

**AVAILABILITY AND UTILIZATION OF LABORATORY FACILITIES FOR TEACHING
CARBOHYDRATES IN SENIOR SECONDARY SCHOOLS IN
UYO EDUCATION ZONE, AKWA IBOM STATE**

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Abstract

This study examined availability and utilization of laboratory facilities for teaching carbohydrates in senior secondary schools in Uyo Education Zone. The objective was to investigate the availability, utilization of laboratory instructional facilities and problems encountered by biology and chemistry teachers on the concept of carbohydrates. The study adopted the descriptive survey research design. Three research questions and three research hypotheses were formulated to guide the study. The sample size for the study was two hundred and fifteen (215) biology and chemistry teachers from the population of two hundred and eighteen (218) biology and chemistry teachers in 2018/2019 academic session. The two hundred and fifteen 215 biology and chemistry science teachers were purposively used as sample for the study. Instrument for data collection was questionnaire on the availability, utilization of laboratory instructional facilities and problems encountered by biology and chemistry teachers during the teaching of carbohydrates in Uyo Education Zone. The instrument was standardized by experts. Split half method was used to determine the reliability with coefficient of 0.88. Data was analyzed using mean, standard deviation and independent t-test. The findings showed that few laboratory facilities are available but rarely utilized by biology and chemistry teachers. Based on the findings, it was recommended among others that; biology and chemistry teachers should make use of laboratory facilities available for the teaching of carbohydrates in public senior secondary schools in Uyo Education Zone and school administrators should help reduce problems encountered by biology and chemistry teachers in the utilization of laboratory facilities.

Keywords:

Availability, Utilization, Laboratory Facilities, Teaching, Carbohydrates

Introduction

1.1 Laboratory Instructional Facilities for Science Teaching

Laboratory instructional facilities are materials / resources that can be used to ease, encourage, improve and promote teaching and learning activities in the laboratory. They are materials / resources that a science teacher uses to pass information to the learners. According to Anyadiegwu, (2018), instructional facilities are various forms of educational materials that teachers and learners can use to enhance understanding of concepts, skills and competencies in the teaching – learning process. These facilities communicate explicitly to clarify concept, knowledge and facilitate understanding for learners. Enderle and Leanne (2016) opine that instructional facilities are tools used in educational lessons to promote active learning and assessment. Achimugu (2012) added that any resource a teacher uses to help him teach the learner is an instructional material. Instructional facilities therefore enable good grasp of science subjects.

Udoh (2015) opines that good science teachers seek for more effective and efficient ways of teaching since the emphasis of science teaching is to get the students to understand, comprehend and apply the concepts taught. This has continued to drive researchers towards finding different instructional materials and resources to facilitate the teaching and learning of science in order to make it interesting and instructive for the learners. Enderle and Leanne (2016) added that instructional materials promote hands-on and interactive laboratory experience. Instructional materials also support science effectiveness, learning experience and enable the student to get the best out of it. Good instructional materials stimulate and engage students' learning at different levels, challenging them mentally and physically and the role of a science teacher is to aid the students come to their own understanding in science using appropriate instructional materials. According to Adeniyi (2011), the use of instructional facilities/ materials help teachers create value in teaching by reducing abstraction. Instructional materials make learning relevant to the learners as it offer experiences to stimulate self-activities that provide concrete basis for conceptual, logical and critical thinking if appropriately employed. Good- quality instructional materials can engage students, help them to develop important skills, understand the process of scientific investigation, and develop their understanding of concepts. Based on these advantages, laboratory instructional facilities are important and crucial tools in making learning productively relevant to its learners since the users understand a concept without difficulty. Adequate laboratory instructional facilities are therefore needed in public schools to reduce the burden of science teachers and to promote sensory receptors of the learners on abstract concepts such as carbohydrate (Orji & Abolarin, 2012).

