



Effect of Heuristic Teaching Approach on Students Performance in Economics in Senior Secondary Schools in Kano State, Nigeria

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Abstract: The contents of senior secondary education curricula in Nigeria are rich and the objectives are attainable, but there are some short falls in the implementation process. This led to suboptimal academic performance by the majority of Economics students at the senior secondary school level that has largely been cited to be the consequences of ineffective teaching methods applied by teachers. Consequently, the objectives of the study were: to examine the effect of heuristic approach on students' performance in Economics in senior secondary schools in Kano State and ascertain the effects of heuristic approach on students' retention ability in Economics in senior secondary schools in Kano State. Two null hypotheses were formulated in line with these objectives. The design for this research was quasi-experimental. The population of the study was the entire students of Senior Secondary Schools Two (SSII) in Kano State that are offering Economics. The One hundred and twenty-seven (127) SSII Economics students found intact in two (2) senior secondary schools in the Dawakin-Kudu zone, was the sample size for this study. The instrument used for data gathering for both post-test and retention-test in this research was Economics Performance Test (ECOPERTES). The null hypotheses were tested using t-test at 0.05 level of significance. Findings revealed that: heuristic approach is effective for teaching Economics in senior secondary schools in Kano State. Moreover, students taught Economics using heuristic approach retained knowledge. It was recommended that the Federal and the State Government, the professional bodies like the Teachers Registration Council of Nigeria (TRCN) and the Economics Teachers Associations should sensitize Economics teachers (through seminars and workshops) on the efficacy of heuristic approach in teaching Economics. Inspectors from Kano Educational Resource Department (KERD) and Nigerian Educational Research and Development Council (NERDC) should encourage the Economics teachers to use heuristic approach in teaching Economics in senior secondary schools because the approach will help them to elicit the expected learning in Economics easily. The Government, in conjunction with curriculum developers and Economics teachers, should establish Economics resource centers in each educational zone of the State for the procurement and storage of relevant heuristic approach instructional materials.

Keywords: Teaching Approach, Students Performance, Economics, Secondary Schools, Nigeria.

1. INTRODUCTION

The purpose of teaching at all levels of education is to bring crucial change in the behavior of students. The broad aim and objectives of secondary education in Nigeria are preparation for useful living within the society (self-employment) and preparation for higher education (Federal Government of Nigeria, 2009). Consequently, Nigerian Educational Research and Development Council (NERDC) developed senior secondary schools Economics curriculum as a subject that is relevant in everyday life and could prepare graduates for entrepreneurial career in the future. The knowledge of Economics is very important to human life.

This is because human wants are unlimited and the resources to satisfy those wants are limited. Hence, it is necessary for every individual to have a scale of preference and make choice from it. For an individual consumer to take this rational decision of choice appropriately, needs it, the knowledge of Economics. This could be the main reason why Economics is necessary for some courses like Engineering, Business administration and Accountancy. Consequently, students of these courses must offer some courses in Economics before graduation.

If Economics is so important like that, then why do most students fail the subject at the final year Senior



Secondary Schools Certificate Examination? Over the years, students' failure in Senior Secondary certificate examination has been a problem of great concern in Nigeria. According to National Bureau of Statistics (2019), West African Examination Council, November/December result showed that only 36.93% in 2016, 46.11% in 2017 and 54.64% in 2018 got the needed requirement for admission into Nigerian Universities. Large number of the students that could not get admission became stranded after graduation because they do not get the needed requirements to further their education. According to Danladi and Lorlian (2016), the quest for education is all about seeking positive social change in the society, but unfortunately, it is not seen adequately in the students of Economics. This is because the students that fail the Senior Secondary School Certificate Examination are in dilemma, as they could neither further their education nor get employment. Hence, aggravate their negative behavior in the society such as kidnapping, militancy, terrorism, housebreak and theft. These problems were not originated from the curriculum as noted by Sani (2009) in Yusuf (2016) that the objectives of senior secondary education curricula are adequately defined. Moreover, the contents are well designed thematically and structured in spiral form that spread from Senior Secondary One (SSI) to Senior Secondary Three (SSIII) with in-built teacher and learners' activities for each topic, but some problems hinder the effective implementation of the curriculums. This created gaps that require the attention of educational administrators and policy makers.

