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# Effect of Concept Mapping and Outline Note-Taking Patterns in Students Academic Achievement in Geography in Secondary Schools in Enugu South Lga of Enugu State

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**Abstract**
The WAEC Chief Examiner's report of 2013 pointed out that mass failure in geography had badly affected students who have the desire to study science related subjects in our Universities. The poor image of geography among students was attributed partly to its wide content and partly to the old fashioned approach to its teaching. This study therefore was on the effect of note-taking patterns on the academic achievement in geography on the students. A non-equivalent quasi-experimental research design was adopted by the researcher. Two hundred and five students in three intact classes from three secondary schools in Enugu South of Enugu State formed the sample. Two intact classes where randomly assigned experimental group one and taught with concept mapping notes; experimental group two and taught with outline notes. The third intact class was the control group and taught with the conventional notes. Two research questions and two hypotheses guided the study. Test of Geography Achievement and Retention (TOGAR) was used for data collection. Mean and standard deviation were used to answer the research questions while the hypotheses were test using Analysis of Covariance (ANCOVA). The result of the study revealed that the students of the experimental groups achieved better than the control group with those taught using concept mapping being the best. Recommendations were made.
**Keywords:** Concept Mapping, Geography, Note-taking, Conventional Method

## Introduction

Recently, it was observed that poor enrolment and poor performance of students in geography in school certificate examinations affect those students who have the desire to study science related courses such as pharmacy, medicine, survey etc. in our universities (WAEC 2013).

The poor image of geography among secondary school students was attributed partly to the old fashioned approach to the teaching. (Faniran, 1977) Teaching geography in school was therefore criticized for not being able to prepare students for effective living in the society. The teaching was theoretical. Both performance in examination and interest in the subject were also observed to be poor. Questions both in teacher-made and external examination analyzed according to processes involved showed over emphasis on memory (Okpala, 1981).

In the face of all these, the Federal Government still recognized the importance of Geography in national development (Federal Republic of Nigeria 1977 revised in 1981, 1989, 1998 and 2001). In the 6-3-3-4 educational programme in Nigeria as it concerns secondary education, the curriculum is composed of two major sections, the core subjects and electives. Geography was recognized as one of the core subjects although an elective with literature in English and history. By this arrangement, science based students are only left with the option of choosing Geography as one of the subject they must offer.

During the revision of various curriculums towards the 6-3-3-4 educational programme in Nigeria in 1985, Geography teachers made a lot of inputs by infusing more realistic topics into Geography curriculum. Some irrelevant topics were edited out without lowering the standard of the subject. In the curriculum package, emphasis is on conceptualization, local studies, field work and problem solving approach as a means of preparing the minds of the learners for solving Geography problems (Musa, 1999). Realistic topics such as Environmental hazards and Environmental Interactions were included in the curriculum, the innovation made improved teaching methods necessary. For instance, filed work became compulsory aspect of continuous assessment and it goes to all aspect of Geography to enable students of Geography acquaint themselves with Biological phenomena. Other important methods such as practical work, game and simulation became essential ingredients for teaching and learning of Geography.

The problem of geography at the implementation levels of the curriculum process has been much concerned to Nigerian geographers. The problem ranges from poor method of teaching and evaluating the subject, lack of teaching materials and to lack of motivated teachers (Okafor, 1990). Geographers have therefore focused attention on how to improve the teaching of the subject so as to stimulate the students' interest. Ayeni (1990) indicated that the problem with geography is in its teaching methodology. It is the methodology problem according him that led to - such criticisms that the scope of the subject is very wide or that the time allocated to the teaching of the subject is not enough: Therefore the questions are how can the teaching of this wide content subject be made more meaningful and attractive to the students? Which learning strategies would attempt to

reduce the scope without lowering the standard of the subject so as to facilitate revision for students during their internal and external examinations?

