Effects of Classroom Interaction on Basic Science Students' Achievement in Junior Secondary Schools

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ABSTRACT
This experimental study focused on Effects of Classroom Interaction on Basic Science Students' Achievement in Junior Secondary Schools. The main research hypothesis was: there are no significant effects between the mean scores of Basic Science students with classroom interaction and without classroom interaction. The results showed there was significant effect in the outcomes. Seventy (70) students drawn from Wamba Local Government Area (LGA) of Nasarawa State, Nigeria formed the sample size of the study. Pre-tests and post-tests were used for data collection. It was recommended that teachers should dwell more strategies on classroom interaction so as to boost students' participation levels, and help them in the study of Basic Science, given its relevance to Science and Technology development.
Keywords: Achievement, Basic Science, Classroom interaction, Junior Secondary Schools.

INTRODUCTION
In this globalization era, Basic Science is used as a necessity for Science and Technological development. in Nigeria, Basic Science as a subject, is offered by students at the Junior Secondary School level. Basic Science consists of subjects from the core sciences of Physics, Chemistry, Biology and Agricultural Science (UNESCO, 2007). It used to be named integrated Science. The developed nations have reached their current feat because they have development their science education and utilized it to achieve their current growth sprouts (Gonzale, Brambila, Gonzalez & Perez-Angon, 2016). The teaching and learning of Basic Science therefore, requires expanding its activities outside the classroom and geared towards using the acquired knowledge for creating wealth (Igbokwe, 2015). Basic Science has to play a leading role in transforming the present Nigerian society into an emerging knowledge society which implies the need to build learning communities all over the country and in particular among the younger generation in their Junior Secondary School levels (Igbokwe, 2015). Improving the teaching of Basic Science therefore, stands as a main tool in promoting quality human resources that would rejuvenate the educational and national goals of the nation (UNESCO, 2007).
Every year, primary schools produce graduates who cannot meet up with current Basic Science trends in Junior Secondary Schools classrooms, especially in the rural setting. This has serious social repercussions which need to be identified so that solutions could be sought for them (Nwafor, 2015).
Classroom interaction is an important part of teaching process. Interaction has been defined as a process whereby two or more people engage in reciprocal actions (Cao, Esponda-Arguero & Rojas, 2011). The classroom climate is build up by the pattern of interactions between students and teachers where knowledge transfer prevails through asking questions, responding and reacting. The most imperative factors therefore, in a classroom interaction are the exchanges initiated by students and teachers (Zhao, 2016, Aziz, Quraishi & Kazi, 2018).

Types of Classroom Interaction
Relationship between teachers and students is often due to the subject matter of the course, the atmosphere at school and the attitude of teachers towards students (Pajaja, 2011; Pisterman, 2015). Heikonen (2017) added that classroom interaction types include situations where:
i.   teachers control the interaction but not the topic;
ii.   teachers have no control over the topic and the interaction;
iii.   teachers control the topic but not the interaction; and
iv.   teachers control over the topic and the interaction.
Classroom interaction therefore stimulates involvement in the classroom. It also fuels students' motivation and help them to see the relevance of teachers and topics by increasing their participation especially, when all of them are involved. Such interaction can be between the teacher and the students. This form of classroom interaction also teaches the students to respond and respect their superiors because they are given a chance to air their opinions in the classroom (Heikonen, 2017).
The other form of classroom interaction is among the students themselves. This allows them to learn and understand how to work with partners in a cooperation manner (Wamaina, 2011). It develops and improves their skills to team work and peer relationship by encouraging them to work together in the classroom. They thus, learn the importance of working cohesively with themselves.
Another form of classroom interaction is whole class interaction, where students learn the importance of patience and value for others' view point.
Role playing, conversation, reading around, questions and answers form other classroom interaction processes. By role playing, the students are given role to act on Basic Science with others, which allows them to demonstrate creativity, knowledge as well as helping them to face situations outside the classroom (Nwalin, 2011). In conversation, the whole class is involved in small groups in the class (Gorjian, Habibi, 2015). In question and answer form, a teacher or student poses a question to assess the learner. The student may pose a question to the teacher with the purpose of obtaining more or new information (Gorjian, 2015)).

Role of Teachers in Classroom Interaction
Teachers' role in classroom interaction comes in the form of facilitators, since not all students in the classroom interact well with one another (Weady, Keith and Newcomer, 2016). Such students require encouragement from teachers. In their methods, the teachers may divide the students into small groups and give them tasks, projects or assignments. This will drive the students to communicate with each other through role playing and offering ideas where shyness will be eradicated, in the excitement of accomplishing the group project successfully.
Classroom interaction is thus created by the teacher through actions that depict full participation by the students (Petek, 2015; Heikonen, 2017). In this case, the students are more likely to be happy and they can also sense the temperament of the teacher in such a manner that the way react negatively if the teacher is angry and vis versa, which can invariably impair or accelerate the learning processes (Heikonen, 2017; Petek, 2013).
Role modeling is another role of the teacher in a classroom interaction because students spent more time with their teachers (especially in boarding school). These roles can either be positive or negative depending on the behaviours of the teacher in the situations.
Teachers should therefore, endeavour to identify the elements that impede good classroom attitude in school. For instance, silencing students during classroom interaction can demoralize them thud, affecting the interaction negatively. Peer pressure has overpowering negative effects than can cause other students to be silent during classroom interaction.

