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International Science, Technology,
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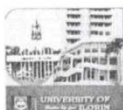
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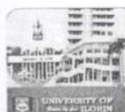


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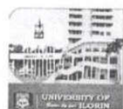


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Views of Teachers on Problems Associated With the Teaching of Biology in Secondary Schools in Kwara State, Nigeria

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Abstract

In this study, we endeavored to find out the views of biology teachers on the problems associated with the teaching of biology in secondary schools within Kwara State, Nigeria. Two hundred and seventy biology teachers took part in the study. We designed a questionnaire for data gathering and employed the chi-square statistical technique to test the four hypotheses generated in the study. Findings from this study revealed that biology teachers in public and private schools, experienced and less experienced, as well as male and female biology teachers do not differ significantly on their views on problems associated with the teaching of biology. We categorized the identified problems into student, teacher, school facility and administrative related factors. We advocated for the inclusion of all the topics in the secondary school biology curriculum in the training programme for biology teachers. We are equally of the view that biology teachers must be equipped with job-related stress-coping skills.

Keywords: : Biology Education, Teacher, Teaching, Secondary school, Nigeria

BACKGROUND TO THE PROBLEM

There is no doubt that science education is a potent tool for sustainable socio-economic and human capital development in any nation. Indeed, it is the driving force behind the current advancement towards a global e-society. Science education nourishes the seemingly infinite applications of modern science in nearly every aspect of daily activities. The responsibility of the science education industry is to ensure sustainable scientific and technological growth and development in the society. Hence, it is not astounding that science education is an integral component of school curricula at different levels of education globally. However, the construction, propagation and acquisition of scientific knowledge, ethics and processes are not easy tasks.

The three natural science disciplines at the secondary school level in Nigeria are Biology, Chemistry and Physics. Evidence abounds in science education literature that biology is the most popular of the three natural pure science disciplines amongst secondary school students. Indeed, most students, teachers and parents alike perceived biology to be the most interesting and the easiest of the school science disciplines as revealed in several studies, such as: NEDRC, (1992) and Omwuachu, W.C. and Nwakonobi, F.E. (2009), among others. This partially accounted for the consistently high enrolment figures in biology at the senior secondary school certificate examinations conducted by the West African Examinations Council (WAEC) as noted by Abimbola (2013). However, Nigerian secondary school students' perception of biology as the easiest of the three school science is implausible. Their performance in the subject is not better than in the other two school science disciplines. Abimbola (2013) rightly observed that students' performance in biology over the past two decades (1991-2011) never rose beyond 50%, whereas their performance in chemistry and physics occasionally rose above 50% during the period under focus.



Reasons adduced for the abysmal performance of students in biology include, ineffective mode of instruction, students' misconceptions and alternative conceptions, inadequate laboratory facilities, high students-teacher ratio, learning environment, and non-coverage of the syllabus, among others. (Abimbola, 2013; Ayanda & Abimbola, 2011; Bello, 1996; Harris Interactive (nd.); Imhankhim & Aguele, 2006; Olagunju & Abiona, 2008). The daily responsibility of practicing biology teachers is to facilitate meaningful learning of biology by the students. Thus, the biology teachers can provide useful insight into the problems associated with the teaching of biology. Abimbola (1998) noted that researchers sought the views of teachers rather than students because teachers are better equipped to judge the biology content and teachers daily confront the problems students have in learning the content. Hence, we sought the views of practicing biology teachers on the challenges associated with the teaching of biology.

In Nigeria, there are at least three categories of teachers in classrooms (a) professionally trained graduate teachers, (b) professionally trained non-graduate (Nigeria Certificate in Education) teachers and (c) untrained teachers. It is arguable that the discrepancy in the professional and academic qualifications of biology teachers will likely reflect in the way they discharge their roles as facilitators of learning. Consequently their views of problems associated with teaching of biology may not be the same. Similarly, the years of teaching experience of individual biology teachers and their gender are also likely to shape their views on challenges associated with the teaching of biology. In recent time many studies focused on teachers' characteristics, such as: teacher qualification, gender, and years of teaching experience, (Birgit and Helmut, 2012; Danmole, 2012; Temelli, & Kurt, 2011; Wabuke, Barmao & Jepkorir, 2013). In this study, we also attempted to build on previous research studies on the aforementioned teacher characteristics and problems associated with biology teaching.

