

PREDICTING INTEREST OF SECONDARY SCHOOL STUDENTS IN BIOLOGY BY TEACHERS' PEDAGOGICAL SKILLS: A STUDY OF NASSARAWA ZONE, KANO STATE, NIGERIA

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Abstract

The study assessed Predicting Interest of Secondary School Students in Biology by Teachers' Pedagogical Skills: A Study of Nassarawa Zone, Kano State, Nigeria. The study used descriptive survey and observational design. The population of the study was 12,996 Biology students and 60 Biology teachers from 38 public schools in Nassarawa Zone. A sample of 375 Biology students and 38 Biology teachers were selected from 19 public schools using simple random sampling technique. Data were collected using two validated instruments; Biology Students' Interest Inventory (BSII) with $r=0.76$ and Biology Teachers' Pedagogical Skills Observation Schedule (BTPSOS) with $r=0.75$. One objective with corresponding research question and null hypothesis guided the study. Data collected were analyzed using descriptive statistic of mean and standard deviation to answer the research question and inferential statistics for the hypothesis using Spearman ranking coefficient at probability levels of $P \leq 0.05$ level of significance. The major finding showed that significant relationship exists between teachers' pedagogical skills and students' interest and it was concluded that Pedagogical Skills enhanced interest of senior secondary school Biology students. It was therefore recommended among others that, only Biology teachers with adequate pedagogical skills be employed to teach the subject in order to enhance interest of students in the subject.

Keywords: Teachers' Pedagogical Skills, Interest, Biology students, Kano, Nigeria

Introduction

Science education plays outstanding roles in determining scientific and technological advancement of every individual and the nation at large and significantly contributes to the development of scientifically literate persons who will further use the achievement and experience in science and technology for the benefit of mankind. Hence steps toward development of science education are inevitable. Shaibu (2014) defines science as a complex human activity that lead to the production of a body of universal statement called laws, theories or hypotheses, which serve to explain the observable behavior of the universe or part of it, which, in themselves, have predictive characteristics. Biology is one

of the science subjects that occupy a significant position in the senior secondary school curricula and forms part of the literacy needed for national growth and development.

Biology is one of the science subjects offered in senior secondary schools in Nigeria that attracts the greatest patronage of both science-oriented and art-based students (Akinwumi & Falemu, 2020). It is one of the major science subjects in the senior secondary school curriculum apart from chemistry and physics and is a requirement for higher learning in quite a number of science-related professional courses like medicine, pharmacy, nursing and agriculture.

In spite of the fact that biology curriculum has very good objectives and the importance attached to the teaching and learning of the subject, it appears that students still encounter problems in the subject as performance at Senior Secondary level had remained poor especially in external examinations. This has led to low interest which affects performance in West African Senior Secondary School Certificate Examination (WASSCE) and the National Examinations Council (NECO). The yearly and continuous decline in interest rate of Nigerian senior school students in science which affects their performance in external examinations such as the West African Senior School Certificate Examinations (WASSCE) and National Examinations Council (NECO) and has been an issue of concern to all and sundry in science education in the country (WAEC Chief Examiner's Report, 2023). Nworgu (2015) has blamed poor pedagogical method used by the teachers in teaching biology as one of the causes of lack of interest among students. It therefore implies that the teacher plays a vital role in facilitating students' interest in Biology.

According to Utami (2016) pedagogical skill is a set of teaching strategies and methods of instruction employed in the classroom. It involves the interaction between the teacher and his students in order to expand their cognitive and skillful perceptions through the appropriate classroom management, determination to teach and continuous evaluation to achieve the desired teaching objectives. Bhowmik, Banerjee, and Banerjee (2017) pointed out that effective teachers use an array of teaching strategies that are tailored to the needs of their individual students learning needs. Guerero (2016) opined that pedagogical skills can generally be divided into classroom management skills and content-related skills. That is, a good teacher is expected to know how to effectively control his students by first and foremost carrying out the task of managing the behaviour of his or her classroom by establishing clear rules and expectation so as to avoid cases of misbehavior and also when issues of misbehavior comes up he should be able to handle the situation without disruption of the learning environment. Pedagogical approaches are often placed on a spectrum from teacher-centred to learner-centred pedagogy; though these two approaches may seem contradictory, they can often complement each other in the realisation of educational goals—for example, a teacher-centred approach may be useful to introduce a new theme, while a learner-centred approach may be necessary to allow students to explore these ideas and develop a deeper understanding (Cook, 2020).

