
Impact of Concept-Mapping Instructional Strategy on Students' Retention in Economics among Senior Secondary Schools in Katsina State, Nigeria

Hassan Abubakar

Department of Educational Foundations, Umaru Musa Yar'adua University, Katsina

Email: abubakarhassankt@gmail.com

ABSTRACT

The study examined the impact of concept-mapping instructional strategy on students' retention in Economics among senior secondary schools in Katsina State, Nigeria. Three research questions and three null hypotheses guided the study. The study adopted a quasi-experimental pretest-posttest non-equivalent control group design. A sample of 216 Senior Secondary II (SSII) Economics students from two public secondary schools in Katsina Zonal Education Quality Assurance was selected using purposive sampling. The experimental group (n=108) was taught selected Economics concepts using concept-mapping strategy, while the control group (n=108) received instruction through the conventional lecture method. The Economics Retention Test (ERT) was developed as the instrument for data collection, adapted from WAEC (2019, 2022) and NECO (2021, 2022, and 2023) past question papers. The instrument's reliability was established using Pearson Product Moment Correlation Coefficient ($r=0.89$). Data were analyzed using mean, standard deviation, and independent sample t-test as well as two-way ANOVA at 0.05 level of significance. Findings revealed that students taught Economics using concept-mapping instructional strategy demonstrated significantly higher retention scores (Mean=68.42, SD=6.34) compared to those taught using conventional method (Mean=52.18, SD=7.21), $t(214)=12.46$, $p<0.05$. Furthermore, no significant difference existed between male and female students' retention capacity when taught using concept-mapping strategy ($t=0.87$, $p>0.05$). The study concluded that concept-mapping instructional strategy is more effective in enhancing students' retention of Economics concepts than conventional teaching methods. The study recommended the integration of concept-mapping strategy into Economics teacher training programmes, and the adoption of this innovative strategy by secondary school Economics teachers to improve students' long-term retention of Economics concepts.

Keywords: Concept-mapping, Instructional Strategy, Retention, Economics.

INTRODUCTION

Education remains the cornerstone for any nation's sustainable development, serving as an indispensable instrument for economic, political, and scientific advancement (Offiah&Achufusi, 2010; Olarinoye, 2001). The Federal Government of Nigeria, recognizing this pivotal role, has emphasized the teaching of social sciences, including Economics, within the National Policy on Education (Federal Republic of Nigeria, 2013). Economics occupies a unique position in the senior secondary school curriculum, serving as a prerequisite for various tertiary-level programmes such

as Accounting, Economics, Business Management, and related disciplines.

Economics, as defined by Amaechi (2014), is a social science that examines human behaviours in their efforts to allocate scarce resources efficiently and effectively to minimize costs within a given environment. The subject equips learners with critical skills including analysis, experimentation, variable manipulation, and decision-making competencies essential for socioeconomic investigations. According to Hansen (as cited in Oleabhie, 2014), Economics distinguishes itself among social science subjects through its extensive utilization of

statistical and mathematical models to analyze real-life socioeconomic challenges. However, the realization of Economics educational objectives at the secondary school level is contingent upon students' ability to not only perform well in examinations but also retain the subject matter over extended periods. Retention, as conceptualized by Haqie (2021), is the process of transferring new information into long-term memory, enabling learners to effectively internalize and subsequently recall information when needed. It represents the learner's capacity to demonstrate cognitive skills in a subject over time (Wushishi, Danjuma&Usman, 2013). Akubilo (2014) emphasized that any instructional strategy eliciting adequate student participation significantly impacts learners' understanding and concept retention.

Despite the acknowledged importance of Economics education, students' performance and retention in the subject at Nigerian secondary schools have remained persistently unsatisfactory. Aniodoh (2001) attributed this challenge largely to Economics teachers' predominant reliance on conventional lecture methods, characterized by teacher-centeredness, passive student participation, and mere note-copying. Oleabhiele and Ikumelu (2012) identified additional challenges including negative attitudes among teachers and students, the unwieldy nature of the Economics curriculum, inappropriate instructional materials, excessive topics requiring coverage, and inadequate time allocation for Economics instruction. This concerning trend necessitates the exploration and implementation of innovative, learner-centered instructional strategies capable of enhancing meaningful learning and long-term retention. One such strategy is concept mapping; a meta-cognitive tool rooted in

Ausubel's (1962) Assimilation Theory and Novak's (1972) Concept Mapping Theory. Concept mapping is a graphical arrangement of key concepts, where concepts are enclosed in circles or boxes and connected with labelled lines indicating relationships between them. According to Novak and Canas (2008), concept maps are tools for organizing and representing knowledge that include concepts (usually enclosed in circles or boxes) and relationships between concepts (indicated by connecting lines with linking words). This instructional strategy has demonstrated effectiveness across various subjects in promoting meaningful learning, knowledge integration, and long-term retention.