To keep the geography flag flying, Okpala (1989) suggested that geography has to be taught more meaningfully by resourceful, dedicated and intrinsically motivated teacher especially in the period of depressed economy. However, geography educator and researchers have been working on how to improve the teaching of the subject so that meaningful learning will take place and this has led to the development of various models, methods and techniques to the teaching and learning geography. (Okpala, 1989; Okafor 2000). Project-work have been developed and used (Ezeudu; 1995). Computer Assisted learning procedure have been popularized Amer *(1994)*. Role play in geography have been explored (Ekwegharri & Okpala (1991).

In all these research efforts highlighted above in the area of geography education, little efforts has been made to look into note-taking patterns as it is an important factor in learning. Note-taking pattern is a study method whose efficacy could be tested in practical terms. After the class lesson, notes became the students closest companion. It is the most ready available are to the memory. At both secondary and tertiary levels, students learn from many sources, therefore taking good notes is of practical importance. Hence without good notes, students would find it difficult to integrate information from all these sources. Acquiring skills in bringing together various aspects of learning that took place in formal setting such as classroom of paramount importance.

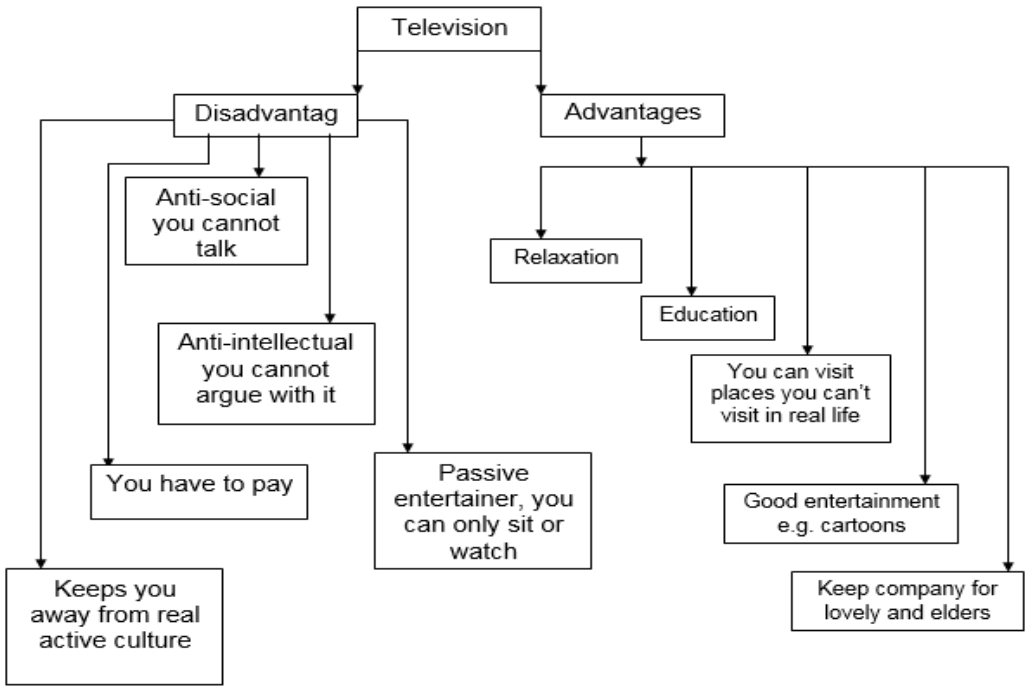
In this study, the researcher examined how three different note taking patterns can improve students' academic achievement in learning geography in secondary schools. These patterns are concept mapping, outline and conventional note-taking patterns.

