

EFFECT OF CONCEPT MAPPING ON ACADEMIC ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN AGRICULTURAL SCIENCE

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ABSTRACT

The study tries to find out the effect of concept mapping on academic achievements of secondary school students in agricultural science. Two research questions and two Null hypotheses guided the study. The study was conducted in public secondary schools in Orumba south L.G.A of Anambra state. Quasi experimental design was the design of the study. The sample size comprises 130 agricultural science students randomly selected from four public secondary schools and they were assigned to the experimental and control groups. The experimental groups was taught using concept mapping while the control group was taught using lecture method. Agricultural Achievement Test (AAT) developed by the researchers and validated by experts in Agricultural science was used to assess the subjects achievement. The Null hypotheses were tested using ANOVA (Analysis of Variance). The finding showed that the experiment group achieved significantly higher that the control groups. Based on the findings of the study, it was recommended that concept mapping should be used by agricultural science teachers in the teaching of Agricultural science and other subjects in secondary schools.

Keywords: Concept Mapping, Academic Achievement, Secondary School Students, Agricultural Science.

INTRODUCTION

The present Nigerian educational system seems to be far from achieving the desired educational goals and objectives as there are noticeable evidence of decline in the standard of education and quality of students especially at the secondary school level. The situation has really attracted the interest and concern of teachers, psychologists, researchers, parents and school administrators (Ajewole 2005). Academic achievement is the yardstick for measuring learning. It follows that poor academic achievement indicates little or no learning. Lack of interest and poor academic achievement which characterize agricultural science in Nigeria today indicates little or insufficient: learning.

Specifically the methods and strategies employed in teaching agricultural science is a concern today as the methods employed in teaching agricultural science should be effective.

- Concept mapping is a general method that can be used to help an individual or group to describe their ideas about some topics in a pictorial form. There are specific steps that are followed by a trained facilitator in helping a group to articulate its ideas and understand them more clearly. Novak (1994) stated that a concept map is a graphical based method that shows the relationship between the main concepts and several sub-concepts. Its basic principle is the use of simple comprehensive tests containing facts, definitions and principles. Jose (2006) opined that a concept map clarify the relationship between the various elements within, a concept, Buzan and Rico (2005) explained that concept mapping presents concepts in a hierarchically organized manner reflecting the psychological structure of knowledge. They went further to state that concept mapping is a teaching strategy which involves the use of schematic devices to represent a set of concept meanings embedded in a framework of prepositions. Concept mapping focuses on a topic or construct of interest involving input from one or more participants, that produces an interpretable pictorial view of their ideas and concepts and how these are interrelated. Concept mapping helps people to think more effectively as a group without losing their individuality, it helps groups to manage the complexity of their ideas without trivializing them or losing detail. A concept mapping process according to Buzan and Rico (2005) involves six steps:

1. Preparation step- The facilitator of the mapping process works with the initiators to identify who the participants will be
2. Generation step- The stakeholders develop a large set of statements that address the focus;
3. structuring Step- Each participant sorts the statement into piles of similar one
4. Representation Step - is where the analysis is done. This is the process of taking the sort and rating input and representing it in a map form;
5. Interpretation Step – The facilitator works with the stakeholder group to help develop their own labels and interpretations for the various maps;
6. Utilization Step - It involves using the maps to help addressing the original focus.

It could be evident that agricultural science teachers rely heavily on the traditional method of talk and chalk instead of opting for some other approach. The abstract nature of some topics in agricultural science cannot be resolved through talk and chalk method adopted, by many teachers but could be brought to reality by the use of concept mapping. Would the pattern of achievement be the same for the students in Agricultural Science in secondary schools if they learnt with concept mapping.

STATEMENT OF THE PROBLEM

The poor academic achievement especially in Agricultural Science in Nigeria with its attendant problems has been a source of worry to parents, teachers, educationists, e.tc. Having knowledge and deep understanding of agricultural science is important especially for those who intend to pursue a career in agricultural science. Unfortunately teaching and learning of agricultural science in secondary school have been facing serious challenges as a result of persistent use of traditional method of talk and chalk in die classrooms. This old method as it appears to have rendered the students passive and. encourages rote memorization of facts, and tend to his affects the performance of the students, Therefore it becomes necessary to find out the effect of concept map on the academic achievement of secondary schools in Orumba South Local Government Area of Anambra State.

