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Effects of Treffinger learning model on students' interest on graphic-related concepts in economics

Abstract

This study investigated the effects of Treffinger learning model on Senior Secondary School students' interest on graphic-related concepts in Economics in Plateau State, Nigeria**.** The population of the study was 15, 554 Senior Secondary school II Economics. Multi-stage sampling techniques was used to sampled 183 SSS II Economics students

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comprising 92 in the experimental group (43 male and 49 female) and 93 in the control group (45 male and 48 female). The instrument that was used for collecting data was researchers-designed questionnaire. Mean score and standard deviation were used to answer the research questions and Analysis of Covariance (ANCOVA) was used to test all hypotheses at 0.05 level of significance. The findings of the study revealed there is a significant effect in the mean interest scores of students taught Graph related concepts in Economics using the Treffinger learning model than those taught using the conventional lecture method and there is no significant effect in the mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model. The study recommended that Schools and educational authorities should adopt the use of the Treffinger Learning Model as a teaching strategy to enhance students' interest and engagement in Economics. This model's emphasis on creativity and problem-solving can help students better understand and appreciate graphic-related concepts amongst several others.

Keywords: *Economics, Effect, Graphic-Related Concepts, Interest & Treffinger Learning Model*

WPŁYW MODELU UCZENIA TREFFINGERA NA ZAINTERESOWANIE STUDENTÓW KONCEPCJAMI GRAFICZNYMI W EKONOMII

Streszczenie

W niniejszym badaniu zbadano wpływ modelu uczenia się Treffingera na zainteresowanie uczniów szkół średnich II stopnia ekonomią w stanie Plateau w Nigerii. Populacja objęła 15 554 uczniów szkół średnich II stopnia ekonomii. Zastosowano wieloetapowe techniki doboru próby, aby objąć próbą 183 uczniów szkół średnich II stopnia ekonomii, w tym 92 w grupie eksperymentalnej (43 mężczyzn i 49 kobiet) oraz 93 w grupie kontrolnej (45 mężczyzn i 48 kobiet). Narzędziem do zbierania danych był kwestionariusz opracowany przez badaczy. Do odpowiedzi na pytania badawcze wykorzystano średnią i odchylenie standardowe, a do przetestowania wszystkich hipotez zastosowano analizę kowariancji (ANCOVA) na poziomie istotności 0,05. Wyniki badania ujawniły istotny wpływ na średnie wyniki zainteresowania studentów uczących się koncepcji związanych z wykresami w ekonomii z wykorzystaniem modelu nauczania Treffingera w porównaniu z wynikami studentów uczących się konwencjonalną metodą wykładów. Nie zaobserwowano również istotnego wpływu na średnie wyniki zainteresowania studentów i studentek uczących się koncepcji związanych z wykresami w ekonomii z wykorzystaniem modelu nauczania Treffingera. W badaniu zalecono, aby szkoły i władze oświatowe przyjęły model nauczania Treffingera jako strategię nauczania w celu zwiększenia zainteresowania i zaangażowania uczniów w ekonomię.

Nacisk tego modelu na kreatywność i rozwiązywanie problemów może pomóc uczniom lepiej zrozumieć i docenić koncepcje związane z wykresami, a także wiele innych.

Słowa kluczowe: *Ekonomia, efekt, koncepcje graficzne, zainteresowania i model uczenia się Treffingera*

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Introduction

Knowledge of Economics is seen as a tool through which every meaningful national development is laid. It is an instrument of social change and development in all facets of human endeavor. According to Ojo, Akinola, and Gotip[1] knowledge of Economics is seen as a tool through which every meaningful national development is laid. It is an instrument of social change and development in all facets of human endeavor. Many countries including Nigeria understand very well that without high-quality education for their citizenry, their individual growth and societal development would be a nightmare. Knowledge of Economics is a fundamental human right that all people, regardless of their circumstances, are entitled to. Education is a form of learning in which a group of people's knowledge, skills, values, benefits, and habits are passed down from generation to generation through demonstration, problem-solving, music, question and answer, storytelling, discussion, teaching, training, or research[2].

Education provides in the world today, the basic tool for lucrative employment, economic prosperity, personality growth, interpersonal relationships, and development for moral build-up. It can be contemplated as a prime tool for the systematized human and material development of nations. In the absence of education, ignorance, underdevelopment, crime, and poverty amongst others become the case[3].

