Evaluating the Extent of Implementation of Basic Science Programme in Junior Secondary Schools in Nasarawa State

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Abstract

This study aimed to evaluate the implementation of the Basic Science Programme in Junior Secondary Schools in Nasarawa State. Specifically, the research sought to assess whether the curriculum content of the Basic Science Programme is taught as prescribed, the availability and adequacy of facilities, the quality and quantity of teachers, and student performance in the Junior Secondary School Certificate Examinations (JSSCE). The evaluation of the implementation process involved data collection and analysis to assess the effectiveness and quality of the science programme. Eighteen Junior Secondary Schools were sampled, and questionnaires were administered to both teachers and students to gather data. The findings revealed that the Basic Science Programme is implemented to a large extent, although the available facilities are inadequate. There was a significant difference in the perceptions of rural and urban teachers regarding the implementation of the curriculum. The study also showed that there is no significant difference in the achievement scores of male and female students in the Basic Science achievement test. Additionally, the research indicated that Nasarawa State has a sufficient number of qualified teachers to enhance the implementation of the Basic Science Programme, but the available facilities are underutilized. Based on these findings, recommendations were made to improve the effective implementation of the Basic Science Programme in the state.

Keywords: Basic Science, Programme, Curriculum Content, Implementation, Material Resources.

Introduction

Science and technology are fundamental drivers of national development, and the role of education in these areas is indispensable for fostering progress in any society. Education in the sciences provides individuals with the knowledge and skills necessary for innovation, productivity, and addressing societal challenges. Basic Science, as a foundational subject, is critical in equipping students with scientific literacy, problem-solving skills, and the ability to apply scientific concepts in real-world situations. It forms the bedrock upon which more specialized scientific knowledge and careers are built.

In Nigeria, the Basic Science curriculum was introduced into the Junior Secondary School system in the 1980s to provide students with an early understanding of science and its applications. The curriculum, as outlined by the National Educational Research and Development Council (NERDC, 2007), aims to foster interest in science and technology, promote scientific thinking, and equip students with practical skills for both further studies and career opportunities in science and technology. Despite these objectives, there are growing concerns about the extent to which the Basic Science curriculum is effectively implemented in many regions of the country, particularly in Nasarawa State.

One of the key challenges to the successful implementation of the Basic Science program is the inadequate preparation of teachers. Numerous studies have indicated that many science teachers in Nigeria are not sufficiently trained in both the content and pedagogy necessary for effective science instruction (Chukwuneka & Nwachukwu, 2005; Sambo et al., 2021). This lack of professional development and proper training negatively impacts the quality of science education and limits students' engagement with the subject. Furthermore, the shortage of qualified teachers in science subjects, especially in rural areas, exacerbates the problem.

Another major issue affecting the implementation of the Basic Science program is the shortage of resources, particularly in terms of laboratories, teaching materials, and equipment. Effective science teaching requires the availability of well-equipped science laboratories and instructional resources to facilitate hands-on learning and experimentation. However, many schools in Nigeria, including those in Nasarawa State, suffer from inadequate laboratory facilities, which undermines the practical aspects of science education (Alebious, 2000; Onipede, 2003). This resource gap often forces teachers to focus primarily on theoretical teaching, neglecting the practical skills and inquiry-based learning that are central to the curriculum.

Additionally, large class sizes present another significant challenge. The student-teacher ratio in many junior secondary schools in Nigeria is high, often reaching 60:1 or more, making it difficult for teachers to provide individualized attention to students and engage them effectively in practical activities (Jimoh, 1999; Sambo & Sabo, 2022). Such overcrowding in classrooms further limits the ability of teachers to implement active learning methods and fully meet the objectives of the Basic Science curriculum.

Despite these challenges, there is limited empirical research on the specific implementation of the Basic Science program in Nasarawa State. While studies have highlighted the general issues facing science education in Nigeria, there is a lack of region-specific data on how these challenges manifest in the context of Nasarawa State. This study, therefore, seeks to evaluate the extent to which the Basic Science curriculum is being implemented in junior secondary schools in Nasarawa State. By identifying the barriers to effective implementation, the study aims to provide insights that can inform strategies for improving the teaching and learning of Basic Science in the state.

In conclusion, the need to assess the implementation of the Basic Science program in Nasarawa State is crucial, given the importance of science education in national development. This study will contribute to a deeper understanding of the challenges facing Basic Science education in the state and offer recommendations for addressing these issues to enhance the quality of science instruction in junior secondary schools.