Birgit and Helmut (2012) investigated factors influencing biology teachers' biology-specific beliefs in Germany. Six hundred and fourteen (614) biology teachers from all over Germany took part in the survey study. Variables under focus in the study included: age, gender, teaching experience, second teaching subject area, school types and school location. The researcher used a closed, 5-level Likert-scale belief questionnaire, and an anonymous questionnaire to gather data in the study. They also employed Chi-square and Pearson Product Moment Correlation statistical techniques to analyze the data collected in the study. Results of the study indicated that teaching experience, school type, and location had significant influence on teachers' beliefs, but gender did not.

Danmole (2012) investigated biology teachers' views on biology practical work in Nigerian senior secondary schools. The researcher examined four teacher variables, viz.: sex, qualification, and years of experience in teaching biology. Ninety-six biology teachers participated in the survey study. Results of the study indicated that there was no significant difference in the views of biology teachers on all the research questions. However, Chi-square analysis revealed a significant difference in the views of biology teachers with marking experience and those without marking experience. The results of the study conducted by Temelli and Kurt (2011) among 96 biology teachers in Turkey indicated no significant divergence of views among the teachers based on their work experience and school type. Wabuke, Barmao, & Jepkorir (2013) conducted an ex-post-facto study on teacher-related challenges to students' performance. A total of 25 biology teachers and 200 biology students selected through stratified random sampling method took part in the study. The researchers used observations, questionnaires and interviews to gather data in the study. Findings from the study revealed that the majority of the teachers agreed that teacher characteristics, such as: level of education, level of experience, among others, were the teacher factors affecting students' performance. In an earlier study conducted in Nigeria, Ogwo (2005) also found that teacher's academic qualifications and teaching experience have a significant effect on the students' performance.

Statement of the Problem

Repeated reports of consistent poor performance in biology at the Senior School Certificate Examinations have attracted a lot of concern from science educators. Thus, researchers in biology education have continued to seek better ways of teaching biology in order to maximize meaningful learning and to identify causal variables for the repeated failures (Obe, 1998). John (2007) investigated the problems of learning biology as perceived by Senior Secondary School students in Kaduna State. Results of the investigation revealed that, lack of well-equipped laboratories, large class size and lack of practical activities affected the teaching and learning of biology. Dickmenli (2010) also noted that large size and poor laboratory facilities make students' perception of some biology concepts difficult.



It is obvious from the foregoing that biology education at secondary school level in Nigeria is bedevilled with multitudes of problems that cumulated into students' poor academic performance. Consequently, numerous studies focused on factors responsible for the poor performances of students in biology, but relatively few studies explored biology teachers' views on problems that they encountered when discharging their responsibilities in the classroom. Hence, we attempted to seek the views of biology teachers on problems associated with the teaching of biology as part of efforts to stem the abysmal performance of students in biology.

Purpose of the Study

The main purpose of this study was to determine the views of biology teachers on the problems associated with the teaching of biology in secondary schools in Kwara State, Nigeria.

We specifically attempted to find out:

- I. the views of biology teachers on the problems associated with the teaching of biology,
- II. if there is gender difference in the views of biology teachers on problems associated with the teaching of biology, and
- III. if the teachers' qualifications, teaching experience, and school type influence their views on problems associated with the teaching of biology in secondary schools in Kwara State

Research Questions

We generated the following research questions to guide the study:

1. What are the views of biology teachers on problems associated with the teaching of biology?
2. Do male and female biology teachers differ in their views on problems associated with the teaching of biology?
3. Is there any difference between the views of professionally qualified and unqualified biology teachers on problems associated with the teaching of biology in Kwara State?
4. Do the less experienced and experienced biology teachers differ in their views on problems associated with the teaching of biology?
5. Is there any difference between the views of biology teachers in public and those in private secondary schools on problems associated with the teaching of biology?

Research Hypotheses

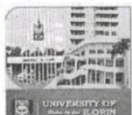
We formulated the following hypotheses for testing purposes:

1. There is no significant gender difference in views of biology teachers on the problems associated with the teaching of biology
2. Significant difference does not exist between the views of professionally qualified and unqualified biology teachers on the problems associated with the teaching of biology.
3. There is no significant difference between the views of experienced and less experienced biology teachers on the problems associated with the teaching of biology.
4. The views of biology teachers in public and private secondary schools on the problems associated with the teaching of biology do not differ significantly.

