



**EFFECT OF CONCEPT MAPPING TEACHING
STRATEGY ON SECONDARY SCHOOL
AGRICULTURAL SCIENCE STUDENTS
ACHIEVEMENT IN JALINGO LGA, TARABA STATE,
NIGERIA**

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ABSTRACT

The aim of the study is to determine the effect of concept mapping teaching strategy on secondary school agricultural student's achievement in Jalingo Local Government Area. This study employs the quasi-experimental pre-test and posttest design. The study was made up of the 21 public secondary schools within Jalingo Local Government area with the population of 13,391 students from which two schools were sampled, i.e. Government Day Secondary School Nukkai and Government Day Secondary School Salihu Dogo. To guide the study, two (2) research questions were raised and two (2) hypotheses stated and tested with 20 multiple objective questions. The control group was mapping lesson plan and instructional package. The reliability of the instrument was 0.72. The research questions were analyzed using mean and standard deviation while the null hypotheses were analyzed using the two sample t-test. Findings of the study show that there is significant difference between the performances of students taught using concept mapping teaching strategy than those taught without concept map. There is also significant difference between the performance of male and female students, female students were found to perform better than male students taught with the use of concept mapping teaching strategy. The findings of this work revealed that concept mapping teaching strategy leads to high achievement of Agriculture students. Therefore, it was recommended that teachers should incorporate this strategy along with the conventional method of teaching in order to boost student performance.

Furthermore, educational stakeholders should organize seminars for teachers in favour of the new teaching strategy.

KEYWORDS: *Concept Mapping, Agricultural science, Student Achievement*

INTRODUCTION

Teachers are always looking for innovative ways and instructional methods to help students improve their outcomes in subject matter. Learning is a purposeful, conscious and complex process (Ahmad & Munawar 2013). An important feature of learning is that it involves a complex interactive system including environmental, social, motivational, emotional and cognitive factors. Ahmad, et al, (2013) agrees that various teaching-learning strategies have been developed to accelerate learning process of students. Learning strategies evolve from the learning theories defining the role of teacher, students and the contents.

In Nigeria, at present, mostly behavioural practices are in vogue in schools where students are passive and classroom environment is mostly teacher dominated (Emaiku, 2013). The effect of teaching methods on students' performance is receiving considerable attention from educators and researchers worldwide. What students learn is greatly influenced by how they are taught (Abdulhamid, 2013). Teachers teaching Agriculture have implemented a wide variety of teaching methods that fit different niches within the agricultural classroom. According to Emaiku (2012), there has been drastic reduction in the standard of students' performance at all levels of education in Nigeria in the past decades. The fall in the standard of education is traceable to many factors which are rooted in psychological and environmental factors. This fall in standard of performance at secondary level is incontrovertibly attributable to instructional methods adopted by teachers in schools. Akeju et al (2011) stresses that learning through some methods are passive rather active. Educational and researchers have repeatedly acknowledged the drawbacks of teaching a strict lecture format.

Teaching methods according to Canas et al (2003) are the approaches, ways strategies that a teacher adopts in conducting his lesson to a successful end. Melaiye (2017) also defines teaching methods as the ways of teaching which involve a series of teacher directed activities that result in students' learning. Teaching methods comprise of principles and strategies used for instruction

(Ausubel, 1968). Teaching methods are the tools of the teacher for reaching the set goals and objectives.

The National Curriculum for Senior Secondary Schools Volume Three (3) as cited in (Ajaja 2009) stated the specific objectives to be achieved by each subject (curriculum). The cardinal objectives for agriculture include: Adequate laboratory and field skills; meaningful and relevant knowledge in Agriculture; Ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture; and reasonable and functional scientific attitudes. (Melaiye, 2017) Agriculture occupies a unique position in the school curriculum; this is because Agriculture is central to many sciences related professional courses such as forestry, fishing, agronomic and all other related courses. Although agriculture is a prerequisite to these courses, poor achievement in agriculture is alarming in both external and internal examinations. These consistent poor performances of students offering agriculture in external examinations among senior secondary schools students have given a lot of concern to educators, curriculum planners and students themselves. Various teaching methods are use for instruction in the teaching of agriculture. These teaching methods have been summarized into expository, practical or activity oriented and constructivism. Expository methods according to Emaiku (2012) which include lecture method, demonstration, project, field trip and teacher while the students are merely asked to listen and take notes. These facts and principles are drawn from textbooks based on stipulated contents and cognitive levels within the unit of instruction. The foregoing presents a picture of the use of poor teaching methods used during Agriculture instructions, which according to Ahmed (2010), may not improve the performance of students in their academic pursuit. The above scenario tends to suggest that the conventional students in internal and external examinations. Scientists and science educators have however come to a conclusive agreement as any researches have been on going on how to involve students in the learning process and science educators have come up with concept maps as one of such teaching learning techniques.

