Faculty of Natural and Applied Sciences Journal of Mathematics and Science Education
Print ISSN: 2814-0885 e-ISSN: 2814-0931
www.fnasjournals.com
Volume 6; Issue 4; May 2025; Page No. 58-65.

Impact of Curriculum Reforms on the Teaching and Learning of Basic Science in Niger State Secondary Schools

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Abstract
This study was on curriculum reforms and its impact on teaching and learning of Basic Science in secondary schools in Niger State, Nigeria. A survey research design was employed for the study. The population for the study was all the 181 science teachers from all the Government junior secondary schools in Niger state. simple random sampling technique was used to select Ninety- two science teachers from 10 senior secondary schools in education zone B of the state for the study. Three research questions guided the study. A 30 - item researcher-made 4- points scale Questionnaire titled, curriculum reforms and its impact on teaching and learning of Basic science (CRITLBS) was employed for the study. Test retest method was used to determine the reliability of the instrument to be 0.71. The instrument was administered on the respondents in the 10 randomly selected schools in 2024/2025 academic session. Data collected was analyzed using mean and standard deviation. A mean score of 2.5 and above was considered significant. The findings of the study revealed positive impacts of science education curriculum reforms on teaching and learning of Basic science with mean scores of 3.2, 2.9, and 3.4 for positive items. Based on the findings, three recommendations were made. Among which is that, Educational stake holders like managers, government among others should always plan for curriculum reforms at regular intervals and teachers well equipped to handle reforms by updating their knowledge and skills through seminars, workshops and symposiums so as to ensure improved quality of teachings particularly in the field of sciences.

Keywords: Basic Science, Curriculum Reforms, Teaching, Learning, Teachers

Introduction

Curriculum is the total package of what is to be taught or learnt, it is well programmed activities that transforms national education objective into achievable and implementable form (Ojo, 2019). In Nigeria, the inclusion of science subjects in the school curriculum is to promote national development as the nation adopts more science oriented policies and programs in education Ogundele (2020). Nigeria science education curriculum has received a tremendous attention since independence, there have been regular changes in education policy in the past century with corresponding curriculum reviews which resulted to introduction of Basic Science for Nigerian Secondary Schools (BSNSS) undertaken in 1962 at the Comprehensive High School, Aiyetoro, followed by the Nigerian Integrated Science Project (NISP) in 1971, a project of the Science Teachers Association of Nigeria (STAN). In 1969, the national curriculum conference led to the involvement of some government agencies such as the defunct Comparative Education study and Adaptation Centre (CESAC), the Nigerian Educational Research Council (NERC), which later merged to become the Nigerian Educational Research and Development Council (NERDC) Afolabi et al. (2021). The central concern of all the curriculums reforms is to facilitate transition from the traditional teaching methods to innovative teaching and learning strategies for better understanding of science concepts, stimulation of students' interest, enhanced transfer of knowledge and improved students' enrolment in science subjects, as the traditional approach did not adequately prepare learners to understand science and technology issues in a rapidly evolving world. The inclusion of science – technology and society (S-T-S) issues in the school curriculum is to achieve the engagement of students in problem solving activities with emphases on science teachings and learning by doing, matching theories with practical but not rote learning. These trends of curriculum reforms were born out of Curiosity and questioning about the nature of science education curriculum

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employed in United States of America and other nations of the world, ever since the launching of the satellite Sputnik" into space by the defunct Soviet Union in 1957 (Nkok, & Chukelu, 2025). The new trend of science curricula with the specification of Physics, Chemistry and Biological Science contents was introduced into Nigerian curriculum to match the global standard in science education particularly, the U.S and the Nuffield Science Projects in the United Kingdom.

