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CHALLENGES OF TEACHING AND LEARNING OF SCIENCE IN SENIOR SECONDARY SCHOOLS IN ENUGU EAST LOCAL GOVERNMENT AREA OF ENUGU STATE

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Abstract: This study investigated the Challenges of Teaching and Learning of Science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State. The study adopted a descriptive survey research design. Two research questions and two hypotheses guided the study. The instrument for data collection was the Challenges of Teaching and Learning of Science Questionnaire (CTLSQ). The population of the study was made up of Five Thousand two hundred (5,200) senior secondary science students in Enugu State. The simple random sampling technique was used to select thirty (30) teachers and two hundred and thirty (230) students from Senior Secondary Schools in Enugu East Local Government Area of Enugu State. The Cronbach Alpha technique was used to ascertain the instrument's reliability, which yielded 0.89. Data collected were analyzed using mean, standard deviation and t-test. The findings revealed that the challenges of teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State include lack of fund, vandalization of science equipment and facilities, lack of competence and inadequate infrastructure. It was recommended that; adequate and qualified teachers must be provided; adequate instructional materials should be provided; Security should be provided for both facilities and students and also Government should provide fund for adequate provision and maintenance of science equipment and facilities.

Keywords: Challenges, Senior Secondary Schools, Science Education, Teaching and Learning.

Introduction

The school equips students to become leaders and citizens who understand how the natural world works, see the patterns that connect human activity to nature, and have the knowledge on that understanding. It is also a technology-based teaching and learning institution for preparing children for the Information Age to achieve Senior Secondary School educational objectives. These teaching and learning concepts should cover: curricular pedagogy, assessment and teaching-learning materials. Smart classrooms are technology-enhance classrooms that foster opportunities for teaching and learning by integrating learning technology, such as computers, specialized, software, audience response technology, assistive listening device, networking and audio visual. The effective teaching and learning of science in Senior Secondary Schools is so important because it encourages the active participation of students in the teaching and learning process. The National Policy of Education (FRN, 2013) emphasizes the need for proper teaching and learning of science by stimulating individual activity on the part of the students. With high achievement in science in mind, there is need to maximize those

factors, which will promote creative and innovation activities among students in the teaching and learning of science (Hacioglu, 2021). Science is essential in the scientific and technological development of the nation as it helps to improve the lives of humans and encourages Senior Secondary Students to continue with science. The curriculum should be taught with an integrated approach that will unite the science subjects such as Chemistry, Physics and Biology which are bases for courses such as Medicine, Pharmacy, Engineering and others (Rahman, Chandra & Anwar, 2019). The science curriculum is filled with lots of activities and experiments which are meant to encourage the students meet the contemporary needs of the society. Despite the importance of science, a report from West African Examination Council (WAEC) indicated that the West African Senior School Certificate Examination (WASSCE) results (2016 – 2022) were poor. The poor achievement has been attributed to abstract nature of the science subject and the lack of use of innovative teaching methods. Toluwa and Adefila (2020) and Nwaeze et al (2016) further stated that the conventional method does not allow students to acquire the necessary achievement in science. However, Ugwuanyi (2022) opined that one of the most effective way of promoting students' achievement is by minimizing those challenges that hinder effective teaching and learning of science in senior secondary schools. The essence of effective teaching and learning of science is to enhance students' learning outcomes, unfortunately this has been hindered by a lot of factors. The competence of teachers, lack of infrastructure, vandalization of equipment and facilities were reported as challenges of teaching and learning science in senior secondary schools (Ibrahim 2016, Onovo & Okorie, 2017). Teachers' experience and qualifications were also reported as a challenge to teaching and learning of science (Oyelakan, Igbokwe&Olarundare, 2017). Lack of funds and lack of supervision affected the effective teaching and learning of science in Senior Secondary schools. (Yusuf, Igwe & Eneh, 2020, Adarkwah, 2020, Olutola & Olatoye 2021). It has been noted that lack of infrastructure and laboratory equipment are the challenges affecting teaching and learning of science (Maphosa, 2020, Aneke, Aduaka & Eze, 2021, Sampong, Dwomoh, Boakye&Ofosua – Adjei, 2022). Challenges that are considered in this investigation are lack of infrastructure and equipment, lack of funds, vandalization of equipment and facilities, lack of competence and experience teachers, poor electricity supply. The challenges investigated in the study affect the effective teaching and learning of science on Senior Secondary Schools. To achieve the predetermined aims and objectives of science, educational researchers are reviewing the Challenges of teaching and learning of science. There seems to be scanty empirical research on the Challenges of teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State (WAEC 2016-2022)