1.2 Availability of Laboratory Instructional Facilities for Science Teaching

Availability of laboratory facilities for science teachers in public secondary schools can solve problems of students' poor performances in internal and external examinations in science. Adebisi, Tewogbade and Olajide (2017) studied the assessment of laboratory resources in science education and their findings about laboratory facilities are that laboratory facilities help to improve science process skills by expanding the basis of inference and the ability to access large data base to activate learning. Mucai (2013) observes that there is lack of relevant laboratory facilities that are appropriate and suitable to Nigerian schools but are not available and poor funding is listed among the factors that hinder the availability of instructional facilities in secondary schools. Maredia (2007) opined that availability of instructional materials will focus on imparting skills and abilities on students which are transferable and will influence the desired characteristics expected of the curriculum. Adeniyi (2011) also observes that for effective science teaching to be promoted laboratory facilities must be available in schools for utilization by science teachers. Abimbade

(2005) posits that lack of adequate funding in education is a barrier to availability of laboratory facilities in public secondary schools. Etiubon (2018) observes that the availability of laboratory facilities in schools results in increased effectiveness of the educational process and increased productivity through enhanced human capacity. This enhances the acquisition of basic knowledge and skills for economic and educational development.

1.3 Utilization of Laboratory Instructional Facilities for Science Teaching.

Utilization of laboratory facilities is the frequency with which the available laboratory facilities are used during laboratory experiments. According to Adebisi, Tewogbade and Olajide (2017), laboratory facilities can be available, adequate but not utilized during science teaching and expressed fervent need for utilization of instructional resources in teaching and learning. Instructional resources also known as instructional facilities are vehicles that carry messages and information from a transmitting source to the receiving end. Anyadiegwu (2018) analyzed the extent of utilization of laboratory facilities and students' academic performance in science and found that students who utilized laboratory facilities during science teaching and learning achieved higher than those who had no experience in laboratory activities. Neji and Nuoha (2015) found that utilization of laboratory facilities/ equipment in secondary schools showed that 74% of the science teachers utilized laboratory facilities during science teaching and learning, while 26% of the teachers never utilized laboratory facilities. The findings also revealed that laboratory facilities significantly influenced students' academic performance in science. Orji and Abolarin (2012) also investigated the utilization of laboratory facilities in secondary schools and observed that the utilization of laboratory facilities in science teaching enable learners to develop problem solving skills, positive attitude and interest towards science learning. Obinna (2012) also posits that teacher's utilization of instructional facilities significantly influence students' academic performance in science. In schools where these facilities are available, students perform significantly higher in their academics.

Since the extent of utilization of laboratory facilities in secondary school science teaching and learning support 'hands on' activity in science learning, the development of practical skills help to shape students' understanding of scientific concepts and phenomena. Science teachers therefore, need to develop holistic array of skills for teaching, thinking, managing instructional facilities as well as knowledge of self, students, community, pedagogies and emerging technologies. They need to update knowledge, learning and apply these to academic work, assignments and environment. These abilities and skills enable science teachers to deliver effective instructions on science concepts like carbohydrate. Adeniyi (2011) and Omosewo (2012) posit that teachers' utilization of laboratory instructional materials/ facilities impact greatly on students' academic performance. They perform better when they are exposed to utilizing laboratory facilities. Science teachers therefore, need to be efficient in designing, planning and implementing laboratory experiments on carbohydrate using appropriate laboratory instructional facilities. A good science teacher thus, is seen in his ability to utilize laboratory instructional facilities to equip the students with knowledge, ideas and experiences that make them functional in the society (Mucui, 2013). This functionality enable students develop skills to compete in chosen future careers and in the workplace.

1.4 Problems Encountered by Science Teachers in the Utilization of Laboratory Instructional Facilities for the Teaching of Carbohydrates

Most science teachers encounter problems in the utilization of instructional facilities in public secondary schools which contribute to poor performances of students both in internal and external examinations on carbohydrates. According to Achimugu (2012), teaching carbohydrates pose challenges to many science teachers because most science teachers are not well equipped to deliver

quality instruction since they lack adequate training on the use of instructional facilities on carbohydrate and therefore find it difficult to transmit appropriate information and ideas on the concept to the students. Hence, students lack understanding of the concept during practical. Other problems according to [Achimugu \(2012\)](#) are; teachers' knowledge of carbohydrate content, inappropriate application and use of instructional facilities involving carbohydrate, inability to adequately deliver instructions on carbohydrate, lack of familiarity with common laboratory equipment, apparatuses and poor knowledge in the fundamental principles, processes and procedures in presenting carbohydrate concept. [Kulshretta \(2013\)](#) asserted that the quality of learning outcome is the function of those who teach it and posit that even a good curriculum and a well-stocked laboratory would not give the desired result in the hands of inexperienced, un-resourceful, inefficient and unwilling science teachers. [Okoye and Nwakonobi \(2011\)](#) observed that science education curriculum implementation is still poorly done, so teaching is yet to be effective in Nigerian secondary schools. Addressing these challenges will improve the utilization of laboratory instructional facilities on carbohydrates.