Subsequently, the global reform initiatives in science education which started in the 1980s and 1990s, has positioned science as a social and cultural practice with emphases on doing science (Omayuli, & Omayuli, 2019). Efforts to achieve the global standard for science education in Nigeria includes strategies of motivating students to study science and stimulating and sustaining their interest in the learning process. As such, science education curriculum is designed to reflect science as an active process, such that "hands-on" activities constitute the major teaching and learning process. Just as in U.K. schools, the Science Education curriculum emphasizes that science education must use the world's most powerful ways of relating ideas in forms of explanatory stories. in accordance with the "Science Education Beyond 2000" report, a new GCE syllabus was introduced in Britain, called "Science for Public Understanding (Nkok, & Chukelu, 2025). This new syllabus aimed at increasing students Understanding of everyday science, confidence in reading and discussing media reports on science and technology issues and applying scientific method of thinking. Subsequently, there is a global emphasis on the importance of scientific literacy, interest in science, gender equity, cooperative learning, hands-on activities and the application of nature of science in science classrooms. For timely inculcation of scientific method of learning into the school system, the Nigeria education system developed and introduced the basic science curriculum into the primary and junior secondary schools' educational systems. The Basic Science curriculum is a wide field curriculum whereby all science subjects; Biology, Chemistry, Physics, Geography, health and Environmental Science are integrated and presented as a unified nature of science in such a way that learners have a holistic view of the scientific field of study. (FRN, 2013). The elaborate multidisciplinary: approach position students at the middle of learning and eradicates phobia of studying science among students. The Basic Science curriculum play a pivotal role in providing sound general education for all children and lays a good foundation for those children who would choose their career in science and technology related profession by studying science subjects in senior secondary schools and proceeding with sciences in tertiary institutions. The importance of basic science cannot be overemphasized in educational system, considering the role of science in the society. Basic Science are taught in both lower and upper Basic schools in Nigeria. Ekundayo (2012) asserted that Basic Science enhances students' understanding of science concepts and principles which are elaborated further in the core science subjects in high schools. Okebukola (2010) expressed the dying need of exposing children to the rudiments of science and technology. The major aim of Basic Science and Technology is to prepare students at the upper basic level for the study of core science subjects (Biology, Chemistry and Physics) at the senior secondary school level and to help students who are likely not to study science understand changes that take place in their bodies, and environments (Chukwuneke & Chikwenze, 2012). Basic science serves as the bedrock which provides basic training of scientific skills to meet the societal needs. The fundamental knowledge of science acquired through basic science at the upper basic level of education leads to the advancements in science and technology related careers (Medicine, Engineering, Agriculture, Earth Sciences among others) professionalism. Dajal and Mohammed (2019) opined that Laying of good foundation for scientific professions through effective teaching and learning of basic science can only be achieved through a well - planned and reformed basic science curriculum. The importance of basic science curriculum is enormous.

The Basic Science curriculum inculcates the right values and norms of the society to foster development. Basic Science equally helps to bring information; action and international education. But most Basic Science teachers seems not to be adequately equipped with the necessary skills for effective teaching of Basic Science concepts, and this pose challenges of incompetencies during instructional delivery. According to Ukor and Agbidye (2015) the nature of Basic Science curriculum raises more concerns than hopes and requires a proactive reform if the objective of inclusion of Basic science and technology into the educational system in Nigeria must be achieved. Ojimba (2023, May) asserted that, the 9-year Basic Science and Technology Curriculum was born out of a quest to restructure and reform Integrated Science curriculum. The aim of Integrated Science was to present science as a unit in such a way that children gain knowledge of the fundamental unity of science, the common approach to solving scientific problems and understanding of scientific principles in everyday life. (Federal Republic of Nigeria, 2013). Some of the relevant Integrated Science themes are still retained in the Basic Science Curriculum. Topics like Information and Communication Technology (ICT) and entrepreneurship education which are major concern in the society were selected for inclusion into the curriculum to help expose children into the rudiment of science and technology early in life. (Ogundele et al., 2020). Basic science is the first stage of science a child comes across at the basic level of education with the features of: Lower Basic Education Curriculum (Basic 1-3), Middle Basic Education Curriculum (Basic 4-6) and Upper Basic Education Curriculum (Junior Secondary School

