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Impact Of Science Education Curriculum Reforms On Teaching, Among Secondary Schools In Niger State, Nigeria. In A Technology Driven World

[1]Nkok, Ekaette Anietie Enang & [2]Chukelu, U. C.,

[1]Niger State Teacher Professional Development Institute, Minna, Nigeria
Ekymum@gmail.com

[2]FCT Secondary Education Board (SEB), Monitoring and Evaluation, Area 3 Garki, Abuja, Gwagwalada Zonal Office, Nigeria

ABSTRACT
This study investigated impact of science education curriculum reforms on teaching and learning, among secondary schools in Niger State, Nigeria**.** in a technology driven world, a survey research design was employed for the study. The population for the study was all the 181 science teachers from all the Government senior secondary schools in Niger state. eighty-two science teachers were selected through simple random sampling technique from 10 senior secondary schools in education zone B of the state, which formed the sample size for the study. Three research questions on impact of curriculum reforms guided the study. The research instrument was A researcher made 4- points Likert scale Questionnaire, titled, Impact of Science Education Curriculum Reforms on Teaching (ISECRTL). The reliability of the instrument was determined to be 0.72 using test retest method. The instrument was administered on the respondents in the 10 randomly selected schools in 2023/2024 academic session. Data collected was analyzed using descriptive statistics. The findings of the study revealed that there are lots of positive impacts of science education curriculum reforms on teaching and learning of science in a technology driven world. Based on the findings, three recommendations were made. Among which is that, Education managers should always plan for curriculum reforms at regular intervals so as to ensure that the quality of teachings are constantly improves in line with the world standard, and to enhance transfer of knowledge for economic development in a technological advanced economy and that Curriculum planners should always inculcate modern step by step evaluation strategies in every science lesson contents so as to help teachers carry out performance evaluation
Keywords: Curriculum Reforms, Science Education, Teaching, Learning, Technology Driven World

INTRODUCTION

Curiosity and questioning about the nature of science curriculum employed in United States of America and other nations of the world arose since the sudden launching of the satellite Sputnik" into space by the defunct Soviet Union in 1957. This has resulted to several trends of science education curriculum reforms in the 1960s and 1970s. New science curricula which has the Physical Science Study (PSCS), to Chemical Educational Materials Study (CHEM study) and Biological Science Study (BSCS) emerged in the U.S and the Nuffield Science Projects in the United Kingdom. Subsequently, the global reform initiatives in science education started in the 1980s and 1990s, and positioned science as a social process and cultural practice with particular ways of knowing and doing science (Omayuli, & Omayuli, 2019). In

an attempt to achieve science standard for all students including girls, language, ethnic minorities and all ability groups, encourage all students to succeed and to embrace excellence and equity. Science education curriculum should be designed to reflect that science is an active process, so that both "hands-on" as well as "minds-on" activities should constitute the core of the education process. Thus, in U.K. schools, the Science Education curriculum emphasizes that science education must make much use of the world's most powerful and pervasive ways of communicating ideas in the narrative form-by presenting a series 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. This new syllabus aims to increase students: (i) Understanding of everyday science (ii) Confidence in reading and discussing media reports of issues concerning science and technology (iii) Appreciation of the impact of science on how we think or act. Similar goals can also be found in many articles and reports documenting new science education reforms in other countries of the world. Typical examples include the implementation of a new science curriculum in Australia (curriculum Corporation, 1994), Science Technology and Society in Canada (Aikenhead and Ryan, 1992), the introduction of Public Understanding of Science in the Netherlands (Devos and Reading, 1999 in Isiksal, & Sahbaz, 2014).) Therefore, the subsequent reforms in science education all over the world emphasize the importance of scientific literacy and understanding for all students with special consideration to women and ethnic minorities who traditionally have been neglected and deprived of science. Consequently, science education reforms have also focused on Constructivism, Thematic Approach, Assessment and Evaluation, Equity, Science, Technology and Society (STS), Cooperative learning, Hands-on Activities and the Nature of Science. However, from a teaching perspective, these reform efforts have some implications for teaching science. Kennedy (1998) found that instead of transmitting content knowledge in a rigid manner, the emphasis in teaching will be on designing situations and a variety of activities which enable students to learn actively. In this respect, the teacher needs to investigate what the students already know, identify possible misconception then design an appropriate educational setting. In their views, Millar and Osborne (1998) said, a shift toward reflection on science rather focusing solely on the content of scientific ideas is implied. To align with the global standard of teaching and learning science in technology driven world, Nigeria science education curriculum has equally 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, Ogunkunle, Toluhi, Appah, and Pelupssiya, (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 technology driven 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 of concepts and theories (Oludipe, Kamba, Ladiva, & Eric, 2015). The Science Curriculum offers a child - centered teaching learning approach as student related course (Okebukola, 2010). This has led to improved students interest in science subjects as students are motivated to learn by exploration and discovery with a mindset of solving the societal problems, as evidenced in improved students' enrolment in science. However, the curriculum is faced with several challenges by both students and teachers during science lessons in secondary schools in Niger state and Nigeria at large. Some of the challenges identified by researchers are overcrowded curriculum, inappropriate teaching methods due to lack of in service-trainings for science

