LEVEL OF ACQUISITION OF LABORATORY MANAGERIAL SKILLS BY BASIC SCIENCE TEACHERS IN SECONDARY SCHOOLS IN ANAMBRA STATE

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ABSTRACT
The study investigated the level of acquisition of laboratory managerial skills by basic sciences teachers in secondary schools in Anambra Stae. Two research questions guided the study while two hypotheses were tested at 0.05 level of significance. The design of the study was descriptive survey design. The population of the study comprised of 298 basic science teachers from Aguata, Awka, Nnewi, Ogidi, Onitsha and Otuocha zones. The entire population was studied without sampling due to its manageable size. The instrument for data collection was a researcher-developed instrument tagged Acquisition of Laboratory Managerial Skills Questionnaire (ALMSQ). The instrument was validated by two experts and the reliability of the instrument was established using Cronbach alpha which yielded reliability co-efficient of 0.90. The research questions were analyzed using mean while the null hypotheses were tested using t-test and ANOVA. The findings of the study revealed that basic science teachers had high level of acquisition of laboratory managerial skills; teaching experience had significant contributions to basic science teachers' level of acquisition of laboratory skills, and that their academic qualifications had no significant effect. Based on the findings, the study recommended that since the basic science teachers in secondary schools have high level of acquisition of laboratory managerial skills, Government, Education Managers and Administrators in Nigeria should create a unit in the Ministry of Education to handle issues that will promote and sustain the basic science teachers' applications of these skills for effective teaching and enhancement of students' achievement in basic science.
Keywords: Laboratory Managerial Skills, Basic Science Teachers, Basic Science

Introduction
It is becoming increasingly apparent that the economically developed countries of the world achieved their position of eminence by dint of hard work based on a scientific approach to life endeavours. Since its inception in Nigeria, science education has brought a dramatic development in the area of education, science and technology as well as contributing immensely to the growth of the nation's economy. Science education is the scholarly and practical discipline concerned with the teaching, learning and assessment of science content, science process as well as nature of science (Obialor, 2018). No nation can afford to neglect science education

at any level of education and hope to thrive in any field of human endeavour. Science education is imperative for useful living in any society. It is at the centre for producing resources necessary for socio-economic, scientific and technological development needed for advancement of any nation (Osuafor & Okonkwo, 2013), Nigeria inclusive

In Nigeria, science education is taught at all levels of the educational system from pre-primary through primary and secondary school to tertiary levels. Science education in primary schools is taught as a component of basic science and technology (Federal Ministry of Education, 2007). At the junior secondary school level, science education is taught as basic science (Federal Ministry of Education, 2007). At the senior secondary school level, science education is taught as chemistry, biology and physics, although, students are not expected to offer all three of them but at least one (Afemikhe, Imobehai & Ogbuanya, 2015), except those with the aim of advancing in science related fields at the tertiary institutions. The Universal Basic Education has coined basic science in place of the earlier known integrated science to cater for both practical and theoretical aspects of science at primary and junior secondary schools in Nigeria (Otarigho&Oruese, 2013).

Basic Science is an introductory course to the study of the sciences in the senior secondary school (Omiko, 2016). Ukpabi in Omiko (2015) defined Basic Science as a science in differentiated form which stresses the fundamentals of science. Basic science involves the study of elementary biology, anatomy, earth/solar system, ecology, genetics, chemistry and physics as a single science subject in the Junior Secondary school. It offers the basic training in scientific skills required for human survival, sustainable development and societal transformation. Basic science studies also involve bringing together traditionally separate science subjects so that students grasp a more understanding of science and one of the guiding principles of the National Science Education Standards (NSES) is simply science for all students. It is in realization of this fact that the Federal Republic of Nigeria in the National Policy on Education (FRN, 2013) stated that secondary education should among other things equip students to live effectively in our modern age of science and technology.