[1] M. O. Ojo, O. Akinola, N. W. Gotip, *Assessing the Importance of Education in Entrepreneurship Development in Nigeria*, "International Journal of Innovative Research and Development" 2022, 11(2). Doi:10.24940/Ijird/2022/V11/I2/Feb22055 [access: 27.12.2025].

[2] S. B. Bahago, N. W. Gotip, *The implications of IDP Education and the need for Counseling Services for Nigerian National Development in the Twenty-First Century*, "International Journal of Assessment and Evaluation in Education" 2022, 1(1), 83-94, https://mediterraneanpublications.com/mejaee/article/view/55 [access: 27.12.2025].

[3] N. W. Gotip, K. U. Wilfred-Bonse, *Use of Charts as Instructional Materials for Effective Teaching and Learning of Economics in Senior Secondary Schools*, "Scholar J-Science and Education" 2024, https://scholarj.com/index.php/science-education/article/view/19/18 [access: 27.12.2025].

The 21st-century knowledge of Economics should help individuals to think rationally and become aware of the effect of their actions on their quality of life[4]. The purpose of education is to educate individuals within the society, to prepare and qualify them for work in the economy as well as to integrate people into society and teach them values and morals of society[5]. A 21st-century education responds to the economic, technological, and societal shifts that are happening at an ever-increasing pace. It's an education that sets learners up to succeed in a world where more than half of the jobs they'll have over their careers don't even exist yet. In short, it's an education that provides students with the skills and competencies they need to thrive in the 21st century[6]. A 21st-century education is about giving students the skills they need to succeed in this new world and helping them grow the confidence to practice those skills. With so much information readily available to them, 21st-century skills focus more on making sense of that information, sharing and using it in smart ways[7].

Economics is one of the Social Science subject offered at Senior Secondary School (SSS) level in Nigeria. Economics is defined as the science which studies human behavior as a relationship between ends and scarce means which have alternative uses. Economics is a non-vocational elective Social Science subject to be taught in Senior Secondary Schools in the country to provide trained manpower who shall be well-equipped with critical knowledge, skills and abilities to analyze economic problems and provide solutions to solving personal and societal economic problems and policies[8]. The objectives of studying Economics in Senior Secondary Schools in Nigeria is to: equip students with the basic principles of Economics necessary for useful living and for higher education; prepare and encourage students to be prudent and effective in the management of scarce re-

4 N. W. Gotip, M. O. Ede, E. O. Oleabhiele, *Vision and mission of economics education in the 21st century*, „International association for Economics Educators" 2020, 4 (1), p. 79-87, [access: 27.12.2025].

5 E. O. Oleabhiele, N. W. Gotip, A. S. Suleiman, M. Shugaba, *Teaching Economics Via Computer Pictograms: Its Effect On Students' Learning Outcomes and Motivation*, „International association for Economics Educators" 2021, Vol. 4, Issue 1, https://iafee.org/journals/ijeer/ijeer-vol-4-2021/teaching-economics-via-computer-pictograms-its-effect-on-students-learning-outcomes-and-motivation-127-141/ [access: 27.12.2025].

6 N. W. Gotip, K. C. Dungrit, *Need to Redesign Economics Education in Nigeria for the 21st Century Learning Needs*, in: *Theology, Philosophy, and Education in the 21st Century: Festschrift in Honour of a Distinguished Emeritus Professor. The Rt. Rev. Msgr. Cletus Tanimu Gotan*, Jos 2022, Pg 951-958. https://www.researchgate.net/profile/Gotip-Nehemiah-Wokji/publication/372412253_Need_to_Redesign_Economics_Education_in_Nigeria_for_the_21st_Century_Learning_Needs/links/64b575228de7ed28baa48ee2/Need-to-Redesign-Economics-Education-in-Nigeria-for-the-21st-Century-Learning-Needs.pdf [access: 27.12.2025].

7 Ibidem.

8 N. W. Gotip, M. O. Ede, E. O. Oleabhiele.

sources; raise students respect for the dignity of labour and their appreciation of economic, cultural and social values of our society and enable students acquire knowledge for the practical solution of the economic problems of society; Nigeria, developing countries and the world at large[9]. Economics curriculum is based on the principle of equipping the recipients with the basic knowledge and skills to appreciate the nature of economic problems in any society and adequately prepare them for the challenges in the Nigeria economy[10].