Concept mapping refers to one and the same note pattern called knowledge mapping. The difference in naming depends on the author's choice of words. While Wandersee (1990) referred to it as concept mapping, Aner (1994) called it knowledge maps. Concept mapping is a schematic representation of concepts and their inter-relationships often in a framework that appear like a flowchart. It is a meta-cognitive strategy which is based on Aususbel – Novak-Gowin theory of meaningful learning (Novak, 1997: Ausubel, 1978; Gowin 1981) in Ezendu, 1996. Simply put, concept mapping is an application of some psychological principles to learn how to learn by applying cartography in representing concept. The three vital steps involved in the construction of concept maps are:

(i) Identifying the key sub-ordinate concepts in super-ordinate concept
(ii) Arranging these from general to specific
(iii) Relating them to each other in meaningful way.

Agbaegba, Ezudu and Agwagah in Okafor, 2000.

Example of concept map

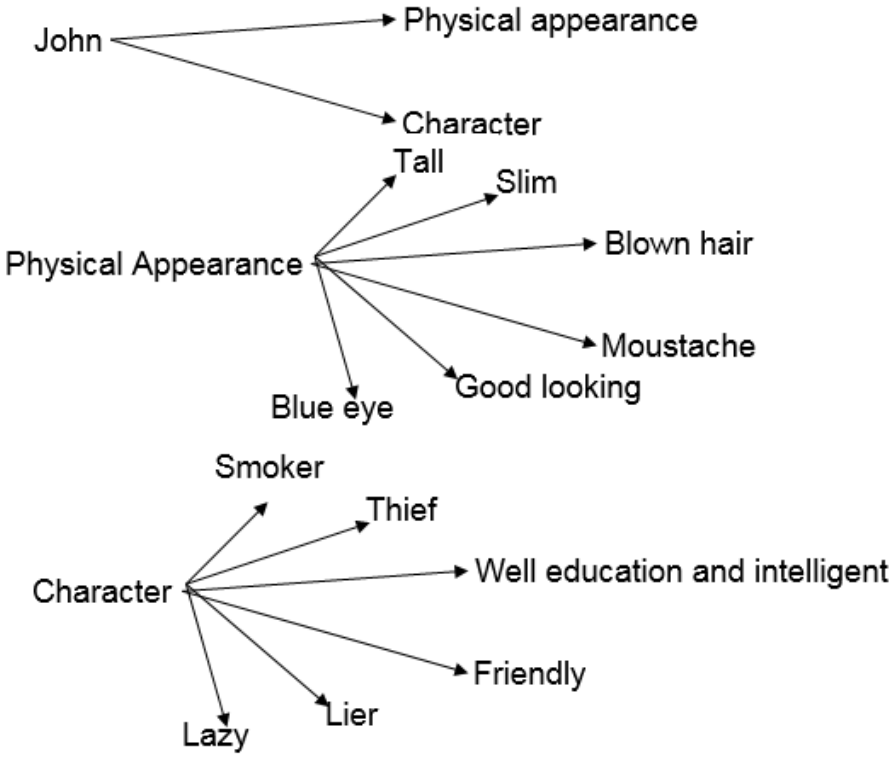



It has been claimed that concept map facilitates the organisation, presentation and acquisition of information (Okafor, 2000) Researches in cognitive and educational psychology supports the use of concepts maps as a "Spatial learning strategy" to form spatial representation of information (Novak, 1984).

**(2) Outline Notes:** In producing outline notes a lot of headings and sub-headings are used to break up the

note into topic and sections. In case of text, underling is used to highlight points. It is usually indented so that the main heading are near the margin and the minor points are progressively set out. The method makes use of various system of numbering which may include numerical, roman figures or alphabets for example in the study of John as a person, the following outline note can be produced.




The major advantages of outline notes are brief and economical, main points are easily recognised, less space is occupied and it appear simple. However its demerits lie on it unconventional nature. It needs some aspect of practice for mastery and it does not reflect the web like nature of human thinking. It is inappropriate for a chronologically sequenced text.

**Conventional/Liner Notes:** In this method, motes are taking in much the same way, in order, each note you take is written on the line after the previous note gradually filling the page from top to the bottom. Here all what the teacher says are written down from top to down of the pages of the note book. The use of conventional notes call for the development of consistent method of indicating important points like underling and starring, use of pattern of abbreviations consistently so that it becomes a personal shorthand e.g.. Govt = Government W = with ∴ = therefore b4 = before etc.

