



THE RELATIONSHIP OF TEACHERS SKILL, KNOWLEDGE OF BIOLOGICAL CONTENT, PEDAGOGY AND STUDENTS' ATTITUDE TOWARDS BIOLOGY IN OYO STATE

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Adegoke Adebare Idowu

Department of Integrated Science School of Secondary Education (Science Programmes) Oyo State College of Education, Lanlate. Oyo state, Nigeria, 08054041783, gokbare@gmail.com

Abstract

The study was carried out to find out the correlation between teaching content, pedagogical knowledge and skills of students attitude to Biology in Oyo State. This study was a descriptive research of the survey type. A total of 600r

Senior Secondary School II Students were selected through simple random sampling formed the sample frame for the study. One research hypothesis formulated and tested. The research instruments used for the study were researchers-designed questionnaire on Teacher's content knowledge of Biology Questionnaire (TCKBQ), Teacher's Skill in Biology Questionnaire (TSBQ) and Students' Attitude to Biology Questionnaire (SABQ).

The data collected were analysed using Multiple Regression, Pearson Product Moment Correlation Coefficient and Analysis of Variance (ANOVA) respectively to test for the hypothesis at 0.05 level of significance. The findings show that there was a significant relationship between teachers content knowledge.

Skills and students attitude in Biology since the cal-F-value is greater than the cri.F (.922>.818). hence, null hypothesis which states there that there is no significant interaction effect of content knowledge, teacher skills and students attitude and academic performance of students in Biology is hereby rejected. There is therefore, a correlation between teachers' skills and students' attitude in Biology. However, it was recommended that teachers' pay attention to the content knowledge and skills which have an effect on the skills of students in Biology among others.

Keywords

Biology, Climate, Teacher' Content, Pedagogical Knowledge, Skills, Attitude

Introduction

Climate change awareness in all citizens of all social classes with its potency to unleash the most devastating environmental threats is important. Climate according to Climateurope, (2018) means an average weather conditions over a long period of time while climatic change refers to the systematic change that occurred in weather conditions after an observation of climatic statistics for at least three decades. It is also seen as disruption of climate pattern with attendant impact on the environment and human life. (Olaniyi Funmilayo and Olutimehin

(2014). NIMET (2019), describes the climatic is changing very fast and this is not good, and we therefore, need to show greater commitment and invest more resources towards observing, monitoring and forecasting the climate system in order to provide early morning services to communities. United Nation Educational, Scientific and Cultural Organization (UNESCO) (2014) stressed that education has a necessary role to play because it will help to develop a workforce with the knowledge, skills and drive to develop a sustainable, green economy. Policy was recognized as a key

vehicle for driving the uptake of climate change into education. Positioning education is a basic component of the worldwide reaction to climate change which enables individuals to comprehend and address the effect of a dangerous atmospheric devastation, builds “atmosphere proficiency” among young stars, empowers changes in their frames of mind and conduct, and causes them to adjust to climate change related patterns. Beyioku (2016) suggested that curriculum planners should ensure that they put in place core knowledge of, and information about, climate change as part of compulsory education for students at all levels of education. Students should learn about the potential impacts of unmanaged climate change, as well as options for adaptation and mitigation in order to enable a complete and robust understanding of climate change.

Teachers' content knowledge is defined as the concepts, principles, relationships, processes and applications that a teacher should know within a given academic subject, appropriate for him/her. It is also involves an organization of the knowledge (Ozden, 2008). Content knowledge (CK) is knowledge about the actual subject matter that is to be learned or taught. The content to be covered in social studies or algebra is very different from the content to be covered in computer science or art and history. Teachers must know and understand the subjects that they teach including the knowledge of central facts, concepts, theories and procedures within a given field, knowledge of explanatory frameworks that organize and connect ideas; and knowledge of the rules of evidence and proof (Mishra and Koehler, 2006). To them teachers must also understand the nature of knowledge and inquiry in different fields. For examples, how is a proof in Mathematics different from historical explanation or a literary interpretation? Teachers who do not have this understanding can misrepresent those subjects to their students.

Pedagogical knowledge (PK) is deep knowledge about the processes and practices or methods of teaching and learning and how it encompasses among other things, overall educational purposes, values and aims (Mishra and Koehler, 2006). The generic form of knowledge that

is involved in all issues of students' learning, classroom management, and lesson plan development and implementation and student evaluation, includes knowledge about techniques or methods to be used in the classroom; the nature of the target audience; and strategies for evaluating students' understanding. A teacher with deep pedagogical knowledge understands how students construct knowledge, acquire skills, and develop habits of mind and positive dispositions toward learning. As such, pedagogical knowledge requires an understanding of cognitive, social and developmental theories of learning and how they apply to students in their classroom. Invariably, the best curriculum and the best instructional method can fail in the hand of an ill-prepared teacher.