Statement of the Problem

Science is very vital for National Development. However, despite the importance of sciences, reports on West African Examination Council (WAEC) indicate poor achievement of students in the West African Senior School Certificate Examination (WASSCE). The poor achievement has been attributed, mainly to the abstract nature of the subjects (chemistry, biology, physics) and the lack of use of innovative teaching methods. It is noted that one of the most effective ways of promoting students' achievement is by minimizing those challenges that hinder the effective teaching and learning of sciences. Unfortunately, there is little or no knowledge on the extent of teachers'

competences and factors that could affect teachers' competence of teaching and learning of science in Senior Secondary schools in Enugu State. Filling this knowledge gap is needed for effective interventions. Hence, the problem of this study is the challenges of teaching and learning of sciences in Senior Secondary Schools in Enugu East Local Government Area of Enugu State.

Purpose of the Study

This study sought to ascertain the challenges of teaching and learning of sciences in Senior Secondary Schools in Enugu East Local Government Area of Enugu State. The main objectives of the study are to ascertain;

i) the extent of teachers and students' utilization of facilities for the effective teaching and learning of sciences;

ii) the challenges affecting effective teaching and learning of science.

Research Questions

The following research questions guided the study;

1. What are the mean ratings of teachers and students on the extent of utilization of facilities for teaching and learning of science?
2. What are the mean ratings of teachers and students on the challenges affecting teaching and learning of science?

Hypotheses

The hypotheses that guided the study were tested at 0.05 level of significance.

$H0_1$: There is no significance difference between the mean ratings of teachers and students on the extent of utilization of facilities for teaching and learning of science.

$H0_2$: There is no significance difference between the mean ratings of teachers and students on the challenges affecting the teaching and learning of science.

Methods

The study adopted a descriptive survey design. The population of the study was made up of Five Thousand two hundred (5,200) senior secondary science students in Enugu East Local Government. Random sampling technique was used to select thirty (30) teachers and two hundred and thirty (230) students from Senior Secondary schools in Enugu East Local Government Area of Enugu State. Two research questions and two hypotheses guided the study. The instrument for data collection was the Challenges of Teaching and Learning of Science Questionnaire (CTLSQ). The instrument was validated by three experts two from the Science Unit and one from the Measurement and Evaluation unit all in the Department of Science and Computer Education, Faculty of Education, Godfrey Okoye University, Enugu. The questionnaire comprises two sections A and B. A, consists of demographic information of the respondents while section B, contains items on the extent of utilization and challenges of effective teaching and learning of science. Cronbach alpha method was used to determine the internal consistency which yielded 0.89. Data relating to research questions were analyzed using mean and standard deviation and t-test to test the hypotheses at 0.05 level of significance. The null hypotheses of no significant difference were not rejected if the p-value was greater than 0.05 level of significance but rejected if otherwise.

Results

Research Question 1: What are the mean ratings of teachers and students on the extent of utilizing science facilities for teaching and learning of science?

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Table 1: mean ratings of teachers and students on the extent of utilizing science facilities for effective teaching and learning of science

S/N	Items	Teachers N = 30			Students N = 230		
		Mean	SD	Dec.	Mean	SD	Dec.
1	Transfer of knowledge to students orally or in written form.	2.29	0.71	LE	2.38	0.48	LE
2	Write a report on experiment	2.42	0.36	LE	2.24	0.40	LE
3	Utilization of practical equipment	2.31	0.57	LE	2.39	0.10	LE
4	Utilization of chemical substances	2.30	0.87	HE	2.52	0.72	HE
5	Utilization of apparatus like test tube, microscopic device.	2.61	0.74	HE	2.15	0.03	HE
6	Utilization of electric supply	1.97	0.16	LE	2.15	0.03	LE
7.	Participation in the practical work	2.58	0.60	LE	2.51	0.59	HE
8	Use of instructional materials like text book, graph etc.	2.25	0.30	HE	2.18	0.08	HE
9.	Use of laboratory rules and regulations to coordinate the students and teachers	2.84	0.83	HE	2.54	0.68	HE
10	Utilization of the laboratory seat and table arrangements.	2.43	0.42	LE	2.39	0.31	LE
	Aggregate mean and Standard Deviation	2.45	0.56	LE	2.38	0.43	LE

The data in table one revealed that the teachers and students disagree on all the items/materials including transfer of knowledge for students having mean ratings of 2.29 and 2.38, writing a report of an experiment having mean rating of 2.42 and 2.24, utilization of practical equipment having mean ratings of 2.31 and 2.39, utilization of chemical substances having the mean rating of 2.30 and 2.52, utilization of apparatus like test tube, microscopic device having the mean rating of 2.61 and 2.15, utilization of electric supply having the mean rating of 1.97 and 2.15, participation in the practical work having the mean rating of 2.58 and 2.51, use of instructional materials like text book, graph having the mean rating of 2.25 and 2.18, use of laboratory rules and regulations to coordinate the students and teachers having the mean rating of 2.84 and 2.54, and utilization of the laboratory seat and table having the mean rating of 2.43 and 2.31 revealed adequate teaching and learning of science. However, the overall mean rating of 2.45 and 2.38 is an indication that there was poor utilization of science facilities by both teachers and students for effective teaching and learning of science.

