EFFECTS OF JIGSAW CO-OPERATIVE TEACHING/LEARNING STRATEGY AND SCHOOL LOCATION ON STUDENTS ACHIEVEMENT AND ATTITUDE TOWARDS BIOLOGY IN SECONDARY SCHOOL IN DELTA STATE

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ABSTRACT

This paper is focusing on the effects and gains of jigsaw co-operative teaching/learning strategy and school location on student achievement and attitudes towards biology in secondary schools in Delta State. Though not empirical in setting, it x-rays the effects and gains of using jigsaw co-operative teaching/learning strategy in teaching biology in secondary schools across the country regards to students achievement and attitudes. The study did not focus much on the effect of school location since little impact was ascertained in school location as an effective variable. Research findings on the effect of co-operative teaching/learning strategies were x-rayed thoroughly in the study. This paper, helps illustrate the various steps on using the jigsaw co-operative teaching/learning strategy and even on how to use it effectively in teaching biology. The major findings from this paper include a significant higher achievement rate of students taught using the Jigsaw co-operative teaching/learning strategy and increasing attitudes and values of learners toward study in biology subject area. The study also advocates that Jigsaw co-operative teaching/learning strategy be in-cooperated in the teachers education programme and in-service courses and seminar be organized for science teachers and co-opt this strategy in teaching biology in classrooms in Delta State.

Key words: *Co-operative teaching/learning strategy, Jigsaw co-operative teaching/learning, Achievement, Attitude.*

INTRODUCTION

Secondary schools in Nigeria of recent have witnessed population explosion in enrolment which has resulted in large class size. Overcrowded classrooms have become a permanent feature of academic setting at the secondary school level in our educational system and this evidently leads to poor classroom management. Classroom management prerequisite for achieving instructional objectives

and safeguarding the well being of students for whom the teaching and learning activities are centered (Ogumu, 2000). In most of the secondary schools in Nigeria, a teacher-student ratio of 1:70 is evident. The national policy on education, revised (2004) recommended a teacher-student ratio of 1:40 for normal or regular schooling. Consequently, most secondary schools in the major cities register over 60 students for externally organized terminal examinations like West African Certificate Examination and NECO. This forces the science teachers to resort to using the traditional lecture method of instructions.

Science education teaching in Nigeria, since the 70's has been under intense public scrutiny and criticism in the area of enrolment, poor performances in science, unqualified sciences, teachers and low moral of teachers (Ajeyalemi and Bajah, 1994). Unarguably, there is need to up the effective teaching of sciences in our secondary and tertiary schools as to achieve the means of achieving the much-needed technological break-through in the country. It is however not encouraging to observe that in spite of all their recognition, performances in sciences continues to be poor. Research findings have found teaching methods among other factors to been responsible for the poor state of students achievement in the sciences (Eshiet and Iyang, 1998). Research findings have also shown the traditional lecturer method is rendering students less active in science classes. Passive students have been known not to show interest in sciences and biology in particular (Ige and Aremu, 2005), thus no meaningful learning can occur in such situation. Given the possible link between science achievement, attitude and teaching strategies, it befits on science teachers to devise or implore teaching methods among other factors, as the center piece of improving science outcomes, reversing this current negative trend in science achievement and attitude through instructional strategies as a major objective of this research work.

The time has come for much emphasis to be placed on other effective methods for teaching and learning in large classes. Studies have shown that cooperative teaching learning strategy could reduce such large classroom into smaller group. Cooperative teaching learning is a form of small group instruction that has become especially popular with teachers and students in most European and Western countries. It is advocated as a complement to direct instructions and to teaching which is often highly competitive. Research evidence indicates that students gain considerably from cooperative teaching across all grades level of schooling (Ellis and Fouts , 1993). According to Cruickshank et al (2003) cooperative learning occurs when learners work together in small groups and are rewarded for their collective accomplishments.

Ajaja. and Eravwoke (2010), citing the works of Lampe, Rooze and Tallent Rimmels, 1998, Slavin, 1990, 1991; Webb, 1989, believed that academic achievements of students have been found to be enhanced by the use of cooperative learning. Apart from the increased academic achievements of learners at all ability levels, cooperative teaching-learning activity engages the student in the learning process and seeks to improve the critical thinking, reasoning and problem solving skills of the learner Branlett (1994), Megnin (1995) and Webb, Tropper and Fall(1995). Lampe et al (1998) emphasized among other benefits of cooperative teaching learning strategy that some learners who might refuse to speak out in a traditional lecture method setting become actively involved in the learning process through group interaction. Statel and Vancickel (1992), ascertained that every cooperative learning strategy when used appropriately can enable students to move beyond the text, memorization of basic facts and learning lower level skills. These methods, which results in cognitive restructuring, leads to an increase in understanding of all students in a cooperative group. There are so many or different forms of cooperative teaching learning strategies in existence around the educational ambit amongst which are Learning together, Team learning, Group investigation, Peer tutoring, Team games tournament, Small group transforming and Jigsaw method. This study is an attempt to implore Jigsaw cooperative teaching learning strategy to determine its effects on students achievements and attitude in science subjects specifically biology in secondary schools in Nigeria.