The application of inappropriate instructional methods by Economics teachers is one of the shortcomings that created a gap between the "planned curriculum" and the "learned curriculum". The style of teaching that Economics teachers are adopting were reported as conventional. Abimbola and Abidoeye, (2013) and Hossain and Tarmizi (2013) argued that the conventional approach is not effective in enhancing students' academic achievement. Learners in conventional method remain as passive listeners because there is minimum interaction between the students and between the teacher and the students. For this reason and the fact that the learning requirement in the twenty first century is to develop life-long learning skills for learners to cope with the various emerging challenges (Mutai, Changeiywo and Okere, 2014), the search for appropriate approach for teaching Economics is necessary. One of these approaches capable of enhancing students' performance in Economics is the heuristic approach that allows the students to discover knowledge for themselves, thus removing the shortcomings attributed to conventional method used by the teachers. Heuristic approach stems from

constructivism learning theory, which suggests that a classroom is no longer a place where learners just wait for instructors to impart the knowledge. In this approach, the students learnt through active participation in the learning process (Boghossian, 2006 in Inuwa, Abdullah and Hassan, 2017). The focus is no longer on how much a student can remember, but how he understands; what meaning he makes of his understanding; and, whether he can apply the knowledge and meaning in real-world situations. Students in this approach learn to reason because the teacher does not solve the problems for the students. The teacher's task here is to list the problems or hints in the class that gives a clue to solve the problems, and then he enables the students to solve problems by themselves.

It is against this background that this study investigated the effects of heuristic teaching approach on students' performance in Economics in Senior Secondary Schools in Nigeria. Specifically, the objectives of the study are:

1. examine the effects of heuristic approach on students' performance in Economics in senior secondary schools in Kano State;
2. ascertain the effects of heuristic approach on students' retention ability in Economics in senior secondary schools in Kano State.

2. CONCEPT OF TEACHING METHOD

Instructional methods are named after the dominant activity employed in a lesson. A teaching method encompasses the guiding principles and steps that could be used for teaching a learner or groups of learners. According to Ayeni (2011) teaching is a continuous series of actions that has to do with bringing about desirable changes in learners, using appropriate style of teaching. The success of every lesson does not only depend on teachers' mastery of the subject matter but also the style a teacher adopts while teaching. According to Ogunniyi (2009) in Thomas and Israel (2013), one of the greatest problems that hinders achievement is poor quality of teaching. Since topics are not the same, they require different method. Therefore, the use of a variety of instructional methods is necessary for effective and efficient curriculum implementation. To facilitate the process of knowledge transmission, teachers should apply appropriate teaching methods that best suit specific objectives (Tebabal and Kahssay, 2011 in Eze, Ezenwafor and Molokwu, 2015), which according to Thomas and Israel (2013), constitutes good teaching and learning.



A. Classification of Teaching Methods

Teaching methods are categorized into some classes. Tara (2005) in Gengle, Abel and Mohammed (2017) classified teaching method into two broad categories: learner-centered strategies and teacher-centered strategies.

B. Teacher-centred methods

The term teacher-centered approach comes from the roles of the teacher in the traditional classroom as the possessor of knowledge and a decision maker. The traditional chalk and talk method is categorized as teacher-centered method in which the teacher dominates the teaching and learning activities (Oloyede, 2007 in Gengle, Abel and Mohammed, 2017). In this approach, the teacher is a prime mover and the torchbearer of educational experiences. Teacher-centered approach is a style of teaching whereby the teacher pours knowledge on to the learners. The learners here remain as passive listeners with little interaction between the students and the teacher. This makes the teacher to be a knowledge-dispenser, and the student a knowledge-recorder and memoriser.

Abimbola & Abidoye, (2013) and Hossain & Tarmizi (2013) have argued that conventional teaching method was not effective in enhancing students' academic performance because the students are not fully partaking in the learning process. Teacher-centered approach is more theoretical and memorizing than practical (Teo & Wong, 2000 in Ganyaupfu, 2013). Teacher-centered approach does not motivate the students to actively participate in the learning process. Consequently, both interest, attention and understanding of the learners may get lost. To address such shortfalls, Zakaria, Chin and Daud (2010) maintained that teaching should not merely focus on dispensing rules, definitions and process for students to memorize, but should also actively engage students as primary participants.

