

# The Effect of Gender on the Achievement of Students in Biology Using the Jigsaw Method

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## ABSTRACT

This paper examined the effect of gender on the achievement of students in biology using the jigsaw method. The sample was made up of 87 students in SS1 in a secondary school. The study utilized an intact class because the study took place in a normal school term. There were 39 males and 49 females. The Biology Achievement Test (BAT) was constructed from past WAEC questions. These questions are standardized test and so were not subjected to further reliability test. The students administered the BAT as pretest, and the results were collated by gender. A t- test analysis showed that there was no significant difference between the mean scores of boys and girls. The class was taught, topics in microorganisms for 12 weeks. At the end of the 12 weeks, the BAT was administered as posttest. The results were analysed using the t-test at 0.05 level of significance. Results showed that there was a significant difference between the mean scores in favour of the males. This showed that the males gained more from the jigsaw method compared with the females. It was recommended that in order to get the best out of instruction, various methods, or a combination of them must be employed.

**Key words:** Gender, Jigsaw, Achievement.

## 1. Introduction

One of the millennium development goals (MDGs) is gender equality. As fatokun and Odagboyi (2011) noted, most societies, the roles of women is knocked to the floor, preventing women from participating in, and benefitting from development efforts. They added that some subjects such as science and mathematics are branded masculine, while others like home economics, secretarial studies are branded feminine.

Fasiku (2011) in his comparison of the knowledge of male and female teachers in social studies, concluded that male social studies teachers were very vast in the knowledge of environmental education than female social studies teachers. Gin (2011) observed that in contemporary context, men and women classification is a world where patriarchal values predominate, it is a world where there are general sets of beliefs that women are inferior to men and therefore, the power relations attached to their ideas, and beliefs, give men more power, more opportunities and more consentions over and above women in the society.

Nwona (2013) noted imbalance against women in science, technology and mathematics. These are perceived as masculine subjects. Research has demonstrated that different teaching methods produce different results. The identification of the best teaching strategy for a given set of students must be done if the best result must be achieved.

Could it be that the teaching methods adopted by teachers presently accounts for the low enrolment of female students in the science and technology subjects? This paper sought to find out the effects of gender on the achievement of biology concepts using the jigsaw method. De-Baz (2001) described the Jigsaw method thus:

In the Jigsaw structure, students are members of two different groups, the 'home groups' and the 'expert groups' with 4-6 members, to work on an instructional material that has been broken down into sections. Each student from every 'home group' is assigned a portion of the material. Then the home groups' break apart, like pieces of the jigsaw puzzle, and each home team sends representatives to join with other representatives from all the other teams and form 'expert groups'. While in the expert groups the students study intensively their particular material to ensure that they understand it well and prepare it for peer tutoring. Later, each student returns to his/her respective home group where (s)he teaches his assigned material to the rest of his/her group and learns the other sub-topics from his /her peers in the group. After the completion of the assigned learning tasks over a number of class periods each student takes an individual test.

## 2. Statement of the problem

Every segment of the educational industry operates on a curriculum. It is expected that when learners are exposed to the curriculum of the segment of education they undertake, they should have achieved the objectives of the planned curriculum. This takes no cognizance of gender, or, it could be seen as a matter of no relevance seeing all human beings are thought to have similar characteristics.

However, it has been noted over time that the female folk have lagged behind their male counterparts in many ways that warranted world leaders to sign the millennium development goals in the year 2000. This included gender equality. Is this equality qualitative or quantitative? Is the female inferior to the male inferior in times of learning?

Literature abounds about the efficacy of the jigsaw method. However, the effect of gender on achievement in the use of the Jigsaw method has not been explored. This became the rationale for this study. This study was carried out to determine the effect of gender on the achievement of biology student using the jigsaw method.

### **3. Hypothesis**

There is no significant difference between the achievement of males and females using the Jigsaw method.

### **4. Sample**

One senior secondary class 1 (SS1) was purposively sampled for the study. The class size is 88, male up of 49 males and 39 females.

### **5. Instrument data collection**

A 20 item Biology Achievement Test (BAT) was developed by the researcher. The BAT comprised of objective questions drawn from past West African Examination Council (WAEC) questions. This was used as pre and post test on the sampled participants.

### **6. Procedure**

BAT was administered on the participants at the beginning of the study and results were collected based on gender. The results were analyzed using the t-test and reviewed that there was no significant difference in the mean scores of the males and females. The class was taught using the Jigsaw method for 12 weeks. The participants in each lesson were divided into groups of five' this is the home group. Each of the members of the home group are given a portion of the material to be learned, each differing from the other. All the students that have similar materials form their own groups. This is the expert group. In the expert group, students discuss their part of the material in detail. The expert group disperses, and they return to their home groups. Each student takes turn to teach their peers. this went on for twelve weeks. At the end, the BAT was administered as a post-test to elicit the effect of the teacher method.