However the advantage of this type of note is that one does not have to comprehend before writing down the note. The method has limited utilization and application e.g. you cannot use it to take down notes from a textbook as it will boil down to copying the text all over again.

**Achievement**

According to Blair (1968) to achieve is to accomplish gain, reach by effort or do something successfully with an effort and skill. Love (1973) said that academic achievement concerns mental health. He explained that mental health has as its basis, physical health and intellectual skills, which leads to satisfactory means of adjustment social sensitivity and adequate self concept. A number of studies had been carried out on the factors affecting achievement in general. Academic achievement is based on the degree of intellectual stimulation that the child could receive from learning situations. The teacher can play a very crucial role in the development of achievement motive of the learner in a number of ways such as; the teacher should make clear the importance of achievement in life by means of telling the stories of great men and women and their achievement from all work of life. He/she should provide a proper environment in the class and outside classes. The teacher's attitude and enthusiasm will create better environment for achievement in children. When learners are not challenged sufficiently, they become satisfied with doing just enough to get by (Blair, 1968) in a classroom in which the standards are too low, bordom can lead to poor morale, irritability and noisy mischievous behaviour. (Okafor 2000).

This study was delimited to find out the effect of concept map, outline and conventional note-taking patterns on academic achievement in geography among senior secondary school (SSSI) in Enugu South of

Enugu Educational Zone of Enugu State. The study was guided with two research questions and two hypotheses. Thus

**Research Question 1:** How do the note-taking patterns affect the students academic achievement in some geography topics? M

**Research Question 2:** what gender related difference exist in academic achievement of students taught with different note-taking pattern.

**Hypothesis 1:** There is no significant difference between the mean achievement scores of students taught with different note-taking patterns under this study.

**Hypothesis 2:** Gender is not a significant factor in the achievement of students taught with different note-taking patterns. The hypotheses were tested at alpha 0.05.

## Methodology

The research is quasi- experimental study of a non-equivalent control group design. This is because it was not possible to have complete randomization of the subjects. Intact classes were used. The study was quasi experimental because the researcher manipulated independent variables of the study, that were concept mapping and outline note-taking patterns and observed their effects on achievement. The intact classes randomly assigned to experimental and control groups were used. The treatments of the subject were done as indicated below.

**Table1: Representation of Pre-test, Post-test Control Group Design**

| Group | Pre-test | Research | Post-treatment test |
|---|---|---|---|
| $E_1$ | $O_a$ | $X_1$ | $O_b$ |
| $E_2$ | $O_a$ | $X_2$ | $O_b$ |
| $E_3$ | $O_a$ | $X_3$ | $O_b$ |

Where

$E_1$ = Represents experimental treatment group on concept mapping note-taking pattern
$E_2$ = Represents experimental treatment group on outline note-taking pattern
$E_3$ = Represents conventional note-taking method on control group
$O_a$ = Represents pretest on achievement
$O_b$ = Represents posttest on achievement
$X_1$ = Represents treatment condition on concept mapping notes on group I
$X_2$ = Represents treatment condition on outline notes on group II
$X_3$ = Represents treatment condition on conventional method on control

## Area of the Study

The study was carried out in Enugu South Local Government Area out of the seventeen (17) local government Areas of Enugu State. Enugu South Local Government Area is predominantly an urban local government area created out from Enugu urban municipal local government area.

## Population

The population for this study consisted of all he senior secondary schools (SSS) students who offered geography in all the secondary schools that have at least three stream/classes in Enugu South Local Government Area in 2011/2012 school year. SS I students were used because they had not yet made choice on which subjects to offer in the senior school certificate examination (SSCE). This enabled the researcher has enough students to study. Secondly since SS 1 students were introduced to study of geography for the first time, they had not formed opinion on the subject.

