



Effect of Mnemonics Teaching for Learning Strategy on Academic Achievement in Senior Secondary School Economics in Ughelli–North Local Government Area of Delta State, Nigeria

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Abstract

This study examined the effect of this model in promoting the learning of economics in secondary schools in the aforementioned local government area. The pre-test post-test control group quasi experimental design was used while the senior secondary (SS) II Economics students constituted the population. Six secondary schools were randomly selected from the thirty public secondary schools in the Area. Three schools were randomly assigned to the experiment, while the other three formed the control group. One hundred and eighty-five (90 male and 95 female) participated in the study. Required data were collected with an Economics Achievement Test (EAT), with reliability coefficient of .73 using KR₂₀ formula and concurrent validity coefficient of 0.67, and a Verbal Ability Test with reliability coefficient of .68 using the KR₂₀ formula, and content validity of .63. A stimulant instrument was designed to guide the research assistants employed. Data collected were analysed using the descriptive statistics of percentages, mean and standard deviation as well as a one-way between-subject ANCOVA. Findings revealed that the experimental group had a remarkable achievement gain (37%) while the control group had a marginal increase of 26% improvement in their achievement. Results also showed that there was no significant difference in participants' performances based on verbal ability. It was therefore recommended that the Mnemonics teaching for learning strategy should be used in teaching Economics.

Keywords: Learning, Mnemonics, Academic Achievement.

Reference to this paper should be made as follows:

Ekpuyama, G. O. (2021). Effect of mnemonics teaching for learning strategy on academic achievement in senior secondary school economics in Ughelli-North Local Government Area of Delta State, Nigeria. *International Journal of Scientific Research in Education*, 14(4), 486-501.

INTRODUCTION

The importance of economics as a discipline cannot be overemphasised. As noted by Onuka (2017) it is the core of business and management disciplines as they draw much of their principles and concepts from it. In addition, knowledge of Economics is necessary for the individual, firm, government and the entire nation. As put by Adu et al. (2014), an individual relies on the knowledge of the subject to live meaningfully within the changing economic world. This implies that an individual's ability to explore alternatives, and to measure the benefits and costs of choices in face of scarce resources, is enhanced with the knowledge of the subject. To a business firm, knowledge of economics is very important since profits can only be maximised by properly weighing options/alternatives against desired goals in the use of resources. For government and a nation, knowledge of Economics is cardinal in facilitating rapid social and economic development. It is in the light of this that the World Bank (2007) emphasized the need for citizens and leaders of any country to be conversant with basic economic concepts and principles. This undoubtedly will enhance proper formulation and implementation of sound economic policies. This therefore requires that great effort should be directed at teaching economics for the purpose of equipping learners with a culture of economic skills and literacy.

Teaching economics in the real sense of it should go beyond mere teaching. As noted by Tebabal and Kahssay (2011) the primary purpose of teaching is to bring a fundamental change in the learner. Where activities considered to constitute teaching do not result in desired changes, teaching has not taken place. We must thus strategically teach for learning. Teaching for learning strategy has a first priority of promoting learning. It is an instructional scaffolding strategy that implements principles and activities that initiate and sustain improved learning, and application of what has been learnt despite prevailing threats and/or hindrances. In teacher-dominated classrooms as obtaining in many Nigerian secondary schools, over-reliance on textbooks by most teachers is a common trend which poses a hindrance to effective learning. One possible way to overcome this is for subject teachers to provide a learning environment where students search for meaning, appreciate uncertainty, and inquire responsibly. The goal of teaching should not be for students to repeat what the teacher or textbook has provided. Rather the goal should be for students to understand what information is around them and be able to generate on their own relevant meaning. This is the focus of teaching for learning.

Evidence that is often as accepted one that shows the extent to which learning has taken place is academic achievement. Academic achievement is a measure of the effects of a specified programme of instruction or training. Designated by test and examination scores or marks assigned by the subject teachers (Adediwura & Tayo 2007) it indicates a student's scholastic standing. Lewin et al. (2011) reported that the academic achievement of students at the secondary school level is a pointer to the effectiveness of schools. From this perspective, it is perceived as an index of the extent to which learning objectives are attained in our secondary schools. On its part, the United Nations Educational, Scientific and Cultural Organization, UNESCO (2005a) considers academic achievement as the mastery of knowledge, information and skills useful in solving problems or meeting life demands.