teachers, lack of introduction of technology into the teaching process which makes the work cumbersome to teachers despite the fact that the world has gradually been taken over by advancement in technology, lack of adequate teaching facilities among other challenges (Nkok, & Nkok, 2024). Introducing technology into science curriculum in Nigeria will help students begin with problems that they find significant which will engage them in using all the intellectual resources available and develop new ones in order to solve the problem. Therefore, current science education reforms proposals seek the introduction of technology studies in the education of all students from primary school to university. The reform movements envision a system of education that will enable better understanding of science concepts and principles of technology such as design, control and systems as well as the key ideas about technology in specific areas such as materials energy, manufacturing and information. One important and relatively recent notion is that of science literacy, which intrinsically includes understanding technology. This conception of science literacy therefore raises fundamental challenges for science education. Questions like, what exactly should be the role of understanding technology in science education? What specific technological ideas and skills are fundamental for science literacy, or what changes are needed if we want students to have an understanding of technology? It is therefore important that science and technology be designed to provide all students with conceptual tools to make sense of a highly technological world. Such programmes would help all students to learn about design, the interaction between science and technology and the limits and strength of technology Ojimba (2023, May). Furthermore, Ayodele (2002) had argued that if the teaching and learning of science are culturally and historically contextual and involve the dynamic and reflective interactions among teachers, students, science and society, then any performance assessment, must also be viewed as embedding dynamic and recursive processes that raise understanding of issues of access and enactment. The new curriculum in science education implies that teaching science cannot be reduced to only the acquisition of knowledge or mastery of skills/techniques but must also be defined to involve human activities, as the teaching of science occurs within the larger contexts of culture, community, power and knowledge. Thus the science education reform supports a pedagogical position that views students' achievement in the cultural and historical content of the domain, the classroom, the community and positive lives. Hence, assessment that represent knowledge as a final product is only regarded as one-sided view to students and so does not account for science or science learning as an all- encompassing problem solving process. Ojimba (2023) asserted that performance assessment plays an important role in challenging how we define good science learning and achievement in the classroom by raising fundamental questions about what it means to know and do science in individual and contexts. Science differences exist in students' experiences, beliefs and understanding, performance assessment must be consequential to: Include issues of equity and diversity and reflect the collective process of creating culture and history, include action and change within the process of determining what students know and understand. Ojimba concluded that science should be closely tied to individuals and collective responses, needs, concern and problems of the lives of students involved. The subsequent science education curriculum reforms should definitely include the professional development of science teachers and the uniformity of education policies at both the federal and state levels as well as the alignment of curriculum instruction and assessment in the classroom (Onose, Okogun & Richard 2019). Therefore, the role of teachers in the context of curriculum should change from that of implementations to that of stakeholders in the reform process as teachers' cognition including their beliefs, intentions and attitudes should be considered if efficient curriculum reforms must be achieved. Subsequent reforms call for a total overhaul of our present science curricular to reduce the content, with special consideration to equity and relevance to the societal needs. A developing country like Nigeria that aspires to equate with developed countries in a technology driven world needs to pay attention to the nature of science and technology education curriculum employed at all levels of education and to constantly reform the curriculums to align with the world trend of evolution in technology.

Objectives of the Study

The major objective of the study is to determine the impact of science education curriculum reform on teaching, learning and economic advancement,

Specifically, sought to determine the

1. impact of science education curriculum reforms on teaching of science subjects
2. impact of science education curriculum reforms on evaluation of science lessons
3. impact of inclusion of technology in science education curriculum on teaching of science

Research Questions

1. To what extent does science education curriculum reforms impact on the teaching of science
2. To what extent does science education curriculum reforms impact on evaluation process
3. To what extent does inclusion of technology in science education curriculum impacts on teaching of science.