In the Nigerian context, limited empirical evidence exists regarding the efficacy of concept-mapping instructional strategy specifically for enhancing retention in Economics at the senior secondary level, particularly within Katsina State. This study therefore sought to fill this gap by experimentally investigating the impact of concept-mapping instructional strategy on students' retention in Economics among senior secondary schools in Katsina State, Nigeria.

Statement of the Problem

The teaching of Economics in Nigerian senior secondary schools faces a persistent challenge of poor student retention. Despite the subject's importance as a prerequisite for numerous tertiary programmes and its role in developing critical socioeconomic analytical skills, students consistently demonstrate difficulty in recalling and applying Economics concepts beyond immediate examination contexts. This problem manifests in students' inability to connect previously learned concepts with new content, poor performance in cumulative examinations, and inadequate

preparation for higher education in Economics-related fields.

Preliminary observations and interactions with Economics teachers in Katsina State reveal that conventional lecture methods dominate classroom instruction. In this approach, teachers transmit information while students passively receive content, memorize facts for examinations, and promptly forget much of the material thereafter. This teacher-centered paradigm fails to engage students in meaningful learning processes that promote long-term memory consolidation and retrieval.

The consequences of poor retention extend beyond individual student performance to broader educational and national development concerns. Students who cannot retain Economics concepts are unlikely to pursue careers in Economics, Accounting, Business Management, and related fields, thereby limiting the pool of qualified professionals in these critical sectors. Furthermore, the Federal Government's investment in Economics education yields diminished returns when students fail to internalize and apply learned concepts over time.

While concept-mapping instructional strategy has shown promise in enhancing retention across various subjects internationally and in some Nigerian contexts, limited empirical research has specifically examined its impact on Economics retention among senior secondary students in Katsina State. Existing studies have focused primarily on immediate performance rather than delayed retention, or have been conducted in different subject areas or geographical contexts. This gap in knowledge necessitates an experimental investigation to determine whether concept-mapping strategy can effectively address the retention challenges facing Economics

education in Katsina State's senior secondary schools.

Objectives of the Study

The paper is guided by the following objectives:

1. Determine the difference in retention scores between students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method.
2. Examine the difference between male and female students' retention scores when taught Economics using concept-mapping instructional strategy.
3. Investigate the interaction effect of teaching method and gender on students' retention in Economics.

Research Questions

The following research questions were raised to guide the study:

1. What is the difference in mean retention scores between students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method?
2. What is the difference in mean retention scores between male and female students taught Economics using concept-mapping instructional strategy?
3. What is the interaction effect of teaching method and gender on students' mean retention scores in Economics?

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance:

H₀₁: There is no significant difference between the mean retention scores of students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method.

H₀₂: There is no significant difference between the mean retention scores of

male and female students taught Economics using concept-mapping instructional strategy.

H₀₃: There is no significant interaction effect of teaching method and genders on students' mean retention scores in Economics.

METHODOLOGY

The study adopted a quasi-experimental pretest-posttest non-equivalent control group design. This design was appropriate because random assignment of individual students to groups was not feasible given the intact class structure of senior secondary schools in Katsina State. However, pre-test, post-test and post-post-test were used for experimental and control groups. This design was employed because students were not randomly assigned to groups. According to Gall, Gall and Borg (2007), quasi-experimental design can be used when it is not possible for the researcher to randomly sample the subjects and assign them to treatment groups without disrupting the academic programme of the school involved in the study. Three research questions were raised, while three null hypotheses were postulated and tested at 0.05 level of significance to guide the study.

The population of the study comprised all 17,057 Senior Secondary II (SSII) students offering Economics in the 22 senior secondary schools within Katsina Zonal Education Quality Assurance, Katsina State for 2022/2023 academic session (Source: ZEQA, Department of Planning Research and Statistics, Katsina, 2023). SSII students were selected because they have been exposed to foundational Economics concepts and are preparing for external examinations. A sample of 216 economics students comprising of intact classes of 108 students in each of the experimental and control groups participated in the study.

Purposive sampling was employed to select two senior secondary schools from the 22 schools in the zone. Intact classes were used in both schools to avoid disrupting normal school schedules.