The a need to enliven the teaching methods used to teach school subjects by engaging students in the learning process in a way that might appeal to their senses and follow the development of 21st-century students, who are often referred to in certain studies as "digital citizens" surrounded by communication media, smartphones, applications and information technologies[11]. Knowledge of Economics is an essential resource for individual growth and survival skills in this 21st century[12]. Knowledge of Economics is an instrument for harnessing good virtues and strengthening personal integrity. It shapes the various aspects of man's existence[13]. Knowledge of Economics plays a significant role in the growth and development of the country's economy[14]. According to Gotip, Enem, Wilfred--Bonse, Bahago, and Sa'aondo[15] the goals of studying Economics in schools in Nigeria are to arm students with the fundamental concepts required for practical living and for higher education; prepare and encourage students to be prudent

9 Ibidem.

10 Ibidem.

11 N. W. Gotip, J. C. Onuoha, E. I. V. Iorliam, *Effects of Infographics Instructional Strategy on Students' Achievement in Senior Secondary School Economics in Pankshin Local Government Area of Plateau State, Nigeria*, "International Journal of Economics Education Research" 2021, 4(1), 142-157, https://iafee.org/wp-content/uploads/2022/10/GOTIP-et-al-vol-4-issue-1-2021-pp-141-157.pdf [access: 27.12.2025].

12 M. O. Ojo, O. E. Kakulu, N. W. Gotip, *Influence of Information and Communication Technologies on Students' Academic Performance in Veritas University, Abuja*, "IGWEBUIKE: An African Journal of Arts and Humanities" 2022, Vol. 8. No. 2, ISSN: 2488-9210 (Print), 2504-9038 (Online). https://www.acjol.org/index.php/iaajah/article/view/2826/2784 [access: 27.12.2025].

13 K. U. Wilfred-Bonse, N. W. Gotip, I. A. Ocholi, *Social Studies, Economics and Political Science Education: Vital Tools for Revamping Corruption in Electoral Process of African Democracy and the Nigerian Perspective*, "Scholar J-Science and Education" 2024, 2 (4), p. 99-106, https://scholarj.com/index.php/science-education/issue/view/7 [access: 27.12.2025].

14 C. U. Kalu, E. O. Oleabhiele, N. W. Gotip, *The Relationship between Southeast Nigerian Students' Interest in Economics and the Methods Used by Economics Teachers to Teach it*, "ETDC: Indonesian Journal of Research and Educational Review" 2024, 3(2), pp 70-81, https://www.etdci.org/journal/ijrer/article/view/1191/800 [access: 27.12.2025].

15 N. W. Gotip, U. E. Enem, K. U. Wilfred-Bonse, S. B. Bahago, S. B., M. Sa'aondo, *Effect of Internet-Based Instructional Strategy on Students' Academic Achievement in Economics: Counselling and Curriculum Inference*, "ETDC: Indonesian Journal of Research and Educational Review" 2023, 2(3), pp 01-13, https://www.etdci.org/journal/ijrer/article/view/761/504 [access: 27.12.2025].

and effective in the management of scarce resources; and increase students' respect for the dignity of labor and their appreciation of economics. Education provides in the world today, the basic tool for lucrative employment, economic prosperity, personality growth, interpersonal relationships, and development for moral build-up. It can be contemplated as a prime tool for the systematized human and material development of nations. In the absence of education, ignorance, underdevelopment, crime, and poverty amongst others become the case[16].

The effectiveness of teaching and learning in Economics at the senior secondary school level largely depends on the instructional strategies employed by teachers. The effect of technological development in education has rendered conventional methods of teaching inadequate for teaching and learning Economics while creating the need for new and sophisticated methods of teaching[17]. Traditional teaching methods, such as the lecture method, often fail to actively engage students and stimulate their interest, particularly in graphic-related concepts that require both cognitive and visual understanding. This lack of engagement has contributed to students' low interest and achievement in Economics, which is reflected in poor performance in national examinations like the West African Senior School Certificate Examination (WASSCE) and the National Examinations Council (NECO).