Knowledge bases of teacher education have focused on the content knowledge of the teacher (Mishra and Koehler, 2006). Parker and Heywood (2000) stated that studies have consistently revealed no relationship between the knowledge of the subject matter and pedagogical knowledge. This therefore, implies that apart from a secondary school biology teachers' subject content knowledge, he still needs to develop his pedagogic content knowledge in order to function effectively. The teacher is to impart knowledge to his students; this is important because the teachers' content knowledge is very crucial in impacting the needed knowledge to the students. The teacher should acquire the necessary content knowledge to impart successfully the students' the necessary knowledge of Biology.

Teachers' access to textbooks, journals, conference proceedings, online materials and e-books will go a long way to improve the content knowledge of the teachers. Invariably, educational discussions also go a long way to improve the content knowledge of the teachers because everything cannot be found in books alone as workshops, seminars, conferences and lectures also sharpen the teachers' content knowledge in biology. What the students knows show the time and energy the teacher had put in the teaching and learning. Finally, The study of Aina and Olaonipekun (2015) showed that a teachers' subject content knowledge cannot contribute to the professional development of that teacher but a teacher that is very sound in

content knowledge (CK) and can impact well to the students' will teach any concept in the curriculum and bring about the needed achievement in students.

Teachers' skills are acquired systematically by professionals who have acquired some skills and knowledge either by training or experience or both. Babalola (2019) stated the feature of skill acquisition is to cover various aspects of skills needed to serve numerous human needs as follows:

- To discover hidden talent and potentials and utilize it to the service of humanity
- Self-discovery has a lot to do in skill acquisition. If a trainee discovers potentials hidden.
- To develop the discovered talent through active training so as to benefit the talented.
- To practice or release the skill acquired when skills are acquired the onus lies on the trainee to practice the skills acquired otherwise what is not released or practiced will soon be forgotten.
- To contribute to the society's economy: when the above three are done, then the society's economy is directly or indirectly contributed to by the person who acquired the skill.
- To reduce unemployment: skill acquisition reduces the rate of unemployment. Skills acquisition development embarked upon by National Youth Service Corps (NYSC) helps in reducing unemployment and allow the participants to be entrepreneur and self-reliant

To make desirable impact, teaching must aim at total development of the individual, that is, to enhance intellectual capabilities, developmental and cognitive intellectuality, foster psychology-social skills, and draw out neuro - physical aptitude of the learners (Akinmusire, 2012). According to Akanji (2015), the Biology curriculum which is in use in Nigeria for teaching and learning in senior secondary school had in-built strategy where learners are required to be involved in inquiry and related activities that can develop critical thinking skills. Teachers are charged with the responsibility with respect to improvisation of educational resources and effective use of these resources. If this

task would be realized, then, science teachers in schools are faced with the challenge of possessing appropriate skills for the improvisation.

For effective improvisation of instructional resources, there are two major types of skills teacher should possess; these are the creative and the practical teaching skills. Olagunju and Babayemi (2015) defined creative skills to refer to the behaviour such as imaginativeness, originality, flexibility, dynamism, persistence, independence and observance while practical technical skills are developed through the use of some basic tools. Creative skills are the ability of an individual to bring into a purposeful form something which is partly in existence or has never been in existence. For effective instructional performance, science teachers must be creative and resourceful. To be creative is to bring into being something which is never in existence or has gone into extinction. Basic practical skills include graphical, metal-work, wood-work and ceramic skills. Science teachers are expected to think outside the box so as to perform their duty effectively and avoid teaching science as an abstract subject. Okedeyi, Oginni and Adegortite (2016) opined that teachers have to be creative in bringing these items to showcase to their students so as to improve their knowledge and invariably drive home the needed information to the students. The practical skills are developed when both the teacher and students make use of basic tools and will improve the learning abilities of the students.

Practical activities to Usman, Alli, Abdullahi, Linda, Daniel and Umami (2017) are the method of teaching and learning process in the outdoors for exploration and discovery about the environment using first-hand experience involving all courses of study. One, therefore, can say that education is that instruction either formal or informal that takes place outside the school is class room or laboratory with natural or built materials places in order to attain the objective of teaching and learning through direct experiences. To summarize, outdoors activities are practical activities or activity-oriented teaching strategy that complements the traditional teaching. It is a lesson on itself that is based in the role of nature and environment. Usman *et al.*, (2017) noted, therefore, that when teachers are

educators teaching science concepts indoors (that are best taught outdoors). The concept is isolated from its natural context, thereby limiting the full use and potential of a child's brain. This may lead to de-contextualization of the concepts.