Except otherwise proven, a downward trend in academic achievement suggests a rising trend of poor teaching. Akiri and Ugborugbo (2009) posited that generally in Nigeria, there exists an observed deterioration in the academic achievement, attitude and values of secondary school students in public secondary schools. Akpomudjere (2020) asserted that the problem of poor academic performance by students is so much that it has led to the widely acclaimed fallen

standard of education in Delta State and Nigeria at large. With particular reference to economics, Adu and Galloway (2015) acknowledged that academic achievement in the Senior Secondary Certificate Examinations in recent years has been poor. Other variables assumed; the positions canvassed by these scholars simply question the effectiveness of teachers in the secondary schools. As part of effort to improve students' academic achievement, researchers have recommended a good number of innovative and learner-centred instructional strategies. While a many of these strategies may have been employed in the teaching of economics in the secondary schools in Delta State, there appears to be no known literature attesting to the conscious application of mnemonics teaching for learning strategy in teaching economics in Ughelli-North local government area.

We may need to note that good teaching habits alone may not result in expected learning. Some additional strategies need to be in place to facilitate students' learning in the teaching-learning process. Such strategies may be referred to as learning enhancement strategies. They are characteristic cognitive, affective, and psychological behaviours that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment (Francis, 2016). They are ways which learners may adopt in taking in, organizing and making sense of information. Some of such ways are by seeing, hearing, reflecting and acting, reasoning logically, analysing and visualizing (Francis, 2016). According to Kathy (as cited in Francis, 2016) students are inclined towards different approaches to learning. They often come to class with these as their individual learning strengths and weaknesses (Kelly, 2019). To Kelly, some students will be stronger at auditory learning while others at visual learning or kinaesthetic learning. A good teacher will be cognisant of these as subsisting strategies or attributes possessed by students.

It is the responsibility of the teacher to help each learner to recognise his/her innate meta-cognitive abilities and harness such to promote learning. One meta-cognitive strategy that has been found useful in literature is the application of mnemonics in the learning process. It is a novel strategy when viewed from the backdrop of traditional methods of teaching. Generally, students may find it easier to learn, retain and recall small amount of information but with increasing volume of information it becomes relatively more difficult for them. Therefore, students should be able to compartmentalize knowledge into steps (that is, break problems into smaller portions) which will enable them to bring the smaller portions into the larger picture (Odeyemi, 2014). This is a major thrust of the use of mnemonics teaching for learning strategy.

Mnemonic is a memory device or strategy that is consciously used to improve memory. Iza and Gil in Adepoju (2014) asserted that through the use of imagery, mnemonics as pedagogical methods are memory-enhancing with the twin-aim of improving learning and recalling information. It is a system that makes use of elaborative encoding and retrieval cues that help in retention and retrieval of content (Deleshmatt & Nebraska, 2007). With already stored information in long-term memory, mnemonics help to make memorisation an easier task (Carlson et al., 2009). As put by Seay and McAlum (2010), mnemonic devices can be useful practical strategy in facilitating students' grasp of new concepts. The helpfulness of mnemonic can be seen in what Khoo (2012) describes as its ability to transform hitherto abstract information into concrete and meaningful information by creating a cue such as keyword, phrase or acronyms which students are familiar with. A look at the various descriptions or definitions of mnemonics reveals that its use focuses on improving learning, enhancing the retention of what has been learnt and recalling what has been learnt when needed. Thus, there must first be learning before retention and then, recalling.