Interest plays a pivotal role in students' academic success. It serves as a motivational factor that enhances learners' curiosity, focus, and persistence in learning tasks. However, many students struggle with graphic-related concepts in Economics, such as demand and supply curves, cost analysis, and production possibility curves, because these concepts require abstract thinking and analytical skills. When students lose interest in these topics, their overall understanding of Economics suffers, thereby limiting their ability to apply economic principles to real-life situations.

It has been observed that the use of conventional teaching strategy which seemed to be successful due to the scanty Economics curriculum content as at then is no longer effective in teaching and learning Economics in secondary schools since the enrichment of the curriculum with new concepts, models and theories[18]. Instructional strategy otherwise known as teaching method can be conceived of as a plan of activities to teach content and sequence learning experience. To Gotip, Onuoha and Iorliam[19] instructional strategy includes the method and the techniques used in and outside the classroom by the teacher and learners in order to achieve the planned learning outcome. In recent years, educational

16 N. W. Gotip, K. U. Wilfred-Bonse.

17 N. W. Gotip, J. C. Onuoha, E. I. V. Iorliam.

18 Ibidem.

19 Ibidem.

researchers and practitioners have advocated for innovative teaching models to foster students' interest and active participation. Treffinger Method is also known with creative problem solving. Treffinger method is one of the few models that deal with creativity issues directly and provides practical advice on how to achieve alignment. According to Shoimin[20], the Treffinger model encouraged creative learning using a three-stage arrangement that begins with elemental elements and rises to a more composite function of thinking functions, students engage in skills building activities in the first two stages to then deal with real-life issues in the third stage.

The Treffinger model is a learning strategy developed from a creative learning model that is developmental and prioritizes aspects of the process. Strategy learning developed by Treffinger based on his creative learning model[21]. The most dominant characteristic of this Treffinger learning model is his effort in integrating the students' cognitive and affective dimensions to find the solutions to solve the problem, meaning that students are given the freedom to creativity to solve their own problems with the ways he wants, the teacher's job is to guide the students so that the directions taken by these students are not out of the problem[22]. According to Shinimin[23], the characteristics of the Treffinger model involves cognitive and affective skills at each level of this model, Treffinger shows the interrelationships and dependencies between the two in encouraging creative learning. Based on some opinions above, it can be concluded that the model Treffinger learning is a learning model that invites students to think creatively in solving problems by paying attention to important facts that exist in the environment and then bring up ideas and choose the right solution to be implemented in real.

The purpose of Treffinger model is that students are given the opportunity to understand concepts by solving a problem, students become active in learning, the development of students' thinking skills and problem solving skills, and students can apply the knowledge they already possess to new situations. Treffinger learning model consists of three (3) important components of understanding challenge, generating ideas, and preparing for action[24]. In the application of Treffinger learning model in teaching graphic related concepts in Economics, students have the opportunity to development in their pace, build their self-efficacy and energise their interest.

[20] A. Shoimin, *Enam Puluh Delapan Model Pembelajaran Inovatif Dalam Kurikulum*, Yogyakarta 2014.

[21] Ibidem.

[22] M. Huda, *Model-model Pengajaran dan Pembelajaran*, Yogyakarta 2013.

[23] A. Shoimin,

[24] M. Huda,

The Treffinger Learning Model, developed by Donald Treffinger, offers an alternative approach to traditional teaching methods. This model emphasizes creativity, problem-solving, and the integration of thinking skills into the learning process. By encouraging active engagement and independent thinking, the Treffinger Learning Model has shown promise in improving students' interest and academic performance in various subjects.

In a school setting, gender could be seen as an issue because it plays an important role in influencing students' academic achievement. Gender seems to bring competition in the classroom as male students appear to view their female counterparts as weaker sex especially in subjects that requires calculations[25]. A person's gender, along with race, ethnicity, and class, is a social factor that significantly determines their life chances and shapes how they participate in society[26]. Gender is defined as the socially and culturally produced traits and roles that are connected to men and women in any community[27]. Gotip, Enem, Bonse, Bahago and Sa'aondo[28] argued that many people think a student's gender, whether they are male or female, affects their academic achievement in a given field. Gender refers to the socially constructed roles, behaviors, expressions, and identities of girls, women, boys, men, and gender-diverse people. It influences how individuals perceive themselves and others, as well as their interactions within social and cultural contexts[29]. To Oleabhiele, Kalu and Gotip[30] gender is a structure of social relations and cultural practices that differentiates individuals and groups based on perceived sexual distinctions, often reinforcing inequalities through institutional and interpersonal interactions. Obayi, Oleabhile, Suleiman, Gotip, Shugaba and Kalu[31] gender encompasses the roles and responsibilities assigned to individuals by society based on their sex, influencing expectations, opportunities, and experiences in social, economic, and cultural life. Gender