Hypotheses One: There is no significant difference between the mean rating of teachers and students on the extent of utilization of science facilities for effective teaching and learning of science.

Table 2: t-test analysis of the difference in the mean ratings of teachers and students on the utilization of science facilities for effective teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State.

Group	N	Mean	SD	T	DF	Sign. (2-tailed)
Teachers	30	32.01	5.00	-0.98	238	0.33
Students	230	33.50	6.70			

Table 2 shows that the mean ratings of teachers on the extent of utilization of science facilities for teaching and learning of science (M=32.01, SD = 5.00) are not significantly higher (t=0.98, df = 238, p = 0.33) than students' ratings (M = 33.50, SD = 6.70). Hence, the null hypothesis which states that there is no significant difference in the mean ratings of teachers and students on the utilization of science facilities for effective teaching and learning of science was not rejected.

Research Question 2:

What are the mean ratings of teachers and students on the challenges of teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State?

Table 3: Mean ratings of teachers and students on the challenges of teaching and learning of science in Senior Secondary School in Enugu East Local Government Area of Enugu State.

S/N	Items	Teachers N = 30			Students N = 230		
		Mean	SD	Dec.	Mean	SD	Dec.
1	Poor electricity supply	3.32	0.70	A	3.37	0.60	A
2	lack of competence	3.42	0.63	A	3.41	0.63	A
3	lack of infrastructure	3.40	0.65	A	3.39	0.61	A
4	Lack of fund	3.44	0.67	A	3.35	0.58	A
5	Lack of technical support	3.23	0.72	A	3.28	0.64	A
6	Lack of instructional materials	3.20	0.61	A	3.40	0.59	A
7	Lack of facilities	3.14	0.61	A	3.08	0.43	A
	Aggregate mean and standard deviation	3.33	0.65	A	3.31	0.58	A

The result in table three with overall mean ratings of 3.33 and 2.66 indicated that the respondents agreed that all the items were challenges of teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State. From the table, the major challenges of teaching and learning of science are lack of funds with mean rating of 3.44 and 3.35, lack of competence with mean rating of 3.42 and 3.41 and lack of infrastructure with a mean rating of 3.40, and 3.39, lack of electric supply with mean rating of 3.32 and 3.37, lack of instructional materials with mean rating of 3.20 and 3.24, lack of technical support with mean rating of 3.23 and 3.28.

Hypothesis Two: There is no significant difference between the mean ratings of teachers and students on the Challenges of teaching and learning of science in Senior Secondary School in Enugu East Local Government Area of Enugu State.

Group	N	Mean	SD	T	DF	Sign. (2-tailed)

Teachers	30	25.13	3.05	0.42	2.39	0.68
Students	230	24.82	3.19			

Table 4 shows that the mean ratings of teachers on the challenges that affect the effective teaching and learning of science in Senior Secondary Schools in Enugu East Local Government Area of Enugu State. (M = 25.13, SD = 3.05) are not significantly higher (t = 0.42, DF = 2.39, p = 0.68) than students ratings (M = 24.82, SD = 3.19). Hence, the null hypothesis which states that there is no significant difference in the mean ratings of teachers and students on the challenges that affect the effective teaching and learning of science was not rejected.

Discussion of Findings

The result of research question one showed that science facilities were poorly utilized by both teachers and students. This was evidenced in the overall low mean scores of the items. The findings in table one further revealed that report on experiment, utilization of practical equipments and transfer of knowledge orally or in written form, utilization of apparatus like test tubes, microscopic device, utilization of practical equipments and utilization of chemical substances were poorly utilized and is not adequately incorporated in effective teaching and learning of science in Senior Secondary Schools. This is in line with Maphosa (2021) who found out that the students of tertiary institutions had negative perception of teaching and learning of science. The findings in table two revealed that challenges affecting the effective teaching and learning of science include; poor funding, inadequate infrastructure, lack of competence, poor electricity supply, lack of instructional materials. The test of the hypothesis showed that there is no significant difference in the mean ratings of teachers and students on the challenges affecting the effective teaching and learning of science. This result is in line with that of Ibrahim (2016) who stated that both lecturers and students of sciences were affected by these factors. Other authors include Oyelakan, Igbokwe and Olarundare (2017, YusufiIgwe and Eneh (2020), Olutola, Olatoye and Olatoye (2020) and Sarpong, Dwomoh, Boakye and Ofosua – Adjei (2022) who also found out that poor funding, poor infrastructure and lack of experience among others affect the effective teaching and learning of science in tertiary institution.