Literature reviewed showed several perspectives of mnemonics. Congos (2004) identifies several types of mnemonics to include:

- music mnemonics in which learners make a song or jingle or use any chosen type of music for any list of items. For example, the popular ABC song has helped some children learn the ABC's, and
- name mnemonics in which a list of items may be rearranged and the first letter of each word is used to make a name of a person or thing. An example can be found in the factors of production which are **C**apital, **E**ntrepreneurship, **L**and, **L**abour. The first letters can give the mnemonic **CELL**. Some scholars have referred to this type of mnemonics as acronym.
- Expression or Word mnemonic: In this type, a phrase or word can be formed using the first letter of the items in a list or keywords in a definition. For example, unemployment is defined as a state in which one that is ready to work cannot find a job to do. Keywords in this definition can be listed as **S**tate- S, **O**ne- O, **R**eady- R, **W**ork- W, **C**annot- C, **F**ind- F, **D**o- D. An expression mnemonic can be **S**ign of **R**ain **W**ill **C**age **F**lying **D**oves. Some scholars have referred to this type of mnemonics as First letter mnemonics or acrostics.
- Model mnemonic: Here representations are constructed to help in understanding and recalling important information. For example, constructing charts, graphs, signs, etc can be useful as model mnemonics. The use of demand curve can aid the understanding and recall of the law of demand.

Other types of mnemonics identified by Congo are Ode or Rhyme mnemonic, Note Organization mnemonic, Image mnemonics, Connection mnemonics and Spelling Mnemonics. Some other scholars have classified mnemonics as organization mnemonics, and encoding mnemonics (Deleshmatt & Nebraska, 2007; Seay & McAlum, 2010). With organisation mnemonic easy recall of information is made possible by organizing new information in memory. By encoding mnemonic, abstract information are converted into codes in the form of high imagery substitutes which can be easily stored in memory. In other words, the major thrust of mnemonics is to translate any given information from its original form into another that the brain can retain better. This very process of learning to convert has the potential to aid in the transfer of information to long-term memory.

Other mnemonic strategies are the Keyword strategy, the Pegword strategy and the Loci strategy. With the keyword strategy, a link is made of new information to keywords that are already encoded in memory. That is, students who use Keyword mnemonics learn to associate unfamiliar words meant to be to be learned with words that are familiar to them. According to Fontana et al. (2007), the Keyword method employs the use of concrete, acoustically similar words as a cue to the recall of a new term. Hence familiar words may need to rhyme or have some physical resemblance to the target word(s). The keyword strategy works best when the information to be learned is new to students (Fontana et al. 2007). From these explanations, a teacher of economics that wants to teach the term elasticity made have to present the word 'electricity'. The pronunciation of elasticity and electricity rhymes to a large extent hence the latter can be a cue to recalling the former. In this Study however and with particular reference to using mnemonic strategies in teaching economics, there is an attempt to propose a variant of keyword strategy.

Unlike relying on keywords that are already encoded in memory, here the student is encouraged to look out for keywords in the content to be learnt (say, the keywords in a definition of a concept), arrange them in the order in which they appear, extract their first letters and use them to form a word, phrase or sentence that will help them internalize and recall the information learnt. For example, Trade by barter is defined as a system of exchange in which goods are exchanged for goods. The keywords are system **S**, exchange **E**, goods **G**, goods **G**. These first letters can be used to form an acronym **SEGG** or a phrase **Sell Eggs and Get Gowns**.

Scholars have also canvassed the Pegword mnemonic strategy. The thrust of this strategy is to associate the sound of numbers with short words that are pronounced in similar sounds. According to Shaughnessy and White (2012) pegging is a technique in which listed information is to be remembered in an order, and the individual concerned associates an integer with each memorable word or keyword and proceeds to imagine that word interacting with the concept to be remembered. The Pegword strategy can thus be effective when the order of information is important, or when the information to be remembered and recalled involves numbers (Scruggs & Mastropieri, 2000; Nidhi & Suman, 2016). In the pegword strategy, two stages are involved. The learner must in the first place memorize a rhyme for numbers capable of being used for a number of times. Thereafter the learner creates a mental image of each item on the list and associates the word that rhymes in sound with the appropriate number. For example One is a bun, gun, fun, sun; two is a shoe; three is a tree; four is a door, floor; thirty is dirty; etc. The pegword strategy has a major advantage of providing direct access to numerical-order information. Pegwords has also been shown to reduce memory decay since pictorial representations are assigned to numbers.