PURPOSE OF THE STUDY

The purpose of die study is to find out the effect of concept mapping on academic achievement of secondary school students in Agricultural science. Specifically the study intends to:

1. Determine die effect of concept mapping on academic achievement of students taught agriculture science using concept mapping and lecture method;
2. Determine the mean achievement scores of males and females SS II students taught agricultural science using concept mapping;

RESEARCH QUESTIONS

The following research questions were posed to guide the Study

1. What is the effect of concept mapping on the academic achievement of students taught agriculture science with concept map and those taught using lecture method?
2. What are the mean achievement scores of males and females SS II students taught agricultural science using concept mapping?

RESEARCH HYPOTHESES

The following hypothesis were formulated

HO₁ There is no significant difference between the mean scores of students taught agricultural science using concept map and those in control group.

HO₂ Significant different does not exist between the mean achievement scores of male and female students taught agricultural science using concept map.

METHODOLOGY

RESEARCH DESIGN

The study is a quasi- experimental study. The researcher used intact classes for the study. The specific design used is the non- equivalent pte-test design as developed by Best and Kahri (1986). The design was adopted because two groups were involved, the concept map learning group and the control group.

POPULATION OF THE STUDY

The population of the study consisted of all the senior secondary school class II Agricultural Science student in the public secondary schools in Orumba south Local Government Area, The total number of students in these schools that offer Agricultural Science is 635 (Source: Education unit, Orumba South Local Government Area, 2016)

SAMPLE AND SAMPLING TECHNIQUES

Random sampling was used in selecting four schools out of 16 secondary schools in Orumba South Local Government Area. 130 agricultural science students (85 girls and 45 boys) were randomly selected from the four sampled schools in the study area. The assignment of intact classes of both groups was done randomly using simple ballot system.

RESEARCH INSTRUMENT

The instrument used for data collection was Agricultural Science Achievement Test (AAT). AAT was constructed by the researcher in conjunction with the Agricultural Science teachers in the experimental schools. It contains forty multiple choice items covering four units on SS II students third term scheme of work. The AAT was validated by an experienced Agricultural Science teacher from Demonstration Secondary School Eziagu and two lecturers in Agricultural Education Department and Measurement and Evaluation Department of Federal College of Education (Tech.) Umunze. The relevant criticisms, comments and inputs by the three experts were taken into consideration while modifying the instrument.

The reliability of AAT was established through trial testing of the instrument on 30 SS H Agricultural Science in the schools not used for the study. Kuder Richardson formula (FC-R 20) was used in determining the reliability coefficient of the AAT and 0.88 was obtained.

RESEARCH PROCEDURE

The regular teachers in the selected schools were employed. They were given adequate orientation on the use of the instructional strategy and were given lesson plans. The same topics were taught to the experimental group and control group. Before the treatment, the researcher subjects in two groups were given pre AAT. After die pre-test, teachers commenced the treatment after five weeks, the post-AAT were given the post-AAT' obtained the same test items as the pre-AAT but the items were rearranged. Data on student's achievement in Agricultural Science from the two groups were recorded and used to answer die* research questions and test the hypotheses

METHOD OF DATA ANALYSIS

The researcher used the student raw scores to compute the group means. They were used to test the research questions. The hypotheses were tested using the Analysis of Variance (ANOVA).

RESULTS

Results are hereby presented in table 1 to 3

Research Question 1: What is the effect of concept map on the academic achievement of students taught agriculture science using concept map and those taught using lecture method. **Table 1:** Mean gain scores of students Achievement in Agricultural science for Experimental and control groups.

Groups	N	Pre-test	Post test	Mean Gain scores
Experimental group	60	22:10	37:21	15:11
Control group	70	12:27	12:54	5:27

Table 1 showed that mean scores of 22.10 and 12.27 for the experiment and control groups respectively for the pre-test and 37.21 and 17.54 for the post test. The mean gain score for the experimental group is, 15.11 while that of the control was 5.27. This showed that the experimental group had a high mean gain score than the control group.