Research Questions

The following research questions were answered in the course of this study:

(a) To what extent is the curriculum content of Basic Science Programme being implemented in Nasarawa State, Nigeria?
(b) What are the facilities available for the implementation of the Basic Science Programme in Nasarawa State, Nigeria?
(c) How adequate are the facilities provided for the implementation of the Basic Science Programme in Nasarawa State, Nigeria?
(d) What are the mean achievement scores of students by gender in the Basic Science Programme in Junior Secondary School in Nasarawa State, Nigeria?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

(a) Ho_1. There is no significant difference between the mean responses of Rural and Urban teachers on the extent of implementation of the curriculum content for Basic Science programme in Nasarawa State, Nigeria.
(b) Ho_2. There is no significant difference in the provision of material resources for Basic Science between urban and rural junior secondary schools in Nasarawa state, Nigeria.
(c) Ho_3. There is no significant difference in the level of utilization of material resources between urban and rural junior secondary schools in Nasarawa State, Nigeria.
(d) Ho_4. There is no significant difference in the mean achievement scores of male and female students in Basic Science programme in Nasarawa State, Nigeria

Methodology

The research design for this study was the descriptive survey research design. The study fits into the survey design because data was collected from a representative sample of Junior Secondary Schools and Basic Science teachers for the purpose of describing in a systematic manner the fact about the extent of implementation of Basic Science programme in the sampled schools, thereafter the findings of this work was generalized to the entire junior secondary schools in Nasarawa State of Nigeria. The

study employed instruments like questionnaire and checklist for the collection of data.

The population of the study consists of 568 Junior Secondary Schools with Basic Science programme, 10,203 Junior Secondary School (JSS) Students and all the 2, 578 Basic Science teachers spread across the three Senatorial Zones of each of the states.

The samples for the study consisted of 278 Junior Secondary Schools, 433 Basic Science teachers and 379 Basic Science students. These samples were considered adequate because according to Krejcie, Robert and Margan (1970) in Baumgartner, Strong and Hensley (2002), for populations of 568, 10,203 and 2, 578, sample sizes of 278, 433 and 379 were considered adequate. The proportionate stratified random sampling technique was employed in the selection of the samples from the population.

Table 1: Population and Sampling Techniques

S/N	Zones	No. of Schools	Teachers Population		Total	Teachers Sampled		Total
			Male	Female		Male	Female	
1	A(NSZ)	225	752	213	965	103	61	164
2	B(NNZ)	130	523	231	754	84	39	123
3	C(NWZ)	213	634	216	859	98	48	146
Total		**568**	**1918**	**660**	**2,578**	**285**	**148**	**433**

Source: Nasarawa State Ministry of Education, 2012

The study employed three data collection instruments to assess the implementation of Basic Science programs in junior secondary schools in Nasarawa State. These instruments were:

1. Basic Science Material Resources Evaluation Checklist (BSMREC): A checklist designed to assess the availability of essential material resources needed for Basic Science program implementation. Developed using the National Curriculum for junior secondary schools, BSMREC includes seven types of material resources, each listed with a corresponding column to record their availability. It was used to address research questions and hypotheses related to resource availability.

2. Basic Science Implementation Evaluation Questionnaire (BSIEQ): This questionnaire gathers responses on the implementation challenges faced in Basic Science programs, offering a three-point response scale (Major problem, Minor problem, and No problem) with scores of 3, 2, and 1, respectively. It contains 24 questions about likely implementation problems and was used to answer research questions and hypotheses related to these issues.

3. Basic Science Achievement Test (BSAT): A multiple-choice test consisting of 60 questions to evaluate the understanding of the Basic Science curriculum among JSS-III students. Each correct answer is awarded one mark. BSAT was used to measure student achievement in relation to research questions and hypotheses.

Together, these instruments were designed to provide comprehensive insights into resource availability, implementation challenges, and student performance in Basic Science education.

Results

Research Question 1: To what extent is the curriculum contents of Basic Science programme taught to students in Nasarawa state junior secondary schools?