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Classes-JSS 1-3). Chukelu and Nkok (2024) opined that Basic Science is the foundation of all science subjects at the senior secondary school (SSS) level. With the vast global advancement in technology, there is a need to reform science curriculums, to integrate modern day technology in the teaching, learning and evaluation process in science classrooms at all levels. In this respect, the teacher would investigate students' prior knowledge, identify misconceptions and design appropriate learning experiences. Then there should be a shift from focusing solely on the content of scientific ideas to reflective learning. Therefore, the role of teachers in the context of curriculum should change from that of implementations to that of stakeholders in the reform process. Subsequent reforms call for a total overhaul of our present science curriculum with the aim of contents reduction, and special consideration to equity and relevance to the societal needs. A developing country like Nigeria that aspires to measure up with developed countries in a fast technology growing world needs to pay attention to the nature of sciences curricula employed at all levels of education and to constantly reform the curriculums to align with the global trend of evolution in technology.

Despite the relative importance of science and technology to the country, there is a continuous trend of poor academic achievement of Basic Science students in Basic Education Certificate Examination (BECE) in Nigeria, particularly in Niger State. (Nkok, & Chukelu, 2025, Jan**).** This trend of poor achievement may not be unconnected with the nature of science curriculum, teaching methods, inadequate competent and well trained Basic science teachers, lack of Basic science laboratories among other factors in the state. Basic science is the foundation of all science subjects and technology related professions. If the curriculum of Basic science is not well designed to boost the learning process, the implication is that most students of Niger State would not be motivated to study science courses in their senior secondary schools and tertiary institutions respectively which will result to inadequate manpower in science and technology related professions in the nearest future. Investigating the impact of science curriculum reforms on teaching and learning of Basic science among upper basic science students in Niger State may have an interesting result. But from the literature available to the researcher, efforts have consistently been made by researchers to investigate the relationship between curriculum reforms and academic achievement of students. For example, (Ndifon,et.al., 2023; Igwe, et. al., 2021; Rufai, 2021; Ajayi., & Ogunyemi, 2023; Ojo & Folarin 2024) all carried out researches on curriculum reforms in different locations and different field of studies, but no research on impact of curriculum reforms on teaching and learning of sciences has been carried out in Niger State, this creates a gap in knowledge which this research seeks to fill. Hence, this study investigated Curriculum Reforms and its Impact on Teaching and Learning of Basic Science among Secondary Schools in Niger State, Nigeria.

Aim and Objectives of the Study

The aim objective of the study is to determine the impact of science education curriculum reforms on teaching and learning of Basic science,

Specifically, to determine the

1. impact of science education curriculum reforms on teaching of Basic Science subjects
2. impact of science education curriculum reforms on evaluation of Basic Science lessons
3. impact of technology utilization on teaching of Basic Science

Research Questions

1. What is the impact of curriculum reforms on the teaching of Basic science?
2. What is the impact of curriculum reform on the evaluation process of Basic science classroom?
3. What is the impact of technology on the teaching of Basic Science?

Materials and Methods

Impact of science education curriculum reforms on teaching and learning of basic science, among junior secondary school students in Niger state was investigated in this study using a survey research design. The study's population was 181 science teachers from all the government junior secondary schools in Niger state. Multi-stage sampling technique was employed to draw the sample. Stage 1: Simple random sampling technique was used in selecting one Educational zone from which the sample of the study was drawn; Following this method, the 'lucky dip' with replacement, simple random sampling technique was employed in selecting the one Educational Zone. Stage 2: Simple Random Sampling technique was employed to select 10 schools. In stage 3: Simple random sampling technique was used to select ninety-two (92) science teachers from 10 junior secondary schools in education zone B of the state. The research instrument was a 30-items researcher -made 4- points scale Questionnaire (10 items for each of the three sections), titled, Curriculum Reforms and Its Impact on Teaching and Learning of Basic Science (CRITLBS). Responses to the objective questions was four option SA for strongly Agree, A for Agree SD for strongly disagree and D for disagree, Test retest method was used to determine the reliability of the instrument to be 0.71. The CRITLBS was given to one science education expert, one Senior Basic-science teacher