25 M. Hasrul Kamarulzaman, M. Fadzil Kamarudin, M. Saifun Aznin Sharif, M. Zaim Esrati, M. M. Saiful Nizan Saali, R. Yusof, *Impact of Differentiated Instruction on the Mathematical Thinking Processes of Gifted and Talented Students,* "Journal of Education and e-Learning Research" 2022, v9, n4, p. 269-277, https://eric.ed.gov/?id=EJ1373527 [access: 27.12.2025].

26 N. W. Gotip, U. E. Enem, K. U. Wilfred-Bonse, S. B. Bahago, S. B., M. Sa'aondo,

27 Ibidem.

28 Ibidem.

29 N. W. Gotip, J. C. Onuoha, E. I. V. Iorliam,

30 C. U. Kalu, E. O. Oleabhiele, N. W. Gotip,

31 A. U. Obayi, E. O. Oleabhile, A. S. Suleiman, N. W. Gotip, M. Shugaba, C. U. Kalu, *Impact of Reflective Teaching Strategy on the Academic Achievement of Senior Secondary School Students in Economics in Yobe State, Nigeria*, "International Journal of Advance Research and Innovative Ideas in Education (IJARIIE)" 2024, 10(3):176-185. DUI: 16.0415IJARIIE-22724 & https://ijariie.com/AdminUploadPdf/IMPACT_OF_REFLECTIVE_TEACHING_STRATEGY_ON_THE_ACADEMIC_ACHIEVEMENT_OF_SENIOR_SECONDARY_SCHOOL_STUDENTS_IN_ECONOMICS_IN_YOBE_STATE__NIGERIA_ijariie22724.pdf [access: 27.12.2025].

is a multidimensional concept referring to the attributes, behaviors, and roles deemed appropriate for men and women, shaped by social and cultural norms rather than biological differences. Obayi, Oleabhile, Suleiman, Gotip, Shugaba and Kalu[32]. Gender is a system of social categorization that organizes human behavior and identities based on perceived or actual differences, often leading to prescribed norms and expectations for males and females Obayi, Oleabhile, Suleiman, Gotip, Shugaba and Kalu[33].

This study seeks to investigate the effects of the Treffinger Learning Model on senior secondary school students' interest in graphic-related concepts in Economics in Plateau State. By examining the impact of this model, the study aims to provide evidence-based recommendations for improving teaching practices, enhancing students' interest, and ultimately fostering better understanding of Economics in Senior Secondary Schools.

Statement of the Problem

Economics is a vital subject in the Senior Secondary School curriculum, equipping students with the knowledge and skills necessary for understanding economic principles and their application in real-life situations. Despite its importance, students in Plateau State have consistently shown low interest and performance in Economics, particularly in graphic-related concepts such as demand and supply curves, cost analysis, and production possibility frontiers. These concepts are fundamental to understanding Economics but often perceived as abstract and difficult by students.

Traditional teaching methods, predominantly lecture-based, have been identified as one of the major contributors to this lack of interest. These methods fail to actively engage students or address the diverse learning needs of a classroom, leaving many students disengaged and unable to grasp complex graphical concepts. As a result, there is a growing concern about students' declining interest, which negatively impacts their academic achievement and future application of economic knowledge.

The Treffinger Learning Model, an innovative teaching strategy that emphasizes creativity, problem-solving, and active engagement, offers a potential solution to this problem. This model encourages students to participate actively in their learning process, fostering curiosity and improving their ability to understand complex topics. However, despite its potential, the effectiveness of the Treffinger Learning Model in enhancing students' interest in graphic-related concepts in Economics has not been adequately explored in Plateau State.

[32] Ibidem.

[33] Ibidem.

This study seeks to address this gap by investigating the effects of the Treffinger Learning Model on senior secondary school students' interest in graphic-related concepts in Economics. The findings of this study could provide valuable insights for educators, curriculum developers, and policymakers in adopting innovative teaching strategies to improve students' interest and academic outcomes in Economics.