The loci mnemonic technique as described by Shaughnessy and White (2012) requires that the learner visualizes a scene that has different fixed locations. It is further imagined that moving from one location to the next is ordered, stopping at each one and with the first in the scene always followed by the second and so forth. As an example, entering into a house has the front door as the first location followed by a second location which could be a rug on the floor, the third being the side table, etc. The learner should be encouraged to always visualize moving from the door to the rug to the table (and not from the door directly to the table, skipping the rug) to ensure that the items to be remembered later are always in their correct order. With repeated rehearsals, the learner becomes familiar with the movements. Thereafter each component of information to be learned, especially when they are ordered, are associated with each location of the scene. This enhances memorization and recall. One benefit of the method of loci technique according to Massen and Vaterrodt-Plünnecke (2006) is that the same locations can be applied to different information. It is just a matter of substituting new images to facilitate recall.

Another type of mnemonic is called the process mnemonics. Also known as the Yodai method (Manalo et al., 2000) this technique is unlike the previously discussed type often described by scholars as fact mnemonic techniques. Fact mnemonics are mainly used to aid the recall of facts a system where one mnemonic association is made for each item to be remembered. Contrary to fact mnemonic techniques however, process mnemonics help users to remember rules, principles, and procedures. These mnemonics aim to summarise the organisation and the process of problem solving. Process mnemonics employ the use of phrases, sentences, rhymes, and even songs to facilitate the learning and remembering of the orderly steps that leads to solving a problem. In most approaches in Japanese and Western education comprehension precedes doing but in the yodai system, it is doing before understanding (Manalo, et al). These authors however were of the opinion that most mnemonics are similar in

this sense emphasizing the existence of evidence to show that doing can effectively lead to learning. Process mnemonics are considered to use familiar metaphors expressed in familiar words to teach mathematical operations in a simple and uncomplicated way to children.

Why Mnemonics Work

In Studies conducted on the use of mnemonics, some assumptions have been canvassed as the psychological foundations for the workability of these learning techniques. For example, Paivio in Odeyemi (2014) listed the assumptions. A highlight of these is given as follows.

- Perception and thought are continuous. It is assumed that whatever (persons, objects and places) we perceive as real have characteristics. It is these attributes that are registered in our memory hence the ability to remember them.
- Memory is like a wax tablet on which letters could be written. It is assumed that memory comprises mental rooms in which images or facts are stored in a manner similar to writing letters on a wax tablet. These stored images or facts remain in memory for up to when they are deliberately erased or over written.
- it is also assumed that of the five senses, sight is assumed to be most influential. Therefore the most durable impressions stored in our minds are those placed by the sense of sight. Hence information derived through other sense organs is best retained when converted into visual images.
- Words and symbols can be converted to each other through the use of images.

Based on these assumptions, Paivio then suggests the following as reasons why mnemonics may work:

- Mnemonics helps to organize information
- Mnemonics thrives on use of power of association.
- Mnemonics require rehearsals.
- Mnemonics provides retrieval cues.
- Mnemonics prevent interference between pieces of information
- Mnemonics make use of novelty or distinctiveness.

Arguments For and Against Mnemonics

Literature has shown some arguments in favour of the use of mnemonics. Lesser (2011a) is of the view that mnemonic does not aim to replace higher-order thinking or conceptual understanding. It is the view of the author that mnemonics merely help to enable students to recall low-level facts more readily thereby acquiring more cognitive resources needed to apply to something more important and conceptual. Stalder and Olson (2011) on their part argued that mnemonics require less instructor effort relative to other interventions because they are only and easily added to existing material. A benefit of mnemonics can also be seen in its potential to help students perform better often with less anxiety in examinations (Mocko et al., 2017). In addition, the art and science of using mnemonics has the potential of promoting autonomy in learning.

In spite of the potentials of mnemonics in improving learning, remembering and recall, a possible limitation is that some mnemonics may not be easy to recall or implement (Mocko et al.,

2017). While this may be tenable, one can argue that the way a mnemonic is written will largely determine its recall and/or possible application. Although there could be practical limitations to the kinds of information that mnemonics can help in remembering, the basic fact remains that mnemonic learning has in many cases been demonstrated to be more effective than learning with the use of other alternative methods.