RESEARCH QUESTION 2: What are the mean achievement scores or males and females SS II students taught Agricultural Science using concept mapping

Table 2: Mean gain scores of SS II male and female students Achievement in Agricultural science for the Experimental Group

Groups	N	Pre-test	Post test	Mean Gain scores
Male	45	25:14	38:44	13:3
Female	85	20:11	29:10	8:99

Table 2 revealed that at the pre-test level, the 45 males in the experimental groups had mean score of 25.14 while their female counterparts had 20.11. Also the post-test mean achievement score recorded 38.44 and 29.10 for male and female students respectively. The mean gain score showed 13.3 in favour of male students and 8.99 for the female. Thus male students had higher gain score than their female counterpart

TESTING OF HYPOTHESIS

Table 3: Summary of Analysis of variance of post test scores of students in Agricultural Science when classified by Treatment and Sex

Sources of Variation	Sum of squares	DF	Mean square	T-cal.	Sig of F	Decision
Co-variates	0.363	1	0.363	48,14	0.000	Significant

Main Effect	0.442	2	0.221	40.18	0.000	Significant
Methods	0.441	1	0.441	80.29	0.000	Not Significant
2 way interaction	0.000	1	0.000	0.045	0.831	Not Significant
Gander method	0.000	1	0.000	0.045	0.83	Not significant

Table 3 revealed that there is significant differences in the post test scores of students in Agricultural science. Students taught using concept mapping performed significantly better than their counterparts taught using lecture method

DISCUSSION

Research question one was designed to find out the mean score of students taught agricultural science using concept map and those taught using lecture method. Results of die study revealed that the pre-test and post-test scores of the experimental groups were higher than those in control croup. The experimental group has a mean score of 15:11 while those in the control group had mean score of 5.27. These scores showed that experimental groups performed better than the control groups.

Data in table 2 showed the mean gain score of SS II male and female students in agriculture science group. In the pre-test and post-test the mean gain score of the male is 13,3 while that of die female is 8.99. The mean gain score of mean is greater than that of female showing that the male£ performed higher than their female counterparts.

The higher achievement of the experimental group are in line With Ellis (2003) where he contended that concept mapping helps students to think more effectively as a group without losing their individuality. It is primarily a group process and so it is especially well suited for situations where groups of stakeholders have to work together in order to achieve high.

Researchers such as Dehaz (1994) found that gender influences students' academics for example in a metanalysis of 77 studies conducted between 1980 and 1991 among middle and high school students. He found a significant gender effect favouring males in overall achievement in science. The hypothesis revealed that a significant difference exists in the mean achievement of students taught using concept map and lecture method.

RECOMMENDATIONS

Based on the findings, the following are recommended

1. Due to the relative newness of the concept map, seminar and workshop should be organized for teachers on the use of the method
2. Government and other stakeholders in Education should organize and sponsor further research on the efficiency of concept map in promoting academic achievement among students.
3. The use of concept mapping instructional strategies should be given more emphasis in the curriculum of Agricultural Science
4. Authors of Agricultural Science textbooks should develop textbooks with contents that include concept maps with teachers handbooks written to facilitate the teachers full adoption of concept map

CONCLUSION

It can be concluded from the findings of the study that students performed better and have higher cognitive achievement under concept mapping than under lecture method. It is therefore concluded that concept mapping should be employed in teaching agricultural science in secondary schools

REFERENCES

- Ajewole C (2005) Innovations in teaching and learning. *Journal of Research in Science Teaching* 4(5) pp 10-15
- Ajai, K. O & Muriam, K. O, (2011). Parents education, occupation and real mothers age as predictors of students achievement in some selected secondary schools in Ogun State Nigeria *Academic Leadership Online Journal*; 9 (2). pp112-113
- Buzan, T & Rico D. J. (2005). Learning skills programmes. Concept mapping approach. <http://www.un.unic/leam/program/map-hoh-m>. (12/ 8/2005).
- Ellis I.K (2003). *Concept mapping*. London: Macmillan press.
- Dehaz. M. O (1994) *teaching using concept map*. London: Macmillan press
- Jose, K (2006), *Concept map methodology-* London: MacmillanPublishers.
- Novak, J. D & Godwin. E. (1994). *Learning how to learn*, London: Cambridge University Press