Conclusion

Teachers and students agreed that the challenges pointed out above affected the effective teaching and learning of science. Therefore, there is an urgent need for stakeholders in education to eliminate these challenges posing a serious problem to the effective teaching and learning of science to enable teachers to teach and present their lessons very effectively and efficiently.

Recommendations

Based on the findings of the study, the following recommendations were made thus;

1. Professional bodies such as STAN should organize workshops, seminars and conferences to improve teachers' pedagogical knowledge and skills for instructional purposes.
2. Government should provide funds for adequate provision and maintenance of science equipment and facilities.
3. Security should be provided for both students and facilities to avoid thieves from vandalizing them.
4. Students should engage themselves in active participation in teaching and learning of science.

REFERENCES

Federal Government of Nigeria (2023). National Policy on Education. Lagos.

Hacioglu, Y. (2021). The effect of STEM education on 21st century skills: pre-service science teachers' evaluations. Journal of Science Technology, English, Mathematics, and Arts Education (STEMAED), 2(4), 140-167.

Ibrahim, J.D. (2016). Challenges affecting information and communication technology use in teaching and learning integrated science in Colleges of Education in Katsina State: A case of Federal College of Education, Katsina. 57th Annual Conference Proceeding of science teachers association of Nigeria (STAN), 354-362.

Iyo, Obeta, M.U. Etukudoh, N. S. &Ejinaka, R. O. (2020).A case of online teaching and learning during Covid-19 in a medical lab, science Lab and training in federal school of medical Lab science, Jos. South-East Asian Journal of Medical Education,14(2), 108-116.

Malaysian online Journal of Educational Sciences, 5(2), 49-65.

Maphosa, V. (2021).Factors influencing students' perception towards learning adoption during a covid-19 pandemic: A developing country context-European journal of teacher perspective, 11(2)1-10.

Nwaeze, E.U. C., Onuoha, R.C. & Ukogom I. (2016).Innovative teaching methods in science education for senior secondary school science students. Journal of teacher perception, 11(2).

Oguguo, B.C., Ajuonuma, J.O. Azubuike, R., Ene, C.U. Attah, F.O. &Oko, C.J. (2020). Influence of social media on students' achievement, International Journal of Evaluation and Research Education (IJERE), 9(4), 1,000 -10,009.

Olutola, A.T., Olatoye, R. A&Olatoye, O.O. (2021). Assessing the impediments to learning utilization by the higher institution. Journal of Education and Leanring (Edulearn), 15(12) 297 – 302.

Onovo, J.S. &Okorie, M.N. (2017). Adoption of learning as instructional media in secondary schools: challenges and prospects. Journal of Education and practice, 8(35), 90-95.

Oyelakan, O.S. Igbokwe, E.F., &Olarunda, A.S. (2017).Science teachers' utilization of innovative strategies for teaching senior schools science in Ilorin, Nigeria.

Rahman, D.F., Chandra, D.T. & Anwar, S. (2019). Development of an integrated science teaching material-oriented ability to argue for junior high school students. Journal of physics conference, sense, 1157(2), 1-4.

Sarpong S.A, Dwomoh, G., Ofosua-Adjei, I. & Boakye, E.K. (2022). Online teaching and learning under COVID-19 pandemic; perception of university students in Ghana. European Journal of International Multimedia and Education, 3(1), January 2022, e2203, https://doi.org/10.30935/ejimed/11438.

Toluwa, O. & Adefila, O.M. (2020). Effects of analog-enhanced instructional strategy on learning outcomes of students in basic science practical skills in Ekiti State, Nigeria,

International Journal of Multidisciplinary Current Research (IJMCE), 2(4), 41-45.

Ugwuanyi, C.S. (2022). Enhancing children's achievement in basic science using library electronic books: A case of repeated evaluation. Library philosophy and practice 6573.https://digital.

WEAC Chief Examiners' Report (2016 – 2022).

Yusuf, L., Igwe, N. J. & Eneh, E.C. (2020). Utilization of information and communication technology (ITC) for students' support services in learning in tertiary institutions for sustainable national development. Review of Education, 32(11), 311-318.