Jigsaw Co-Operative Teaching-Learning Strategy

Jigsaw co-operation teaching-learning strategy is a teaching and learning strategy that promotes motivation in learning, positive attitudes and develop interpersonal skills and increase student's achievement. This strategy was developed by Elliot Aronson in 1971 with his students from Texas University and Californian University. Jigsaw co-operative teaching is one, that places much emphases on providing students the opportunity to actually help each other build comprehension. This strategy assigns students to small groups composed of varying skill levels. Each group member is responsible for becoming an "Experts" on one section of the assigned materials and then teaching it to the other members of the teams. Aronson, E. (2000 – 2008). Students learn best when they are actively involved in the process. Research findings revealed that regardless the subject matter, students working in small groups tend to learn more of what is taught and retained them longer than when the same content is prescribed in other instructional way Hedeen (2003).

Efe and Efe (2010) analyzed how students assigned as group leaders in Jigsaw method helped motivate the rest of the group. Result suggested that when given the title of "group leader" students

worked very hard to motivate other students to complete their work load. It means simply without missing without missing words that this activity allows students to experience learning and contribute to their learning.

Findings show that using Jigsaw methods presents several advantages as put by Tamah (2007). Students are encouraged to learn from their fellow students in their expert team and when they go back to their home team, they are encouraged to teach what has been taught in expert team.

According to Mangolio and Xiaoling (2010), the Jigsaw classroom reduces student's reluctance and anxiety to participate in the classroom activities while increasing self esteem and self confidence. Researchers have come to conclude that the Jigsaw method not only increases the self-esteem and confidence of students but has also improved performance and increase their likening for school and their enthusiasm about learning. Aronson and Patnoe (2011)

The Jigsaw co-operative learning also provides a way to help students become active in classroom activities and lessons. Reports suggest high motivation of students when working together, sharing ideas, pursuing of common goals and developing self esteem. Anderson and Palmer (2001). The Jigsaw allows students to work with one another and develops a sense of being needed, by involving in the activities, the student focuses on listening, speaking, cooperation, reflection and problem solving skills.

Jigsaw as a corporative teaching-learning strategy can be used whenever material can be segmented into separate component. Like the Jigsaw puzzle, each piece (student part) is essential for the completion and full understanding of the final product. Each group member becomes an expert on a different concept or procedure and teaches it to the group (Panitz, 1996). Therefore, each student is essential for the understanding of the whole concept been taught. Student grow in high confidence in performing challenging and engaging task in their expert groups with enthusiasm since they know they are the only ones with that piece of information when they move to their respective groups (Aronson, 2000).

Biology is the science of life of animals and plants (Hornby, 2004). It has to do with the studies of the inter-relationship between the living organism and their immediate environment. Biology is been taught as a compulsory subject in schools across Nigeria. The objective of the revised biology curriculum for secondary school was derived from the National policy of education (1977, 1981, 1999, 2008) and the cardinal objectives of the syllable are to prepares pupils to acquire

i. Adequate laboratory and field skills in Biology
ii. Reasonable aid and functional.
iii. Ability to apply scientific knowledge to everyday reduction on pastoral and community health, thus the underlying objectives, content and context of the biology syllabus for secondary schools in Nigeria which is intended to meet the much needed relevance of the needs of the society and functionality in its content methods process and application.

Unfortunately, available evidence has revealed that students performance in biology has been quite discouraging (WAEC, 2009, 2010, 2011, 2012). The broad aim and expectation of any teaching and learning programme in productivity and positively evaluated end-product, which in other words could be seen as achievement. Most quarters of the Nigeria society have frowned at the continued fall in the standard of education in external examination like SSCE and NECO in science subjects biology inclusive. Factors that contribute to the failure of students in biology specifically and science subject generally have been earlier pointed out by the researcher as to include unqualified science teachers, class size-explosion, teaching style, lack of facilities, teachers attitude e.t.c. In addition to the above findings, research have shown that the school location is a factor that affect students academic achievements (Akpan, 2001) Research has indicated that the educational operation of students who study in the rural areas lack behind those of their urban counterparts (Arnold et al, 2005). Students from rural schools place less value on academics and at times feel inferior and less confident of themselves as Haas (1992) puts it “Rural students could exhibit a sense that “School isn’t for me”

Consequently, there is a need to examine, teaching style, school location, students achievement and attitude in biology in secondary schools is Delta State.

Research Problem

There have been lots of comments on the falling standards of secondary school students achievement in science subjects in external examination like GCE, NECO, SSCE. Students have exhibited that this consistent poor performance in achievement and negative attitude towards science subject like biology could be the fact that science subject (biology) teaching is not properly done and the use of poor teaching strategy, hence the concepts are not properly understood. This poor or improper science teaching strategies employed by teachers has affected student's achievement and attitudes towards science subject. With the large class size in Nigeria schools the need therefore to use the appropriate teaching strategy that improves student's achievement and hence enhance positive attitudes towards science subjects is a welcomed development.

The purpose of this study therefore is to specifically determine among others, the effect of Jigsaws cooperative teaching strategy and school location on students achievement and attitudes towards biology in secondary school Delta State, X-raying different research findings by various educational scholars in recent times.