C. Learner-centred methods.

Teaching is only meaningful if learning takes place. For this reason, modern teaching methods focus on the learner. Tara (2005) in Gengle, Abel & Mohammed (2017) described learner-centered teaching method as a method that focuses instruction on the desire and interest of the learner. Teachers act as organizers of the teaching and learning process, providing direction and feedback, rather than just instruction. Learning activities emphasizes cognitive process that prompts learners to construct new meaning from the information they acquire. In this method, students are given multiple opportunities to discover knowledge for themselves and practice skills.

Learner-centered teaching allows the students to actively participate in the decision-making process about what to learn, how to learn and how much to be learned (Abdurrahaman, 2010). Learner-centered involves how teachers help the learners to activate prior knowledge, motivate students to master skills. Kaminski (2000) in Gengle Abel and Mohammed (2017), posited that learner-centered method is an instructional process, in which the learners are kept at the center of the learning process, and they share much responsibility while the instructor help them to create an environment in which students can make connections of points. The focus of learner-centered methods are the students and the teacher act as a guide.

Vasiliki, Panagiota, and Maria (2016) asserted that teachers should select and apply teaching method(s) that are compatible with the needs, interests and the abilities of their learner. For effective and successful teaching to take place, the students need to be engaged with activities. According to Khan (2017), the teacher is not the sole source of knowledge; therefore, it is important that the teachers see the students as stars that can contribute to their own learning. Student-centered approach is based on constructivists' principles and ideas, which is relevant to Economics teaching, because it creates an environment that encourages students to interact with materials and construct meaningful knowledge.

3. HEURISTIC TEACHING APPROACH

The term heuristic, popularly known as discovery (Yusuf, 2012 and Oghenevwe, 2010), was coined from a Greek word, which means 'I find' (Ofori-Kusi, 2017). The student in this approach is put in the place of a discoverer. According to Fasasi (2015), the approach involves finding out by the learner, instead the teacher explains everything to the students. A learning situation with a presentation from the teacher neither raises learners' participation nor build the needed level of reasoning among the learners. The students understand more effectively when they are engaged to solve problems during class activities.

The heuristic approach encourages student's achievement through discovery (Hoona, Keab and Singh, 2013 and Thomas and Israel, 2013). This is the main reason why heuristic approach gained prominence in recent years as a captivating the teaching strategy.

A. Application of the Heuristic Approach in Teaching Economics

The heuristic approach is based on discovery learning. In this approach, the teacher serves as a guide,



therefore, allowing the students to discover knowledge by themselves instead for the teacher pouring knowledge to the students (Fasasi, 2015). Heuristic approach could be applied for an example to teach the concept of market equilibrium. The teacher here is expected to carry along to the class with some instructional materials necessary to teach this topic. The behavioral objectives are: by the end of the lesson, the students should be able to explain and calculate equilibrium price and quantity; and find the equilibrium price and the quantity from graph. The previous knowledge that this topic could be built on is linear equation. That is to say, the students have an idea of solving linear equation from their SSI Economics and Junior Secondary School mathematics. This topic is just the application of linear equation in Economics.

The teacher introduces the lesson by explaining a market situation where the quantity of groundnut demanded by the students in their school is exactly supplied by the groundnut seller; without excess demand or supply. Such situation is an equilibrium point where the demand and supply are equal (Udu and Agu, 2012). After that, the teacher directs the students to find the meaning of equilibrium price and quantity from the market situation of groundnut in the school. The correct responses of the students are to be written on the chalkboard and make one definition out of the points. Later, the students find the equilibrium price and quantity demand from the demand function $Q_d = 60 - 2p$ and supply function $Q_s = 20 + 2p$ (Tawiah, 2011). The students also find the equilibrium price from the graph when the values of price are 10, 15, 20, 25 and 7. This step gives the students the opportunity to discover equilibrium price and quantity from the demand and supply functions. Furthermore, the students could also determine the equilibrium price and quantity from graph. The students are to do all these exercises in their individual exercise books.

