

COMPARATIVE ANALYSIS OF SENIOR SECONDARY SCHOOL STUDENTS' ACHIEVEMENT IN GENETICS AMONG GENDER USING CONCEPT MAP INSTRUCTIONAL METHOD IN ZARIA, LGA.

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Abstract

This study was an investigation on the comparative analysis of senior secondary school students' achievement among gender using concept map instructional method in genetics in Zaria local Government Area. The designed for the study was pretest and posttest control groups design. Samples of 96 SSII students were involved in the study. The instrument for data collection was Genetics Achievement Test (GAT) with reliability $r=0.65$. Data collected were analyzed using student t -test statistics. The result indicated that male students taught genetics using concept map instructional method performed better than their female counterpart. It was recommended that, teachers need to exploit better pedagogical methods that is learner-centered in teaching genetics than expository method. Learners should be allowed to participate fully in the learning process.

Introduction

Education is an instrument for economic, political and scientific development of all nations (Olarinoye, 2001 and Otuka, 2006). This could be the reason why the Federal Government of Nigeria emphasized the proper teaching in education in the National Policy on Education (FGN, 2008). It has been observed that secondary education is provided to children aged between 12 to 17 years to prepare them for entry into tertiary institutions. The focus is on cognitive development by introducing them to scientific concepts and to specially prepare them to think for themselves, respect others and respect the dignity of labor (Danjuma, 2005). This makes learning meaningful in the life of students if learner-centered instructional method such as problem-solving method, concept mapping etc are use.

Concept map is a virtual, graphical learning tool that uses diagrams to represent a particular knowledge domain and the relationships between concepts. Learners use different ideas to explore concepts and logic while reflecting on the adequacy of the entire knowledge structure. Through the conceptual relationship process, abstract and scattered pieces of knowledge are combined to become meaningful. This innovative technique helps users to incorporate known concepts into various applications that assist the learners to improve their academic achievement in science (Lawal, 2004 & Meisu and Chang, 2011). Concept map assist the learners in concept development, self-awareness also changes through different timelines and periods of mapping. Concept maps accompanying student narrations allow teachers to pinpoint the students' misconceptions (Tsai, Lin, & Yuan, 2001, Meisu and Chang, 2011). That is to say, concept map helps students reflect while informing the teacher of their educational needs. By pointing out the students' blind

spots, teachers can help students avoid costly mistakes and learn more efficiently. Concept maps are widely used for teaching, learning and evaluation in science and mathematics (Havel & Treagust, 1989; Roth & Roychoudhury, 1992; Schmidt & Telaro, 1990 & Lawal, 2004).

It has been observed gender disparity appears in learners and performed poorly in biology. This was attributed to insufficient instructional materials, poor method of teaching employed, difficulty of some biological concepts among others (Lawal 2004 and Chief Examiners Report WAEC 2010). It has been reported by Wallace and Mintzes (1990) that concept map instructional method enhanced academic achievement more than computer assisted instruction in science when taught to pre-service teachers. Also Lawal (2004) found significant difference in the academic achievement of undergraduate students taught genetics using concept map instructional strategy but found no significant difference on gender. The researcher concluded that concept map is gender friendly in the study.

It has been reported that individual's background/ characteristics affect his/her cognitive and non-cognitive behaviors (Ai, 1999). Studies has indicated that gender is one of the significant and influential characteristics in academic achievement (Ai, 1999). James (1991) stated that gender differences in science achievement has been found to exist and that females performed better when the inquiry method was used than their male counterparts. On the other hand Graybill (1975) found that American males were better than the females at activities requiring manipulation. While Nuru (2009) reported in his research on gender using biological garden as a teaching aid and found that there is no significant difference on the academic achievement of both sexes, therefore using biological

garden as teaching is gender friendly. The present research was design to investigate the comparative analysis of senior secondary school students' achievement among gender using concept map instructional method in genetics.

Purpose of the Study

The general purpose of the study was to determine the comparative analysis of senior secondary school students' achievement among gender using concept map instructional method in genetics in Zaria local Government Area. of Kaduna State.

Research Questions

What is the mean academic achievement of male and female senior secondary school students taught genetics using concept map instructional method?

The following Null hypothesis was formulated for testing at 0.05 level

H₀₁: There is no significant difference in the mean academic achievement of male and female senior secondary school students taught genetics using concept map instructional method.