Verbal ability is a moderating variable in this Study. It can be construed as having a number of components such as verbal communication, verbal memory, verbal reasoning, language proficiency, oral communication, writing skills and written communication. In the Nigerian educational system, English Language is the major language of instruction in the teaching, learning and assessment except in the area of local languages (Olatoye cited in Olatoye & Aderogba, 2011). This makes verbal ability a critical language skill required by students in the teaching, learning and assessment of virtually all subjects including economics. A student who is deficient in English Language may thus not be able to perform certain functions of Language such as communication, rational, logical, critical or prepositional thinking and comprehension (Obi-Okoye, 2002). As noted by Olatoye and Aderogba (2011) proficiency in language has been linked to general performance.

Verbal reasoning as a component of verbal ability has become increasingly important in schools as students make more use of books, videos, and in-class conversation (Logsdon, 2017). According to Logsdon, in college and in the workplace, verbal intelligence is central to instruction and training. This claim becomes obvious when we recall that most concepts in economics are either introduced orally by the teacher or introduced in written form in a textbook. In addition, students need to be able to comprehend, express themselves in the language of instruction and be able to interpret questions. All these call for sufficiency in verbal skills.

Statement of the Problem

Although economics is not one of the compulsory subjects studied at the secondary school level in Delta State, a good number of students enrol for the subject each year at the SSC examinations conducted by the West African Examination Council. However, literature reviewed suggests that students' academic performances in the said examinations have not been encouraging. This has given rise to some serious concern due to the importance of the knowledge of economics in any society. Literature earlier reviewed has shown that identified shortfalls in academic achievement in economics were in part occasioned by improper selection, and/or poor application, of teaching strategies. Consequently, recommendations were made calling for a shift from traditional teacher-centred teaching strategies to more learner-centred teaching strategies. Some examples of the recommended teaching strategies included discussion, role-play, demonstration and fieldtrips to mention but a few.

It was hoped that with such more modern and innovative teaching strategies, remarkable improvement in the performances of secondary school economics students will be attained. The shift however yielded less than desired results in Delta State as attested to by results of students' performances in economics examinations in addition to various WAEC Chief Examiners' reports of students' poor performances in economics examinations during the period 2008 to 2017. Additionally, from literature reviewed it appears that much of earlier researches on ways to improve achievement in Economics were largely focused on teaching strategies that do not incorporate learning enhancement strategies. An example of a teaching strategy that incorporates learning enhancement strategies is the mnemonics teaching for learning strategy. Again, a

noticeable trend in the practice of mnemonics is that it has mainly been to facilitate recall of facts learned and has not been systematically used as a teaching strategy.

Additionally, its practice has mainly been at the tertiary levels of education in disciplines other than economics and has been found effective for the tasks of recall. Though the results of its application at that level of education appear appreciable there seem to be no existing studies to show the application of the mnemonics teaching for learning strategy in the teaching and learning of secondary school economics in Ughelli-North LGA of Delta-State. It is against this background that this study intends to investigate the effect of the mnemonics teaching for learning strategy on academic achievement in senior secondary school economics in Ughelli-North local government area of Delta State, Nigeria. The effect of students' verbal ability on academic achievement in Economics in Delta State will also be respectively investigated.

Hypotheses

The following hypotheses were tested in at the 0.05 level of significance:

- There is no significant effect of mnemonics teaching for learning strategy on students' academic achievement in Economics in Ughelli-North local government area.
- There is no significant effect of verbal ability on students' academic achievement in Economics using mnemonics teaching for learning strategy Ughelli-North local government area.
- There is no significant interaction effect of mnemonics teaching for learning strategy and verbal ability on students' academic achievement in Economics in this local government area.

The procedure in this study makes the teacher a lead-guide. In addition, the teacher uses some criteria to pair up the students in each lesson. Thereafter he/she demonstrates the lesson content orally giving examples of how to develop mnemonics while the students are encouraged to observe and take notes. The teacher uses the first lesson to acquaint students with the basic principles and steps involved in the use of mnemonics in learning giving relevant examples. In each of the subsequent sessions, the teacher distributes to the students copies of prepared content at the end of each lesson. After each demonstration by the teacher, the students are asked to read and reread content for better understanding. Students are then encouraged to think individually and figure out the overall meaning of the idea contained in the content taught them.