At this stage, some students selected at random to find the equilibrium price and quantity from the functions on chalkboard. After that, the other students are selected at random to find the equilibrium price and quantity from the graph on chalkboard. The students, eventually, become certain that the equilibrium price is that price at which demand equates supply (Nnadi and Falodun, 2013). These give feedback to the teacher about what the students did in their respective individual exercise books. The lesson is to be concluded by calculating on chalkboard the equilibrium price and quantity from the functions and on graph board. The teacher evaluates the lesson by selecting some students at random to find the equilibrium price and quantity from the functions and graph, if there is change in demand as $Q_d = 60 - 3p$. According to Polya (2004) in Rudd (2010), this is the

examining solutions stage, which is the final stage in the heuristic reasoning process. At this stage, the teacher gives the following assignment for the students to practice at hostel/home: Find the equilibrium price and quantity from function and graph, if there is change in supply as $Q_s = 10 + 2p$.

4. RESEARCH HYPOTHESES

This study tested the following hypotheses:

HO₁: There is no significant difference between the pre-test and post-test performances of students taught Economics using heuristic approach in senior secondary schools in Kano State.

HO₂: There is no significant difference between the post-test and retention-test scores of students taught Economics using heuristic approach in senior secondary schools in Kano State.

5. RESEARCH METHODOLOGY

The design for this research was Quasi-experimental; using the pre-test post-test design. Non-randomized intact classes from two schools (GSS Gano and GSS Jaoji) were used in the study. The students were taught Economics using heuristic approach. From this experiment, all the differences found in the performance of the students in the post-test were attributed to the effects of treatment (heuristic approach) offered.

The targeted population for this study is forty three thousand one hundred and fifty four (43,154) senior secondary two students, which is the total number of senior secondary schools two students (SS2) in Kano State that are offering Economics as at July 2019 (Kano Educational Resource Department, 2017). One hundred and twenty-seven (127) students from Dawakin-Kudu Educational Zone was sampled for this study. According to Dike (2008) in Alasoluyi (2017), this figure is sufficient to be a sample since it is up to fifty (50) subjects. The procedure followed in selecting Dawakin-Kudu Zone is the stratified sampling technique. The reason for choosing this zone is that the concentration of the schools in the zone have similar characteristics of the population. Therefore, the sample can be a good representation of the population. Two (2) schools were selected using simple random strategy (SRS). Here, the researcher assigns numerals to all schools in the zone on a piece of paper, which were folded and put all into a cup, mixed up and shuffled. At this stage, the researcher dipped his hand into the cup and picked out one. For the second selection, the folded piece of paper was mixed and shuffled again.



The instrument used in data gathering for both post-test and retention-test in this research was Economics Performance Test (ECOPERTES). During the instrument development, the researcher prepared lesson plans and constructed a test of multiple-choice items. The regular WAEC Examiner in Kano marking venue, the Examination Officer of GSS Garun-Ali and a Senior Lecturer in Test and Measurement at Sule Lamido University determined the face and content validity of Economics Performance Test (ECOPERTES). Their criticisms and corrections were incorporated in the instrument, which improved the items structure and format. This is in line with the view of Berge (1995) in Alasoluyi (2015) who stated to ascertain the validity of any research instrument, it should be given to a panel of experts to determine, if its contents is valid and can elicit the desired data. The reliability and item consistency index of the instrument was determined through a test-retest analysis of inquiry using Pearson Product Moment Correlation of Statistical Package for Social Science (SPSS) version 20. The reliability coefficient of 0.83 was obtained, and this judged the instrument as reliable and consistent for the study. This is in line with the assertion of Spiegel (1992) in Yusuf (2018) who posited that an instrument is reliable if its reliability coefficient is between 0.5 and 1.

The researcher was granted permission from Kano State Senior Secondary Management Board to carry out

TABLE 1. RESULTS OF PAIRED SAMPLE T-TEST OF PRE-TEST AND POST-TEST SCORES FOR STUDENTS TAUGHT ECONOMICS USING HEURISTIC APPROACH

| Test | n | Mean | SD | T | Df | α | Sig. (2 tailed) | Mean Difference | Decision |
|-----------|-----|-------|-------|-------|--------|----------|-----------------|-----------------|----------|
| Post-Test | 127 | 58.16 | 14.55 | | | | | | |
| Pre-Test | 127 | 7.18 | 3.58 | 38.35 | 141.17 | .05 | 0.000 | 50.98 | Rejected |