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from junior secondary school and one expert in measurement and evaluation. These experts assessed the face and content validity of the instrument in relation to the background of study. Respondents were assured of anonymity of survey responses and that the purpose of the study was only for academic research which enhanced credibility of the responses. The small sample size was informed by the manageable number of basic science teachers in the educational zone as the study focused on basic science teachers' views of the impact of curriculum reforms on students since they are the key implementers of the curriculum in the classroom, hence the lack of students' perspective in the study. Instrument was administered on all the participants in the10 randomly selected schools in 2024/2025 academic session and data collected analyzed using mean and standard deviation. A mean of 2.50 and above was considered significant.

Results:
Answering Research Question one

What is the impact of curriculum reforms on the teaching of Basic Science?

Table 1: Mean and Standard Deviation Scores of Responses on Impact of Curriculum Reforms on Teaching of Basic Science in Niger State

s/n	Items	SA	A	D	SD	Mean	Std	Decision
1	Curriculum reforms do suggests innovative teaching materials to teachers	50	20	16	6	2.8	0.70	Agreed
2	Curriculum reforms introduces innovative teaching strategies	71	12	5	4	3.6	0.84	Agreed
3	Curriculum reforms do pose new challenges for critical thinking	49	17	11	15	3.0	0.80	Agreed
4	Curriculum reforms always bring improved teaching methods	70	10	7	5	3.5	0.85	Agreed
5	Contemporary issues in the society are always addressed through curriculum reforms	43	31	11	7	3.1	0.81	Agreed
6	Teachers are not always impacted positively through curriculum reforms.	9	12	33	38	1.9	0.60	Disagreed
7	Curriculum reforms does not always motivate teachers to teach	10	25	34	23	2.2	0.75	Disagreed
8	Learners' interest cannot be improved through Curriculum reforms	7	9	35	41	1.8	0.50	Disagreed
9	Curriculum reforms cannot improve academic achievement	4	13	50	25	1.9	0.60	Disagreed
10	Teachers' workload cannot be reduced through Curriculum reforms	12	5	41	34	1.9	0.60	Disagreed

A = Agree+strongly agree, D=disagree + strongly disagree, Std= standard deviation

Table 1 shows mean and standard deviation scores on the responses on impact of Curriculum reforms on teaching of Basic Science in Niger State, items 1-5 with mean values of 2.8,3.6,3.0, 3.5, 3.1; standard deviation scores of 0.70,0.84,0.80,0.85,0.81 respectively and average mean score of 3.2 which is higher than the criterion mean score of 2.5 are in agreement with the items. This implies that curriculum reforms impact positively on teaching of Basic science and other science subjects. In the other hand, negative values 6-10 with corresponding mean scores of 1.9, 2.2, 1.8,1.9 1.9; standard deviation scores of 0.60,0.75,0.50,0.60,0.60 and average mean score of 1.94 which is below the criterion mean score of 2.5 are in disagreement with the items, which affirms that curriculum reforms do not impact negatively on teaching of Basic Science and other science subjects

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Answering Research Question Two

What is the impact of curriculum reform on the evaluation process in basic science classroom?