It is a basic fact that the development of science and technology requires not only resources but effective use of such resources. These resources are found in the laboratories. Ufondu (2011) observed that laboratory is an indispensable organ of the school but many Basic Science teachers are not doing well in their level of acquisition of laboratory management skills such as in laboratory equipment procurement, storage and safety and maintenance practices. Ezeano and Ezeudo (2013) argued that proper management of student's prerequisite skills in the laboratory will lead to acquisition of a higher skill or easier understanding of the required skills. Management pattern of practical work in science laboratory can

ensure sequential move from basic practical skills to fundamental science skills needed in future career. Hruz (2019) asserted that effective laboratory management is a learned skill which involves regular meetings and delegating responsibility. Management of science laboratory therefore means the running and controlling of materials and human resources (Ezeano& Ezeudo, 2013).

According to Eze and Akubue (2007), it is expected of science teachers to possess laboratory management skills after graduation. It is necessary, therefore, that science teachers should employ such laboratory skills as maintenance of equipment, ordering, stocking and storage of equipment and chemicals, and also safety precautions. These skills when properly applied will help to improve the quality of teaching and learning of science subjects in the secondary schools. Nevertheless, since skills are not innate attributes but must be acquired externally. The level of acquisition of managerial skills by science teachers determines how much impact they will have on the students. Osuafor and Ezeobi (2017) discovered that laboratories in Secondary School in Awka South Local Government of Anambra State are not properly organized and managed by the concerned staff or teachers. Nevertheless, teaching experience and qualification may likely be factors contributing to the level of acquisition of managerial skills by science teachers.

Experienced teachers are considered to be more able to concentrate on the most appropriate way to teach particular topics to students who differ in their abilities, prior knowledge and backgrounds. They believe that teacher's attendance of in-service training is one of the indicators of experience. In addition, the more the teachers know about students, the better the teachers can connect with them and the more likely they will be able to benefit from the teacher's experience in reconstructing their world. Teaching qualification on the other hand, is the number of academic and professional degrees that enables a person to become a registered teacher in primary or secondary school. Such qualifications include but are not limited to, the Postgraduate Certificate in Education (PGCE), Professional Diploma in Education (PDE), Bachelor of Education (B.Ed.) and Nigeria Certificate in Education (NCE). Based on these facts,one may wonder if the basic science teachers had the qualification and experience needed for effective laboratory management of the Basic Science laboratories. This study therefore aims at investigating the level of acquisition of laboratory managerial skills by Basic Science teachers in Anambra State.

Purpose of the study
The purpose of this study was to investigate the level of acquisition of laboratory managerial skills by basic science teachers in Anambra State. Specifically, the study accessed: objectives:
1.   The level of acquisition of laboratory managerial skills of basic science teachers based on their teaching experience;

2.   The level of acquisition of laboratory managerial skills of basic science teachers based on their qualifications.

Research Questions
The following research questions guided the study
1.   What is the level of acquisition of laboratory managerial skills of basic science teachers based on their teaching experience?
2.   What is the level of acquisition of laboratory managerial skills of basic science teacher based on their qualifications?

Hypotheses
 The following null hypotheses were formulated and tested at 0.05 level of significance
1.   There is no significant difference in the level of acquisition of laboratory managerial skills among basic science teachers in Junior Secondary Schools, based on their years of teaching experience.
2.   There is no significant difference in the level of acquisition of laboratory managerial skills among basic science teachers   in Secondary Schools based on their qualifications.

Method
The design for the study was descriptive survey design. According to Nworgu (2015), descriptive survey design is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire study. The population for this study consisted of all the 298 basic science teachers in all the 261 public secondary schools in the six education zone in Anambra State. Sampling was not done because the entire population of the basic science teachers (298) was deemed not to be too large; therefore all the basic science teachers in all the 261public secondary schools in the six education zone formed the sample for the study. The instrument for data collection was tagged "Acquisition of Laboratory Managerial Skills Questionnaire (ALMSQ)". The instrument was divided into two sections, A and B. Section A consists of personal characteristics of the teachers while section B contains 26 items that were used to elicit information on the level of acquisition of laboratory managerial skills by Basic Science teachers. The instrument used was developed through information from literature and was subjected to face validation by two experts, one from department of science education, Nnamdi Azikiwe University, Awka and one experienced secondary school basic science teacher. The reliability of the instrument was determined using Cronbach alpha method which yielded internal consistency value of 0.90. The researchers administered the copies of the questionnaire personally to the 298 basic science teachers and all the copies were collected after completion. Data collected were analyzed using mean to answer the research questions and t-test and ANOVA to test the hypotheses at 0.05 level of

significance. Mean scores of 2.50 and above indicates high level of acquisition of laboratory managerial skills while mean scores below 2.50 indicates low level of acquisition of laboratory managerial skills. Also, a hypothesis is rejected when the P-value is less than ($<$) 0.05, otherwise, it is not rejected.