The t-test result in table 1; showed that the Sign. (2-tailed) value is $p < .001$, which is less than the chosen significant level $\alpha = 0.05$. This indicated that there is significant difference in the means performance between the post-test and pre-test scores ($t_{141.17} = 38.35$, $p < .001$). The average scores in the post-test was 50.98 higher than the pre-test scores. Therefore, hypothesis one which says “there is no significant difference between the pre-test and post-test performances of students taught Economics using heuristic approach in senior secondary schools” is hereby rejected. This means heuristic approach is effective for teaching Economics in senior secondary schools in Kano State.

the research. The permission mandated the school principals and allowed the researcher to conduct the research. This research was conducted in thirteen (13) weeks. The data for the study was collected by giving treatment, using the lesson plans for eight (8) weeks; administered post-test using ECOPERTES and then after two (2) weeks, administered ECOPERTES for the retention test to the selected subjects. The two hypotheses were analyzed using Paired Sample t-test at 0.05 level of significance. The justification for using t-test according to Clarcke and Cook 2007 in Umar (2018) was because it compares the actual difference between two means.

6. RESULTS

The result of the tested null hypotheses of this research was presented in this section. The two hypotheses were tested using Paired Sample t-test at 0.05 level of significance.

Hypothesis One: There is no significant difference between the pre-test and post-test performances of students taught Economics using heuristic approach in senior secondary schools in Kano State.

The data obtained from the administration of pre-test and post-test on the subjects were used in testing the hypothesis one. The statistical tool used for this analysis is Paired Sample t-test at 0.05 level of significance as shown in table 1.

Hypothesis Two: There is no significant difference between the post-test and retention-test scores of students taught Economics using heuristic approach in senior secondary schools in Kano State.

Paired Sample t-test was used in the test of this hypothesis at 0.05 level of significance. The obtained data from the administration of post-test and retention test on the subjects that were exposed to heuristic approach was analyzed and presented in table 2.



TABLE 2. RESULTS OF PAIRED SAMPLE T-TEST OF POST-TEST AND RETENTION-TEST SCORES IN ECONOMICS FOR STUDENTS TAUGHT ECONOMICS USING HEURISTIC APPROACH

| Test | n | Mean | SD | t | df | α | Sig. | Mean Difference | Decision |
|-------------------|-----|-------|--------|-------|-----|----------|-------|-----------------|----------|
| (2 tailed) | | | | | | | | | |
| Post-Test | 127 | 58.16 | 14.546 | 1.029 | 252 | .05 | 0.305 | 1.858 | Retained |
| Retention-Test | 127 | 56.30 | 14.236 | | | | | | |

The Sign. (2-tailed) value from t-test result in table 16 is $p = .305$, which is higher than the chosen significant level $\alpha = 0.05$. This showed there is no statistically significant difference between the two conditions ($t_{252} = 1.045$, $p > .05$). The difference in the mean scores was just 1.86 marks. This showed that the performance of students in both post-test and retention-test is the same in experimental group. Hence, hypothesis four that says, “there is no significant difference between the post-test and retention test scores of students taught Economics using heuristic approach” is retained. This means students that were taught Economics using heuristic approach retained learning.

7. DISCUSSION

The results obtained from the test of hypothesis one revealed that the students performed better in post-test than in the pre-test. The hypothesis was rejected and this implied that there is significant difference between the pre-test and post-test performances of students taught Economics using heuristic approach in Kano state. That means heuristic teaching method is effective for teaching Economics at secondary school level. This finding agrees with Ofori-Kusi (2017) who reported that students that were exposed to heuristic approach performed excellently in mathematics in the post-test better than in the pre-test, and even better than the students in the controlled group. This is also in line with Dimitriou-Hadjichristou (2015), which concluded that students in the experimental group who received the treatment of heuristic approach, achieved higher in post-test than in the pre-test. This finding also strengthens Rudd (2010) that found heuristic method as effective.

The outcomes of the analysis on hypothesis 2 divulge that there is no clear difference between the post-test and retention test. The hypothesis was retained because no significant difference was found between the post-test and retention test scores of students taught Economics using heuristic approach. This ascertains that students exposed to the heuristic approach in teaching Economics retained learning in senior secondary schools in Kano State. This finding corroborates Rayakaew (1996) in Satchakett and Art-in (2014), who found out

that the students being taught by focusing on heuristics approach had higher level of learning achievement, as well as retention in learning than those being taught by conventional teaching approach. This finding was also in concomitance with Oghenevwe (2010) who reported that students that were exposed to heuristic approach retained knowledge better than those in the controlled group that did not receive treatment.