Table 2: Mean and Standard Deviation Scores of Responses on Impact of Curriculum Reforms on Evaluation Process in Basic Science Classrooms

s/n	Items	SA	A	D	SD	Mean	Std	Remark
1	Curriculum reforms do facilitate evaluation process	43	21	15	12	3.0	0.80	Agreed
2	Curriculum reforms always come with improved evaluation strategies	40	33	12	7	3.1	0.81	Agreed
3	Curriculum reforms do help teachers'-self- assessment	53	19	11	9	3.2	0.82	Agreed
4	effective ways of lessons evaluation can be achieved through curriculum reforms	32	30	20	10	2.9	0.79	Agreed
5	Teachers' critical thinking can be stimulated through curriculum reforms	39	22	13	18	2.8	0.78	Agreed
6	Curriculum reforms cannot affect evaluation process	17	4	38	33	2.0	0.50	Disagreed
7	Teachers work can be complicated by Curriculum reforms.	2	7	43	40	1.6	0.43	Disagreed
8	Curriculum reforms always help improve students evaluation outcome	33	31	20	8	2.9	0.79	Agreed
9	Curriculum reforms cannot help improve students' formative evaluations outcome	8	7	40	37	1.8	0.43	Disagreed
10	summative evaluation outcome can be influenced by curriculum reforms	41	22	9	20	2.9	0.79	Disagreed

A = Agree + strongly agree, D=disagree + strongly disagree, N =total number and Std = standard deviation

Table 2 shows analysis of impact of curriculum reforms on evaluation process in basic science classrooms. items 1,2,3,4,5,8 and 10 with corresponding mean score of 3.0,3.1,3.2,2.9 2.8, 2.9 and 2.9; standard deviation scores of 0.80,0.81,0.82,0.79,0.78,0.79 and 0.79 and average mean score of 2.9 which surpasses the criterion mean score of 2.5 are in agreement to the items. which implies that curriculum reforms impact positively on the evaluation process. Consequently, negative items 6, 7 and 9 with corresponding mean scores of 2.0,1.6 and 1.8; standard deviation scores of 0.50,0.43 and 0.43 and average mean score of 1.8 which is below the criterion mean score of 2.5 are in disagreement with the negative items. This implies that curriculum reforms do not impact negatively on evaluation processes in schools.

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Answering Research Question Three

what is the impact of introduction of technology into science education curriculum on the teaching of Basic Science?

Table 3: Mean and Standard Deviation Scores of Responses on Impact of Curriculum Reforms on Inclusion of Technology into Basic Science Curriculum.

S/n	Items	SA	A	D	SD	Mean	Std	Decision
1	Teaching of basic science can be improved by technological tools	35	32	21	4	3.0	0.70	Agreed
2	Technology can improve learning outcome	51	27	7	7	3.3	0.72	Agreed
3	Teachers work load can be reduced by technological tools	70	12	8	2	3.6	0.65	Agreed
4	Technology saves teachers' time	50	28	11	3	4.3	0.95	Agreed
5	Teachers' stress can be reduced by innovative tools	43	33	10	6	3.2	0.71	Agreed
6	Technology would facilitate students' understanding	39	30	13	10	3.0	0.70	Agreed
7	Technology would not enhance individualized learning	9	8	39	36	1.8	0.51	Disagreed
8	Energy of Basic science teachers' cannot be saved through technology	17	13	43	19	2.3	0.65	Disagreed
9	Technology cannot increase learners' interest	9	7	39	37	1,8	0.51	Disagreed
10	Technology does not motivate teachers to teach	5	12	32	43	1.7	0.50	Disagreed

A = Agree + strongly agree, D=disagree + strongly disagree and Std = Standard Deviation

Table 3 shows the analysis of Impact of inclusion of technology into Basic science curriculum on teaching of science. Positive items 1-6 with mean scores of 3.0, 3.3, 3.6, 4.3, 3.2,3.0 and standard deviation scores of 0.70,0.72,0.84,0.95,0.71 and 0.70 respectively and average mean score of 3.4 which is greater than the criterion mean score of 2.5 agree with the items that inclusion of technology in curriculum will improve teaching of sciences and other subjects in secondary schools, consequently, items 7-10 with mean scores of 1.8,2.3, 1.8 and 1.7 and corresponding standard deviation scores of 0.51,0.65,0.51 and 0.50 and average mean score of 1.9 which is below the criterion mean score of 2.5 disagree with the negative items. This implies that inclusion of technology into the next science education curriculum reforms will not have negative impact on the teaching process

