

Note-Taking Patterns and Students Retention on Selected Geography Topics in Secondary Schools in Enugu State

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Abstract

The dwindling rate of enrolment and poor performance in geography in the senior secondary schools certificate examinations prompted this study. The study sought to find out how note-taking patterns can improve students retention in some selected geography topics. It was believed that if students retain geography facts well, their performance in the subject will be improved and more students will be attracted to study and enroll for the subject in external examinations. A non-equivalent quasi-experimental design method was adopted by the researcher. Two hundred and twenty-five students in three intact classes from three secondary schools in Enugu South local government area of Enugu State form the sample. Out of the three intact classes one was assigned as experimental group one and taught using knowledge mapping notes, another was assigned as experimental group two and taught with alternative to linear notes. The third class was assigned control group and taught using the conventional notes. A research question and a hypothesis guided the study. Test of geography achievement and retention (TOGAR) was used for data collection with a reliability coefficient of 0.80 based on Kuder-Richardson 20. Mean and standard deviation were used for answering the research question while the hypothesis was tested using analysis of covariance (ANCOVA). The result of the study revealed that students taught using knowledge mapping notes retain more geography facts than the other two groups in this study. Recommendations were therefore made on how to get both teachers in training and the serving teachers to get acquainted with methods of note-taking that will make learning of geography meaningful to students.

Keywords: *Students Performance, Learning and Research*

Background to the Study

Low enrolment and poor performance among students who enter for senior school certificate examinations in geography in recent time had been a source of worry for geography teachers and school administrators. Many students choose geography for certificate examinations to make up the number of subjects entries (Okafor, 2000). The poor image of geography among secondary school students was attributed partly to its wide content and partly to the old fashioned approach to the teaching (Faniran, 1997). Teaching of geography in schools was criticized for not being able to prepare students for effective living in the society because the teaching was theoretical. Performance in examination was also observed to be poor. Questions in both teachers made and external examination analyzed according to processes involved showed overemphasis on memory (Okafor, 1990).

In spite of the above, the federal government still recognized the importance of geography in our national development by making it a core subject. In the 6-3-3-4 education programme in Nigeria as it concerns secondary education the curriculum is composed of too major sections the core subjects and electives. The core subjects are made up of six groups namely: (a) English language (b) one Nigerian language (c) mathematics (d) one of the following alternative subjects. Literature in English, history or geography (e) one of the following alternative subjects Physics chemistry or biology (f) agricultural science or vocational subjects (FRN, 2004).

The core subjects are basic subjects which will enable students to offer arts or science courses in higher education. Geography was recognized as one of the core subjects though an elective with literature in English or history. By this arrangement science based students are only left with the option to choose geography as one of the subjects they must offer. During the revision of various curricular towards the 6-3-3-4 education programme in Nigeria in 1989, 1998 and 2001 geographers made a lot of inputs in infusing more realistic topics into the geography curriculum. Some irrelevant topics were removed without lowering the standard of the subject. In the new curriculum package emphasis is on conceptualization, local studies, field works and problem solving approach as a means of preparing the minds of the learner for solving environmental problems (Musa, 1989). Realistic topics such as environmental hazards and environmental interactions were included in the curriculum and such innovations made improved teaching methods such as improved note-taking patterns necessary. For instance field work became a compulsory aspect of continuous assessment and it goes to all aspects of geography study to enable students of geography acquaint themselves with geographic phenomena. Other important methods such as practical works, games and simulations became essential ingredients for teaching and learning geography (Okpala, 1987).

The problem of geography at implementation levels of the curriculum process has been of much concern to Nigerian geographers. These problems range from poor methods of teaching and evaluating the subject to lack of teaching materials and lack of interested and motivated teachers. Geographers have therefore focused attention on how to improve the teaching of the subject. Ayeni (1990) indicated that the problem with geography is methodology. It is methodology problem according Ayeni that led to the 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 question is 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?

Okpala (1987) indicated that practical work is the hallmark of the new geography. According to her geography teaching to be practical a lot may be needed which requires financial involvements. Unfortunately the government has not done much to improve the financial base for the geography teaching. As a result for instance Alaba (1998) found out that none of the schools he used for his study has any of the teaching materials needed. The seriousness of the situation is best understood by observing the proportion of schools that lacked equipment. According to Okpala (1987) percentage of schools that did not possess the following equipment were: Maps and atlases (56%); thermometer (60%) topographical sheets (58%) wind vane (70%), Globes (48%), Rain gauge (63%) and compass (70%). When materials are not available for teaching, the effects are likely to be poor performance in geography.

Therefore to keep the geography flag flying, Okpala (1989) suggested that geography has to be taught more meaningfully by resourceful, dedicated and intrinsically motivated teachers especially in the period of depressed economy. However, geography educators and researchers have been working on how to improve the teaching of the subject so that meaningful learning will take place. This has led to the development of various models methods and techniques for the teaching and learning geography. For instance, minimum structured simulation exercises have been developed and used (Okpala et al 1989). Project-works have been developed and used (Ezeudu, 1991), Computer Assisted learning procedure has been popularized (Okarazu, 1990). Role play in geography has been practicalized (Ekweghariri & Okpala 1991) Team teaching approaches in geography have been explored (Johnson, 1998) and field work technique practicalized and found useful (Adinna, 1989).