Results
Research Question one
What is the level of acquisition of laboratory managerial skills of basic science teachers based on their teaching experience?

Table 3: Mean ratings on the level of acquisition of laboratory managerial skills of basic science teachers based on their experience.

	Laboratory Managerial Skills	0-5 (n=108)			6 Years and above (n=153)		
		Mean	SD	Remark	Mean	SD	Remark
1	Procuring needed and relevant laboratory materials/ equipment	3.35	.70	High	3.14	.91	High
2.	Ensuring priority placement on items that are ordered	3.09	.85	High	3.11	.89	High
3	Procuring from knowledgeable laboratory equipment suppliers	3.16	.82	High	2.99	.94	High
4.	Ensuring that the needed chemicals and equipment ordered for are supplied	3.30	.90	High	3.12	1.07	High
5	Matching the cost of materials with their qualities	3.06	.88	High	2.89	.94	High
6	Checking for and rejecting fake laboratory equipment and chemicals	3.33	.98	High	2.95	1.13	High
7	Labeling of reagents boldly	3.34	.86	High	3.15	.97	High
8	Separating chemicals that can react with each other	3.25	.88	High	3.25	.98	High
9	Making provision and using stock record book(s)	3.07	.89	High	2.96	.93	High
10	Frequently checking the production and expiry dates of chemicals	3.42	.86	High	3.08	1.03	High
11	Storing chemicals that are susceptible to photolysis in dark colored bottles	2.90	.96	High	2.93	1.03	High
12	Preventing glass ware breakages by not storing them in nest pattern	3.09	.92	High	3.04	.98	High
13	Recording damages and breakages properly	3.26	.87	High	3.09	1.03	High

14	Carefully recording and stocking of used-up chemicals	3.33	.84	High	3.03	.98.	High
15	Isolating radioactive, toxic, inflammable and carcinogenic	3.13	.86	High	3.08	.99	High
16	Using warning symbols or signs where and when necessary	3.17	1.04	High	3.14	.99	High
17	Making laboratory store assessable to only chemistry teachers and laboratory assistant	3.28	.81	High	3.13	.96	High
18	Ensuring the drainages are functional	3.01	.96	High	2.85	1.09	High
19	Inspecting apparatus, equipment and electrical appliances before allowing students to use them	3.27	.88	High	3.26	.97	High
20	Ensuring that used laboratory equipment are washed and packed	3.45	.90	High	3.28	.98	High
21	Preventing and amending leakages of water and gas	3.23	.92	High	3.10	1.03	High
22	Repairing equipment with minor problems like leaking burette, blocked pipette	3.13	.91	High	2.88	1.08	High
23	Taking care of students who may swallow base, spill acid on their bodies and floor	3.21	.90	High	3.26	1.01	High
24	Ensuring that students wear lab coats and use their napkins	3.56	.84	High	3.18	1.11	High
25	Using fume cub-board where necessary and applicable	3.17	.88	High	2.94	1.10	High
26	Making sure that students wash their hands after every practical before leaving	3.45	.89	High	3.24	1.07	High
	Mean of means	**3.23**	**.88**	**High**	**3.08**	**1.00**	**High**

The analysis on Table 3 shows the overall mean and standard deviation score of 3.23 and .88 for teachers with 0-5 years of experience and 3.08 and 1.00 for those with 6 years and above experience. These mean scores are all above cut-off point of 2.5 indicating that both teachers with 0-5 years of experience and those with 6 years and above experience have high level of acquisition of laboratory managerial skills. The item by item analysis shows that the mean rating for teachers with 0-5 years of experience ranged from 2.90 to 3.56 while that of those with 6 years and above years of experience ranged from 2.85 to 3.28.

Research Question Two

What is the level of acquisition of laboratory managerial skills of basic science teachers based on their academic qualification?