This is followed by identification of the key words which are then put in the order of which comes first in the content. Then select a letter from each keyword to form a word that represents the definition. They are encouraged to ask a few questions and on individual basis develop relevant mnemonics from the key words identified. For example, the definition of Demand goes thus: Demand refers to the amount of a product that consumers are ready to buy at given prices per period of time. The keywords in this definition are Amount, Consumers, Ready, Buy, Prices, Time. In our example, we may have ACRUPT in which A- amount, C - consumers, R - ready, B - buy, P - prices, T – time. Where the content involves listing, mnemonics can also be used to aid memory and recall. For example, Factors affecting demand are as follows include price of the commodity – P, price of related commodity – P, population of consumers – P, taste and fashion – T, consumer's income – C, income distribution – I and season – S.

In cases that involve listing, order may not be followed in developing the mnemonic and the first letters can be used to represent each point. Such letters are used to coin a word or an acronym. For example, from the factors above we may have 3P- STIC. In the mathematical aspects of economics, process mnemonics can be used to learn. For example state the formula – S, substitute figures for letters – S and calculate C. Thus, we may have SSC as the acronym for most mathematical economics content. To draw a graph, the VAHA MATCH technique can be applied. That is, match the figures in the vertical axis (VA) with those in horizontal axis (HA). Tips can also be developed to recall formula. For example, in demand and supply formulae, what we need to recall are the quantity, intercept, slope and price in that order. Hence, we may have QISP while in Statistical formulae, basically we need to recall that they are stated in the forms of fractions. Hence, we may have N/D where N is numerator and D is denominator.

At the end of each class exercise, the teacher directs paired students to exchange their work for peer review, assessment and submission of marked work to the teacher for correction and continuous assessment. Such peer assessments are to be independently done and the scores kept secret from the fellow student assessed. The teacher is to set maximum marks obtainable for each peer assessment exercise. Note that once a particular mnemonic has been developed for any content, it requires regular practice for it to be internalised. Since mnemonics help to streamline the learning process, they provide a quick means for students to review their notes.

The mnemonic teaching for learning model promotes and utilises an aggregate assessment value for each student in the format below:

- An average of peer assessment scores over a period, say a term.
- An average of the teacher’s assessment of the particular student during the period
- Summative tests score for that student for the term.
- The addition of these gives the overall assessment of the student for the period.

Before the summative test, the teacher monitors progress of each student by placing scores from the series of assessment side by side overtime.

In Delta-State of Nigeria, the policy in secondary schools is that continuous assessment for the term is 30 marks while summative assessment is 70 marks. In this study, the researcher has planned all assessments in line with the state-government policy. Thus an index of each student’s achievement in economics was derived as an aggregate value from these two set of scores during the period of the study.

METHODOS

A pre-test, post-test control group quasi-experimental design was employed in the Study. The design is shown below:

O₁X₁O₂ Experimental Group
 O₁X₂O₂ Control Group

Where:

O₁– represents pre-test measure

O₂– represents post-test measure

X₁– (Mnemonics teaching for learning strategy)

X₂– (Learning without Mnemonics teaching for learning strategy)

The independent variable for the study was treatment (Mnemonics teaching for learning strategy and Traditional teaching strategy) while students' academic achievement was the dependent variable. Verbal ability was considered a moderator variable. The population for the study comprised all senior secondary two (2) students in public secondary schools in Ughelli-North LGA. A total of one hundred and eighty-five (90 males and 95 females) participants constituted the sample for the study. Using the simple random sampling technique, six secondary schools were selected from thirty public secondary schools in the local government area. Three of the sampled schools were randomly assigned as experimental groups while the other three were randomly assigned as control groups. In each of the schools selected for the Study, an intact class was used.

The researcher developed a Mnemonics teaching for learning package to guide the teachers in the use of the strategy while the response instrument was a Multiple-Choice test named Economics Achievement Test (EAT) constructed and validated by the researcher. The KR₂₀ formula was used to derive a reliability coefficient of 0.73 for the EAT while the concurrent validity index obtained was 0.67. The EAT instrument consisted of 40 items covering such topics like Money, Simple linear equations, Theory of demand and Theory of supply. A verbal ability test (VAT) was also constructed and validated for the purpose of this study. Reliability of this instrument was 0.68 using the KR₂₀ formula while the obtained concurrent validity index was 0.63. The research assistants earlier trained and used in the study were Economics teachers in the respective schools selected. The final draft of the EAT was first administered as pre-test on the participant students a week before treatment. The VAT was also administered before experimentation. Responses by participants to the instruments were collected at the end of each exercise.