The new curriculum calls for acquisition of basic knowledge and skills in science which can only be achieved by exposing students to more of practical activities when teaching all science concepts. This, in turn, will equip the learners to apply what they learnt to meet societal need and prepare for further studies. For science to be meaningful and relevant, it must reflect the nature of science. This clearly shows that the reflecting nature of science means using activities to explore the processes and product of science. According to Awolere (2015), a review of the West African Examination Council (WAEC) Chief Examiners report showed that students' have problems with skills. The Chief Examiner, therefore, suggested that because of the poor skills demonstrated by the students, there is a need for Biology teachers to help students develop these skills by teaching them better.

Statement of the Problem

It has been discovered that students have been performing below average in biology for the past ten years. Can this be as a result of the content knowledge and skills exhibited by the teachers in various schools in the country? This study therefore sought to examine the correlation between teachers' content knowledge and skills, and students' attitude to biology in Oyo State.

Research Hypotheses

There is no significant interaction effect of teacher's skills knowledge of biological content and student's attitudes.

Methodology

This study adopted a descriptive survey study design to assess the teachers' content knowledge and skills as correlates of students' attitude in Biology.

Population and Sample Selection

The population of the study consists of all the secondary Biology teachers' and students in senior secondary Two (SS2) in Oyo State. There are 33 Local Government Areas in Oyo State. This study

covered five (5) Local Government Areas randomly selected from all the Local Government Areas of the State. A simple random sampling procedure was used to select three secondary schools from each local government area to make a total of fifteen secondary schools in all. A total sample of 600 students and 15 teachers were randomly selected from the 15 schools used for the study. A total of 40 students were randomly selected from each of the 15 schools.

Research Instrumentation

The following instruments were used in the study:

- i. Teachers' Content Knowledge of Biology Questionnaire (TCKBQ)
- ii. Teachers' Skills in Biology Questionnaire (TSBQ)
- iii. Students' Attitude to Biology Questionnaire (SABQ)

Teachers' Content Knowledge of Biology Questionnaire (TCKBQ)

The instrument investigates the teachers' content knowledge of biology questionnaire (TCKBQ). It was designed to sample teachers' knowledge both in content of the subject matter and pedagogy strategy used in these sections, A and B, Section A was designed to know the personal information of each teacher which includes school location, years of teaching experience and qualification while section B was made up of twenty (20) items, placed on a 4 point Likert Scale. The scoring is as follows for positive statement; Strongly Agree – 4, Agreed – 3, Disagree 2 and Strongly Disagree – 1. The reverse is the case for the negative statement; Strongly Agree – 1, Agree – 2, Disagree – 3 and strongly disagree – 4.

Validation of TCKBQ

The instrument was given to five experienced secondary school Biology teachers' for scrutiny and their suggestions were used to modify the final version used. Cronbach Alpha measure was used to ascertain its validity and a reliability index of 0.75 was obtained.

Teachers' Skills in Biology Questionnaire (TSBQ)

The instrument was designed to sample teachers' skills of Biology. The instrument was grouped into two sections, A and B, section A was

designed to know the personal information of each teacher which includes school location, years of teaching experience and qualification, Section B was made up of (18) items, placed on a 4 point Likert Scale of Strongly Agree, Agree, Disagree and Strongly Disagree

Validation of TSBQ

The instrument was given to five experienced secondary school Biology teachers' for scrutiny and their suggestions were used to modify the final version used. Cronbach Alpha measure was used to ascertain its reliability and a reliability index of 0.72 was obtained.

Research Procedure

The following work schedules were adopted

- i. The first week for training of research assistants
- ii. Two (2) weeks for the administration of the questionnaire

- iii. One (1) week for data collection. This took place simultaneously in selected schools. The work lasted for 4 weeks for the data collection.

Method of Data Analysis

Data collected were analyzed using descriptive and inferential statistics which include mean, standard deviation, and Pearson Product Moment Correlation (PPMC), used to determine the relationship among the variables.

Results

Research Hypothesis: What relationship exists between the independent variables (Teachers Content Knowledge and Skills) and Students' attitude to Biology?

Table 1: Pearson Product Moment Correlation Coefficient on the Correlation between Teachers skills, biological content, and student attitudes to Biology.