Firstly, teacher-centred pedagogy positions the teacher at the centre of the learning process and typically relies on methods such as whole-class lecture, rote memorization, and chorus answers (call-and-response). This approach is often criticized, especially when students complete only lower-order tasks and are afraid of the teacher (Li, 2023). However, whole-class teaching can be effective when teachers frequently ask students to explain and elaborate key ideas, rather than merely lecture.

Secondly, learner-Centred Pedagogy: This pedagogical approach has many associated terms such as constructivist, student-centred, participatory, active, but generally draws on learning theories suggesting learners should play an active role in the learning process. Students therefore use prior knowledge and new experiences to create knowledge. The teacher facilitates this process, but also creates and structures the conditions for learning. Considerable research and advocacy has promoted learner-centred pedagogy in recent years for economic, cognitive, and political reasons. Some research suggests this approach can be very effective but it is also difficult to measure consistently (Green, 2015). He added that it is often challenging for teachers to shift from teacher-centred pedagogy to learner-centred pedagogy, and so considerable support may be needed if this is an important goal for a given education system. Learning-centred pedagogy is a relatively new term that acknowledges both learner-centred and teacher-centred pedagogy, it can be effective, but teachers must consider the local context, including the number of students in the class, the physical environment, the availability of teaching and learning materials

Studies have shown that effective pedagogical approaches are the ones promoting learning by providing students opportunities to actively participate in their own learning (Centre for the Use of Research and Evidence in Education (CUREE) 2014). This student-centred approach (constructivist teaching) contrasts sharply with the traditional teacher-directed approach (sometimes referred to as transmission teaching) where the teacher is viewed as the front of all knowledge and where that knowledge is passed from teacher to student. According to CUREE (2014), using the teacher directed approach; teachers do most of the talking and students work, mostly individually, on tasks provided by the teacher, such as worksheets and text book exercises. However, with a student-focused approach students take a much more active role, engaging in discussion with their teacher and peers. This strategy usually arouses students' interest.

Okoye, Okongwu and Nweke (2015) opined that Interest is an individual's behavioural tendency to be attracted towards a certain class or classes of activities. Also, Salisu (2015) describe interest as a feeling of curiosity or concerned of subject or topic that direct attention towards it. Interest is a source of motivation which drives people to do what they want to do when they are free to choose (Amaefuna and Ezeliora, 2023). Interest promotes intrinsic motivation which is believed to drive and sustain students in a particular task.

The teachers' pedagogical approach has great influence on how students learn and how their interests are being sustained during instruction. When the teacher employs an array of pedagogical skills during instruction, students' interest is usually aroused as the need of the learners are being met. According to Sauer (2014) the type of pedagogy adopted by teachers shape their actions, judgments and other teaching strategies by taking into cognizance theories of learning, understandings of students and their needs, and the background and interests of individual students. The teacher upholds the learning and growth of all students through instructional practices that create high expectations, safe and effective classroom environment, engage all students and accommodate diverse learning styles, needs, interests, and levels of readiness of the student.

According to Gess-Newsome (2017) Pedagogical knowledge include a rationale linking teaching strategies to student learning strategies for eliciting student prior understandings; and strategies to promote student examination of their own thinking. Pedagogical skills are expressed through successful teaching and development of the teaching, and through

evaluations and student learning. He therefore added that pedagogical skills, thus, include the capacity to plan, initiate, lead and develop education and teaching with the departure point in both general and subject-specific knowledge of student learning. In addition, Pedagogical skills also include the capacity to connect the teaching to research in the subject of interest. The development of the pedagogical skills requires continuous interaction around matters of subject didactics and teaching and learning. In this way, the pedagogical skills of the individual can contribute to the development of the pedagogical practice of others.

Pedagogical strategies involve the teacher being able to convey knowledge and skills in ways that students can understand, remember and apply. Guerero (2016) opined that Pedagogical skills can generally be divided into classroom management skills and content-related skills. That is a good teacher is expected to know how to have firm control of his students by first and foremost carrying out the task of managing the behavior of his or her classroom by establishing clear rules and expectation so as to avoid cases of misbehavior. The other aspect is that of content-related skills. He further opined that pedagogical skills of a good teacher should also be tailored towards content for individual needs and challenges due to individual differences in the class. These types of pedagogical skills will create a good learning environment and thereby boost students' interest.