Table 4: Mean ratings on the level of acquisition of laboratory managerial skills of male and female basic science teachers in secondary schools.

		NCE(n=39)		OND(n=16)		HND(n=74)		B.SC(n=132)	
		Mean	Remark	Mean	Remark	Mean	Remark	Mean	Remark
1	Procuring needed and relevant laboratory materials/ equipment	3.13	High	3.13	High	3.41	High	3.16	High
2.	Ensuring priority placement on items that are ordered	3.23	High	3.06	High	3.15	High	3.05	High
3	Procuring from knowledgeable laboratory equipment suppliers	2.97	High	2.81	High	3.16	High	3.05	High
4.	Ensuring that the needed chemicals and equipment ordered for are supplied	3.26	High	3.13	High	3.34	High	3.10	High
5	Matching the cost of materials with their qualities	3.18	High	3.00	High	2.95	High	2.89	High
6	Checking for and rejecting fake laboratory equipment and chemicals	3.15	High	2.69	High	3.19	High	3.10	High
7	Labeling of reagents boldly	3.18	High	2.75	High	3.35	High	3.23	High
8	Separating chemicals that can react with each other	3.26	High	3.31	High	3.20	High	3.26	High

9	Making provision and using stock record book(s)	3.31	High	3.06	High	3.09	High	2.86	High
10	Frequently checking the production and expiry dates of chemicals	3.28	High	3.06	High	3.20	High	3.23	High
11	Storing chemicals that are susceptible to photolysis in dark colored bottles.	2.97	High	2.87	High	3.03	High	2.84	High
12	Preventing glass ware breakages by not storing them in nest pattern	3.10	High	2.94	High	3.15	High	3.02	High
13	Recording damages and breakages properly	2.95	High	3.44	High	3.16	High	3.19	High
14	Carefully recording and stocking of used-up chemicals	3.10	High	2.94	High	3.34	High	3.09	High
15	Isolating radioactive, toxic, inflammable and carcinogenic	3.31	High	3.13	High	3.14	High	3.02	High
16	Using warning symbols or signs where and when necessary	3.13	High	3.13	High	3.34	High	3.05	High
17	Making laboratory store assessable to only chemistry teachers and laboratory assistant	3.26	High	3.06	High	3.12	High	3.23	High
18	Ensuring the drainages are functional	3.03	High	2.69	High	3.07	High	2.83	High
19	Inspecting apparatus, equipment and electrical	3.21	High	3.06	High	3.31	High	3.29	High

	appliances before allowing students to use them							
20	Ensuring that used laboratory equipment are washed and packed	3.38	High	3.31	High	3.38	High	3.33	High
21	Preventing and amending leakages of water and gas	3.31	High	3.19	High	3.26	High	3.05	High
22	Repairing equipment with minor problems like leaking burette, blocked pipette	2.92	High	3.06	High	2.97	High	3.00	High
23	Taking care of students who may swallow base, spill acid on their bodies and floor	3.26	High	3.44	High	3.24	High	3.20	High
24	Ensuring that students wear lab coats and use their napkins	2.92	High	3.44	High	3.51	High	3.34	High
25	Using fume cub-board where necessary and applicable	3.10	High	2.94	High	3.09	High	2.99	High
26	Making sure that students wash their hands after every practical before leaving	3.33	High	3.75	High	3.47	High	3.19	High
	Mean of means	**3.16**	**High**	**3.09**	**High**	**3.22**	**High**	**3.10**	**High**

The analysis in above Table 4 shows the overall mean scores of 3.16, 3.09, 3.22 and 3.10 for teachers with NCE, OND, HND and B.Sc qualifications. These mean scores are all above the cut-off point of 2.50 indicating that teachers with NCE, OND, HND and B.Sc qualifications have high level of acquisition of laboratory managerial skills. The item by item analysis shows that the respondents' mean rating ranged

from 2.92 to 3.38 for those with NCE qualification, 2.69 to 3.75 for those with OND, 2.95 to 3.51 for those with HND and from 2.84 to 3.34 for those with B.Sc.

Hypotheses
Hypotheses one
There is no significant difference in the level of acquisition of laboratory managerial skills among basic science teachers in secondary schools based on their years of teaching experience.