A concept map is a type of graphic organizer used to help students organize and represent knowledge of a subject. Concept maps being with a main idea (concept) and then branch out to show how that main idea can be broken down into specific topics. Concept maps are typically hierarchical, with subordinate

concepts stemming from the main concept or idea. This type of graphic organizer however, always allows change and new concepts to be added. They include concepts usually enclosed in circles or boxes of some type, and relationship between concepts indicated by a connecting line linking two concepts. According to Ahmad (2010), a concept map is a diagram showing the relationships among concepts. It is a graphical tool for organizing and representing knowledge.

In educational settings, concept mapping exercises have been used to encourage students to actively construct an understanding of concepts and relationship within domains of interest (Ahmad, 2013). It was designed to support the learner's effort by externalizing concepts and propositions known to the student, making them visually apparent to facilitate their connection with newly acquired concepts. Concept maps have been used by teachers to assess students' understanding, by students to compare their knowledge and collaboratively renew their understanding, and by experts as a vehicle for modeling and sharing their knowledge. When created correctly and thoroughly, concept mapping is a powerful way for students to reach high levels of cognitive performance. Edinyang (2012) opined that, a concept map is also not just learning tool, but an ideal evaluation tool for educators measuring the growth of and assessing student learning. As students create concept maps they reiterate ideas using their own words and help identify incorrect ideas and concepts; educators are able to see what students do not understand, providing an accurate, objective way to evaluate areas in which students do not yet grasp concepts fully.

Concept mapping is a valuable visual learning and thinking technique that helps students understand and communicate a concept and its connections between examples and ideas. Adesoji (2008) added that, concept mapping is a valuable theory of learning that teachers can use to evaluate a student's level of understanding. A concept map is meant to be constantly changed, added to and reconstructed as new information and knowledge is learned (which is why it's usually easier to concept map using a computer); the goal is to have the student be able to explain each part of the concept map and their reasoning behind the concepts and connections they made. Student's academic performance refers to students' achievement in the topic taught base on the stated objectives. The use of appropriate teaching method by the teacher helps to achieve this goal Edinyang (2012) defines academic performance as the outcome of education

which reveals the extent to which a student, teacher or institution have achieved their educational goals. Academic performance or achievement is commonly measure by examination or continuous assessment (Abdulhamid, 2013). Considering the central role played by agriculture in the Nigerian economy, it is necessary to identify and apply teaching methods most appropriate for the subject in senior secondary schools. This is because, according to Melaiye (2017), the objectives of agriculture in secondary schools can only be attainable through effective instruction and motivation of students by Agric teachers. Abdulhamid (2013) also maintains that, for effective teaching to take place the teacher must stimulate, encourage and maintain active participation of the students through the selection of appropriate teaching methods. This would require a balance between what is taught and how it is taught. Thus successful teaching of agricultural science does not depend only on the teacher's mastery of the subject matter but also the teaching method employed.

Concept maps have their origin in the learning movement called constructivism. In particular, constructivists hold that learners should actively construct knowledge. Canas (2003) believes that one of the reasons concept mappings is so powerful for the facilitation of knowledge and to structure it, even though the structure must be built up piece by piece with small units of interacting concept and propositional frameworks.

One of the key factors in learning agriculture is students' attitude, and development of positive attitudes toward science that can motivate students' interest in science and science related careers. Adesoji (2008) sees the concept of attitude towards science as vague and ambiguous hence, opined that attitude is a concept that defines emotional trends in response to affairs, persons, locations, events or ideas. They concluded that such phrases as 'I like science or I enjoy science' courses enumerate as attitude. According to Edinyang and Ubi (2012) attitude of the teacher and his teaching method can influence students' attitude and attitude is a key to success. Emaiku (2012) opined that one of the factors that affect students' learning performance is the way they face knowledge, namely their attitude to the subject. Such attitudes as profound feelings, relatively stable are derived from positive or negative experiences across time on learning a subject. Buttressing this, Adesoji (2008) reported that students' positive attitude to science correlate highly with science achievement.

The foregoing, therefore underscores the need to look into the effect of concept mapping in teaching Agriculture.

Statement of the Problem: The research work is prompted due to the poor academic performance of students in Agricultural science in both internal and external examinations which has assumed a dangerous dimension. With regard to this, Agricultural educators need to seek suitable ways of tackling the current mass failure if they are to half the drifts of students to arts and social sciences subject.