Table 2: Descriptive Statistics for Curriculum Content of Basic Science Programme taught to Students

S/N	Statement	Response Mode				Total
		SA	D	D	SD	
1	Basic Science teachers are familiar with the curriculum for the science programme.	85 (20)	210 (48)	108 (25)	30 (7)	433 (100)
2	Basic science teachers have access to the basic science curriculum.	76 (18)	215 (50)	114 (26)	28 (6)	433 (100)
3	Teachers use basic science curriculum in their teaching.	101 (24)	304 (70)	10 (2)	18 (4)	433 (100)
4	Teachers teach the curriculum content of basic science as specified.	44 (10)	212 (49)	124 (29)	53 (12)	433 (100)

Table 2 shows the extent at which curriculum content of basic science programme is taught to students in junior secondary schools.

Research Hypothesis 1: There is no significant difference between the mean responses of rural and urban teachers on the extent of implementation of the curriculum content of basic science programme in Nasarawa State of Nigeria.

Table 3: Chi-square Contingency Table for Teachers on the Extent of Implementation of the Curriculum Content of Basic Science Programme

Response Model	Observed Values			Expected Values			Total
	School Location		Total	Response	School Location		
	Urban	Rural		Mode	Urban	Rural	
SA	16	26	42	SA	24	18	42
A	104	96	200	A	114	86	200
D	93	22	115	D	66	49	115
SD	34	42	76	SD	43	33	76
Total	247	186	433	Total	247	186	433

df = 3 α = 0,05, © SPSS version 19

$X^2_{cal} = 6.32$
$X^2_{tab} = 7.815$
$\alpha = 0.05$
df = 3

Table 3 shows the chi-square result for significant difference between the mean responses of rural and urban teachers on the extent of implementation of the curriculum content of basic science programme in Nasarawa State of Nigeria. From the table, it is evident that the calculated X^2 at 0.05 level of significance with 3 degrees of freedom was 6.32 which was less than the critical value of the X^2 which was 7.815. The null hypothesis is therefore not rejected.

Hence, there is no significant difference between the mean responses of rural and urban teachers on the extent of implementation of the curriculum content of basic science programme. The implication of this finding is that both rural and urban teachers have similar view on the extent of implementation of the curriculum content of basic science programme.

Research Question 2: What are the facilities available for the implementation of the basic science programme in junior secondary schools in Nasarawa State of Nigeria?

Table 4: Descriptive Statistics for Facilities Available for the Implementation of the basic science programme

S/N	Material Resource	Response Mode		Total
		Available		Not Available
1	Service points	58 (13)	375 (87)	433 (100)
2	Library resources	129 (30)	304 (70)	433 (100)
3	Equipment	133 (31)	300 (64)	433 (100)
4	Reagents/chemicals	158 (36)	275 (64)	433 (100)
5	Reserved/live specimens	254 (59)	179 (41)	433 (100)
6	Charts	53 (12)	380 (88)	433 (100)
7	Models	150 (35)	283 (65)	433 (100

Table 4 shows the facilities available for the implementation of the basic science programme in junior secondary schools in Nasarawa State of Nigeria. It is evident from item 1 that only 13% of the schools used for the study have available service points (like: water taps, gas cylinder, electric fittings, benches, fire extinguisher, sandbucket). However, 87% of the schools under consideration do not have service points for basic science programme. Again, responses in item 2 indicated that only 30% of the schools used for the study have library services (likes: basic science textbooks, teachers guide, students' practical text books, basic science curriculum etc.) But 70% of the schools do not have library services for basic science programme. Furthermore, it is also obvious from item 3 that only 31% of the schools used for the study have available equipment (like: microscope, specimen jars, small animal cage, aquarium, balance, spring balance etc.)

Research Hypothesis 2: There is no significant difference in the provision of material for basic science between urban and rural junior secondary schools in Nasarawa State of Nigeria.

Table 5: Chi-square Contingency Table for Provision of Material Resource for Basic Science between Urban and Rural Junior Secondary Schools

	Observed Values			**Expected Values**			
Material Resource	**Provision of Material Resources by School Location**		**Total**	**Material Resources**	**Provision of Material Resource by School Location**		**Total**
	Urban	**Rural**			**Urban**	**Rural**	
Service Points	38	11	49	Service Points	37	12	49
Library Resource	37	13	50	Library Resource	40	10	50
Reagent/ Chemicals	33	6	39	Reagent/ Chemicals	32	7	39
Reserve Specimens	12	4	16	Reserve Specimens	13	3	16
Charts	36	10	46	Charts	37	9	46
Models	23	6	29	Models	23	6	29
Total	219	59	278	Total	219	59	278

df = 6 α = 0,05, © SPSS version 19

X^2_{cal} = 13.453
X^2_{tab} = 12.592
α = 0.05
df = 6

Table 5 shows the chi-square result for significant difference in the provision of material resources for basic science between urban and rural junior secondary schools in Nasarawa State of Nigeria. From the table, it is evident that the calculated X^2 at 0.05 level of significance with 6 degrees of freedom was 13.453 which was greater than the critical value of the X^2 which was 12.592. The null hypothesis is therefore rejected. Hence, there is a significant difference in the provision of material resources for basic science between urban and rural junior secondary schools. The implication of this finding is that there is better provision of material resources for basic science in urban schools than in rural schools.

