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Interaction Styles in Senior Secondary Practical Biology Classroom in Nigeria

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Abstract. This study was carried out to observe the interaction style in SS2 practical biology classroom. In line with this, four research questions guided the study. A descriptive survey design was used. The sample used was 645 senior secondary year two biology students who made up 18 intact classes from six (6) secondary schools located in Awka educational zone. The data from the study were collected using the modified Flanders Instrument and analyzed using mean. The result of the study showed that in the practical classroom, teachers dominated the practical classroom with the use of lecture method, as the mode of teaching. Girls participated in fewer interactions than boys meaning that boys distinctly dominated the biology lesson, they were more active, more willing, commented impulsively and made more contiguity with the students-teachers than girls.

Keywords: Practical, Interaction style, Flanders's model, Gender, Senior Secondary school

Introduction

The pursuit for advancement in technology of any nation is dependent on science. Science circumscribes the systematic study of the structure and behavior of the physical and natural world through observation and experiment. Science therefore is a systematic, evidence-based pursuit of knowledge and understanding of the natural and social world (Ladiges & Mayo, 2017). Wilson (2015) also refers to science as knowledge acquired through study or practice. Science is receiving much emphasis in education because its significance are relevant to life and society, which is to say that much effort is been made to improve on the study of science and other related subjects in school.

Biology as a science subject occupies a distinct position in the secondary school education curriculum because it is one of the most popular science subject offered by both science based and art based students in Senior Secondary Certificate Examination (SSCE) in Nigeria. Biology is a very important science subject and stands as the bedrock upon which are based many other science courses like Medicine, Pharmacy, nursing, Biochemistry, Genetic, Agriculture etc., that are of great economic importance to a nation. This is in line with As Amosa, Akuwo, Eli and Queen (2004) who reported that biology helps to develop future scientist, technologist, engineers and other related profession. In Nigeria the biology curriculum is designed to arouse their interest and deepen their understanding in the subject and also apply the knowledge in everyday life in matters of personal community, health and agriculture among others (Federal Ministry of Education, 2009). Owing to the importance of biology there is therefore need to improve the methodology used in teaching biology in Nigeria. A lot of research studies have shown that in each year there is a decline in performance in examination (Okoye & Onwuachie, 2018). Results from West African Examination Council (WAEC 2015-2019) revealed that student's performance in practical biology was poor due to their inadequate exposure of relevant skills.

Practical is a process skill which involves classification, measurement, collecting of data, questioning, making hypothesis, analysis, observation, communication and experimentation (Ndioho, 2006). A practical work activity is described as enhancing learning of science and developing scientific skills among students (Sedumedi, 2017). The researcher further stated that practical work allows the students knowledge and skills to be assessed simultaneously. Practical is a very important resource input for teaching science. Learning

science is enhanced and understanding level is improved when students are engaged in practical experiments (Dada et al., 2016). In practical work its fundamental purpose is to help students make links between two domains of knowledge – that is domain of real objects and observable things and domain of ideas. The teaching and learning of biology in the senior secondary school has of late not been very effective since the practical aspect of the subject is seemingly neglected by many teachers (Tordzro & Ofori, 2018).

In the 21st century senior secondary school teachers still engage in the orthodox or dramatic method of teaching science which results to rote learning (Abimbola & Dada, 2015). This approach does not enhance the student's knowledge of biology and their confidence rather it works antagonistically to the best practical biology approach in which students purse their own practical under the guidance of the teacher. This is essential to the teaching of science because the success of any science subject (biology) depends on the practical activity available for it (Umar, Fugu & Aliyu, 2018). There are factors which may affect the use of practical in teaching biology, such as the interaction of students among themselves, with their teachers as well as the subject. Interaction in practical biology classroom can help students attain meaningful understanding which brings about better performance in the subject. This is to say that when students are told what to do, how to accomplish the task and the possible answer or solution, they are involved in some form of interaction.