Interest has to do with a learner's predisposition to react positively in certain ways towards certain aspects of the environment and is usually developed in relation to and remains allied to more basic motives (Adeyemi & Adeyemi, 2014). In other words, Abande (2014) defines interest as a state of curiosity or concern about something or the attention given to something. In addition, Magnus (2014), further stated that interest encompasses the positive, pleasant feelings an individual has when trying to study a subject-matter.

Datom (2015) studied the effect of Demonstration and Guided Discovery Methods on Interest and Achievement of Upper Basic Science students in Wukari Educational Zone, Taraba State Nigeria. The purpose of his study was to find out the effects of demonstration and guided discovery teaching methods on interest and achievement of Upper Basic Science students, the findings of the study revealed that the interest level of participants showed significant difference after exposure to demonstration method while there was no significant difference in interest level of participants after exposure to guided discovery and lecture methods of instruction. This implies that the pedagogical skills or teaching methods employed by a teacher to facilitate students learning can ignite interest in understanding the concepts. From the above definitions and literature, it could be deduced that interest governs our feeling and attitudes towards a particular thing or activity. Furthermore, Okafor (2015) emphasized that interest is an important factor that supports learning, individual development and achievement. Interest in a subject is therefore indispensable in learning and many are of the opinion that learning cannot take place without it.

Oyenuga (2016) opined that interest is the motive which serves as important influence in producing both activities and attitudes that are favorable to learning. In his views, interest act as a drive or motivation that propels people to act in certain ways. He also advised that in studying learners' interest, care must be taken to identify those undesirable interest areas. Learner's interest has to be guided so that educational objective might be directed towards eliminating undesired activities. He added that students' interest is very

important in the study of any subject because the interest of a learner is in many ways the reflections of his/her deeds. Altogether, it is appropriate to say that the interest of a student in a particular subject or career may influence his/her academic achievement in a positive way. Meanwhile, Oyenuga (2016) equally submitted that it is up to a teacher to make a subject or course interesting. He further stressed that the teacher can help in setting up certain conditions which will enable the students to take or create interest in the subject or course. Conclusively, the literatures have revealed that interest of a student in any subject is borne out of motivation and attitude exhibited by the teacher in the course of his teaching. Students' interest can be reduced if a teacher employs ineffective pedagogy.

It is therefore expedient that teaching of biology should be carefully planned and appropriate pedagogical skills should be applied in order to provide meaningful learning that will arouse students' interest.

Objective

to assess the relationship between teachers' pedagogical skills and students' interest in Biology in Nassarawa Zone, Kano State, Nigeria.

Research Question

What is the relationship between teachers' pedagogical skills and students' interest in Biology in Nassarawa Zone, Kano State, Nigeria.?

Research Hypothesis

There is no significant relationship between teachers' pedagogical skill and students' interest in biology in Nassarawa Zone, Kano State, Nigeria.

Methodology

This study adopted a descriptive survey research design, ex-post facto and observational study to gather data from the participating Biology students and teachers in Nassarawa and Fagge Local Government Areas of Kano State. The total population were 12,996 Biology students and 60 Biology teachers. A sample of 375 SS2 biology students and 38 biology teachers participated in the research and were selected by stratified random sampling technique. Data were collected using two instruments; Biology Students' Interest Inventory (BSII) and Biology Teachers' Pedagogical Skills Observation Schedule (BTPSOS). Face and content validity as well as reliability of the instruments were determined. Split-half method was used to test the reliability of the instruments and the Chronbach's alpha yielded 0.76 for Biology Students' Interest Inventory (BSII) and 0.75 for Biology Teachers' Pedagogical Skills Observation Schedule). This is in line with Uzosike (2008) who stated that a reliability coefficient of 0.5 and above implies that an instrument is internally consistent.

At descriptive level, mean and standard deviation were used to answer the research question while at inferential level, hypothesis was analysed using Spearman ranking coefficient at probability of $P \leq 0.05$ level of significance for rejecting or not rejecting the null hypotheses.

Results

In order to answer this research question, a descriptive statistics of mean scores and standard deviation were used and a correlation test on the relationship between teachers’ pedagogical skills and students interest in biology.