Research Question 3: How adequate are the facilities provided for the implementation of the basic science programme in junior secondary schools in Nasarawa State of Nigeria?

Table 6: Descriptive Statistics for Facilities provided for the Implementation of Basic Science Programme

S/N	Material Resources	Response Mode		Total
		Adequate	Inadequate	
1	Service points	78 (18)	355 (82)	433 (100)
2	Library resources	59 (14)	374 (86)	433 (100)
3	Equipment	63 (15)	370 (85)	433 (100)
4	Reagents/chemicals	58 (13)	375 (87)	433 (100)
5	Reserved/live specimens	54 (12)	379 (88)	433 (100)
6	Charts	53 (12)	380 (88)	433 (100)
7	Models	50 (11)	383 (89)	433 (100)

Table 6 shows the adequacy of facilities for the implementation of the basic science programme in junior secondary schools in Nasarawa State. It is evident from item 1 that only 18% of the schools used for the study have adequate service points (like: water taps, gas cylinder, electric fittings, benches, fire extinguisher, stand bucket). However, 82% of the schools under consideration do not have adequate service points for basic science programme. Again, responses in item 2 indicated that only 14% of the schools used for the study have adequate library services (like: basic science textbooks, teachers guide, students' practical textbooks, basic science curriculum etc.). But 86% of the schools do not have adequate library services for basic science programme. Furthermore, it is also obvious from item 3 that only 15% of the schools used for the study have adequate equipment (like: microscope, specimen jars, small animal cage, aquarium, balance, spring balance etc.). However,85% of the schools under consideration do not have adequate equipment for basic science programme. Moreover, responses in item 4 indicated that only 13% of the schools used for the study have adequate reagents/chemicals (like: fehlings solutions, sudan iii solution, hydrochloric acid, tetraoxosulphate (vi) acid, distilled water etc.). But 87% of the schools do not adequate reagents/chemicals for basic science programme. Finally, responses in item 5,6 and 7 indicated that only 12%, 12% and 11% of the schools used for the study have adequate reserved/live specimens (like: earth worms, round worms, tilapia, lizards frogs/toads, birds etc.), charts (like: life cycles of insect, charts on respective plants and animals etc) and models (like: audio visual equipment, projector, brain nervous system, circulatory system, digestive system etc.) respectively. But 88%, 88% and 89% of the schools do not have adequate reserved/live specimens, charts and models respectively.

Research Hypothesis 3: There is no significant difference in the level of utilization of material resource for basic science between urban and rural junior secondary schools in Nasarawa State of Nigeria.

Table 7: Chi-square Contingency Table for Utilization of Material Resources for Basic Science between Urban and Rural Junior Secondary Schools

Observed Values				Expected Values			
Material Resource	**Provision of Material Resources by School Location**		**Total**	**Material Resources**	**Provision of Material Resource by School Location**		**Total**
	Urban	**Rural**			**Urban**	**Rural**	
Service Points	25	21	46	Service Points	25	21	46
Library Resource	27	26	53	Library Resource	29	24	53
Reagent/ Chemicals	23	16	39	Reagent/ Chemicals	22	17	39
Reserve Specimens	12	14	26	Reserve Specimens	14	12	26
Charts	20	16	36	Charts	20	16	36
Models	23	16	39	Models	21	18	39
Total	153	125	278	Total	153	125	278

df = 6 α = 0,05, © SPSS version 19

$X^2_{cal} = 12.101$
$X^2_{tab} = 12.592$
$\alpha = 0.05$
df = 6

Table 7 shows the chi-square result for significant difference in the utilization of material resources for basic science between urban and rural junior secondary schools in Nasarawa State of Nigeria. From the table, it is evident that the calculated X^2 at 0.05 level of significance with 6 degrees of freedom was 12.101 which was less than the critical value of the X^2 which was 12.592. The null hypothesis is therefore not rejected. Hence, there is a significant difference in the utilization of material resources for basic science between urban and rural junior secondary schools. The implication of this finding is that both urban and rural schools utilize material resources for basic science adequate in their schools. Though rural schools have limited supply of material resources for basic science adequate in their schools, but they make maximum utilization of these materials.