In all these research efforts highlighted above in the area of geography education, little effort has been made to look into note-taking pattern as it is an important factor in learning. Note-taking pattern is a study method whose efficacy could be tested in practical terms. Note is the students' closest companion. It is the most readily available cue to the memory. At both secondary and tertiary levels students learn from many sources, therefore taking/preparing good notes is of practical importance. Hence without good notes students would find it difficult to integrate information from all these sources. Acquiring skill in bringing together various aspects of learning that took place in formal setting such as the classroom is important in learning process. An ideal note is supposed to be a rich summary containing all items and necessary ingredients for effective qualitative utilization. The most common note-taking patterns are (i) Patterned-notes in form of either brain pattern notes (Mind maps), Knowledge map or concept maps (ii) Conventional notes including underlining and (iii) Alternative to linear notes (Buzan, 1974).

The researcher observed that conventional note-taking method is the most popular method being used in secondary schools. According to Pauk (1989) alternative to linear note is a modified conventional note-taking pattern adopted as a way of checking comprehension. The teacher delivers his/her lesson, students jot down salient points the teacher makes as lesson progresses. At the end of the lesson students recall and develop their notes in details. Knowledge mapping on the other hand is a two dimensional display

that presents information in form or note-like mode assemblies. It is a note form of instructional procedures which has been studied under varieties of names like Maps (Floyd, 1984), Concept mapping (Norak, 1986), Cognitive instruction Cartoon (Lambiotte, 1989) and Systematic Instructional Design (Granmen 1988).

Knowledge mapping makes the note to resemble a programme of instruction such as seen in a computer. It has the advantage of giving the user a bird's eye view of the note. The nodes contain key ideas and the links specify the relationship between the nodes. (Mac-cagg & Deansreen, 1991) and add structure and organisation to the map (Reway, 1992). It has been claimed that knowledge maps facilitate the organisation, presentation and acquisition of information. Research in cognitive and educational psychology support the use of knowledge mapping as spatial learning strategy to form spatial representation of information (Okafor, 2000). As geography is basically the science of spatial organisation, it will be interesting to find out how teaching strategy that seek to form spatial representation would be effective in the teaching of geography.

Retention

One of the aims of school instruction is to expand the knowledge of the learners. The teacher's responsibility is to encourage the learner to acquire and to retain the knowledge imparted in school for future use in meeting life problems. There are three methods of measuring retention namely recall, recognition and relearning (Chauhan, 1983). According him, recall refers to the ability of the learner to reproduce correctly what he has previously learned; Recognition is the discrimination between the seen and unseen while relearning takes place when a learner is asked to relearn the material learnt before at some later state.

Every classroom teacher faces the problem of how to improve the retention of his students. Chauhan (1983) highlighted number of steps that can be taken to encourage retention in the classroom namely:

- (i) Over learning: Retention is greater when subject matter is well-learned. The better something is learned the greater are its chances of survival despite interference due to learning other materials.
- (ii) Meaningfulness and organization of subject matter: One of the most effective methods to improve retention which the teacher can use is to make the subject matter meaningful to the students. The materials should be well organized in increasing difficult order. This level of organization in the original learning determines how well the material will be retained. Ausubel (1996) has proposed a pedagogic strategy that is based on the use of appropriately relevant and inclusive organizers which are introduced in advance of the learning materials and one selected by the teacher. The use of organizer can effect great economy in the process of acquisition and enhance retention from such evidence. It was concluded that some organising tendencies termed "clustering" were operating at the time of recall (Chauhan, 1983). Clustering refers to the categorization list to be remembered items.
- (iii) Use of principle of learning by doing: Learners should be encouraged to practicalize what they learn. In practical work students are actively involved, this helps the students to develop clear concepts about the subject matter.

The above review shows that any method of teaching which facilitates meaningful learning of any given concept is bound to enhance retention among the learners. It would therefore be worthwhile to investigate teaching strategies that will make the learning of geography more meaningful to the students. Knowledge mapping and alternative to linear note-taking patterns can therefore be used to ascertain to what extent students' retention will be affected in comparison to the popular conventional note-taking which the students are more familiar with.

Research Question

Which group of students retains more in selected geography topics, those taught with knowledge mapping, alternative to linear or conventional method as indicated by their mean scores?

Hypothesis

The students' retention in selected geography topics as measured by their mean retention scores will not differ significantly due to methods of note-taking. This hypothesis was 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 knowledge mapping and alternative to linear note-taking patterns and observed their effects on retention. The intact classes randomly assigned to experimental and control groups were used. The treatment of the subject was done as indicated below.