Interaction is a salient style where both teachers and students come into contact to share information and knowledge (Rido & Sari, 2018). It is a systematic procedure which involves people working together and having an influence on each other. It can also be seen as a sum total of activities taking place in the classroom between the teacher, the learner and the learning material during the teaching and learning process (Okoye, 2011). The concern on the success of teaching process leads to the study on how to explore and identify the characteristics of classroom interaction. As the educational system is changing, teachers are required to cope with the latest trends and give the best learning experience to their students (Rido & Sari, 2018). Therefore the effective interaction found in the practical classroom not only has a positive impact on the students, but also improves the teachers teaching and learning process. Success or failure in a biology practical classroom has something, if not absolutely everything to do with the nature of interaction that takes place during the lesson.

An educationist, Flander originally developed an instrument called Flanders Interaction Analysis (FIA). It is a system designed to categorize the type and quantity of verbal interaction in the classroom and to plot the information on a matrix so that it could be analyzed and interpreted. This result gave a picture as to who was talking in the classroom, how much and the kind of talking that took place. This system consist of ten (10) categories namely: accepting feelings, praising or encouraging, using ideas of students, asking questions, lecturing, giving directions, criticizing or justifying, student talk-response, student talk-imitation and silence or confusion.

A technique consisting of objective and systematic observation of the classroom events for the study of the teacher's classroom behavior and the process of interaction going on in the classroom is referred to as classroom interaction (Eriba & Achor, 2010). It is an interpersonal transaction between the teacher and the students which occurs at different levels. It is seen as a successful transmission of message between the teacher and student. Teacher-student interaction therefore is a two way process whereby each participant influences the other's behavior. It is a verbal communication pattern or style of the teacher and the students in a classroom activity (Okoye & Onwuachu, 2018).

There are mixed reports on findings of a number of research studies on gender difference in science. It is a contending issue in Nigerian culture. Studies have shown that in secondary school science classroom males dominate both teacher-initiated interaction and the

student-initiated interaction (Rashidi & Naderi, 2012; Onyegegbu, 2004). It has been generally assumed that gender is an affecting factor in the process of teacher-student interaction (Abimbola & Dada, 2015; Rashidi & Naderi, 2012; Afuwape & Oludipe, 2008; Francis, 2004). In order words gender of both teachers and students influences the quality and quantity of the interaction in the classroom. Hence, the researcher wants to find out the type of interaction style that goes on in practical biology classroom using gender as a moderator.

Statement of the Problem

The roles of practical class in science subjects during the teaching and learning process are often overlooked in secondary education. The biology practical lesson in a typical Nigerian classroom is dominated with lecture style of chalk and talk method which has not changed in decades. This teaching method has led to abstractness which makes the student less active and engages them in rote memorization.

Practical experience in any science subject is crucial for the real understanding of principles and application of knowledge grained in that subject for cognitive growth and technological orientation and advancement. Interaction in the secondary school practical biology is a precursor to learning by students in the laboratory. This is because the type of interaction style that goes on in the laboratory could have a major impact on how well students achieve the goals of instruction. The search for ways and means of identifying empirically the role of interaction style as a tool for enhancing biology achievement becomes necessary. Hence the need for the study.

Purpose of the Study

Specifically the study seeks to:

1. determine the frequency of interaction style between student-student in practical biology classroom;
2. determine the frequency of interaction style between teacher-student in practical biology classroom;
3. determine the influence and frequency of gender on student-student interaction style in practical biology classroom;
4. determine the influence and frequency of gender on teacher-student interaction style in practical biology classroom.

Research Questions

1. What is the frequency of interaction style between student-student in practical biology classroom?
2. What is the frequency of interaction style between teacher-student in practical biology classroom?
3. What is the influence and frequency of gender on student-student interaction style in practical biology classroom?
4. What is the influence and frequency of gender on teacher-student interaction style in practical biology classroom?

Methodology

The design of this study is descriptive survey design. The study was conducted in a selected educational zone in Anambra State. The target population of this study was second year Senior Secondary School Students (SS 11). The sample of this study consisted of urban and rural schools. Out of 20 schools, 10 schools were selected for both urban and rural schools. From the 10 schools, 3 schools each were drawn respectively from both the urban and rural schools. The simple random sampling technique (by balloting) was adopted. From each school three (3) streams were selected through simple random sampling. A total of

eighteen (18) intact classes were used for the study. Flanders's Interaction Analysis procedure was employed to observe classroom interaction pattern in practical biology at secondary level classroom. The observational sheet represented 90 seconds for 21 categories of FIA. Each block in the observational sheet represents 3 secs. The following observation procedure was adopted.

