effective citizenship training of Nigerian youths and discovered that majority of teachers respectively agreed that the goals of basic education social studies curricula are very relevant to civic training of Nigerian youths. However, notwithstanding the above position, it was also shown that current basic education social studies curricula did not adequately reflect sufficient civic contents. Table 2 provided answer to Research question 2. The result shows that majority of the responding science and technology teachers ( $\bar{X}_g = 2.93$ ) agreed that there was no need to review the present BST curriculum for now. This is because the present BST can adequately equip students for SSS learning and activities in science and technology. This findings is in agreement with the opinion of Offorma (1994) who pointed out that curriculum contents must be relevant to the need and aspirations of the learners. This was the reason why majority of the teachers are in favour of the current status (table 3) of curriculum that compose of Basic Science, Basic Technology, Physical and Health Education and Information Technology to remain. The results of hypotheses tested indicated there were no significance difference between mean response of Male and Female Science and technology Teachers on relevance of BST for preparing students for SSS and on the need to review the content of BST curriculum in order to make its relevance at Senior Secondary Schools.

### **Conclusion**

The fundamental issues which the findings of the study seem to have reiterated is the suitability of the Basic education BST curriculum in dealing with problems and issues confronting man technologically which science and technology education is a very vital aspect. Although, the BST curricula cannot completely covered the basic concepts that will sufficiently equips students for SSS learning directly, other related themes reflected in the curricula such as entrepreneurial, environmental education, climate change, drug abuse education, safety and security, food drugs safety education, disaster risk reduction education and consumer education concepts will also impact positively on students' attitude towards society. This position is informed by teachers' current knowledge of the integrated philosophy and nature of BST contents which recommends it as a suitable tool for inculcating scientific and technological virtues, knowledge, values, skills and attitudes into Nigerian pupils with a view to making them efficient scientists and technologists.

### **Recommendations**

Based on the findings of this study, the following recommendations were made:

1. Nigerian Educational Research and Development Council should ensure that BST curriculum respond to emerging issues in the education and technology sectors and also address the irrelevancies identified by this study

2. In-service training programmes such as workshops, conferences, seminars should be organized for BST teachers to enhance their instructional effectiveness in handling BST related concepts.
3. In addition, teacher preparation in BST studies should still take cognizance of the BST mandate of the subject and the growing status of BST as a separate school subject in Nigeria
4. The necessary facilities should be created in order to change the current lecture-based teaching into more practical and learning-by-doing type teaching.

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