Research Design

This research design is Quasi-experimental Control group research design that employed pretest posttest control group design. Pretest was administered before the treatment. This was to determine the equivalent in their academic ability. Posttest was administered after the treatment to determine the effect of treatment (concept map instructional method) on the subjects. This was done using the same instrument (Genetics achievement Test (GAT)).Experimental group received treatment which was using concept map instructional method. In posttest, the instrument was reshuffled to avoid test wiseness.

Population for the study

The population for the study was all the 2,340 students of (30) senior secondary schools in Zaria local government area of Kaduna state offering biology in the area covered by the study.

The schools were Government Day Secondary School (GDSS) Dembo as Experimental Group and Government Day Secondary School (GDSS) Kofan Kuyam Bana, Zaria as Control Group respectively.

Sampling size and sampling procedure

The research employed purposive sampling in the choice of two (2) senior secondary schools used in this study out of 30 senior secondary schools in Zaria L.G.A. reasons for their population and that many students offered biology. In both the schools selected for the study intact classes were used. The experimental group was taught using concept map instructional method while the control group was taught using expository method.

Instrument for data collection

The instrument for data collection was Genetics Achievement Test (GAT).A 20 items multiple choice questions was developed by the researchers.

Validation/Reliability of the Research Instrument

The instrument was validated by two PhD holders in science education department, Faculty of Education, Ahmadu Bello University Zaria and two graduates teaching biology in secondary schools. The advice of these experts helped in modifying the instrument to its present form. A test /retest reliability method was carried out with a small group of students that are in SSII in GSS, Soba and a reliability co-efficient of 0.65 was obtained using PPMC.

Method of Data Collection

The data for this study was collected by administration of the instrument Genetics Achievement Test (GAT) which was done by the researcher assisted by biology Teacher(s) with a minimum qualification of first degree and a good teaching experience in the selected schools. After the pre-test and initial teaching (treatment period) by the researchers which lasted for two months, the instrument was administered to the students as post test

Method of Data Analysis

Student t-test statistics was used to test the hypothesis at 0.05 level of significance.

Results and Discussions

The null hypothesis states that there is no significant difference in the mean academic performance of male and female senior secondary school students taught genetics using concept map instructional method. This hypothesis was tested using t-test statistics and the results presented in Table 1.

Table 1: t-test for the difference in the mean academic achievement of male and female senior secondary school students' taught genetics using concept map instructional method.

Groups	N	Mean	SD	df	T cal	P
Male	30	32.62	6.18	40	0.63	0.05
Female	11	30.21	7.56			

P=0.60 DF 40 0.05

Table 1 shows that significant difference exists between male and female students in their academic achievement in genetics taught using concept map instructional method. The table shows that the calculated value of t is 0.62 at df 40 is greater than the significant P 0.05 level of significance set for the study.. Also male students performed better than female students with a mean score of 32.62 against the mean score for the female which is 30.21. The null hypothesis is hereby rejected. The results revealed that male students taught genetics using concept map instructional method performed better than their female counterparts. . Findings of this study on gender difference agreed with that of Finley (1982) who found that male students performed better than female students in sciences but disagreed with those of Smullin (1983), Inomiesa (1989); Jimoh (2004) and Jimoh (2007) who individually found that gender difference do not influence students' academic achievement in sciences. The findings on gender difference are controversial and inconclusive.

In support of the result of this study, Yusuf (2002) & Yakubu (2011) observed that the degree of academic success measured by performance outcome is higher for students who benefited from activity-based instructional method such as concept map instructional method as shown in the present study.

Conclusion

Based on the finding of this study, it was concluded that concept map instructional method enhanced the academic achievement of male students' in genetics more than the female.

Recommendations

Considering the findings of this study, the following recommendations are made:-

1. With regards to academic performance, this study indicates that the concept map instructional method enhances better performance and it is therefore, recommended for use in teaching genetics
2. Government should put in place a policy that will encourage the use of activity-based instructional method such as concept map instructional method in teaching secondary school students.
3. Teachers should take care of individual differences while teaching genetics in order to motivate the female students participate fully in the learning process.
4. Induction courses and workshops should be organised for teachers on the application of the activity-based instructional method in teaching and learning genetics.

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