Another problem encountered by science teachers in the utilization of laboratory instructional facilities on carbohydrates is that many teachers are not specialists in sciences but were persuaded to teach science due to shortage of science teachers. These set of teachers lack knowledge of the fundamental principles, processes and procedures guiding carbohydrate and therefore do not have the capacity and mastery required to translate relevance and competence on use of instructional facilities for students' cognition and meaningful performance on carbohydrate ([Njoku, 2010 & Etiubon, 2018](#)). For instance, during practical, a competent teacher in the absence of bunsen burner can improvise the use of stove during the process of heating to help in the smooth and effective process of the practical activities. A competent and resourceful science teacher therefore, applies laboratory instructional facilities in such a way as to guide, benefit and promote greater impact in the teaching of carbohydrate.

1.5 Concept of Carbohydrates

Carbohydrates are chemically neutral compounds of carbon, hydrogen and oxygen. Carbohydrates occur in simple forms such as sugars and in complex forms such as starches and fiber. Both simple and complex carbohydrates are healthy food options. The body breaks down most sugars and starches into glucose, a simple sugar that the body can use to feed its cells. Carbohydrates are present in varying amounts in most food including fruits, vegetables, grains, beans, legumes, milk and milk products, and in foods containing added sugar such as candy, soda and sweets. Simple carbohydrates are monosaccharides and disaccharides. Monosaccharides are single sugar molecule, while disaccharides are two simple sugar molecules linked together. More complex carbohydrates are called polysaccharides and are multiple sugar molecules linked together ([Kanter, 2017](#)).

Carbohydrates provide one with energy, as they make up about half of the daily calorie intake and are converted into blood glucose or blood sugar by the body to be used for energy. According to the American Diabetes Association, both the amount and type of carbohydrates one consume affects one's blood sugar levels and so it is important to choose healthy carbohydrate choices and control one's portion sizes. Foods that contain nutrients such as fiber, vitamins, minerals, antioxidants, protein and healthy fats tend to be better choices than those which are considered empty calorie foods such cake, cookies. Sweets and candy because these only provide calories with little or no other nutrients. Carbohydrates are a common source of energy in living organisms; however, in the case of dietary fiber – indigestible carbohydrates which are not a source of energy – inadequate intake can lead to significant increases in mortality ([Gui, Sun, Si, & Chen, 2017](#)).

2.0 Statement of the Problem

Carbohydrates in most secondary schools are viewed as difficult by many science students and this is reflected in poor academic performances of science students in Nigerian public senior secondary schools examinations, West African Examination Counsel (WAEC, 2018). In this regard, the West African Examinations Council Chief Examiner's report (2018), observed students' poor performances in sciences particularly as regards carbohydrates. These poor performances on the part of the students may be from insufficient and non-utilization of laboratory facilities by science teachers. These lead to poor knowledge in the fundamental principles, process and procedures in the teaching of carbohydrates. Consequently, inadequate and non-utilization of laboratory facilities by science teachers leads to poor understanding on the procedures necessary for practical work on carbohydrates. It is therefore, necessary to investigate science teachers' availability and utilization of laboratory instructional facilities on carbohydrates in senior secondary schools in Uyo Education Zone.

2.1 Purpose of the study

The specific objectives of the study are;

1. To determine the difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates
2. To examine the difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates
3. To access the difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates

2.2 Research Questions

The study was guided by the following research questions;

1. What is the difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates?
2. What is the difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates
3. What is the difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates

Research Hypotheses

The following research hypotheses were formulated;

1. There is no significant difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates.
2. There is no significant difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates
3. There is no significant difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates

2.3 Methodology

The design adopted for this study was descriptive survey research design. The choice of this design was that it focuses on eliciting information from respondents' opinions, beliefs, motivations and behaviour. The study was conducted in Uyo Education Zone of Akwa Ibom State. There are fifteen (15) public secondary schools that are Government owned in the study area. The population of the study comprises two hundred and eighteen (218) biology and chemistry teachers in

2018/2019 academic session from the fifteen (15) public co-educational secondary schools in Uyo Education Zone. The schools were used to ascertain the availability and utilization of laboratory instructional facilities for the teaching of carbohydrates. A sample of two hundred and fifteen (215) biology and chemistry teachers was used for the study. The teachers were purposively used as sample for the study.