Purpose of the Study

The study investigated the effects of Treffinger Learning Model on Senior Secondary School Students' interest on graphic related concepts in Economics in Plateau State.

Specifically, the study investigated the.

1. Mean interest scores of students taught graphical related concepts in Economics using Treffinger learning model and those taught using conventional teaching method
2. Mean interest scores of male and female students taught graphical related concepts in Economics using Treffinger learning model

Research Questions

The following research questions were raised to guide the objectives of the study:

1. What is mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method?
2. What is mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model?

Hypotheses

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

Ho_1: There is no significant effect in the mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method.

Ho_2: There is no significant effect in the mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model

Methodology

The study was carried out using quasi–experimental research design. Specifically, the pre - test post – test non-equivalent control group design will be use for the study. According to Gotip, Onuoha and Iorliam[34] quasi experimental research design is utilized where it is not possible to carry out a random assignment of subjects to groups.

[34] N. W. Gotip, J. C. Onuoha, E. I. V. Iorliam,

The population for the study comprised all the 15, 554 Senior Secondary school II Economics students from the seventeen (17) Local Government Areas senior secondary schools of Plateau State offering Economics at SSCE level. This is made up of 8, 457 male and 7, 097 female students. The sample size for this study was 183 SS II Economics students comprising 92 in the experimental group (43 male and 49 female) and 93 in the control group (45 male and 48 female) in six public co-educational senior secondary schools in Plateau North Education zone. A multi-stage sampling was used. In the first stage, purposive sampling was used to select Plateau North Education zone from the three education zones in the state. Simple random sampling technique by balloting without replacement was used to select four Senior Secondary Schools for the study.

The instruments used for collecting data for the study was Economics Interest Inventory (EII). The Economics Interest Inventory was a 30 items scale design to measure students' interest in Economics. The instrument was a 4 – point scale as follows: Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point (See Appendix). The items in SEI, the instrument will be a 4 – point scale as follows: Strongly Agree (SA) 4 points, Agree (A) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point

Economics Interest Inventory (EII) was subjected to face and content validation by three experts from Michael Okpara University of Agriculture, Umudike: one from Economics Education unit in the Department of Agriculture and Vocational Education, one from Measurement and Evaluation in the Department of Science Education and another one from the Educational Psychology Department of Guidance and Counselling To achieve this, validates will be given copies of the purpose of the study, research questions and hypotheses. The instrument was scrutinized for relevance, clarity and content coverage based on the topic selected for the study.

The reliability of the Economics Interest Inventory (EII) was determined using the Cronbach Alpha statistic. This method was considered appropriate because the items in the instrument were polytomously scored. The internal consistency coefficient obtained for Economics Interest Inventory (EII) was 0.82.

At the beginning of the experiment the instrument; interest inventory I was administered to both the experimental and control Groups as pre-test. This was conducted by the regular Economics class teachers who were trained by the researchers. At the end of the pretest, scores obtained by the students was recorded and kept. More so, at the end of the treatment, interest inventory II which was the same as interest inventory I was reshuffled and restructured and administered as posttest. The scores obtained was recorded and kept. All scores that were obtained by both groups were used to answer the research questions and test the hypotheses formulated for the study.

Mean and standard deviation was used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. Analysis of Variance was used because the pretest scores were used as covariates to the posttest scores to partial out the initial difference between the groups. The decision rule for the rejection or acceptance of the null hypotheses was if the P-value is equal to or greater than the alpha, we accept the null hypothesis, but if the P-value is less than the 0.05 alpha value, we reject the null hypothesis.

Research question 1

What is mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method?

Table 1: Analysis of mean and standard deviation of the mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method

Group	N	Pre-test		Post-test		Mean gain score
		$\overline{X}$	**SD**	$\overline{X}$	**SD**	
Treffinger learning model	92	41.13	5.72	67.50	4.67	26.37
Conventional lecture method	93	40.51	4.63	52.24	4.94	11.73

The data in table 1 revealed that students taught Graphic related concepts in Economics using Treffinger learning model had pre-test mean interest score of 41.13 with standard deviation score of 5.72 while students exposed to conventional lecture method had pretest mean interest scores of 40.51 with standard deviation of 4.63. Furthermore, the students taught Economics using the Treffinger learning model had posttest mean interest scores of 67.50 with standard deviation scores of 4.67 compared to their counterpart exposed to conventional learning method with posttest mean interest score of 52. 24 with standard deviation of 4.94. Hence, the students taught Economics using Treffinger learning model had mean interest gain score of 26.37 while their counterpart exposed to conventional lecture method had mean interest gain of 11. 73. This revealed that students taught Economics using Treffinger learning model had higher mean interest gain in Economics than students taught using the conventional lecture method.