METHODOLOGY

As in, several previous studies on teachers' views and characteristics cited earlier, this study is a descriptive one of the survey research design. In this study, biology teachers in all the Senior Secondary Schools in Kwara State constituted the population of the study. We employed stratified sampling method to select 163 biology teachers from public secondary schools and 107 biology teachers from private secondary schools in Kwara State.

We designed, and used a questionnaire based on the Likert-scale format to gather data in the study. The questionnaire contained two parts, A and B. Part A sought for personal information from the biology teachers, such as, their gender, teaching experience, qualifications, and school type. Part B contained 57 statements on the problems associated with the teaching of biology in secondary schools in Kwara State. Through many layers of vetting for the questionnaire, we established the face and content validities of the instrument. We used the test re-test technique to determine the reliability coefficient of the questionnaire, and found it to be 0.71. We administered copies of the questionnaire to the selected biology teachers in each of the selected school with the help of researcher assistants.



DATA ANALYSES AND RESULTS

We employed the percentage computation as a descriptive statistical technique to analyze the views of the teachers on the problems associated with teaching biology. Table 1 presents the summary of the views held by majority (more than 50%) of the biology teachers on problems associated with the teaching of biology. We categorized their views on problems associated with teaching biology into: teacher, students, school facility and administrative related problems. This finding provides answer to research question 1. Evidence from Table 1 indicates that most (41%) of the widely held views on problems associated with the teaching of biology by the teachers are school facilities and administration related factors. While about one in every three (32%) of the widely held views are related to teachers, only 27% are related to the students. Many researchers (Abimbola, 1998; Abimbola & Ayanda, 2011; Ajaja, 2009; Dickmenli, 2010; Imhankhim & Aguele, 2006; John, 2007; Okebukola, 1994; and Olagunju & Abiona, 2008) in the field of biology education had earlier identified some of these problems in their various studies. However, not many studies reported that many biology teachers simply give notes on difficult concepts to their students to copy instead of teaching the concepts. Similarly, it seems that not many studies reported the work overload experienced by biology teachers, their inability as well as lack of interest to improvise materials to teach biology and students' unwillingness to buy biology textbooks.

Table 1

Summary of the Views of Biology Teachers on the Problems Associated with the Teaching of Biology

S/N	Views of Biology Teachers	%
Teacher Related Factor		32%
1.	Non-graduate professional teachers (holders of the NCE certificate) trained to teach at junior secondary school level often teach biology at the senior secondary school level.	
2.	There are too many professionally unqualified biology teachers in the classrooms.	
3.	Biology teachers often give very few examples of the biology concepts, specimens or phenomenon under focus during class lessons.	
4.	Most biology teachers monotonously use the lecture and discussion methods due to the prevailing class and school environment.	
5.	Teachers frequently give out notes to students on difficult topics instead of teaching the topics.	
6.	It is relatively difficult for biology teachers to cover all the topics in the syllabus	
7.	Biology teachers' inability and lack of interest to improvise biology laboratory equipment and materials hinder effective teaching and meaningful learning	
Student Related Factor		27%
8.	Many students perceived biology to be the simplest science discipline, but they do not devote enough time to study it.	
9.	Students' poor attitude and interest in biology stifled the teachers' enthusiasm.	
10.	Most of the students do not have the required biology textbooks and even prefer to buy textbooks in other disciplines instead of biology.	
11.	Non-science students offer biology just to enable them to meet the requirements for registering for the final external examinations.	
12.	Many students frequently display lackadaisical approach to practical laboratory activities.	
13.	Students have difficulty in mastering many biology terminologies.	
School Facilities and Administration Related Factor		41%
14.	Lack of separate biology laboratory in schools is a major obstacle to practical biology lesson.	
15.	Lack of/inadequate quantity and quality of basic biology laboratory equipment and materials overwhelm teachers' efforts in enhancing meaningful learning.	
16.	School administrators are frequently unwilling to support teachers' efforts with finance and materials to improvise biology laboratory equipment and materials.	
17.	Teachers' remuneration and working conditions are not attractive enough to stimulate teachers to work at optimum level.	
18.	Biology teachers are over-burdened by their workload due to the extra large number of students in biology classes and other administrative assignments.	
19.	Biology teachers hardly give assignments to the students at the end of biology lesson due to the short duration for biology lesson.	
20.	Biology teachers do find it difficult to conduct written formative assessment at the end of each topic taught in biology due to the large student population.	
21.	Time constraint and large student population often hinder teachers' efforts to pay adequate attention to students' individual differences.	
22.	It is difficult to employ some learner-centered instructional strategies, especially the fieldtrip, to enhance meaningful learning due to lack of fund, and limited time for biology lesson.	