METHODOLOGY

This study investigated impact of science education curriculum reforms on teaching and learning, among secondary schools in Niger state, Nigeria. in a technology driven world, a survey research design was employed for the study. The population for the study was all the 181 science teachers from all the Government senior secondary schools in Niger state. Forty-two science teachers were selected through simple random sampling technique from 10 senior secondary schools in education zone B of the sate formed the sample size for the study. The research instrument was a researcher made 4- points Likert scale Questionnaire, titled, impact of science education curriculum reforms on teaching and learning (ISECRTL). The reliability of the instrument was determined to be 0.72 using test retest method. The instrument was administered on the respondents in the 10 randomly selected schools in 2023/2024 academic session. Data collected was analyzed using mean and standard deviation.

PRESENATION OF RESULTS

Answering Research Question one

To what extent does science education curriculum reform impacts on the teaching of sciences in a technology driven world?

Table 1: Impact of Curriculum reforms on teaching of science in a technology driven world

s/n	Items	N	Agree		T	X	S	Disagree		T	X	Std	Decision
			A	SA				D	SD				
1	Curriculum reforms do help teachers with innovative teaching materials	82	45	20	65	2.9	0.05	10	7	17	0.3	0.34	accepted
2	Curriculum reforms do introduce innovative teaching strategies		45	13	58	2.6	0.03	12	12	24	0.3	0.27	accepted
3	Curriculum reforms normally create room for critical thinking for teachers		40	29	69	3.0	0.04	9	4	11	0.2	0.55	accepted
4	Curriculum reforms always give teachers room for improvement		45	20	55	2.9	0.04	7	10	17	0.4	0.43	accepted
5	Curriculum reforms do take contemporary societal issues into consideration	82	50	12	72	2.8	0.09	8	2	10	0.1	NA	accepted
6	Curriculum reforms does not always have positive impacts on teachers		7	3	10	0.1	0.12	43	29	72	4.5	0.34	rejected
7	Curriculum reforms does not always give room for teachers training	82	3	6	9	0.1	0.32	39	34	73	4.8	0.55	rejected
8	Curriculum reforms does not always improve learners' interest in the learning	82	5	3	8	0.1	0.19	50	24	74	4.4	0.76	rejected
9	Curriculum reforms does not always improve learning outcomes	82	7	10	17	0.3	0.11	48	17	65	3.7	0.32	rejected
10	Curriculum reforms does not always reduce teachers work load	82	7	9	16	0.3	o.06	50	16	66	3.8	0.43	rejected

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

Table 1 shows impact of Curriculum reforms on teaching of science in a technology driven world, positive items 1-5 with corresponding mean values of 2.9,2.6,3.0, 2.9 and 2.8 in agreement to the items were all upheld as the mean scores surpassed the criterion mean score of 2.5. This implies that curriculum reforms impact positively on teaching of science and other subjects and the items were not rejected. In the other hand, negative values 6-10 with corresponding mean scores of 0.1,0.1,0.1,0.3,0.3 which are below the criterion mean score of 2.5 in disagreement with the items were all rejected, which further affirms that curriculum reforms do not impact negatively on teaching of science and other subjects

Answering Research Question Two

To what extent does science education curriculum reform impacts on the teaching of sciences in a technology driven world?

Table 2: Impact of Curriculum Reforms On Evaluation Process in a Technology Driven World

s/n	Items	N	Agree		T	X	Std	Disagree		X	Std	Decision
			A	SA				A	SA			
1	Curriculum reforms always make evaluation process easier	82	4	28	58	2.9	0.03	11	3	0.3	0.97	accepted
2	Curriculum reforms always come with improved evaluation strategies	82	25	45		2.8	0.31	10	2	0.2	0.89	accepted
3	Curriculum reforms always introduce new ways of teachers' performance assessment	82	39	23	52	2.7	0.5	16	4	0.4	0.55	accepted
4	Curriculum reforms always suggest effective ways of lessons evaluation	82	35	31	56	2.8	0.07	8	8	0.3	0.45	accepted
5	Curriculum reforms always stimulate teachers to think critically	82	43	20	63	2.8	0.56	9	11	0.3	0.76	accepted
6	Curriculum reforms does not always have any effect on evaluation process	82	12	11	23	0.4	0.008	32	29	2.5	0.740 .0.85	rejected
7	Curriculum reforms do make teachers work complicated	82	6	3	9	0.1	0.001	26	47	3.2	0.55	rejected
8	Curriculum reforms always help improve students evaluation outcome	82	33	27	60	2.5	0.002	15	7	0.8	0.39	rejected
9	Curriculum reforms cannot help improve students formative evaluations outcome	82	5	13	18	0.3	0.003	43	21	2.5	0.67	rejected
10	Curriculum reforms cannot influence students' summative evaluation	82	8	7	15	0.2	0.001	39	28	2.7	0.89	rejected