Research Objectives
The purpose of the study was to investigate the effects of classroom interaction on Basic Science students. Specifically, the study was set to determine the following objectives:
i.   to measure the students' academic achievement in Basic Science without classroom interaction;
ii.   to determine the effects of classroom interaction on students' achievement in Basic Science

Research Questions

i.   What is the mean classroom achievement scores of Basic Science students without classroom interaction?

ii.   What is the mean classroom achievement scores of Basic Science with classroom interaction?

Hypothesis

There is no significant effect between the mean achievement scores of Basic Science students under classroom interaction and without classroom interaction.

METHODOLOGY

Population

The population for this study comprise of all Junior Secondary School students (JSS) in Wamba Local Government Area (LGA) of Nasarawa State, Nigeria.

Sample

The sample comprised of seventy (70) students divided into 2 equal parts for experimental and control groups.

Sampling

A purposive sampling technique was used for the study.

Instrumentation

The researcher used pre-test to check the achievement of the students in Basic Science before experiment and post-test to check their achievement after experiment.

Administration

The pre-test was administered to the students in the experimental and control groups. The two groups were taught by the researcher where they were exposed to similar experiences. Post-test was later administered (after the treatment was over) to both groups. All the treatments and scoring were conducted by the researcher.

The researcher conducted the treatment on the experimental group using class interaction method, while the control group was taught without the interaction. Post-test scores were used to measure achievement in Basic Science in both groups to determine the effects of the treatment.

RESULTS

Based on the treatments, mean and standard deviation (SD) were calculated for scores of both the Pre-test of the experimental group and the control group, while t-test was applied to ensure that both groups were equal on dependent variables prior to the treatment. Similarly, t-test was used for comparison of the scores of Post-test.

Table 1: Pre-test scores of control and experimental groups

Groups	N	Mean	SD	Df	t-calculated	t-critical	Signif. Level
Control	35	18.5910	4.5173				
Experimental	35	18.6745	4.9017	68	-4.9751	1.99	0.05

Table 1 showed that the t-critical (1.99) was greater than t-calculated (-4.9751) at alpha = 0.05.

Table 2: Post-test scores of control and experimental groups

Groups	N	Mean	SD	Df	t-calculated	t-critical	Signif. Level
Control	35	16.7	3.014				
Experimental	35	19.2	2.1714	68	-4.8456	1.99	0.05

Table 2 showed that t-critical (1.99) was greater than t-calculated (-4.9756) at alpha=0.05.

From Table 1, it was found that t-critical (1.99) was greater than t-calculated (-4.9751) at alpha=0.05 implying that the 2 groups were at equal footing before the treatment. Table 2 showed the t-critical (1.99) was greater than t-calculated (-4.8456) at alpha=0.05, thus rejecting the null hypothesis, signifying that there were significant effects of the classroom interaction on students' achievement in Basic Science.

DISCUSSIONS

The study focused on effects of classroom interaction on Basic Science students' achievement. The experimentation found that classroom interaction was significant in the students' achievement. This supports the earlier findings of (Hussain, Jamil, Ameen & Bakhsh, 2011; Wendy, et al, 2011). The findings of this study further buttress the concepts of relationship between teachers and students which were shown to be positively beneficial – especially when the teachers' emotions are positive during class interaction (Peket, 2013).

The roles of the teacher in classroom interaction are significant in harnessing the interest, competence and critical thinking of the students being taught, Basic Science inclusive (Heikonen, 2017). Similarly, the interaction between teachers and students is an integral part of the teaching and learning process, especially when it produces positive outcomes. Classroom interactions thus, stimulate the students' involvement in the classroom by fueling their motivation and helping them to see the relevance of teachers' perspective (Wamaina, 2011).

CONCLUSION

The result of the study clearly showed that there was relationship between classroom interaction and students' achievement in Basic Science.

RECOMMENDATIONS

Sequel to the findings of the study, it was recommended that:

i.   Teachers should encourage more interaction in the classroom and allow more extraordinary events to happen in the classroom;
ii.   Teachers should stick to the common methods that produce acceptable results in the students' achievement;
iii.   Basic Science should be widely taught in schools in order to support its position as the basic for technological and scientific development of any nation;
iv.   Peer discussions should be incorporated into classroom interactions so as to raise the productivity of interaction and cooperation amongst them.

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