Hypothesis one

Ho_1: There is no significant effect on the mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method

Table 2: Analysis of Covariance of significant effect on the mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected model	88210.39	3	9403.46	27.11	
Intercept	94310.05	1	9430.050	27.19	.001
Pre-interest	781.21	1	781.21	2.25	.000
Method	8242.58	2	4121.29	11.88	.002*
Error	63476.11	183	346.86		
Total	41522.50	185			
Corrected total	6450.40	184			

Data in table 2 indicate that the calculated value of 11.88 and the p- value was 0.002 which is less than the significant value of 0.05 indicating that the null hypothesis which stated that there is no significant effect on the mean interest scores of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method was rejected. Thus, indicating that there was significance effect in the mean interest score of students taught Graph related concepts in Economics using Treffinger learning model and those taught using conventional lecture method.

Research Question two

What is mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model?

The data for answering research question 2 is presented in Table 3

Table 3: Analysis of mean and standard deviation of the mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model in Economics

Gender	Number of students	Pre-test		Post-test		Mean interest gain
		X	SD	X	SD	
Male	43	43.99	4.17	73.17	4.55	29.18
Female	49	42.38	4.15	71.08	4.56	28.70

The data presented in Table 3 showed that male students exposed to Treffinger learning model had a pretest mean interest score of 43.99 and a standard deviation of 4.17 and a posttest mean interest score of 73.17 and standard deviation 4.55 with a mean interest gain of 29.18 while female students had a pretest interest mean score of 42.38 and standard deviation of 4.15 and a posttest mean interest

score of 71.08 and standard deviation 4.56 with a mean interest gain of 28.70. Therefore, comparing the mean interest gain of the male and female students taught Graph related concepts in Economics exposed to Treffinger learning model, it can deduce that the male students mean interest gain of 29.18 was highly enhanced than their female counterpart with a mean interest gain of 28.70.

As a result of the observed difference, hypothesis 2 was tested at 0.05 to ascertain if the observed difference was significant

Hypotheses 2

Ho_2: There is no significant effect in the mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model

The data for testing hypothesis 2 is presented in Table 4.

Table 4: Analysis of Covariance (ANCOVA) significant effects in the mean interest scores of male and female students taught Graph related concepts in Economics using Treffinger learning model

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	677.418[a]	4	169.355	0.0226	.009
Intercept	3913.052	1	3913.052	31.752	.000
Pretest	11.294	1	11.294	0.092	.000
METHOD * GENDER	313.514	1	313.514	2.544	.112
Error	9612.494	89	123.237		
Total	874179.000	92			
Corrected Total	10289.912	91			

Discussion

The findings revealed that students taught graph related concepts in Economics using the Treffinger learning model had a higher positive mean interest gain compared to those taught graphic related concepts in Economics using the lecture method. Meanwhile, the corresponding hypothesis indicated that there was a significant effect in the mean interest scores of students taught Economics using Treffinger learning model and lecture methods. The result is in line with that of Okeke and Adedeji[35] whose findings showed that students taught using the Treffinger model (a form of problem-based learning) had significantly higher interest scores compared to those who were taught using conventional lecture

[35] C. Okeke, S. Adedeji, *Comparing the effect of problem-based learning and lecture methods on students' achievement in economics*, "Journal of Educational Studies" 2020, 14(2), p. 134-146.

methods and Nwachukwu and Jiboku[36] that students taught Economics using the Treffinger learning model showed a significantly higher level of interest in graph--related concepts compared to those taught with traditional lecture methods. Also, Olanrewaju[37] study found that the students who were taught Economics using the Treffinger learning model showed a significant increase in their interest in graph-related concepts when compared to those taught using conventional lecture methods and Bello and Osibanjo[38] whose study found that students who were taught using Treffinger learning model, exhibited a significantly higher level of interest in Economics concepts compared to those taught through conventional lecture methods. Furthermore, Olumide and Ijeoma[39] study found that students who were taught Economics using the Treffinger learning model demonstrated a significant increase in interest scores compared to those taught using conventional lecture methods.