1. A practical double class period of 60 minutes was used as observational period.
2. 60 minutes (3600s) was divided into thirty times units.
3. One time unit was for the duration of 1.5 minutes (90s).
4. In the first 15 minutes of the practical class observation period, four times units were observed randomly, comprising of 6 minutes (360s)
5. In second 15 minutes of the practical class observation period, four times units were observed randomly comprising of 6 minutes (360s).
6. In the third 15 minutes of the practical class observation period, four times units were observed randomly, comprising of 6 minutes (360s).
7. In the fourth 15 minutes of the practical class observation period, four times units were observed randomly, comprising of 6 minutes (360s).
8. Stopwatch was used along with an ordinary watch.
9. Total time for observation in a single biology practical classroom comprised of 1hr (60 mins). Data collected through the modified Flanders Research Instrument were coded in the observation sheet. Each table was analyzed and interpreted using mean of interaction time. All the categories from 1 to 21 were added and the mean for the 21 categories of 6 secondary schools and 18 intact classes were calculated.

Results

The findings of the study were presented sequentially, according to the research questions.

Table 1. Mean time of interaction style between student-student in practical biology classroom

	School 1	School 2	School 3	School 4	School 5	School 6	Overall
Mean scores	57.6 sec	72 sec	46.8 sec	54 sec	39.6 sec	14.4 sec	47.4 sec

As displayed in Table 1, the overall mean time of interaction in the six schools is 47.4 sec. The standard time of interaction is 90sec. This shows that the student-student interaction time is less than the standard time, (47.4 sec < 90 sec). Figures 1 & 2 are graphical presentation of the mean time of interaction pattern between student-student in practical biology classroom. For this type of interaction the frequency was 0.5.

Table 2. Mean time of interaction style between teacher-student in practical biology classroom

	School 1	School 2	School 3	School 4	School 5	School 6	Overall
Mean scores	151.2 sec	126 sec	79.2 sec	79.2 sec	151.2 sec	82.2 sec	111.6 sec

As displayed in Table 2, the overall mean time of interaction in the six schools is 111.6 sec. The standard time of interaction is 90 sec. This shows that the teacher and student interaction is higher than the standard time, (111.6 sec > 90 sec). Figures 1 & 2 are graphical presentation of the mean time of interaction pattern between teacher-student in practical biology classroom. Therefore the frequency is 1.24.

Table 3. The mean time of interaction on the influence of gender on student-student interaction in practical biology classroom

	School 1	School 2	School 3	School 4	School 5	School 6	Overall
Mean scores	61.2 sec	18 sec	21.6 sec	10.8 sec	10.8 sec	14.4 sec	22.8 sec

As shown in Table 3, the overall mean time of interaction on the influence of gender on student-student interaction in practical biology classroom is 22.8sec and frequency 0.25. This is lower than the standard interaction time (90 sec) (Figures 1 & 2).

Table 4. The mean time of interaction on the influence of gender on teacher-student interaction in practical biology classroom

	School 1	School 2	School 3	School 4	School 5	School 6	Overall
Mean scores	7.2 sec	7.2 sec	64.8 sec	50.4 sec	21.6 sec	3.6 sec	25.8 sec

As shown in Table 4, the overall mean time of interaction on the influence of gender on teacher-student interaction in practical biology classroom is 25.8 sec. The standard time of interaction is 90 sec and frequency 0.3. Therefore, 25.8 sec < 90 sec is below the standard. Figures 1 & 2 are graphical representation of overall mean time of interactions.