We employed the chi-square statistical tool to determine whether significant differences exist in the views of the biology teachers on the problems associated with teaching of biology, and presented the results in Tables 2-5. Data from Table 2 indicate that the calculated chi-square value [$\chi^2_{(3, 0.05)} = 1.332$] is not significant at 0.05 alpha level, hence, we failed to reject hypothesis 1 in this study. This finding suggests that there is no significant gender difference in the views of biology teachers. This result thus provides answer to research question 2 in this study. This result is at variance with the findings of Birgit and Helmut (2012) and Danmole (2012), among others.

Table 2: Chi-Square Analysis of Gender Difference In the Views of Biology Teachers On Problems Associated With the Teaching of Biology.

	SA	A	D	SD	Total	χ^2	Df	Table value	Remark
Male	46(47.7)	54(52.5)	37(39.2)	23(20.5)	160	1.332	3	7.81	NS
Female	33 (31.3)	33(34.5)	28(25.8)	11(13.5)	105				
Total	79	87	65	34	265				

Table 3 showed that the calculated chi-square value [$\chi^2_{(3, 0.05)} = 8.651$] is significant at 0.05 alpha level, hence, we rejected the second hypothesis formulated in this study. This finding indicated that qualified and unqualified biology teachers held significantly divergent views on the problems associated with the teaching of biology. This result provides an answer to the third research question raised in this study. It is also in accord with the findings of the study conducted by Birgit and Helmut (2012).

Table 3: Chi-Square Analysis of Difference In the Views of Qualified and Unqualified Biology Teachers on Problems Associated with the Teaching of Biology.

Teacher qualification	SA	A	D	SD	Total	χ^2	Df	Table Value	Remark
Qualified	47(56.3)	69(62.0)	49(46.4)	24(24.2)	189	8.651	3	7.82	Sig.
Unqualified	32(22.7)	18(25.0)	16(18.6)	10(9.8)	76				
Total	79	87	65	34	265				

Table 4 indicated that the calculated chi-square value [$\chi^2_{(3, 0.05)} = 2.228$] is not significant at 0.05 alpha level hence, we did not reject hypothesis This result suggests that both the less experience and the experience biology teachers held similar views on problems associated with the teaching of biology, and provides answer to research question 4 in this study. The result is consistent with the findings of Temelli, and Kurt (2011) but it is at variance with the findings of Birgit and Helmut, (2012); Danmole, (2012), and Wabuke, Barmao, & Jepakorir (2013).

Table 4: Chi-Square Analysis of Difference in the Views of Experience and Less experience Biology Teachers on Problems Associated with the Teaching of Biology.

Teacher	SA	A	D	SD	Total	χ^2	Df	Table Value	Remark
Experience	49.(17.5)	69(67.0)	40(41.6)	46(48.5)	204	2.228	3	7.82	NS
Less Experience	14(17.5)	21(19.3)	17(15.2)	9(9.0)	61				
Total	63	90	57	55	265				

Table 5 revealed that significant difference does not exist in the views of biology teachers in public and private schools since the calculated chi-square value [$\chi^2_{(3, 0.05)} = 3.414$] is not significant at 0.05 alpha level. The fourth null hypothesis in this study, which stated that there is no significant difference in the views of biology teachers in public and private schools on problems associated with the teaching of biology was therefore, not rejected. This finding provides answer to research question 5 in this study. It is in contrast to the result of the study conducted recently by Birgit and Helmut (2012), but consistent with the findings of Temelli, and Kurt (2011).



Table 5: Chi-Square Analysis of Difference in the Views of Biology Teachers in Public and Private Schools on Problems Associated with the Teaching of Biology.

School	SA	A	D	SD	Total	X ²	Df	Table value	Remark
Public	66(69.5)	51(51.1)	35(34.4)	11(8.0)	163	3.414	3	7.82	NS
Private	47(43.5)	32(31.9)	21(21.6)	2(5.0)	102				
Total	133	83	56	13	265				

SUMMARY OF THE MAJOR FINDINGS

We attempted to provide answers to five research questions and tested four hypotheses in this study.