The instrument for data collection was the Economics Retention Test (ERT). The ERT was a 40-item multiple-choice objective test adapted from West African Examination Council (WAEC) May/June 2019 and 2022, and National Examination Council (NECO) 2021, 2022, and 2023 past question papers. The test covered five selected Economics concepts: Demand, Supply, Equilibrium Price, Production Possibility Curve, and Circular Flow of Income. Each item had four options (A-D) with one correct answer. The ERT was administered twice: immediately after treatment (as posttest) and three weeks after treatment (as retention test). The retention test was identical to the posttest in content and structure.

Face and content validity were established through expert validation. The initial draft of the ERT was submitted to three experts: two from the Department of Education (Curriculum and Instruction) and one from the Department of Economics, all from Umaru Musa Yar'adua University, Katsina. Experts assessed the instrument for clarity, relevance, content coverage, and appropriateness to SSII level. The reliability of the ERT was established through a test-retest method, where a sample of 40 students were administered the ERT instrument before and after treatment during a pilot study. The two sets of scores were correlated using Pearson Product Moment Correlation (PPMC), yielding a reliability coefficient of 0.89. This high coefficient indicated that the instrument was reliable for measuring students' retention in Economics.

Data collected from research questions were analysed through the use of mean and standard deviation while the null hypotheses were tested using independent sample t-test

(for hypotheses 1 and 2) and two-way ANOVA (for hypothesis 3) at 0.05 significance level.

RESULTS

Answering of Research Questions

Research Question 1: What is the difference in mean retention scores between students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method?

Table 1: Mean Retention Scores of Experimental and Control Groups

Group	N	X	SD	Mean Difference
Experimental Group (Concept Mapping)	108	68.42	6.34	
Control Group (Conventional Method)	108	52.18	7.21	
Mean Difference		16.24		

The result in table 1 shows that students taught using concept-mapping strategy achieved a mean retention score of 68.42 (SD=6.34), while those taught using conventional method achieved a mean

retention score of 52.18 (SD=7.21). The mean difference of 16.24 points favours the experimental group. This implies that students taught economics using concept mapping strategy performed better than students taught using conventional method.

Research Question 2: What is the difference in mean retention scores between male and female students taught Economics using concept-mapping instructional strategy?

Table 2: Mean Retention Scores by Gender in Experimental Group

Gender	N	X	SD	Mean Difference
Male	52	69.15	5.98	
Female	56	67.75	6.67	
Mean Difference		1.40		

The table 2 shows that male students in the experimental group had a mean retention score of 69.15 (SD=5.98), while female students had a mean retention score of 67.75 (SD=6.67). The mean difference of 1.40

points slightly favours male students. That, is implies that male students' retention capacity is higher than that of female students

Research Question 3: What is the interaction effect of teaching method and gender on students' mean retention scores in Economics?

Table 3: Mean Retention Scores by Teaching Method and Gender

Teaching Method	Gender	N	Mean	SD
Concept Mapping	Male	52	69.15	5.98
	Female	56	67.75	6.67
Conventional	Male	50	52.60	7.10
	Female	58	51.81	7.32

The table 3 above indicated that the mean retention scores varied across groups, with the highest scores observed among male students in the concept-mapping group (Mean=69.15) and the lowest among female

students in the conventional group (Mean=51.81). This implies that the retention capacity of male students is better than that of female students.

Testing of Hypotheses

H₀₁: There is no significant difference between the mean retention scores of students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method.

Table 4: Independent t-test Analysis on students taught Economics using concept-mapping instructional strategy and those taught using conventional lecture method.

Group	N	X	SD	Df	t-cal	p-value	Decision
Experimental	108	68.42	6.34	214	12.46	0.000	Rejected
Control	108	52.18	7.21				

Significant at $p < 0.05$

The table 4 indicated that the calculated t-value (12.46) exceeded the critical t-value (1.96) at 214 degrees of freedom, and p-value (0.000) was less than 0.05. Therefore,

the null hypothesis was rejected. There is a significant difference in retention scores between the experimental and control groups

H₀₂: There is no significant difference between the mean retention scores of male and female students taught Economics using concept-mapping instructional strategy.