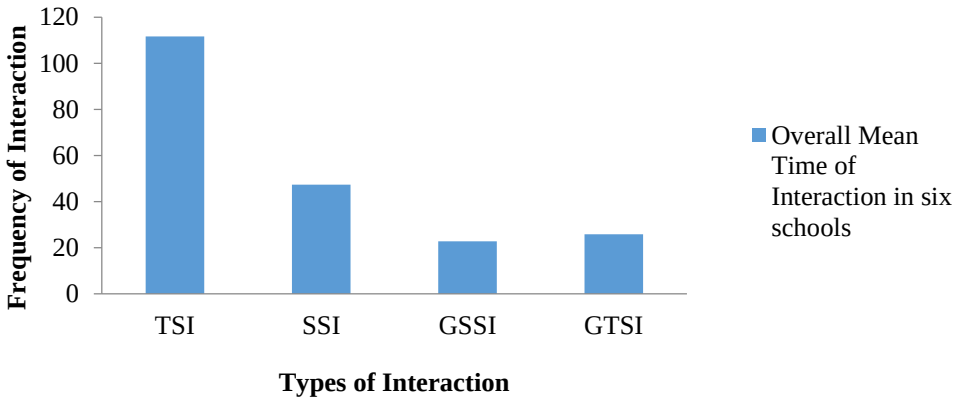

Figure 1. Overall frequency of interaction

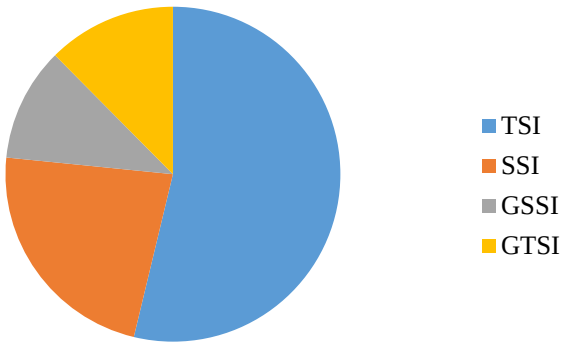

Figure 2. Frequency of interaction in six schools
(TSI – Teacher-Student Interaction; SSI – Student-Student Interaction; GSSI – Gender on Student-Student Interaction; GTSI – Gender on Teacher-Student Interaction)

Discussion of Results

The results from this study indicated that the predominant interaction style in practical biology classroom was directly oriented by the teacher with lecturing being the most frequently occurring interaction. Teachers characteristically dominated the practical classroom; students had little opportunity to manipulate the equipment and practical materials in order to experiments and the teacher's rarely manipulated apparatus to demonstrate physical phenomena.

The results from this study showed that, student-student interaction was lower than that of teacher-student interaction. In the mixed schools, boys dominated both the teacher-initiated interactions and student-initiated interaction in the practical biology classroom under observation. The girls raised their hands and remained seated in their seats as the boys were already off their marks to answer the questions. They were observed to be more active and restless. It was also noticed that the boys mocked most of the girls that attempted to answer the question; this attitude was noticed to have reduced their self-esteem.

During the practical, the girls grouped themselves together and interacted more within themselves than between boys. The girls preferred asking questions to the teachers than to their counterparts. The boys make themselves leaders in group activities. The restlessness of boys made it possible for them to receive attention from the teacher more than girls. Attention was gotten by frequently asking of irrelevant questions, giving unexpected responses to questions, making comments, at times shouting and disturbing for help.

In sex segregated schools, the result of data analysis indicated that the measures of the frequency of the interaction with the teachers favored the girls over the boys. On the other-hand in mixed schools, the results indicated gender differences was in favor of boys, both on the qualitative and quantitative measures of teacher interactions with male and female students.

Conclusion

Based on the results of the study, the following conclusions were drawn about the nature of interaction style in senior secondary practical biology classroom in Awka education zone: the predominant interaction style during practical biology is direct influenced by the teacher. Teachers dominate practical classroom talk, ask questions more frequently than students and mainly closed questions at that and hardly manipulate apparatus or equipment to demonstrate physical phenomena to students.

On the other hand, students spends a considerable part of the class period taking down notes, responding to teachers' questions, hardly ask questions and never had the opportunity to handle practical materials in a bid to experiment; in sex segregated schools, girls interact with the teacher much more frequently than boys in majority of the behavioral dimensions. The teachers interact more frequently with boys on behaviors that address the intellectual quality of their work. In mixed schools, on other hand, boys are more active than girls in seeking and getting contacts with teachers and in getting response opportunities but are criticized more frequently for misbehavior. Indeed, boys interact with teachers more than girls in almost all the behavioral dimension.

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