Table 5: t-test Comparison of Basic Science Teachers' Level of Acquisition of Laboratory Managerial Skills by Teaching Experience.

Source of variation	N	Mean	SD	df	t-cal	*P*-value	Decision
0-5 Years	106	3.23	0.40				
				259	2.39	.018	Sig
6 Years and Above	155	3.08	0.57				

Table 5 shows that the mean score for teachers with 0-5 years of teaching experience (x =3.23, SD=0.40) is greater than that of those with 6 years and above teaching experience (x =3.08, SD=0.57). P-value of 0.018 is less than 0.05. This shows that there is significant difference in the level of acquisition of laboratory managerial skills of basic science teachers in junior secondary schools based on their years of teaching experience. The null hypothesis of no significant difference between the two groups was therefore rejected.

Hypotheses two
There is no significant difference in the level of acquisition of laboratory managerial skills among basic science teachers in secondary schools based on their qualification.

Table 6: Analysis of variance on the level of acquisition of laboratory managerial skills among basic science teachers in secondary schools based on their qualification

	Sum of Squares	df	Mean Square	F	P-value
Between Groups	.709	3	.236	.908	.438
Within Groups	66.823	257	.260		
Total	67.532	260			

As shows in Table 6, F-ratio (df: 3/257) is .908 and p-value (.438) is greater than the stipulated 0.05 level of significance. It was therefore decided that there is no

signification difference in the level of acquisition of laboratory managerial skills among basic science teachers in secondary schools based on their qualification. The null hypothesis was therefore not rejected.

Discussion of the findings
The findings of this study revealed that teachers with 0-5 years of experience and those with 6 years and above have a high level of laboratory managerial skills with teachers with 0-5 years of experience showing higher acquisition of laboratory managerial skills. This finding is in line with the recent findings reported by Bello (2015) who found that teachers' ability to use laboratory equipment in teaching biology practical work depend on their years of experience. However, the finding is in contrast to Ezenwabachili (2016) who reported that the teachers' years of experience did not account for the pedagogical content knowledge level of biology teachers. Again, the finding of this study disagrees with Sarpong and Apaak (2016) who reported that no significant relationship exists between teaching experience and their Pedagogical content knowledge. The t- test analysis revealed that teaching experience has significant contribution on basic science teachers' laboratory managerial skills. The significance contribution of teaching experience in explaining teachers' laboratory managerial skills may be linked to effective teaching. Just as Obialor and Osuafor (2019) opined that effective teaching is the teacher doing the right thing in the teaching process so that at the end of teaching events, he/she can truly say that the goals and objectives of the lessons have been achieved implying that the students for whom the lesson was planned have learnt. Again it may be possible that teachers with 6 years and above experience may be taking certain things for granted while those with 0-5 years are still very enthusiastic.

In terms of the teachers' laboratory managerial skills and their qualifications, this study find out that teachers with NCE, OND, HND and B.SC qualifications have high level of acquisition of laboratory managerial skills. This suggested that other factors other than basic science teachers' qualification may have resulted to their high level of acquisition of managerial skills and not just their qualifications. This position agrees with the findings reported by Muhammed (2016) which showed that there are other factors identified as contributing to high level of laboratory managerial skills other than qualification. Hence, the professional training may have given rise to non- significant difference found in laboratory managerial skills in relation to basic science teachers' qualifications.

Conclusion
Based on the findings of the study, it was concluded that there was significance difference in the level of acquisition of laboratory managerial skill among basic science teachers based on their years of teaching experience but there was no significant difference in their acquisition of laboratory managerial skills on the bases of academic qualification. Therefore, basic science teachers' acquisition of

laboratory managerial skills could depend on their years of experience but not on their qualifications.

Recommendations
 Based on the findings of the study, the following recommendations were made:
1) Since the basic science teachers in secondary schools have high level of acquisition of laboratory managerial practice skills, Government, Education Managers and Administrators in Nigeria should create a unit in Ministry of Education to handle issues that will promote and sustain the basic science teachers' applications of these skills for effective teaching and enhancement of students' achievement in basic science.
2) Government and Administrators of Education should consider, incorporating Acquisition of Laboratory Managerial Skills into their interview schedule for employment of teachers as the Laboratory is the hub of Science Education.

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