## Sample and Sampling Technique

The sample consisted of two hundred and twenty-five SS I students. The sample were drawn through multi-staged techniques. All schools in Enugu South Local Government Area were clustered into male, female and mixed/coeducational schools. Then random sampling technique was used to select one male school, one female school and one mixed school. The selected schools had up to three streams. In each school therefore, these was a randomly assignment of intact classes to experimental group I, experimental group II and control group.

Table 2: **Sample of SSS I Students used for Study**

| S/N | School type | Exp group I | Exp group II | Control Group | Total |
|---|---|---|---|---|---|
| 1. | Male only | 26 | 22 | 25 | 73 |
| 2. | Female only | 28 | 27 | 25 | 80 |
| 3. | Mixed | 24 | 25 | 23 | 72 |
| | Total | 78 | 74 | 73 | 225 |

**Instrument for Data Collection**

The researcher constructed an instrument pertinent to the study called test on geography achievement and retention (TOGAR). The TOGAR covered the four geography units taught during the study namely (i) the solar system (ii) the shape and evidence of earth sphericity (Hi) the earth's movement; rotation and revolution and (iv) longitude and latitude. The test blue-print as well as TOGAR were face validated by three experts drawn from department of geography and sub-Department of Science Education, University of Nigeria. Nsukka. The criticisms and vetting by these experts helped in modifying and replacing some items. Initially a total of forty items made up TOGAR. The items measured objectives in the cognitive domain of Bloom taxonomy of education objectives. The weight of the objective level was based on the proportional of low order level and high order level as suggested by Margret (1990) in Okafor (2000) in the same units of study in the SS I geography curriculum in Enugu State. This is because it was observed that students do not normally exceed the comprehension level by the time they complete their post primary school programme in some social science subjects (Supper, 1960) in Okafor (2000).

**TOGAR Pilot Test**

The initial test of TOGAR was at Opi High School, Nsukka in Nsukka education zone, The test was written by 30 SS I students who were about starting their promotion examination to SS II and who had already covered the topic understudy. The 30 students were made up of members of intact class who were available at the time the researcher visited the school. The purpose of the pilot test was to determine the item mortality. Two psychometric characteristics of the items were calculated in order to determine the items that will be finally used. These were the item difficult index and the item discrimination index. Based on these, 30 test items were selected from the initial 40 items. The consideration for including an item in the final version of the TOGAR was based on the item satisfying these psychometric properties.

(i) an item difficult level of between 0.30 and 0.70
(ii) an item discrimination level of between 0.20 and 1.00 (Nwana. 1989).

**TOGAR Trial Test**

The thirty (30) test item finally selected was trial tested on the sample of two classes of SS II geography students from Nsukka education zone. The purpose of trial test was to determine the co-efficient of internal consistency of TOGAR. The TOGAR was therefore a 30 test item of 4 optional multiple choice objective test.

**Reliability of the Instrument**

To establish the co-efficient of internal consistency of the instrument used for this study, the following steps were followed:

1. In establishing the co-efficient of internal consistency of TOGAR scores generated from the SS I students used for the trial test were subjected to the Kudder. Richardson (K-R) formular and found to be 0.80/ K-R 20 formular was considered appropriate since TOGAR consisted of items that are dichotomously scored. The internal consistency gives a measure of homogeneity of the test items in the instrument.

Richard K-R 20 formular was stated thus.

$$\text{K-R20} = \text{rrt} = (\eta/n-1)\ S_1^2 - \sum piqi / S_1^2$$

Where n = number of items
Pi = proportion passing the item
qi = I-pi
$S_1^2$ = variance of total test
$\sum$ = summation
Rrt = reliability coefficient (Gulford, 1973 in Okafor, 2000)

**Experimental Procedure**

In each secondary school, three intact classes of SS I were randomly drawn. Two of the three intact classes were randomly assigned to treatment conditions as experimental group I and experimental group II while the third intact class was the control group. The treatment was thus.