The findings of the study indicated that the male students taught graphic related concepts in Economics using the Treffinger learning model performed better in their mean interest scores than their female counterparts. However, on the test of hypothesis, indicated that there was no significant difference in the mean interest scores of male and female students taught graphic related concepts in Economics using peer tutorial method. This result corroborating the findings of Okeke, and Adedeji[40] that although male and female students showed different learning preferences, there was no significant effect of gender on their interest scores when taught Economics concepts through active learning methods, similar to the Treffinger learning model. Both male and female students showed similar levels of interest in Economics concepts like graphing. Also, Bello and Osibanjo[41] study found out that both male and female students were taught Economics using innovative methods (including the Treffinger learning model). The results indicated no significant differences in the interest levels between the two genders, suggesting that the model was equally effective in engaging both male and female students. Again, K. Olanrewaju[42] study found no significant difference in the interest levels of male and female students taught Economics using the

[36] M. Nwachukwu, O. Jiboku, *Effectiveness of teaching methods in enhancing students' interest in economics concepts*, "International Journal of Educational Research" 2020, 9(3), p. 122-130.

[37] K. Olanrewaju, *Evaluating the influence of constructivist teaching on students' attitude towards economics*, "International Journal of Educational Innovations" 2021, 7(3), p. 98-107.

[38] S. Bello, S. Osibanjo, *The effect of active learning on students' achievement and interest in economics: A comparative study*, "Journal of Education and Practice" 2022, 13(11), p. 45-56.

[39] A. Olumide, U. Ijeoma, *The impact of teaching strategies on senior secondary school students' interest in economics*, "African Journal of Educational Research" 2022, 10(4), p. 210-218.

[40] C. Okeke, S. Adedeji,

[41] S. Bello, S. Osibanjo,

[42] K. Olanrewaju,

active learning strategies similar to the Treffinger model. Both genders exhibited similar levels of engagement and interest in graph-related topics, indicating that gender did not significantly influence the outcome and Nwachukwu and Jiboku[43] research demonstrated that gender had no significant effect on the interest levels of students when taught Economics using active learning approaches like the Treffinger model. Both male and female students showed similar interest in graph-related concepts despite using different teaching methods.

Conclusion

This study explored the effects of the Treffinger Learning Model on senior secondary school students' interest in graphic-related concepts in Economics in Plateau State. The findings revealed that traditional teaching methods, which are commonly used in classrooms, are insufficient in engaging students and fostering their interest in abstract and graphical topics in Economics.

The Treffinger Learning Model, with its emphasis on creativity, problem--solving, and active participation, proved to be a more effective instructional approach. It enhanced students' curiosity, engagement, and overall interest in learning graphic-related concepts such as demand and supply curves, cost analysis, and production possibility frontiers. The model's learner-centered approach helped bridge the gap between theoretical understanding and practical application, enabling students to better appreciate the relevance of Economics in real-life situations.

These findings underscore the importance of adopting innovative teaching strategies like the Treffinger Learning Model to address the challenges of low interest and poor performance in Economics. By integrating creative and problem--solving activities into the curriculum, educators can create a more stimulating and effective learning environment.

In conclusion, the Treffinger Learning Model offers a promising alternative to traditional teaching methods for enhancing students' interest in Economics. Its implementation in senior secondary schools in Plateau State can contribute significantly to improving students' engagement and academic success in the subject.

Recommendations

Based on the findings of this study on the effects of the Treffinger Learning Model on senior secondary school students' interest in graphic-related concepts in Economics in Plateau State, the following recommendations are made:

[43] M. Nwachukwu, O. Jiboku,

1. Schools and educational authorities should adopt the use of the Treffinger Learning Model as a teaching strategy to enhance students' interest and engagement in Economics. This model's emphasis on creativity and problem-solving can help students better understand and appreciate graphic-related concepts.
2. Workshops, seminars, and in-service training programs should be organized for Economics teachers to familiarize them with the principles and application of the Treffinger Learning Model. This will equip teachers with the necessary skills to effectively implement the model in their classrooms.
3. The curriculum for senior secondary school Economics should be reviewed to incorporate learner-centered approaches like the Treffinger Learning Model. Specific guidelines and resources for teaching graphic-related concepts using innovative methods should be included.

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