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 a technological driven world, positive items 1,2,3,4,5 and 8 with corresponding mean score of 2.9 2.8,2.7,2.8,2.8, and 2.5 which surpasses the criterion score of 2.5 in agreement to the items were upheld, which implies that curriculum reforms impact positively on the evaluation process in a technological driven world. Consequently, negative items 6, 7, 9 and 10 with corresponding mean values of 0. 4, 0.1,0.3, 0.2 which are below the criterion mean score of 2.5 in disagreement to the negative items were all rejected which implies that curriculum reforms do not impact negatively on evaluation processes in schools

Answering Research Question Three

To what extent does introduction of technology into science education curriculum impacts on the teaching of sciences in a technology driven world?

Table 2: Impact of Inclusion of Technology into Science Education Curriculum on Teaching of Science in a Technology Driven World

S/N		N	Agree		X	Std	Disagree		X	SD	Decision
			SA	AG			D	SD			
1	Technology would improve teaching process	82	40	21	2.7	0.3	10	11	0.3	0.002	accepted
2	Technology would improve learning outcome	82	50	23	3.2	0.35	7	2	0.1	0.001	accepted
3	Technology would reduce teachers work load	82	48	21	3.1	0.31	5	8	0.2	0.002	accepted
4	Technology would save teachers' time	82	59	20	3.6	0.32	2	1	0.06	0.003	accepted
5	Technology would reduce teachers stress	82	61	10	3.3	0.31	7	3	0.2	0.01	accepted
6	Technology would ease students' understanding	82	43	13	2.5	0.23	17	13	0.5	0.003	accepted
7	Technology would not enhance individualize learning	82	5	4	0.1	0.001	53	20	2.9	0.21	rejected
8	Technology would not save teachers' energy	82	7	3	0.1	0.001	65	7	2.7	0.22	rejected
9	Technology would not increase learners' interest	82	1	3	0.01	0.001	69	9	2.9	0.3	rejected
10	Technology does not motivate teachers to teach	82	7	1	0.1	0.001	70	4	2.7	0.25	rejected

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

Table 3 shows the analyses of Impact of inclusion of technology into science education curriculum on teaching of science in a technology driven world, positive items 1-6 with mean scores of 2.7, 3.2, 3.1, 3.6 and 3.3 respectively which surpasses the criterion mean score of 2.5 agree with the items that inclusion of technology in subsequent curriculum reform will improve teaching of sciences and other subjects in secondary schools, consequently, items 7-10 with average mean score of 0.1 which is far below the criterion mean score of 2.5 disagrees with the negative items and the negative items were all rejected, which implies that inclusion of technology into the next science education curriculum reforms will impact positively on the teaching process

DISCUSSION OF FINDINGS

The findings on impact of curriculum reforms on teaching of science shows that curriculum reforms impact positively on teaching of science 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, children and learning. Also with the findings of Nkok and Nkok (2024) which concluded that science education curriculum reforms do bring innovative teaching strategies, trim down science education curriculum contents, introduce modern teaching aids and motivate teachers for effective teaching further aligns with the findings of this study.

The enhanced teaching may be due to the fact that curriculum reforms always consider the contemporary issues in the society and stimulate teachers' critical thinking which may have cause improved teaching strategies. The findings on impact of curriculum reforms on evaluation process in secondary schools shows that curriculum reforms impact positively on both formative and summative 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, children and learning, also the findings of Afolabi Ogunkunle, Toluhi, Appah, and Pelupssiya, (2021) which concluded that there is a positive correlation between curriculum reforms and effective evaluation process also tandems with the findings of this study. The improved evaluation processes could be caused by the step by step teaching strategies and the suggested evaluation methods suggested in the reformed curriculums. Finally, the findings on inclusion of technology on curriculum reforms on teaching of science shows that inclusion of technology into curriculum will impact positively on teaching of science in secondary schools. This finding is in agreement with the findings of Weiqi and Ouyang (2021) and Omayuli, and Omayuli, (2019) and Xu and Ouyang (2021) which affirmed that inclusion of technology in curriculum enhanced science teachings, cause changes in teachers' knowledge and beliefs about subject matter, learners and teaching. The world has become a global village and effective teaching and learning can no longer be limited to traditional class rooms, to catch up with the technology driven world and economy, there should be introduction of modern technologies into science curriculum that will enhance teaching and learning, motivate learners interest, reduce teachers work load, and encourage individualize teaching and learning process.