(i) Experimental group I - used concept mapping note-taking pattern (CM)
(ii) Experimental group II - used outline note-taking pattern (OL)
(iii) Control group - used conventional method note-taking pattern (CM)

The students were tested before and after the experiment and their mean achievement scores recorded. Their regular teachers under the supervision of the researcher taught the students. The experiment lasted for only

four week as allowed by the school authority. The skills for preparing CM and OL notes were learnt simultaneously with the facts of the lessons.

**Control of Extraneous Variables**

In order to reduce as much as possible experimental bias so as to increase internal validity of the experiment, the following measures were taken:

1. **Experimental bias:** The researcher did not do the actual teaching of both experimental and control groups. The actual teaching was done by regular teachers of the participatory classes
2. **Teachers variables:** There was training programme of all the teachers that were involved in the teaching. During the period, the validated lesson plans were discussed between the research and the teachers. The researcher gave the teachers common instructions. There were trial teaching by the teachers during the training programme which was supervised by the researcher.
3. **Initial group difference:** All sampled schools were public schools. Unity and private schools were not used. This is because in public schools, there is nothing like ability class arrangement i.e. where students are placed in classes based on their promotion examination results.

**Lesson Plans**

The initial drafts of the lesson plans drawn by the researcher for the experiment and control group were face validated by three geography teachers and one expert in Measurement and Evaluation, Department of Science Education, University of Nigeria, Nsukka. The modified plans were used during the training of teachers' programme feedback from the training programme on the lesson plans incorporated in the final draft of the lesson plans. TOGAR was administered to the student before and after the study began. This served as pre-achievement test which equally served as covariate for the variable under study. The lesson plan was used in teaching the students. The actual teaching lasted for four weeks. TOGAR was administered to the subjects immediately after the last period of teaching. This was the post-achievement test.

The class teachers taught the lessons in each selected schools and administer the tests under the supervision of the researcher.

**Method of Data Analysis**

Mean ( $\bar{x}$ ) and standard deviation were used in analyzing the research questions of this study. Mean was used because it is the most appropriate statistical tool to use for such situation and as such takes all measurements or observations into consideration. Analysis of covariance (ANCOVA) was used to test the hypothesis. ANCOVA was used because intact classes were used and as such it corrects the error of initial differences in the ability levels among the students used for the study. ANCOVA served as a controller for the initial differences across groups as well as to increase the experimental precision by partitioning out the variation due to extraneous variables thereby reducing error variance (Okafor, 2000).

**Results**

The results were presented below according to the research question and hypotheses to which they pertain

**Research Question One**: How do the note-taking patterns affect the students academic achievement in some geographic topics?

Table 3: **Means and Standard Deviation of students Post Achievement Scores**

| | **Exp Group I (CM)** | | | **Exp Group II (ON)** | | | **Control Group (CM)** | | |
|---|---|---|---|---|---|---|---|---|---|
| | $\bar{x}$ | SD | N | $\bar{x}$ | SD | N | $\bar{x}$ | SD | N |
| Post Achievement Male | 55.80 | 9.55 | 40 | 44.44 | 11.90 | 32 | 40.16 | 6.68 | 38 |
| Post Achievement Female | 55.37 | 9.72 | 38 | 44.19 | 8.84 | 42 | 40.69 | 4.70 | 35 |
| Overall Score | 55.59 | 9.57 | 78 | 44.30 | 10.20 | 74 | 40.07 | 6.27 | 73 |

Table 3 showed that the mean achievement scores for the experimental group one taught with concept mapping, experimental group two taught with outline notes and control group taught with conventional notes were 55.59, 44.30 and 40.07 respectively. Therefore students taught with concept mapping notes had the highest mean achievement score, followed by those taught with outline notes. The group taught with the conventional/Linear notes had the least mean achievement scores

**Hypothesis 1:** There is no significance difference between the mean achievement scores of students taught with different note-taking patterns under this study.