Research Question: What is the relationship between teachers’ pedagogical skills and students’ interest in Biology in Nassarawa Zone, Kano State, Nigeria.?

Table 1: Summary of Mean, Standard Deviation and Correlation Test on the Relationship between Teachers’ Pedagogical Skills and Students’ Interest

Variables	N	Mean	Standard Deviation	Correlation coefficient	Remarks
Teachers’ Pedagogical Skills	38	65.65	8.64	0.50	There is positive relationship
Students’ Interest	375	75.78	5.34		

Table 1 showed the relationship using mean and standard deviation of teachers’ pedagogical skills and students’ interest. Both the mean and standard deviation of teachers’ pedagogical skills was 65.65 + 8.64 out of the total/ maximum mean of 125.00 + 0.00 while that of students’ interest mean and standard deviation was 75.78 + 5.34 out of the maximum score 100.00 + 0.00. This shows that the higher the teachers’ pedagogical skills mean response, the higher the students’ mean interest and vice versa. A correlation coefficient of 0.50 also shows a positive relationship between Teachers’ Pedagogical skills and students’ interest.

Hypothesis testing

Research Hypothesis: There is no significant relationship between teachers’ pedagogical skill and students’ interest in biology in Nassarawa Zone, Kano State, Nigeria.

Table 2: Spearman’s Rank Correlation Coefficient (rho) Statistics on the Relationship between Teachers’ Pedagogical Skills and Students’ Interest in Biology

Variable	N	X	S.D	Df	Rho	P. value	Remark
Teachers’ Pedagogical Skills	38	65.65	8.64	411	0.50	0.00	Significant
Students’ Interest	375	75.78	5.34				

Sig at $\alpha \leq 0.05$

Results of the Spearman non parametric Test in Table 2 shows that significant relationship exists between teachers’ pedagogical skills and students’ interest in biology. Reason being that the p value of 0.00 is lower than the 0.05 alpha level of significance, and the level of correlation is put at 0.50. The relationship is proportional, that is the higher the teachers’ level of pedagogical skills, the higher the students level of interest and vice

versa. Therefore, the null hypothesis which states that there is no significant relationship between teachers' pedagogical skills and students' interest in biology, is hereby rejected.

Discussion

Outcome of the hypothesis revealed the presence of Significant relationship existing between teachers' pedagogical skills and students' interest in biology. The relationship is proportional, that is the higher the teachers' level of pedagogical skills, the higher the students level of interest and vice versa. This outcome agrees with Hakim (2015) who pointed out that pedagogical competence has a significant influence in improving students' interest. It also agrees with Sauer (2014) who pointed out that the type of pedagogy adopted by teachers shape their actions, judgments and other teaching strategies by taking into cognizance theories of learning, understandings of students and their needs, and the background and interests of individual students. He added that the teacher upholds the learning and growth of all students through instructional practices that create high expectations, safe and effective classroom environment, engage all students and accommodate diverse learning styles, needs, interests, and levels of readiness of the student. This also agrees with the observation made by the researcher using the observation schedule to observe the teachers' pedagogical skills. It was discovered that the schools where the teacher scored above 50% when the data was collated, the students also had a higher interest rate compared to those schools where the teachers' pedagogical skill rating was below 50%. This revealed the presence of Significant relationship existing between teachers' pedagogical skills and students' interest in biology, showing that the higher the teachers' pedagogical skills, the higher the level of interest among students in biology and vice versa.

Conclusion

The result of this study shows a positive correlation between teachers' pedagogical skills and students' interest in biology. Therefore, a significant relationship exists between Teachers' pedagogical skills and students' interest in biology. In conclusion, it was established that teachers' pedagogical skills of biology are strong predictors of interest among secondary school students, Nassarawa Zone, Kano.

Recommendations

On the basis of the outcome of the study the following recommendations are put forward by the researcher;

- I. School managers should employ Biology teachers with adequate pedagogical skills to teach the subject in order to enhance interest of students in Biology.
- II. Certified agents like Teachers Registration Council of Nigeria (TRCN) should employ testing teachers' pedagogical knowledge and skills as a requirement for certification and license.
- III. Biology teachers pedagogical skills can be improved by school authorities providing all the necessary instructional and infrastructural facilities in schools and this will improve interest of students in biology.

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