Instruments for data collection for this study were science laboratory inventory books and biology/ chemistry teachers' questionnaire (BCTQ). Science laboratory inventory books were used to obtain data on the availability of laboratory facilities and the questionnaire of thirty (30) items were used to obtain data from teachers on the availability and utilization of laboratory facilities. From the inventory records, it was found that laboratory facilities were insufficient. Questionnaire of thirty (30) items highlights the three (3) research questions used to obtain data on the availability of laboratory facilities, extent of science teachers' utilization and problems encountered by biology and chemistry teachers in the utilization of laboratory facilities on carbohydrates.

The BCTQ comprised of two sections: Section A and Section B. Section A contained the personal information of the teachers while section B contained thirty (30) structured items on a rating scale of Available (A) – 2, Not Available (NA) - 1, Utilized (U) – 2, Not Utilized (NU) -1, Agree (A) -2 and Not Agree (NA) – 1. The BCTQ was used to determine the availability, utilization of laboratory facilities and problems faced by science teachers for the teaching of carbohydrates in senior secondary schools.

The questionnaire items were subjected to validation by three lecturers from the department of science education and one lecturer from test and measurement unit of the University of Uyo, Uyo. All comments and corrections were incorporated into the final form of the instrument. Split half method was used to determine the reliability of the instrument which was established at 0.88. On the basis of the high index, the instrument was considered reliable and suitable for conducting the research. Mean and Standard deviation were used in analyzing the data on the research questions and Independent t-test was used to test the hypotheses.

In order to be effective, one biology and chemistry teachers in each of the fifteen (15) secondary schools under study were used as research assistants. The copies of the questionnaire were administered to biology and chemistry teachers in each school with the help of research assistants. The teachers in each school were required to fill and return the questionnaire on the day of each visit. Two hundred and fifteen (215) copies of questionnaire out of the two hundred and eighteen (218) given out were retrieved. The items of questionnaire collected were prepared for analysis using mean and standard deviation. Mean response of 1.50 and above was considered as available, agree and utilize, and mean response of 1.49 and below was considered as not available, not agree and not utilize

4.0 Results of Data Analysis:

Research Question 1

What is the difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates?

The scores derived from the questionnaire were analyzed and presented as follows:

Table 1: Mean and Standard Deviation of Biology and Chemistry Teachers' Responses on the Availability of Laboratory Facilities on the Concept of Carbohydrates

S/N	The following laboratory facilities are available in my school for practicals on carbohydrates :	Number of Respondents	Mean	Standard Deviation	Decision
1	retort stands, tripod stands	215	1.57	0.49	Available
2	beakers, test tubes, test tube holders, pipettes	215	1.50	0.51	Available
3	wash bottles, aqueous ammonia, ethanoic acid,	215	1.47	0.50	Not Available
4	spatula, burette, bom calorimeters, descicator	215	1.43	0.49	Not Available
5	benzoic acid, NaOH, NaCl, copper turnings, ethyl alcohol, potassium permanganate, salicylic acid, methyl orange indicator, indicator bottle,	215	1.47	0.50	Not Available
6	weighing balance, pH meter, condensers, thermometers,	215	1.57	0.49	Available
7	measuring cylinders, blue litmus, evaporating discs	215	1.50	0.51	Available
8	periodical charts, AgNO ₃ , Ca(OH) ₂	215	1.43	0.49	Not Available
9	thermometer, bunsen burners, volumetric flask, fume cupboard, accumulator,	215	1.46	0.50	Not Available
10	electricity supply, water supply,	215	1.43	0.49	Not Available

Data in Table 1 shows that only items 1, 2, 6, and 7 had cut-off mean scores of 1.50 and above. This showed that few laboratory instructional facilities are available in secondary schools in Uyo Education Zone and items 3, 4, 5, 8, 9 and 10 showed mean scores below the cut-off mean of 1.50 which indicated that most laboratory facilities are not available in secondary schools in Uyo Education Zone for the teaching of carbohydrates.

Research Hypothesis 1

There is no significant difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates.

Table 2

t-test Analysis on the responses of Biology and Chemistry Teachers on the Availability of Laboratory Facilities on the Concept of Carbohydrates

Laboratory Facilities	Teachers	N	Mean	SD	df	t-cal	P-cal	Decision
Availability	Biology	119	1.78	0.42	213	0.20	.84	NS
	Chemistry	96	1.79	0.41				

- S = Significant at $P < 0.05$ level of significance

Data from table 2 shows that the calculated probability value (P- value) 0.84 is greater than the alpha level 0.05. Therefore, the null hypothesis 1 is accepted. This implies that there is no significant difference in the responses of Biology and Chemistry teachers on the availability of laboratory facilities on the concept of carbohydrates.