Expository methods according to Ajaja (2009) which include method, demonstration, project, field trip and discussion methods, concentrates on presentation of concepts, fact and principles by the teacher while the students are merely asked to listen and take notes which negate practical work. The above scenario tends to suggest that the conventional teaching methods used among others have accounted for the persistent poor performance of students in internal and external examinations, hence for the old and conservative approach to teaching and learning to change to contemporary approach, there is need for a diagnostic study.

This research study explores the Effect of Concept Mapping Teaching Strategy on Secondary School Agric Students Achievement in Jalingo Local Government Area of Taraba State. The instructional strategy so conceived is believed to be an innovation especially when integrated with conventional lecture method of teaching. It attempt at introducing to the Nigerian Agric teaching-learning audience that concept mapping teaching strategy is a veritable tool and an effective innovation in the teaching-learning process.

Objectives of the Study; The major objective of the study is to determine the effect of concept mapping teaching strategy on secondary school agric students' academic achievement in Jalingo local government area, Taraba state. Specifically, the study sought to;- **i.** Determine the difference in the academic performance of agricultural students taught using concept mapping strategy and those that were taught without concept mapping strategy
Determine the difference in the academic performance of male and female.

Research Questions i. What is the difference in the academic performance of agric students using concept mapping method and those that were taught without concept mapping strategy ?

What is the difference in the academic performance of male and female agric students taught using concept mapping method?

Research Design; This study used quasi-experimental design, specifically the pre-test and post-test non-equivalent group design. In non-equivalent group design, intact groups that are similar to the treatment and the control are use (Ajai and Amuche, 2015). Ajaja (2009) defines quasi-experimental study “a in which some threats to validity cannot be properly controlled because of unavoidable situation associated with the study when human beings are used for experimental study. The academic achievement will be measured using Agriculture achievement test (AAT) with one experimental group (E) and one control group (C),

Population of the Study; the study is made up of 21 public secondary schools within Jalingo local government area with a total of 13,391 students in the 2020/21 academic session.

Sample and Sampling; For the purpose of this study, two government secondary schools are used (i.e. government day secondary school Nukkai and Government Day secondary school Salihu Dogo). These schools were chosen at random because they share similar features like student and teachers

Instrumentation; The agric achievement test (AAT) was used in the study with 20 multiple objective questions. The dependent variable in this study is students’ agric achievement

Validation of Instrument; The instrument for this study was validated by two experts from the Department of Science Education Taraba State University Jalingo

Reliability of Instrument; The reliability coefficient of Agric achievement test (AAT) was obtained using kuder-Richardson formula. The k-21 formula was adopted because it is more suitable for teachers requires less computation and is useful when items are multiple responses, it yielded a co-efficient value of 0,72. Results have indicated that reliability co-efficient of 0.5 or more is considered reliable.

Administration; Two schools where used for this study. Government Day Senior Secondary School Nukkai was used as the experimental group while Government Day Secondary school Salihu Dogo was used as control. Before the treatment, agric achievement test (AAT) was given to the two groups as a pretest for student to tick correct answers from the multiple objectives

questions. The researcher treated the experimental group using lecture method and the concept mapping teaching strategy while the control group was subjected to normal lecture method (all was done within two weeks) after the treatment, post test was administered to the two groups to ascertain their response to the treatment. No research assistant was used in this study

Method of Data Analysis; The research questions were answered using mean and standard deviation while the two sample t-test was used for testing the hypotheses

Data Presentation Analysis and Interpretation

Research Question One (1); What is the difference in the academic performance of agriculture students taught using concept mapping method and those in the control group?

The comparison of the performance of the student taught using concept maps and experiments was conducted by using pre-test scores along with the post test scores in the two methods as summarized in the table below;

Table 1; Mean score for pre-test and post test of students taught using concept mapping teaching strategy and those without

Design	Test	N	Mean	Standard Deviation
Control	Pre-test	45	7.48	2.007
	Post test	45	12.77	2.787
Experimental	Pre-test	50	7.26	1.978
	Post test	50	15.18	2.977

From the above table, it indicate that students taught using concept mapping teaching strategy achieve more than those taught using the normal conventional method. The mean score of students taught using concept mapping in the post test is higher (15.18) than those taught without the use of concept mapping (12.77).

The findings of this study are based on data collected. From the first research question; what is the difference in the academic performance of agriculture students taught using concept mapping method and those in the control group? The mean score of students taught using concept mapping in the post test is 15.18 which are higher than those taught without the use of concept mapping

12.77. This signifies that students exposed to the use of concept mapping teaching strategy performed better than those taught with the conventional method. It is in consensus with Edinyang and Ubi (2012) that when concept mapping is incorporated into teaching, it helps to improve student's performance.