Recent Works On Co-Operative Teaching/Learning Strategies

So much research works have being carried out on co-operative teaching strategies on student's achievement and attitudes but not so much on Jigsaw which is a form of on co-operative teaching/learning strategy, it is also necessary to boldly say a little about co-operative teaching/learning strategy.

What is co-operative learning/teaching?

Co-operative learning/teaching is a form of small group instruction that has become especially popular with teachers and students in developed countries. It is often advocated as a complement to direct instruction and to teaching which is often highly competitive. Research evidence indicates that students gain considerably from co-operative teaching/learning strategy across all grade levels of schooling (Elis and Fouts, 1993)

Ajaja (2010) citing the works of Borich (2004) states that cooperative learning is important in helping learners acquire from the curriculum the basic co-operative attitudes and values inside the classroom. Furthermore he believes that co-operative learning has been seen to promote student achievement. He drew conclusions that co-operative teaching/learning engages the student in the learning process and helps to improve their critical thinking, reasoning and problem solving skills.

According to Borich (2004), co-operative teaching/learning is intended to heighten the interest of student and encourage positive feelings and attitude towards any subject matter.

In the research works of Marhamah and Mulyad (2013), they found out there is a significant difference between the mean achievement scores of students taught with co-operative jigsaw teaching strategy than those taught using group discussion strategies. Their findings are in line with Aronson (2000-2013), who stated that Jigsaw classes showed greater academic achievement. Mbacho Naomi and Bernald Githua (2013), citing the works of (Slavin, Leavy, Madden, 1989, Goodwin, 1999) stated that co-operative teaching and learning enhances social interaction which is essential to meet the needs of students and helps to maintain trust among them. To the above researchers, jigsaw co-operative teaching and learning, following the research findings of Hanze and Berger (2007) results in higher learners achievement because they are engaged in challenging tasks in their expert groups with enthusiasm since they know they have to convey the information when they move back to their respective home groups.

The Steps Used for Jigsaw Co-operative Teaching and Learning Strategy

Marhamah and Mulyadi (2013) outlined the steps used in Jigsaw co-operative teaching learning strategy as followings.

- Define the group project or major topic on which the class will be working
- Randomly break the class into groups of 4-5 students each, usually depending on the size of the class and assign a number (1 to 4-5) to student in each group. This group is called the home group
- Assign each student or number a topic in which he or she will become an expert
- The topics should be related facts of a general content theme
- Rearrange the student into expert groups based on their assigned numbers and topics
- Provide the experts with the materials and resources necessary to learn about their topics
- The experts should be given the opportunity to obtain knowledge through reading, research and discussion
- Reassemble the original group
- Experts then teach what they have learned to the rest of the group
- Take turns until all experts have presented their new materials

- Group presents results to the entire class or they may participate in some assessement activity

How Jigsaw Teaching/Learning Strategy can be Used to Teach a Biology Topic

Following the methodology adopted by Mbacho Naomi, Bernard Githua (2013) in their works, the topic to be taught is "Plant Nutrition". Using the Jigsaw co-operative learning strategy to senior secondary student II with an average of 16 years. The sub topics of plant nutrition are Photosynthesis in plants, Phases in photosynthesis, Materials necessary for photosynthesis, Evidences to show photosynthesis has occurred and Importance of photosynthesis. Appropriate group work for each of the sub topics are constructed and used during instruction at the beginning of each biology lesson. For each of the sub-topics to be taught, the eleven steps of creating and use of jigsaw co-operative teaching-learning strategy are followed as recommended by Aronson (2000). The group work is assigned to the groups and each student in the group assigned questions. The students with the same question form the experts group where they discuss their written answers to the questions. The students then go back to their home group to present their findings to the other members of the group. All this is to be done with very close supervision of the teacher. The teacher then evaluates the students by asking questions that demand written answers and give them feedback. Finally BAT (Biology Attitude Test) post test is administered. Here, teachers is a mere facilitator.

Conclusion

From the research works of all the various scholars and researchers, the study revealed that Jigsaw co-operative teaching/ learning strategy is a very useful techniques. Teachers should rather concentrate on teaching techniques or methods to bring out the best in their students irrespective of subject area, class size and school location. This will in most cases, if properly used, enable the students to properly understand the concepts taught in class. This co-operative learning/teaching strategy (Jigsaw), naturally will enable the students develop the interest of working with their colleagues and through this learn from each other. They are also able to cultivate good attitudes from each other and for themselves. The study, though not empirical shows the fact that students achievements and attitudes towards studies is strengthened. We however should not be too confident or over generalize since the Jigsaw co-operative teaching/learning strategy could make

students believe that instructional problems can not be tackled independently since so much emphasizes is place on team work.

Recommendations

Knowing that little or no much research work has been carried out on jigsaw co-operative teaching learning strategy in Nigeria in general and Delta State in particular, it is thus recommended that jigsaw co-operative learning/teaching strategy be incorporated in teachers education programs, in-service courses and seminars for science teaching and that the strategy be practiced in biology classroom lessons.

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