Research Question 2:

What is the difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates?

The scores derived from the questionnaire were analyzed and presented as follows:

Table 3: Mean and Standard Deviation of Biology and Chemistry Teachers' Responses on the Utilization of Laboratory Facilities on the Concept of Carbohydrates

S/N	Science teachers utilizes the following laboratory instructional facilities during practical on carbohydrates for effective instructional delivery	N	Mean	Std. Deviation	Decision
1.	Retort stands, Tripod stands	215	1.49	0.50	Not Utilized
2	Beakers, Test tubes, Test tube holders, Pipettes	215	1.43	0.49	Not Utilized
3	Wash bottles, Aqueous ammonia, Ethanoic acid,	215	1.46	0.50	Not Utilized
4	Spatula, Burette, Bom calorimeters, Desiccators	215	1.47	0.50	Not Utilized
5	Benzoic acid, NaOH, NaCl, Copper turnings, Ethyl alcohol, Potassium permanganate, Salicylic acid, Methyl orange indicator, Indicator bottle,	215	1.43	0.49	Not Utilized
6	Weighing balance, pH meter, Condensers, Thermometers,	215	1.46	0.57	Not Utilized

7	Measuring cylinders, Blue litmus, Evaporating discs	215	1.47	0.50	Not Utilized
8	Periodical charts, AgNO ₃ , CaOH	215	1.43	0.49	Not Utilized
9	Thermometer, Bunsen burners, Volumetric flask, Fume cupboard, Accumulator,	215	1.47	0.50	Not Utilized
10	Electricity supply, Water supply,	215	1.47	0.50	Not Utilized

Data in table 3 indicates that items 1 to 10 have mean scores below 1.50 which was the cut-off mean. This showed that biology and chemistry teachers do not utilize laboratory facilities in public secondary schools in Uyo Education Zone for the teaching of carbohydrates.

Research Hypothesis 2: There is no significant difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates.

Table 4

t-test Analysis on the responses of Biology and Chemistry Teachers on the Utilization of Laboratory Facilities on the Concept of Carbohydrates

Laboratory Facilities	Teachers	N	Mean	SD	df	t-cal	P-cal	Decision
Utilization	Biology	119	1.18	0.38	213	0.21	.83	NS
	Chemistry	96	1.17	0.37				

- S = Significant at P<.05 level of significance

Data from Table 4 shows that the calculated probability value (P- value) .83 is greater than the alpha level 0.05. Therefore, the null hypothesis 2 is accepted. This implies that there is no significant difference in the responses of Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates.

The scores derived from the questionnaire were analyzed and presented as follows:

Table 5

Mean and Standard Deviation of Biology and Chemistry Teachers' Responses on the Problem Encountered on the Utilization of Laboratory Facilities on the Concept of Carbohydrates

S/n	Problems encountered in schools on utilization of laboratory facilities in the teaching of carbohydrates	N	Mean	Standard deviation	Decision
1	There are inadequate laboratory facilities in my school	215	1.60	0.49	Agreed
2	There is no in-service training for science teachers on the use of laboratory facilities.	215	1.53	0.51	Agreed
3	Science teachers are not sponsored for educational conferences	215	1.57	0.49	Agreed
4	Large classes makes it difficult to use laboratory facilities for practical	215	1.54	0.49	Agreed

5	Training program as a teacher trainee was mainly theory-oriented not practical-oriented	215	1.54	0.49	Agreed
6	I find it difficult to operate the basic scientific equipment used in teaching carbohydrate	215	1.49	0.50	Disagreed
7	The number of periods given for teaching of carbohydrate is inadequate	215	1.50	0.50	Agreed
8	Students have problems in understanding carbohydrate even when similar examples are given	215	1.49	0.50	Disagreed
9	No provision of books, journals and scientific publications on laboratory facilities for science teachers	215	1.60	0.49	Agreed
10	No provision of funds by schools to help set up indoor facilities needed for effective utilization of laboratory facilities	215	1.51	0.50	Agreed

Research Question 3: What is the difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates?