Table 1: 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

- E₁ = Represents experimental treatment group on knowledge mapping note-taking pattern
- E₂ = Represents experimental treatment group on alternative to linear note-taking pattern
- E₃ = Represents conventional note-taking method on control group
- O_a = Represents pretest on retention
- O_b = Represents posttest on retention
- X₁ = Represents treatment condition on knowledge mapping notes on group I
- X₂ = Represents treatment condition on alternative to linear notes on group II
- X₃ = Represents treatment condition on conventional method on control group

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 the 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 2013/2014 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 I 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 was drawn through multi-staged techniques. All schools in Enugu South Local Government Area were clustered into male, female and mixed/co-educational 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

School	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 (iii) 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 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 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 trial 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 I 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 Kuder-Richardson 20 formula 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.
2. Since TOGAR was a retention test, the test re-test of stability of TOGAR was conducted and was found to be 0.71. The Kuder-Richardson 20 formular was stated thus.

$$K-R\ 20 = rrt = (\eta/n-1) S_1^2 - \sum piqi / S_1^2$$

Where n	=	number of items
Pi	=	proportion passing the item
qi	=	I – pi
S_1^2	=	variance of total test
Σ	=	summation
Rrt	=	reliability coefficient (Gulford 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 knowledge mapping note-taking pattern (KM)
- (ii) Experimental group II – used alternative to linear note-taking pattern (AL)
- (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. The retention test was administered three weeks after the end of the experiments. 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 KM and AL 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 researcher 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. A reshuffled version of TOGAR was given to the students three (3) weeks after the post-test and this served as the retention test. The post-achievement test served as covariate to the retention 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 question 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. The post achievement scores were used as covariates to the retention test. 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

Research Question: Which group of students retain more in selected geography topics, those taught with knowledge mapping, Alternative to linear or conventional method as indicated by their mean scores?

Table 3: Mean and Standard Deviation of Students Retention Scores

	Exp: Group I Knowledge Mapping			Exp: Group II Alternative to linear			Control Group Conventional Method		
	<i>x</i>	SD	N	<i>x</i>	SD	N	<i>x</i>	SD	N
Post-Ret Score Male	48.73	19.28	40	42.39	8.24	32	34.48	8.51	38
Post –Ret Score Female	48.11	7.8	38	36.24	12.25	42	34.14	7.80	35
Overall	48.42	14.75	78	38.86	11.06	74	34.32	8.12	72

Table 3 above provided data for answering the research question for this study. The table showed that the mean retention scores for experimental group I; experimental group II and the control group were 48.42, 38.86 and 34.32 respectively. Therefore students taught with knowledge mapping notes had the highest mean retention score followed by those taught with alternative to linear notes. The group taught with the conventional method had the least retention score.

Hypothesis: The students' retention in selected geography topics as measured by their mean retention scores will not differ significantly due to methods of note-taking.

Table 4: ANCOVA of Overall Students' Retention Scores by Note – taking patterns by Gender

Source of Variation	Sum of Sqrs	Df	Mean Sqrs	F. Calculated	F. critical	Remarks
Covariates	5807.543	1	5807.543	52.866	3.84	*
Main Effect	7418.855	3	2339.613	6.271	2.60	*
Methods	6258.355	2	3149.178	7.631	2.99	*
Sex	77.511	1	77.411	0.705	3.84	
2-way Interaction						
Method by Sex	697.821	2	348.910	3.176	2.99	*
Explained	14364.784	6	2394.130	21.794	2.09	*
Residual	23948.265	218	109.854			
Total	38313.265	224	171.040			

* Significance at $P < 0.05$

The calculated F-value for the effect of note-taking methods on students' retention as shown on the table was 7.631. The critical F-ratio of 2.99 was less at 0.05 level of significance for 2 and 218 degree of freedom. The only hypothesis for this study was therefore rejected. This meant that there was a significant effect due to note-taking patterns on student retention in selected geography topics.

Discussion of Result/Conclusion

This study revealed that the effect of experimental treatment on students' retention was significant. the funding of the experimental group retaining better than the control group was supported by those similar works done by Nworgu (1990), Ezeudu (1995) and Okafor (2000) but did not agree with the funding of Eze (1992). The study showed that knowledge mapping help students to retain more of geography concepts. The retentive effect of knowledge mapping promotes meaningful learning, it does not promote rote – learning (Wandese, 1990). When materials learnt are meaningful they tend to be stored in long term memory. Hence knowledge mapping notes which involves active students participation promoted meaningful learning and it helped the students to retain more geography concepts

Recommendations

- Based on the finding from this study the following recommendations were made:
1. Since knowledge mapping and alternative to linear notes were found efficacious in improving retention in geography and since the technique is not popular in our school system, they should be incorporated in the curricular for teacher training institutions
 2. Since it is obvious that serving teachers in the field lack the necessary skills to develop knowledge mapping and alternative linear notes, to equip these categories of teachers, the Nigeria Geography Association (NGA) and other relevant agencies such as Ministries of Education (States & Federal) should organize workshops seminars and conferences for serving teachers from time to time.
 3. On acquiring the necessary skill, the teachers should be encouraged to employ them in teaching geography so that students will no longer be scared about the vastness of the subject.

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