H_{01} : There is no significant difference between the performance of students taught using concept mapping and those taught with the normal conventional method.

H_{01} : There is no significant difference between the performances of students taught using concept mapping and those taught with the normal conventional method. The result obtained shows that T_{cal} is greater than the T_{cr} therefore, the Null Hypothesis is rejected. It indicates that students taught using concept mapping significantly perform better than students taught with the conventional method. This agrees with the Melaiye (2017) that students exposed to the use of concept mapping teaching strategy performs significantly better than those taught using the conventional method of teaching 4 ($P < 0.05$).

Research Questions Two (2); What is the difference in the academic performance of male and female agriculture students taught using concept mapping method?

Table 2; Mean score of male and female students taught with concept map

Design	N	Mean	Standard Deviation
Male	28	15.43	3.188
Female	17	10.58	4.31

The result obtained from the above data reveals the differences between the performances of male and female students taught with the concept mapping teaching strategies. The male standard deviation is 3.188 while the female is 4.31.

Table 3; T-test analysis of the mean score between the experimental group and the control

Group	N	Mean	Standard Deviation	Df	T_{cal}	T_{cri}	Decision
Experimental	50	15.18	2.977				
Control	45	12.77	2.977	93	4.084	1.987	Rejected

From the data in the table above the T_{cal} is 4.084 and the T_{cri} is 1.987 with the difference of 93 at 0.05 significant values.

H_{02} : There is no significant difference between male and female student taught using concept mapping.

Table 4; T-test analysis of the performance of the male and female students taught using concept mapping teaching strategy

Group	N	Mean	Standard Deviation	Df	T_{cal}	T_{cri}	Decision
Experimental	28	15.43	3.188	11	7.674	2.201	Rejected
Control	17	10.58	4.31				

The table above has the T_{cal} as 7.674, while the T_{cri} is 2.201 with the difference of 11 at 0.05 significance.

The second research question: what is the difference in the academic performance of male and female agriculture students taught using concept mapping method?

The male standard deviation is 3.188 while the female is 4.31. This implies that female students exposed to the use of concept map performed better than the male students.

H_{02} : There is no significant difference between male and female student taught using concept mapping.

The score from the t-test analysis shows that the T_{cal} is greater than the T_{cri} . Therefore, the hypothesis is rejected. It means female students perform better than male students exposed to the use of concept mapping teaching strategy performed better than their female counterpart.

Based on this study, it has been found that students in Jalingo taught using concept mapping teaching strategy performed better than those taught without it. Also, it indicates that female students performed better than the male students exposed to the concept mapping teaching strategy.

Summary of the Major Findings

The study investigates the effect of concept mapping teaching strategy on secondary school agriculture students' achievement in Jalingo Local Government Area. To determine this effect, the students expose to the use of

concept mapping were found to perform better than their counterpart who were not exposed to the concept mapping teaching strategy. This has proven from the data analysis that concept mapping teaching strategy results to higher achievement in agriculture students.

From the result obtained in this work, concept mapping teaching strategy has effect on gender. Female student were found to perform significantly better than their male counterpart when exposed to concept mapping teaching strategy.

Conclusion

This study further strengthens that concept mapping is one way to make instructional concepts arranged from known to unknown in a more organized manner and also to acknowledge that knowledge is hierarchical. From the analysis of the data collected from the study and tests of the study's hypotheses, the following conclusions were drawn.

1. Concept mapping teaching strategy enhances student's performance than the normal conventional method.
2. Female students perform significantly better than the male student when exposed to the concept mapping teaching strategy.

Recommendation

In view of the above discussions concept mapping has been proven to be an effective strategy that if incorporated into the teaching-learning setting, will not only boost student's performances in agriculture but also their ability to link relationship that exist between certain concepts.

In view of this, there is need for teachers to adopt this innovation in their daily teaching of agriculture. Educational stakeholder should be organizing seminars for teachers so as to help the teachers also to benefit from this innovation as well as to modify their method of teaching in order to achieve the aim of education and also to halt low achievement of agriculture students in Jalingo Local Government Area.

Contribution to Knowledge

The result obtained from this study 'Effect of Concept Mapping Teaching Strategy in Secondary School Agriculture Students Achievement in Jalingo Government Area' has been found to be effective in enhancing student

achievement in Secondary Schools. It also exposed Agriculture teachers on the use of concept map in teaching of difficult concepts. The research also adds to a host of existing literature on concept mapping teaching strategy.

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