Discussion

Investigation on impact of curriculum reforms on teaching of Basic science reveals that curriculum reforms impact positively on teaching of Basic science in junior secondary schools. This finding is in agreement with the findings of Ojimba (2023, May) which asserted that curriculum reforms normally call for radical change in teachers' knowledge and beliefs about subject matter. Okoi and Anake, (2023) affirmed in their study that reforms in business Nigeria technical education curriculum is outdated and not align with industrial expectation. education have improved students' ICT, creativity and media literacy skills. The finding is also in line with that of Nkok, and Nkok (2024) which concluded that science education curriculum reforms do bring innovative teaching strategies, introduce modern teaching aids and motivate teachers for effective teaching. Also, the findings of Ojo, and Folarin (2024) supports this finding. The improved teaching strategy may have stemmed out of the fact that

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curriculum reforms always stimulates teachers' critical thinking on how to proffer solutions to contemporary issues in the society. The findings on impact of curriculum reforms on evaluation process in basic science classrooms shows that curriculum reforms impact positively on evaluation processes in secondary schools. This finding is in agreement with the findings of Ojimba (2023, May) which asserted that curriculum reforms normally call for radical change in teachers' knowledge and beliefs about subject matter, teaching, also the findings of Afolabi et al. (2021) which concluded that there is a significant relationship between curriculum reforms and effective evaluation process also tandems with the findings of this study. The improved evaluation processes could be caused by the inclusion of new activities in the curriculum, in the same vein, the findings on impact of inclusion of technology into the curriculum shows that technology has positive impacts on teaching of science in secondary schools. This finding is in agreement with the findings of (Sunday, 2021; Omayuli & Omayuli, 2021; Xu & Ouyang 2021) which concluded that technology inclusion in curriculum enhanced science teachings, cause changes in teachers' knowledge and beliefs about subject matter, and the teaching process. This finding is anchored on constructivist theory of curriculum, which states that, curriculum is based on the idea that learning is an active, constructive process. in this approach, learners build their own understanding and knowledge of the world through experiences and reflecting on those experiences Ultanir (2012). The world has become a global village and effective teaching and learning can no longer be limited to traditional classrooms, to catch up with global trend of economic development, introduction of modern technologies into science curriculum becomes inevitable as it encourages active learning and aligns with constructivist theory of curriculum.

Conclusion

Technological and economy growth of any country is consequent upon the nature of science education curriculum employed in such country. If any country must catch up with rapid technology and economic growth, frequent reviews of school's curriculum especially Basic Science Education Curriculum is the way forward. Therefore, consistent curriculum reforms to align with the global standard of education and the contemporary societal needs should not be ignored. Based on the findings of this study, it's concluded that consistent reforms of science education curriculum particularly at the basic level of education has the potential to improve teaching, reduce teachers stress, facilitate learning, enhance academic achievement of students and stimulate students interest in studying sciences to senior secondary school level and beyond.

Recommendations

Based on the findings of the study; the following recommendations were made:

1. Educational stake holders like managers, government among others should always plan for curriculum reforms at regular intervals and teachers well equipped to handle reforms by updating their knowledge and skills through seminars, workshops and symposiums so as to ensure improved quality of teachings particularly in the field of sciences.
2. NERDC should always endeavor that a comprehensive evaluation process of every concept in Basic science curriculum and other related subjects is explicitly presented.
3. There should be a collaboration between government, NERDC, science educators and educational technologists with the aim of matching all science concepts with appropriate innovative teaching aids so as to improve teaching of Basic science concepts.

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