8. CONCLUSION

From the outcomes obtained from effect of heuristic teaching approach on students' performance in Economics in senior secondary schools in Nigeria, it was concluded that the heuristic approach is effective for teaching Economics in senior secondary schools. Furthermore, students that were taught Economics using heuristic approach retained learning.

9. RECOMMENDATIONS

The study made the following recommendations that were based on the outcomes and the conclusion of the study:

1. The Federal and the State Government, the professional bodies, like the Teachers Registration Council of Nigeria (TRCN) and the Economics Teachers Associations, should sensitize Economics teachers (through seminars and workshops) on the efficacy of heuristic approach in teaching Economics.
2. Inspectors from KERD and NERDC should encourage the Economics teachers to use heuristic approach in teaching Economics in senior secondary schools. The approach will help them to elicit the expected learning in Economics easily.
3. The Government, in conjunction with curriculum developers and Economics teachers, should establish Economics resource centers in each educational zones of the State for the procurement and storage of relevant heuristic approach instructional materials.



REFERENCES

- Abdurrahman, K. (2010). Learner-centred microteaching in teacher education. *International Journal of Instruction*, 3(1), 76–100.
- Abimbola, I. O., & Abidoye, F. O. (2013). Effect of qualification and experience of biology teachers on the status of ecology teaching in kwara state. *Journal of Education and Practice*, 4(24), 1-8.
- Alasoluyi, O. E. (2015). Effects of computer assisted instruction (CAI) on students' performance in economics in senior secondary schools in Ekiti state, Nigeria. (Unpublished master's Thesis). Ahmadu Bello University, Zaria.
- Alasoluyi, O. E. (2017). Effects of project and discussion method on students' performance in economics in senior secondary schools in Ekiti state, Nigeria. (Unpublished doctoral dissertation). Ahmadu Bello University, Zaria.
- Ayeni, A.J. (2011). Teachers' professional development and quality assurance in Nigerian secondary schools. *World Journal of Education*, 1(2), 143-149.
- Danladi, N. E. & Lorlian, E. I. V. (2016). Challenges of implementing cultural complements of curriculum by teachers in junior secondary schools in Nigeria. *Journal of Educational Research and Development*, 10(1), 106-115.
- Dimitriou-Hadjichristou, C. (2015). *The effect of using lakatos' heuristic method to teach surface area of cone on students' learning: The case of secondary school mathematics students in Cyprus* (Doctoral dissertation, University of South Africa, Pretoria). Retrieved from <http://hdl.handle.net/10500/20006>.
- Eze, T. I., Ezenwafor J. I. & Molokwu, L. I. (2015). Effect of meta-learning teaching method on the academic performance of building trades students in technical colleges in South-east Nigeria. *International Journal of Vocational and Technical Education*, 7(10), 101-108. doi: 0.5897/IJVTE2015.0189.
- Fasasi, K. M. (2015). Effects of heuristic teaching approach on academic achievement of senior secondary school mathematics students in Girei local government area of Adamawa state, Nigeria. *International Journal of Innovative Science, Engineering & Technology*, 2(6), 598-606. Retrieved from www.ijiset.com.
- Federal Government of Nigeria, (2009). *National Policy on Education*. Lagos: NERDC Press.
- Ganyaupfu, E. M. (2013). Teaching methods and students' academic performance. *International Journal of Humanities and Social Science Invention*, 2 (9), 29-35. Retrieved from www.ijhssi.org.
- Gengle, H. I.; Abel, M. A. & Mohammed, B. K. (2017). Effective Teaching and Learning Strategies in Science and Mathematics to Improve Students' Academic Performance in Nigeria. *British Journal of Education, Society & Behavioural Science*, 19(1), 1-7. doi: 10.9734/BJESBS/2017/26509.
- Hoona, T. S.; Keeb, K. L. & Singh, P. (2013). Learning mathematics using heuristic approach. *Procedia-Social and Behavioral Sciences*, 90(2013), 862-869. doi: 10.1016/j.sbspro.2013.07.162.
- Hossain, A., & Tarmizi, R. A. (2013). Effects of cooperative learning on students' achievement and attitudes in secondary mathematics. *Procedia-Social and Behavioural Sciences*, 93, 473-477.
- Inuwa, U.; Abdullah, Z. & Hassan, H. (2017). Assessing the effect of cooperative learning on financial accounting achievement among secondary school students. *International Journal of Instruction*, 10(2), 31-46. Retrieved from <https://doi.org/10.12973/iji.2017.1033a>.
- Khan, S. I. (2017). *An investigation of the concept of critical thinking in the context of a functional english course in a B.Ed. degree in Pakistan* (Doctoral dissertation, University of Glasgow, Pakistan). Retrieved from <http://theses.gla.ac.uk/7922/>.
- Mutai D. K.; Changeiywo, J. M. & Okere, M.I.O, (2014). Effects of Gowin's vee heuristic strategy on secondary school students' conceptual understanding and metacognition in the topic of moments in physics, in Uasin Gishu county, Kenya. *Journal of Education and Practice*, 5 (29), 193-205. Retrieved from www.iiste.org.
- National Bureau of Statistics (2019). *West African Examination Council Result Statistics 2016-2018*. Retrieved from <https://www.proshareng.com/report/Nigerian%20Economy/WAEC-Results-Statistics-2016-2018/12712>
- Nnadi, K. U. & Falodun, A. B. (2013). *Economics for senior secondary schools*. Lagos: Longman Nigeria Plc.
- Ofori-Kusi, D. (2017). *An investigation into the use of problem-solving heuristics to improve the teaching and learning of mathematics* (Doctoral dissertation, University of South Africa). Retrieved from <http://hdl.handle.net/10500/23305>.
- Oghenevwe, O. E (2010). Effects of discovery and inquiry approaches in teaching and learning of biology on secondary school students' performance in delta state, Nigeria. *Journal of Research in Education and Society*, 1 (1), 30-39.
- Rudd, D. M. (2010). The effects of heuristic problem-solving strategies on seventh grade students' self-efficacy and level of achievement in mathematics (Master's theses, State University of New York College, Brockport). Retrieved from http://digitalcommons.brockport.edu/ehd_theses/32.
- Satchakett, N. & Art-in S. (2014). Development of heuristics problem solving and learning achievement of grade 9 students by using learning management focusing on heuristics approach in Thailand. *Procedia-Social and Behavioural Sciences*, 116 (2014), 1011-1015. doi: 10.1016/j.sbspro.2014.01.337.
- Tawiah, P. K. (2011). *Basis Economics for West Africa*. Benin: Idodo Umeh publishers Ltd.