Table 5: Independent t-test Analysis for H₀₂ (Experimental Group Only)

Group	N	X	SD	df	t-cal	p-value	Decision
Male	52	69.15	5.98	106	0.87	0.386	Accepted
Female	56	67.75	6.67				

Not significant at $p < 0.05$

The table 5 above shows that the calculated t-value (0.87) was less than the critical t-

value (1.98) at 106 degrees of freedom, and p-value (0.386) exceeded 0.05. Therefore,

the null hypothesis was not rejected. There is no significant gender difference in

retention scores among students taught using concept-mapping strategy

H₀₃: There is no significant interaction effect of teaching method and genders on students' mean retention scores in Economics.

Table 6: Two-way ANOVA for Interaction Effect (Method × Gender)

Source	Sum of Squares	df	Mean Square	F	p-value	Decision
Method	14,872.34	1	14.872.34	312.45	0.000	Significant
Gender	124.56	1	124.56	2.62	0.107	Not Significant
Method × Gender	89.23	1	89.23	1.87	0.173	Not Significant
Error	10,092.87	212	47.61			
Total	25,179.00	215				

Significant interaction at $p < 0.05$

The table 6 indicated that the interaction effect between teaching method and gender was not statistically significant ($F=1.87$, $p=0.173 > 0.05$). Therefore, the null hypothesis was not rejected. Teaching method and gender do not significantly interact to influence students' retention scores in Economics.

DISCUSSION OF FINDINGS

The finding of research question one revealed that students taught using concept-mapping instructional strategy demonstrated significantly higher retention scores (Mean=68.42) than those taught using conventional lecture method (Mean=52.18) aligns with existing literature. This result supports Akubilo's (2014) assertion that instructional strategies eliciting active student participation significantly enhance concept retention. Concept mapping facilitates meaningful learning by requiring students to identify relationships between concepts, organize knowledge hierarchically, and integrate new information with existing cognitive structures.

This finding corroborates the theoretical framework underpinning the study.

According to Ausubel's (1962) Assimilation Theory, meaningful learning occurs when new information is consciously and deliberately linked to relevant existing concepts in the learner's cognitive structure. Concept mapping externalizes these linkages, making them visible and manipulable, thereby strengthening neural pathways and enhancing long-term retention. Novak's (1972) Concept Mapping Theory further explains that the visual-spatial arrangement of concepts in maps facilitates dual coding (verbal and visual) of information, creating multiple retrieval pathways. The result is consistent with previous empirical studies. For instance, Ajaja and Eravwoke (2010) found that concept mapping significantly improved students' retention in Biology compared to conventional methods. Similarly, Oleabhiere (2014) reported that concept mapping enhanced students' retention of Economics concepts in Lagos State. The present study extends these findings to the Katsina State context, demonstrating the cross-cultural

applicability of concept-mapping effectiveness.

The finding of hypothesis two revealed that no significant gender difference existed between male (Mean=69.15) and female (Mean=67.75) students' retention when taught using concept-mapping strategy challenges traditional stereotypes suggesting gender-based differences in learning outcomes. This result indicates that concept-mapping strategy is equally effective for both male and female learners in Economics. This finding aligns with studies by Bosede (2010) and Gambari, Shittu, and Ogunlade (2011), who reported no significant gender differences in academic achievement when innovative instructional strategies were employed. However, it contradicts studies by Oludipe and Oludipe (2010) who found gender differences favouring males in science achievement. The discrepancy may be explained by the nature of concept mapping, which accommodates diverse learning styles and reduces the competitive, anxiety-inducing elements that sometimes disadvantage female learners in traditional classroom settings.

The absence of gender difference is educationally significant because it suggests that concept-mapping strategy can serve as an egalitarian instructional approach, promoting equitable learning outcomes regardless of gender. This is particularly important in northern Nigerian contexts where gender disparities in education remain a concern.

Finding of hypothesis three shows there is non-significant interaction effect between teaching method and gender ($F=1.87$, $p=0.173$) indicates that the effectiveness of concept-mapping strategy over conventional methods does not depend on gender. Both

male and female students benefited equally from concept-mapping instruction, and neither gender was disproportionately advantaged or disadvantaged by either teaching method. This finding suggests that instructional method and gender operate independently in influencing Economics retention. The main effect of teaching method was significant (favouring concept mapping), but gender neither moderated nor mediated this effect. This result strengthens the case for widespread adoption of concept-mapping strategy across co-educational settings without concern for differential gender effects.

CONCLUSION

Based on the findings of the study, it was concluded that concept-mapping instructional strategy is more effective than conventional lecture method in enhancing senior secondary school students' retention of Economics concepts. The strategy promotes meaningful learning, facilitates long-term memory consolidation, and provides multiple retrieval pathways for Economics knowledge. Furthermore, concept-mapping strategy is gender-inclusive, benefiting male and female students equally without differential effects. The non-significant interaction between teaching method and gender confirms that the advantages of concept mapping apply universally across gender groups.