### **7. Procedure for Data Analysis**

Result from the BAT post-test were collected and separation by gender. The mean scores were determined, and they were further subjected to the t-test to see if significant differences exist between the males and the females.

### **8. Literature Review**

Most times teaching in the secondary schools utilize verbal techniques where the teacher does most of the talking, leaving the student to play passive roles in the class. According to Soares and Valadares (2004), the traditional mode of teaching where by a teacher uses 'pure verbal techniques' too early in the presentation of learning materials without realizing if students have the necessary cognitive readiness or if they can learn meaningfully, may not bring out of the learner the desired outcome in the learning process. Learning is an active process in which meaning is accomplished on the basis of experience (Otuka & Uzuechi 2009).

There is definitely no single method of teaching that can bring about all the desired outcome; however, research has shown that cooperative learning has proved to be very helpful in enhancing achievement in learners. The jigsaw cooperative method has been used to teach with tremendous results. Gocer (2010) using jigsaw to teach literary genres. Results showed that student taught using the jigsaw methods perform better than those taught using the conventional methods. Kernal (2008) used the jigsaw method to teach writing expressions. Result showed that student taught using the jigsaw method performed significantly better than those taught using teacher's centered method. Tahar and Acar (2012), using jigsaw methods to teach chemistry found it to yield better result than the conventional methods. Literature is abundant on the effectiveness of the jigsaw methods (Abidin 2013; Karacop and Doymus 2013)

Research reports are not explicit on the effect of gender on achievement. Zember and Blume (2011) report that most studies show that girls perform more better than boys in schools. This corroborate an earlier report by Dayioglu and Turut - asit (2004) in a study, saw that girls, though enter Turkish universities with low grades, but upon their entry, out perform their male counterparts. Abubakar and Oguguo (2011) in their comparison, found no significant difference between the performance of boys and girls. This agrees with Uduosoro (2011) who found no significant difference between the performance of boys and girls. Though research reports are conflicting as they are, it is necessary to note that none of the reported researches used the jigsaw method; Hence the necessity of this study.

## 9. Results.

Table 1. t-test analysis of BAT pre - test scores

|             | Male | Female |
|-------------|------|--------|
| Mean        | 5.87 | 6.19   |
| Variance    | 6.54 | 5.70   |
| Observation | 24   | 36     |
| df          |      | 47     |
| t-stat      |      | -0.48  |
| t-critical  |      | 1.67   |

### Not significant at 0.05

Table 1 show that the  $t$  – calculated (-0.48) is less than  $t$ -critical (1.67) at 0.05 level of significance. This implies that there was no significant difference between the mean scores of the males and females on the BAT. Therefore, the two groups did not differ significantly prior to commencement of treatment.

Table 2. t-test analysis of BAT post-test scores.

|             | Male  | Female |
|-------------|-------|--------|
| Mean        | 13.48 | 11.43  |
| Variance    | 12.25 | 11.50  |
| Observation | 47    | 41     |
| Of          |       | 85     |
| t-stat      |       | 2.78   |
| t-critical  |       | 1.66   |

### Significant at 0.05

Table 2 show that the  $t$ -calculated (2.78) is greater than  $t$ -critical (1.66). This implies that there was a significant difference between the mean scores of the boys and girls on the BAT at 0.05 level of significance. Therefore, the null hypothesis that stated that there is no significant difference between the mean score of the boys and girls using the Jigsaw cooperative method is hereby rejected

## 10. Discussion

The objective of this study was to investigate whether the jigsaw method will enhance achievement in biology, and to find out if gender will affect the rate of achievement.

The findings of this study shows that the boys achieved significantly higher than the girls when taught using the Jigsaw method. The results of this study differs from those of Zembar and Blume (2011) who stated that girls rather than boys achieve better in schools; which agrees with Dayioglu and Turut–Asit (2004) who also attested to the fact that girls do better than boys in school. The result of this study also differs from those of Abubakkar and Oguguo (2011) and Uduosoro (2011) who found no significant difference in the achievement of boys and girls.

The reason for this significant difference cannot be arbitrarily conjectured. There would be a need to research more into other variables like grouping methods, group dynamics and to use other techniques of gathering data especially from girls to find out how they fared during the lessons. It will be nice to find out the effect of culture on the achievement of girls. If girls come to school with the cultural image created that boys are superior to girls, it might affect their zeal to learn.

## 11. Conclusion

The use of jigsaw method has proved to be a very efficient way to enhance achievement. However, more research needs to be carried out, and vary the method in ways that both boys and girls receive the maximum benefit that the method can offer.

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