- Thomas, O. O. & Israel, O. O. (2013). Assessing the relative effectiveness of three teaching methods in the measurement of students' performance in physics. *International Journal of Materials, Methods and Technologies*, 1(8), 116-125. Retrieved from <http://ijmmt.com>.
- Udu, E. & Agu, G. A. (2012). *Economics: A senior secondary course*. Onitsha: Africana-Fep publishers Ltd.
- Umar, M. (2018). *Effects of cooperative and laboratory-based strategies on performance and retention of students in chemistry in secondary schools in Jigawa state, Nigeria*. (Unpublished doctoral dissertation). Ahmadu Bello University, Zaria.
- Vasiliki, B., Panagiota, K. & Maria, S. K. (2016). A new teaching method for teaching economics in secondary education. *Journal of Research & Method in Education*, 6 (2), 86-93. doi: 10.9790/7388-0602018693.
- Yusuf, A. W. (2016). *Assessment of economics curriculum in senior secondary schools in kano state, Nigeria* (Unpublished master's Thesis). Ahmadu Bello University, Zaria.
- Yusuf, A. W. (2018). Availability and Use of Instructional Materials in Teaching Economics in Senior Secondary Schools in Kano State, Nigeria. *Journal of Teaching and Teacher Education*, 6(1), 59-64. Retrieved from <http://journals.uob.edu.bh>.
- Yusuf, H.O. (2012). *Fundamentals of curriculum and instruction*. Kaduna: Joyce Graphic Printers and Publishers.
- Zakaria, E., Chin, C.L. & Daud, Y. (2010). The effect of cooperative learning on student mathematics achievements and attitude towards mathematics. *Journal of Social Sciences*, 6(2), 272-275. Retrieved from <http://dx.doi.org/10.3844/jssp.2010.272.275>.