Research Question 4: What are the mean achievement scores of students by gender in the basic science programme in junior secondary schools in Nasarawa state of Nigeria?

Table 8: Mean Achievement Scores of Male and Female Students in Basic Science

Variable	Count	Mean	SD
Scores of Male Students in Basic Science	221	61.2	29.9
Scores of Female Students in Basic Science	158	48.8	21.3

Count = 379, © SPSS version 19

Table 8 shows the mean achievement scores of students in the basic science programme in junior secondary schools in Nasarawa State of Nigeria. It is evident that the male students have the mean achievement score and standard deviation of 61.2 and 29.9 respectively. But the female students have mean achievement score and standard deviation of 48.8 and 21.3 respectively. The implication of the finding is that male students excel in basic science than their female counterparts.

Research Hypothesis 4: There is no significant difference in the mean achievement scores of male and female students in basic science programme in Junior Secondary schools in Nasarawa State of Nigeria.

Table 9: t-test Statistics for Significant Difference in the Mean Achievement Scores of Male and Female Students in Basic Science

Variable	Count	Mean	SD	t_{cal}	t_{cal}	Decision
Scores of Male Students in Basic Science	221	61.2	29.9			
Scores of Female Students in Basic Science	158	48.8	21.3	1.832	1.645	Reject Ho 4

Count = 379, df = 377, α = 0, 05, © SPSS version 19

Table 9 showed the t-test statistics results for significant difference in the mean achievement scores of male and female students in basics science in Nasarawa State of Nigeria. It is evident that at 0.05 level of significance and degree of freedom of 377, the t-test value of 1.832 which is greater than the critical value of 1.645 was obtained. Therefore, since the calculated value of t-test is greater than the critical value, the null hypothesis is rejected. Hence, there is significant difference in the mean achievement scores of male and female students in basic science in Nasarawa State of Nigeria. The Implication of the finding is that male students have higher mean achievement score in basic science than their female counterparts.

Discussion

The data analysis and results from the study provide a comprehensive picture of the implementation and challenges faced by junior secondary schools in Nasarawa State regarding the Basic Science program.

The study revealed that most respondents (68%) believed that teachers were familiar with the Basic Science curriculum, and 68% also felt that teachers had access to it. However, 32% of respondents indicated that some teachers were unfamiliar with the curriculum or did not have access to it. Notably, 94% of the respondents felt that teachers used the curriculum in their teaching. Nevertheless, a significant portion (41%) believed that teachers did not always teach the curriculum content as specified. This suggests a gap between curriculum awareness and actual delivery, highlighting the need for stronger adherence to the prescribed curriculum.

The chi-square test on the implementation of curriculum content showed no significant difference between urban and rural teachers' responses, indicating that both urban and rural teachers share similar views on the extent of curriculum implementation. However, the provision and adequacy of facilities for Basic Science were significantly better in urban schools than in rural ones. Urban schools had better access to essential resources like library services, equipment, reagents, and models.

This disparity is crucial as it suggests that students in rural schools may face limitations in accessing the necessary resources for a comprehensive science education.

Regarding the availability of facilities, the study found that a large majority of schools lacked essential resources. For instance, only 13% of schools had adequate service points (water, gas, etc.), and only 30% had proper library resources. Similarly, the availability of equipment, reagents, and models was insufficient, with more than 60% of schools lacking these critical materials. The adequacy of these resources was even more concerning, as over 80% of schools reported inadequacies in service points, library resources, and other essential materials. These findings highlight significant barriers to effective implementation of the Basic Science program, especially in rural schools, where resource shortages are more pronounced.

Although there was a significant difference in the provision of material resources between urban and rural schools, the utilization of available resources did not differ significantly. Rural schools, despite having fewer resources, made maximum use of what they had, indicating a high level of resourcefulness. This contrasts with urban schools, where better resources were available but may not have been utilized to their full potential. This suggests that while urban schools may have more materials, rural schools demonstrate greater efficiency in utilizing their limited resources.