RECOMMENDATION

Based on the above findings, the following recommendations were made:

1. Ministry of Education and Curriculum Planners should integrate concept-mapping instructional strategy into the Economics curriculum as a recommended pedagogical approach. Include concept-mapping activities in the Teacher's Guide for Senior Secondary Economics.

2. Economics Teachers should be encouraged to adopt concept-mapping strategy as a regular instructional tool for teaching Economics concepts, particularly those involving relationships between variables (e.g., Demand and Supply, Market Structures, National Income). Teachers should receive training on effective concept-mapping facilitation.
3. Institutions should incorporate concept-mapping instruction into pre-service and in-service teacher education programmes. Colleges of Education and universities offering Economics Education should dedicate modules to innovative strategies including concept mapping.
4. School Administrators should from time to time organize workshops and professional development sessions to train Economics teachers in concept-mapping construction and classroom implementation. Provide resources such as chart papers, markers, and concept-mapping software where feasible.
5. Examination Bodies namely WAEC, NECO and NABTEB should consider incorporating concept-mapping tasks into school-based assessments for Economics, encouraging teachers and students to engage with this strategy beyond experimental contexts.
6. Students should actively construct personal concept maps during Economics lessons and review them regularly to enhance long-term retention of concepts.

REFERENCES

- Ajaja, O. P., & Eravwoke, U. O. (2010). Effects of concept mapping on students' achievement and retention in Biology. *Journal of Educational Research and Development*, 3(2), 45-56.
- Akubilo, F. U. (2014). Instructional strategies and students' retention of science concepts. *Nigerian Journal of Science Education*, 12(1), 78-89.
- Amaechi, C. E. (2014). *Principles of Economics education*. Enugu: University Trust Publishers.
- Aniodoh, H. C. (2001). Teaching methods and students' performance in Economics in Nigerian secondary schools. *Journal of Social Science Education*, 4(2), 112-125.
- Ausubel, D. P. (1962). *The psychology of meaningful verbal learning*. New York
- Grune & Stratton Bosede, A. F. (2010). Gender differences in students' achievement in Economics using concept mapping. *African Journal of Educational Studies*, 8(2), 34-47.
- Federal Republic of Nigeria (2013). *National policy on education* (6th ed.). Lagos: NERDC Press.
- Gambari, A. I., Shittu, M., & Ogunlade, O. O. (2011). Effects of concept mapping on students' achievement and retention in Physics. *Journal of Educational Media and Technology*, 15(1), 23-38.
- Haqie, M. (2021). *Retention in learning: Theoretical perspectives*. *Educational Psychology Review*, 33(4), 891-908.
- Novak, J. D. (1972). *The theory of concept mapping*. Ithaca, NY: Cornell University Press.
- Novak, J. D., & Canas, A. J. (2008). *The theory underlying concept maps and how*

to construct them. Pensacola, FL:
Institute for Human and Machine
Cognition.

Offiah, F. C., & Achufusi, N. N.
(2010). Education as an instrument for
national development. *Nigerian
Educational Forum*, 28(1), 15-28.

Olarinoye, R. D. (2001). Science education
and national development. *Journal of
Science Teachers Association of Nigeria*,
36(1), 1-10.

Oleabhiere, E. O. (2014). Effects of concept
mapping on students' achievement and
retention in Economics in Lagos State.
Nigerian Journal of Curriculum Studies,
21(2), 67-82.

Oleabhiere, E. O., & Ikumelu, E. U.
(2012). Challenges of teaching Economics
in Nigerian secondary schools. *Journal of
Educational Foundations*, 6(3), 45-58.

Oludipe, B. D., & Oludipe, D. I.
(2010). Gender differences in science
achievement using concept mapping.
*International Journal of Educational
Research*, 8(2), 112-125.

Otuka, J. O. (2006). Education and
economic development in Nigeria.
*Nigerian Journal of Educational
Research*, 7(2), 23-36.

Uroko, E. C. (2010). Academic performance
and learning outcomes. *Journal of
Educational Measurement*, 12(3), 89-
102.

Wushishi, A. D., Danjuma, M. Y., & Usman,
T. (2013). Retention of Economics
concepts among secondary school
students. *Katsina Journal of Educational
Research*, 5(1), 34-48.