Model	B	Beta	T	Sig
Constant	26.907		.819	.043
Knowledge of biological content	3.113	.057	.630	.529
Teacher Skill	2.249	.117	.907	.045
Student attitude	.004	.00	.001	.199

Summary of the independent variables

Model	R	R ²	Adjusted R ²	Std Error of the Estimate
	.378	.176	.112	15.681

Table 2: Pearson product moment correlation coefficient computation on the correlation between, teachers skills knowledge of biological content and students attitudes

Performance	Pearson Correlation	Sig	No
Teacher Skills	.013	.756	600
Knowledge of biological content	.0915	.041	600
Students attitude	0.29	.097	600

H_{01} : *There is no significant interaction effect of reading, time management, study period and the academic performance of students in Biology.* The result shows [$F = (7,592) = 0.922, p = .818$] at 0.05 alpha level of significance. This indicates that Teacher skill, biological content, and student attitude are significant predictors of academic performance of students in Biology, since the cal. F-value is greater than the cri. F (.922 > .818). Hence, null hypothesis which states that there is no significant interaction effect of Teachers skills, Biological content and student attitude and the academic performance of students in Biology is hereby rejected.

Discussion of Findings

There is a negative, moderate significant relationship between teacher's skills and students' attitude to Biology. The functional theory by Kartz shows that attitudes and efforts are related to the motivational structure of the individual. This theory focuses on two things; that is arouses and the individuals method of coping and achieving his goals. Teacher's skill is important as it affects the students attitude to Biology. This therefore, shows that teacher's skill is related to the students attitude to Biology in Senior Secondary Schools.

This means that when teachers have this skill it affects students' attitude to Biology in Senior Secondary Schools. When the teachers have the necessary practical skills in Biology, it will improve the attitude the students have to Biology. Awolere (2015) who asserted that practical activities are needed to make the task of a teacher (which is teaching) more real to the students as opposed to abstract or theoretical presentation of facts, principles, and concepts of subject matters. The development of those skills is basic to scientific inquiry and the development of intellectual skills needed to learn concepts. This, in turn affects their attitude to teachers' use not only refocuses the minds of the students' to what is being taught but also strengthen the attitude the students have to the subject the ways the concepts are expressed to the

students are very important as it will give them the right attitude to the subject. When the skill exhibited by the teacher is poor, it will affect their attitude to Biology.

In another research carried out by Olagunju and Ogundiwin (2008) on the impact of three modes of instruction and cognitive style on student's environmental attitude towards pollution in Biology, they used a pre-test, post-test control group quasi-experimental design. Their result revealed significantly main effect of teaching strategies and main effect of cognitive tyle on environmental attitude towards pollution in Biology. The researchers stressed that analogy, field trip and group project strategies be adopted in Nigerian secondary Schools in teaching pollution. This means that the teaching strategy incorporated into the teaching of Biology is important as it could bring the right attitude to Biology. The strategy used improves the attitude the students had towards pollution as a concept in Biology. To see the needed positive attitude in students' therefore, the teacher should possess the needed skills that will improve the students' attitude to the subject taught; Biology.

In Folarinmi and Laniran (2014)'s survey of secondary Students towards Agricultural Science, an interview schedule and structured questionnaire were used in data collection. The findings revealed that male students have favorable attitude towards agricultural as a career than their female counterparts. About 57.5% were influenced by their parents on career decision. The result also showed that male students' had favorable attitude towards agriculture as a career with (85%) than their female students' counterparts.

Also, there is a positive significant relationship between the parents socio-economic background and the students' attitude towards agriculture in school. They recommended that the government should put in place appropriate machineries so that students' would have favourable attitudes towards agriculture thereby increasing the likelihood of students making career in agricultural science. For students to acquire the needed attitude

the needed appropriate facilities must be in place for the students to utilize, This results in increasing the likelihood of having a positive attitude to Biology.

Conclusion

Conclusions drawn from the study include among others that considering the difficulty in conducting empirical research in this area, the content knowledge of teachers should be one of the criteria in the effective teaching and learning of Biology in senior Secondary Schools. Planning lessons the teacher should have the required content knowledge and the right attitude to biology so that the students will love Biology as a subject which will bring about the right attitude.

Recommendations

1. Teachers should adopt better learning strategies such as acquisition of good content knowledge, emotional attribute (attitude), Classroom practice, appropriate practical skills in Biology and transformation of academic knowledge to science school knowledge of teachers; all these would transform the teacher to be capable of improving the attitude of students' to Biology.
2. Biology should not be taught as an abstract subject as the instructional tools to teach it effectively is found in our environment
3. Teachers and other stakeholders such as parents need to direct students towards adopting and maintaining good content knowledge practice.

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