**Table 4:** *ANCOVA of Overall students' Achievement Score by note-taking patterns by Gender*

| Source of Variation | Sum of Sqrs | Df | Mean Sqrs | F-Calculated | F-Critical | Remark |
|---|---|---|---|---|---|---|
| Covariate | 5835.357 | 1 | 5835.357 | 102.417 | 3.84 | * |
| Main Effects | 11806.423 | 3 | 3935.474 | 60.072 | 2.60 | * |
| Methods | 1196.514 | 2 | 5596.257 | 98.256 | 2.99 | * |
| Sex | 531.397 | 1 | 531.397 | 9.327 | 3.84 | * |
| Two way interaction method x sex | 79.866 | 2 | 39.933 | 0.701 | 2.99 | |
| Explained | 19006.098 | 6 | 3167.516 | 55.501 | 2.09 | * |
| Residual | 12420.331 | 218 | 56.976 | | | |
| Total | 31425.929 | 224 | 140.296 | | | |

* Significance at $P < 0.05$

Information on table 4 provided data for the testing of hypothesis one. The data showed that the calculated f-value for the effect of treatment on students' achievement in geography topics of 98.26 was significant at 0.05 level of significance. This was because the calculated value was much higher than the critical value of 2.99 and 218 degree of freedom, A significant F-value suggests that rejection of null hypothesis as stated. This implied that the null hypothesis was rejected, meaning that there was a significant difference in the mean achievement of students taught with different method of note-taking in selected geography topics

**Research Question Two:** What gender related difference exist in academic achievement of students taught with different note-taking patterns.

Table 3 above provided data for the answering of this research question. The table showed that the mean achievement scores for male students of experimental group I, experimental group II and control group were 55.80; 44.44 and 40.16 respectively. Therefore male students taught with concept mapping had the highest mean achievement score followed by those taught with outline notes. The group taught with the conventional notes had the least mean achievement scores.

Similarly, female students of experimental group I scored higher than their counterparts in experimental group II and each of the experimental group I and II achieved higher than the female students of the control groups as indicated by their mean achievement scores.

**Hypothesis 2:** Gender is not a significant factor in the achievement of students taught with different note-taking patterns.

Data on Table 4 above showed that gender was significant at 0.05 level of significance. This was because the calculated F-value of 9.33 was higher than the critical F-value of 3.84 for 1 and 218 degree of freedom. Based on this significant F-ratio the second null hypothesis was rejected. This implied that gender was a significant factor in achievement of students taught with different note-taking patterns.

**Discussion of Result/Conclusion**

The evidence obtained in this study showed that the two experimental groups achieved better than the control group taught with the conventional note-taking pattern. Data in Table 4 equally indicate that there was a significant effect of treatment a students' overall achievement in geography. This finding was in line with that of similar experimental studies in science and science related subjects (Habor-Ibeaja, 1983; Bown 1985; Moorgu, 1990; Obodo. 1990; Ezeudu, 1995, Osisoma, 1995 and Okafor, 2000) where the experimental treatment groups proved better than the control group.

Concept mapping from pedagogical view point might be an effective learning tool for science students (Amer, 1994). The use of concept mapping strategy made the students to participate actively in the learning process being able to organize their learning experience in order to discover relationship with what they already know and their new experiences.

**Recommendations**

(i). since concept mapping and outline notes were found efficacious in engendering academic achievement and since the techniques are not yet popular in our school system, they should be incorporated in the curricular for teacher training institutions

(ii) Obviously the serving teachers in the field lack the necessary competencies to develop concept mapping and outline notes. Therefore seminars and workshops should be organized for these categories of staff from time to time.

(iii) Serving teachers should be encouraged to adopt these techniques more in teaching a vast content subjects such as geography to make its learning attractive to the students.

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