The achievement scores of male and female students in Basic Science showed a significant gender gap, with male students outperforming female students. Male students had a higher mean score (61.2) compared to female students (48.8). This difference was statistically significant, as indicated by the t-test, which rejected the null hypothesis. This suggests that male students may have advantages in achieving higher academic outcomes in Basic Science, possibly due to factors such as access to resources, teaching methods, or gender-based societal influences that affect learning outcomes.

Conclusion and Implications

The findings underline the need for improved resource provision, particularly in rural areas, to ensure equal opportunities for students across Nasarawa State. There is also a clear need for enhanced teacher training and curriculum alignment to ensure that the curriculum is fully implemented as prescribed. Gender-based disparities in achievement should also be addressed through targeted interventions to support female students in excelling in Basic Science.

In summary, while both urban and rural teachers appear to be similarly familiar with and use the Basic Science curriculum, the availability and adequacy of resources are significantly better in urban areas. This disparity, combined with the gender differences in achievement, suggests that educational policies should focus on resource distribution and gender-inclusive strategies to improve overall learning outcomes in Basic Science.

Recommendations

The following recommendations were preferred based on the findings of the study:

1. Since the objectives for establishing Basic Science Junior Secondary Schools were not fully achieved, the state government through the Ministry of Education should address the issues of staffing, facilities, funding and supervision with all

the seriousness it deserves. This will not only improve on the standard of implementation, but also, the quality of the products.

2. Since most of the recommended instructional materials were either not available or not adequate, the government in conjunction with the Parents Teachers Associations (PTA) should source for funds and ways of providing the necessary instructional materials. More so that, workshops, seminars and conferences aimed at training the staff on the modern techniques and importance of improvisation of necessary instructional materials should be organized by relevant authorities and schools on regular basis.
3. The study further revealed that the available instructional materials were not being fully utilized by the basic science teachers in the teaching/learning process. Therefore, the school authorities should organize in-house workshops, seminars and conferences at schools were job insecurity for teachers and aimed at educating the basic science teachers and refreshing their memories on the importance and effective use of instructional materials in the teaching-learning process on regular basis.
4. Finally, the results also revealed that the major problems affecting the implementation of basic science programme in the Junior Secondary Schools were job insecurity for the teachers and poor background by students in the basic science. Based on these the researchers' recommended that good and effective welfare packages should be put in place by government for basic science teachers during active service and on retirement. In house workshops, seminars, and conferences should be organized on regular basis for teachers on issues relating to job satisfaction, efficiency during teaching as well as educational and vocational orientation of basic science students.
5. Government on their part should ensure job security on the part of the teachers followed by provision of science laboratories and enhancement of basic science students

References

Adejoh, M. J. & Sambo, M. H. (2011). Improving the Quality of Integrated Science Teaching and Learning through Educational Reforms. 52nd Annual Conference of the Science Teachers Association of Nigeria. 182-191.

Adejoh, M.J., Hudu, S.M.A., Kanu, A.C. (2020) "Effects of two innovative instructional delivery strategies on junior secondary school students' achievement in basic science and technology " JEAPP Online Journal, 1(1) Available at: http://independent.academia.edu/leagueofresearchers.

Alebious, K. A. (2000). Effects of two instructional methods on senior secondary school students' perceptions of the difficulty in learning some chemical concepts and their achievement. *Journal of Educational Management,* (1(1), 55-64.

Chukwuneke, B. U. & Nwachukwu, C. O. (2005). State and Future Education in Nigeria: in J.O. Afe and G.C. Edozie (eds). Book of abstracts and Lead papers. Asaba, Nigeria: West and Solomon publishing Company.

Jimoh, M.A. (1999). Effects of class size on students' academic Achievement in Biology. Journal of STAN.

Krejcie, R.V. & Morgan, D.W. (1970). Determining Sample Size for Research Activities. In A. Baumgartner, C.H. Strong and C. Hensley (2002). Conducting and Reading Rsearch in Health and Human Performance. Third Edition. Published by McGRAW Hill, ltd. (pp. 136-137).

National Educational Research & Development Council (NERDC, 2007). Basic Science Curriculum for Junior Secondary Schools, 1-3 (JSS 1-3).

Onipede, H. (2003). National Development hinges on quality education. *Journal of Educational Foundation Management.* 1(5), 27-31.

Sambo, M.A.H., Crescent, O.S. & Akinboboye, J. T. (2022). Fundamentals of Teaching **and** Learning for Teachers and Students in Schools and Colleges. Published by Ya-byangs Publishers.