A total of nine weeks was used to conduct the research. The first week was for training of research assistants and familiarisation with relevant stakeholders while pre-test were carried out in the second week. While post-tests were conducted in the last week, actual treatment took place in six weeks. During the experiment, the researcher coordinated while the trained research assistants carried out instructional delivery and assessment activities. All through the research exercise pre-test, experimental treatment and post-test diffusion among the schools were reasonably prevented.

With reference to methods of data analysis, percentages were used to classify students into high (50% and above), and low (below 50%) verbal ability groups. Descriptive statistics (mean and standard deviation) were used in analysing the pre-test and post-test EAT while the inferential statistics of One-way between-subjects Analysis of Covariance (ANCOVA) procedure was used to test all stated hypotheses at the 0.05 level of significance. ANCOVA helps to take care of any lack of initial equivalence in the groups that may possibly arise from the use of intact classes. The pre-test scores which served as the covariates were controlled for.

RESULTS

HO₁: There is no significant effect of mnemonics teaching for learning strategy on students' academic achievement in Economics in Ughelli-North local government area.

Table 1: Mean Performance of students in the Pre- and Post-Economics Achievement Test in Control and Experimental groups respectively

GROUP	N	Pre-test		Post-test		% Increase/Decrease in mean performance
		Mean	SD	Mean	SD	
Experimental	90	18.86	6.10	25.88	6.65	37% increase
Control	95	13.14	2.33	16.60	4.17	26% increase
Total	185	15.92	5.38	21.11	7.20	33% increase

From Table 1 it can be seen that students treated to Mnemonics teaching for learning strategy (the experimental group) had a mean score of 18.86 in the pre-Economics Achievement Test with a standard deviation of 6.10 while in the Post-Economics Achievement Test the group had a mean score of 25.88 with a standard deviation of 6.65. This represents a 37% improvement of the experimental group in the post-test over the performance in the pre-test. The group taught without the Mnemonics teaching for learning strategy (the control group) had a mean score of 13.14 in the pre-Economics Achievement Test with a standard deviation of 2.33 while in the Post-Economics Achievement Test the mean score was 16.60 with a standard deviation of 4.17. This shows an 26% improvement of the control group in the post-test over the performance in the pre-test. From the analysis, the experimental group gained more (37%) than the control group which relatively improved by (26%).

Further analyses were done by conducting a significant test and results obtained are displayed in Table 2 below.

Table 2: Analysis of Covariance (ANCOVA) of the Control and Experimental Group Students on Economic Achievement Post-Test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6594.791 ^a	4	1648.698	100.604	.000
Intercept	943.472	1	943.472	57.571	.000
Pretest	1630.993	1	1630.993	99.524	.000
Verbal	66.215	1	66.215	4.040	.046
Group	734.835	1	734.835	44.840	.000
Verbal * Group	8.937	1	8.937	.545	.461
Error	2949.825	180	16.388		
Total	92014.000	185			
Corrected Total	9544.616	184			

A One-way between-subjects ANCOVA was calculated to determine the effect of Mnemonics teaching for learning strategy on students' academic achievement in Economics in Ughelli-North LGA of Delta State, Nigeria, controlling for the effects of pre-test. Result in Table 2 indicate that Pre-test was significantly related to Post-test ($F(1, 185) = 99.524, p < .05$). The main effect for group was significant ($F(1, 185) = 44.840, p < .05$). It can be inferred that the null hypothesis of no significant effect of Mnemonics teaching for learning strategy on students' academic achievement in Economics in Ughelli-North local government area of Delta State, Nigeria was rejected. The experimental group significantly improved in the learning of economics than did the control group in the contents taught and assessed.

H0₂: There is no significant effect of verbal ability on students' academic achievement in Economics using mnemonics teaching for learning strategy Ughelli-North local government area.