- The first research question revealed that student, teacher, school facilities and administration related factors were widely viewed by the teachers to be problems associated with the teaching of biology.
- Responses to the second research question clearly indicated that gender difference does not exist in the views of biology teachers on the problems associated with the teaching of biology.
- As for the third research question, qualified and unqualified biology teachers held significantly divergent views on the problems associated with the teaching of biology.
- Research question four showed that a significant difference does not exist between the views of experienced and less experienced biology teachers on the problems associated with the teaching of biology.
- Responses to the fifth research question brought to light that biology teachers in public and private schools do not differ significantly on their views on problems associated with the teaching of biology.

DISCUSSION AND RECOMMENDATIONS

Results of this study brought to light crucial issues worthy of consideration by the biology education community. Our findings revealed that biology teachers often avoid teaching difficult concepts, instead, they give notes on the concepts to the students to copy. This situation directly undermines students' success at the final external national examinations. It equally brings to focus the disciplinary component of the teacher education program and the general level of professional competence of the teachers. Universities in many nations, including Nigeria had replaced Bachelor's degree programme leading to the award of first degree in biology with other first-degree programmes within new departments, such as zoology, botany, and microbiology. Consequently, trainee biology teachers are deprived of the opportunity to study core biology courses relevant to their professional needs. It is obvious that teachers can only teach what they know; hence, a review of the subject matter contents of biology teacher education programme to include all topics in the secondary school biology curriculum is imperative. This will significantly improve biology teachers' mastery of the biology concepts in the secondary school curriculum.

Findings from this study also brought to light the monotonous use of the lecture and discussion methods by the biology teachers. Interestingly, these methods are the predominant modes of instruction in tertiary educational institutions that produced the biology teachers. This finding suggests that the biology teachers are simply teaching in the same way that biology teacher educators taught them. It is high time for biology teacher educators to realize that pedagogic skills are better learned through simulation and regular practice than from lecture notes. Hence, they should stop teaching Instructional Methods course through the lecture and discussion modes predominantly. During the teaching practice exercise, trainee biology teachers should teach under the guidance of trained mentor biology teachers to acquire practical skills on wide varieties of instructional methods.

Results of this study also revealed that students' poor attitude and interest in biology dampened the teachers' enthusiasm. Teaching students who lack motivation is a major source of teacher stress as pointed out by Kyriacou (2001). This need not be the case if the biology teachers are adequately equipped with professional competencies and motivated by their employers. It is the professional responsibility of the biology teachers to develop students' positive attitudes towards biology and stimulate interest in learning biology during and after class lessons. To accomplish these tasks, biology teachers need to be equipped with para-counseling and basic motivational talk skills in addition to recent innovative teaching strategies. Occasional motivational speeches by biology teachers can significantly stimulate students to devote enough time to study biology and change their lackadaisical approach to practical laboratory activities.



Results from this study suggest that work overload arising from a combination of administrative assignments and large class size is inhibiting biology teachers' task of facilitating meaningful learning of biology. Work overload is closely associated with stress and burnout. Kyriacou (2001) rightly observed that teaching is a 'high stress' profession, like other fields of human services. Griffith, Steptoe & Cropley (1999) and Kyriacou (2001) are of the view that stress and burnout impact negatively on the education industry by increasing absenteeism and early retirement among teachers thereby reducing the quantity of competent teachers in the classroom. Teaching pupils who lack motivation, time pressures and workload, poor working conditions, and administrative responsibilities are some of the ten major sources of teacher stress delineated by Kyriacou (2001). Findings from our study also indicated that biology teachers viewed these sources of teacher stress to be part of the problems associated with the teaching of biology. It is therefore, imperative to equip practicing and trainee biology teachers with job-related stress coping skills. This should become an integral component of the training programme for biology teachers. Offering only one core course in Guidance and Counselling may not be enough to achieve this goal.

This study revealed that biology teachers in public and private schools, experienced and less experienced, as well as male and female biology teachers do not differ significantly in their views on problems associated with the teaching of biology. However, qualified and unqualified biology teachers held significantly divergent views. This is not surprising in view of the fact that unqualified biology teachers received no training in science teaching; hence, they are not in a position to technically diagnose the problems associated with biology teaching. The use of unqualified persons to teach biology is certainly an aberration that employers of biology teachers must stem as part of measures to resolve the problems associated with the teaching of biology. Any nation aspiring to be part of the emerging global e-society cannot afford to place biology teaching and science education, in general, at the hands of unqualified teachers and burnout professional science teachers. Most of the problems associated with the teaching of biology that we identified in this study are potentially serious problems waiting to happen if not adequately resolved by all stakeholders in biology education.



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