Data in table 5 shows that items 1, 2, 3, 4, 5, 7, 9 and 10 had mean scores above the cut-off mean of 1.50 and only items 6, and 8 that had mean scores below the cut-off mean of 1.50. This showed that biology and chemistry teachers in public secondary schools in Uyo Education Zone encountered problems toward the utilization of laboratory facilities on carbohydrates for effective instructional delivery.

Research Hypothesis 3: There is no significant difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates.

Table 6

t-test Analysis on the responses of Biology and Chemistry Teachers on the Problem Encountered on the Utilization of Laboratory Facilities on the Concept of Carbohydrates

Laboratory Facilities	Teachers	N	Mean	SD	df	t-cal	P-cal	Decision
Problems Encountered	Biology	119	1.79	0.40	213	0.21	.74	NS
	Chemistry	96	1.69	0.46				

*S = Significant difference at $P < .05$ level of significance

Data from Table 6 shows that the calculated probability value (P- value) 0.74 is greater than the alpha level 0.05. Therefore, the null hypothesis 3 is accepted. This implies that there is no significant difference in the responses of problem encountered by Biology and Chemistry teachers on the utilization of laboratory facilities on the concept of carbohydrates

Discussion of Results

Results from this study indicate unavailability and non-utilization of laboratory facilities for science teachers' teaching on carbohydrates. This corroborates the findings of Anyadiegwu (2018) that there is lack of relevant laboratory facilities that are appropriate and suitable for Nigerian schools and poor funding in secondary schools hinder the availability of instructional materials. This study also corroborate the findings of Adebisi, Tewogbade and Olajide (2017) that lack of adequate funding in education is a barrier to availability of laboratory facilities in public secondary schools. This unavailability of laboratory facilities constitutes hindrance to science teachers' effective delivery on the concept of carbohydrates. This is also in agreement with earlier findings of (Obinna (2012; Mucai, 2013) that unavailability of teaching facilities hinders effective delivery of science, technology and mathematics in general. Anyadiegwu (2018) observed that adequate laboratory instructional facilities are needed in public schools to reduce the burden of science teachers and to promote sensory receptors of the learners on abstract concepts such as carbohydrate. Etiubon (2018) also observed that the availability of laboratory facilities in education results in increased effectiveness of the educational process and results in increased productivity through enhanced human capacity as this facilitates acquisition of basic knowledge and skills for laboratory experiment and lifelong development.

Results also show that science teachers are faced with several challenges in the utilization of laboratory instructional facilities for effective instructional delivery on carbohydrates such as; inadequate laboratory instructional facilities in schools, lack of in-service training for science teachers on the use of laboratory instructional facilities and large classes that makes it difficult to use laboratory instructional facilities for practical purposes. Omosewo (2012) asserted that the quality of learning outcome is the function of those who teach it and he further stated that a good curriculum and well-stocked laboratory facilities would not give the desired result in the hand of science teachers who are faced with several challenges. This corroborate the findings of Adeniyi (2011) that teaching carbohydrates pose challenges to many science teachers because most science teachers are not well equipped to deliver quality instruction since they lack adequate training on the use of instructional facilities that could enhance the teaching of carbohydrates. This poses difficulty in transmitting appropriate information and idea on the concept to students. The study also corroborate the findings of Omosewo (2012) that teachers lack knowledge of carbohydrate content and are not familiar with common laboratory equipment, apparatuses and have poor knowledge in the fundamental principles, processes and procedures applied to teaching carbohydrates. However, the implication of these findings is that science teaching and learning shall remain didactic and teacher centered and this is reflected in the persistent decline in the academic performance of science students on the concept of carbohydrates.

Conclusion

The findings of the study show inadequate availability and non-utilization of laboratory instructional facilities in public secondary schools. Inadequate laboratory facilities with major challenges faced by biology and chemistry teachers affect meaningful teaching and learning in secondary schools and hinders achieving the objectives of laboratory practicals on carbohydrates to improve academic performance.

Recommendations

Based on the findings of this study, recommendations were that,

1. Laboratory facilities should be made available by school administrators and the government for meaningful teaching and learning in secondary schools.
2. Biology and chemistry teachers should make effective utilization of laboratory facilities in public secondary schools where available for the teaching of carbohydrates.
3. In-service training for biology and chemistry teachers on the use of instructional facilities should be made available by their schools, Non-Governmental Organization (NGOs) and research institutes in secondary education through workshops, seminars and national conferences to facilitate effective use of laboratory facilities.

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