Table 3: Mean Performance of students in the Experimental group in Post-Economics Achievement Test based on verbal ability

Verbal Ability level	N	Mean	Std. Deviation
High verbal ability	50	28.74	6.86
Low verbal ability	40	22.30	4.25
Total	90	25.88	6.65

Results in Table 3 show that high verbal ability students exposed to Mnemonics teaching for learning strategy had a mean score of 28.74 in the post-EAT in Ughelli-North LGA of Delta State. Their low verbal ability counterparts had a lower mean score of 22.30. This indicates that the high verbal ability students performed better. An analysis of Table 2 indicates that the difference in mean performance between the two categories of students is significant, ($F(1, 185) = 4.040, p < .05$).

H0₃: There is no significant interaction effect of mnemonics teaching for learning strategy and verbal ability on students' academic achievement in Economics in this local government area.

A close look at Table 2 above shows no significant interaction effect of mnemonics teaching for learning strategy and verbal ability on student learning achievement in economics as measured by post-test scores ($F(1,185) = .545, p > .05$). The probability value of .638 is greater than the 0.05 level of significance hence the null hypothesis of no significant interaction effect of mnemonics teaching for learning strategy and verbal ability on students' academic achievement in Economics is not rejected.

DISCUSSION

Results from the analysis of data in the Study have shown that the use of mnemonics teaching for learning strategy without doubt enhanced the learning achievement of secondary school economics students in Ughelli-North LGA of Delta-State, Nigeria. It was obvious that both experimental and control groups recorded improved performances by students in post-test scores over pre-tests. However, while the experimental group recorded an improvement rate of about 37% the control group had a 26% gain. Although post-test scores were adjusted for pre-test, the experimental group still made a remarkable gain over the control group. The implication is that the mnemonics teaching for learning strategy has led to learning achievement better than the traditional teaching for learning strategy. This development may have resulted from two things namely: a positive perception of this novel teaching for learning strategy hence a consequent acceptance by the students which ultimately may have motivated them to engage in deep learning (Francis, 2016).

As was noted by Adediwura and Tayo (2007), and Dalley-Trim (2007) in their respective studies, the way students perceive their teachers' knowledge of subject matter, attitude to work and teaching skills has a significant relationship on their students' academic performance. Thus, a positive perception has positive effect on student performance. This was also corroborated by Abiola (2013). Also, according to Zaim et al. (2020), some studies found that appropriate

teaching strategy has positive impact on students' academic achievement. This view was supported by Fayambo (2015) who claimed in a study that there was an impact of learning styles and teaching strategies toward academic achievement.

In addition, as a meta-cognitive strategy the mnemonics teaching for learning strategy must have impacted on the students' creative and critical thinking as well as building of self-confidence hence the improved performance (Uwuzurike & Ndidiamake, 2010; Kocak & Bayaci, 2011) of the experimental group over the control group. Equally of importance is the fact that the students were largely in control of their learning. This is supported by the findings of Doyle (2008) and Tok et al. (2010) who noted that students tend to do better when with good meta-cognition they are able to monitor and direct their own learning processes. Another finding of the study was that, of the students exposed to mnemonics teaching for learning strategy a significant difference in learning achievement was observed between economics students of high and low verbal abilities. This finding agrees with Dewi et al. (2016) in their study where they found that verbal ability is a good predictor of the success of students in school academics and universities. Olatoye and Aderogba (2011) proficiency in language has been linked to general performance.

CONCLUSION

The study focussed on investigating the possible effect of Mnemonics teaching for learning strategy in the teaching and learning of secondary school economics in Ughelli-North Local Government Area of Delta-State, Nigeria. Findings revealed the efficacy of the strategy in enhancing students' learning of the subject. Further findings showed no significant differences in academic achievement between students of high and low verbal abilities. Irrespective of their verbal abilities, it appears the model is suitable in teaching and learning of secondary school economics.

Recommendations

Based on the findings of this study, the following recommendations may be worthwhile:

- Teachers should endeavour to incorporate this model in their professional practice of teaching and assessment.
- Policy-makers and curriculum developers should endeavour to incorporate this novel strategy in the economics curriculum for secondary schools.
- Training sessions should be organised by government for teachers, school proprietors and policy-makers on the theory and practices of this strategy.
- Scholars and researchers are encouraged to carry out further researches on the use of this model in the teaching and assessment of other subjects.

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