CONCLUSION

The level of economy and technological growth of any country reflects the nature of education of such a country which invariably is a reflection of the nature of curriculum employed in their schools. With rapid evolution in technology and rapid economic growth, there is need for frequent reviews of school's curriculum to prevent backwardness. Therefore, consistent curriculum reforms to align with the global standard of education becomes imperative in the present technology driven world.

RECOMMENDATION

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

1. Education managers should always plan for curriculum reforms at regular intervals so as to ensure that the quality of teachings are constantly improved in line with the world standard to enhance transfer of knowledge for economic development.
2. Curriculum planners should always try to inculcate step by step evaluation strategies in every science lesson content so as to help teachers carry out performance evaluation for improvement in teaching method and subsequently upgrade in the standard of education in the country.
3. Curriculum planners, science educators and educational technologists should collaborate in order to match each science content with appropriate technological teaching aids that will facilitate teaching and learning and brings about meaningful transfer of knowledge in order to meet up with the societal needs in a technology driven world

REFERENCES

Afolabi, F., Ogunkunle, R., Toluhi, O., Appah, E., & Pelupssiya, M. O. (2021). Reforms in Nigeria science education: A Prerequisite for Socio-Economic Development. International Journal of Innovative Sciences and Research Technology, 6(2), 167-173.

Aiken Head GS, Ryan AG (1992). The development of a new instrument views on science – Tech. – Soc. (VOSTS) Sci. Edu. 76(1):77 – 91.

American Association for the Advancement of Science (1989). Science for all Americans, Washington, D.C.American Association for the Advancement of Science (1993). Benchmarks for Science Learning. New York. Oxford University Press.

Dajal, R.J & Mohammed A.U. (2019). Global Scientific Journals, 7(10)2320-9186

Daworiye, S.P., Alagoa, J.K., Enaregha, E. and Eremasi, B.Y. (2015). International Journal of Current Research in Biosciences and Plant Biology 2 (4): 151-156

Duru, C. N. (2019). Challenges and prospects of STEM education as a pathway to national development: A Nigeria Experience. Universal Journal of Educational Research, 7(5),1215-1221.

Goni, M. U. (2019). Challenges and possible interventions to enhance science education in Nigeria. American Journal of Educational Research, 7(6), 413-418

Isiksal, M., & Sahbaz, N. O. (2014). Science, technology, engineering, and mathematics (STEM) education in Turkey. Eurasia Journal of Mathematics, Science and Technology Education, 10(6), 601-607.

Jololuwa G. T. Mustapha A.G, Salami,S. A. Ogundele R & Oluwagbemi F.R (2024). Harnessing science education for future transformation in Nigeria educational perspectives 12(1)255- 276

.Nkok, E.A.E.& Nkok, U. M. (in press). Challenges of science education curriculum implementation among senior secondary schools in Niger State, Nigeria. ABSU Journal of curriculum and teacher education, faculty of education, Abia state university Uturu

Nwachukwu, C. C. (2020). Implication of the Science Curriculum in Nigeria to Science Education. Journal of Education and Learning, 9(2), 55-63.

Ojimba J. P (2023, May) Reforms in Nigeria's science education, implications for science teachers. African journal of gender and women studies (8)6 001-005

Ojo, S. O. (2019). Nigerian science curriculum: Journal of Education and Research,7(8),33-44Challenges and Prospects. International.

Okebukola, P. (2010). Basic education curriculum reform in Nigeria: Issues of science and technology education. Istanbul Journal of Research in Mathematics, Science and Technology Education (IREMST), 4(1), 3-10.

Okoli, S., Obiajulu, A. & Ella, F. (2013). Science education for sustainable development in Nigeria: challenges and prospects. Academic Journal of Interdisciplinary Studies, 2(6),159-165

Omayuli, M. O. & Omayuli, V. O. (2019). Reforms and innovation in science education; The Way Forward. Journal of Teacher Perspective. 3(2)181-185.

Onose, G. M. Okogun E. A & Richard J. (2019) Reforms and innovation in training and retraining of science and mathematics teachers to meet with the challenges of global development. Journal to Teacher Perspective, 3(2), 181-184.

Xu and Ouyang (2021) Application of Ai technology in STEM education, a systematic review from 2011-2021. International journal of STEM Education. https://10.1186/s40594-022-00377-5