



Students' attitudes and academic performance in the graphical aspect of Economics: Evidence from public secondary schools in Plateau State, Nigeria

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Abstract

Background and Aim: Graphical analysis is essential in Economics education because it enables students to interpret economic relationships, examine market behaviour, and apply theory to real-world situations. Nevertheless, Nigerian students' performance in graph-related WASSCE Economics questions remains persistently poor. This study examined students' attitudes, achievement, and the relationship between both variables in Plateau State.

Materials and Methods: A correlational design was adopted. The population comprised 1,090 SS II Economics students in public secondary schools in Kanke (453) and Pankshin (637) Local Government Areas. Using two-stage sampling, 20 eligible schools were purposively selected, followed by the random selection of 15 students per school, yielding 300 participants. Data were collected using the Students' Attitude towards the Graphical Aspect of Economics Questionnaire and the Academic Achievement Test in the Graphical Aspect of Economics. Reliability was high (Cronbach's $\alpha=.944$; KR-20=.956). Normality and linearity assumptions were satisfied. Frequencies, percentages, means, standard deviations, and Pearson's correlation were computed at $\alpha=.05$.

Results: Overall, 81.7% of students exhibited negative attitudes. Achievement was low: 40.0% failed, whereas only 1.0% attained distinction. Attitude correlated moderately, positively, and significantly with achievement, $r(298) = .45$, 95% CI [.358, .539], $p<.001$; therefore, the null hypothesis was rejected.

Conclusion: Students with more positive attitudes are likely to achieve better outcomes in graphical Economics. Attitude improvement should therefore form an integral component of instruction. The study provides context-specific evidence concerning attitude and graph-related learning in Nigerian secondary schools and supports learner-centred, activity-based, and technology-enhanced teaching approaches for improved academic achievement.

Keywords: Academic Performance, Attitudes, Economics Education, Graphical Analysis, Secondary School Students

Introduction

Economics education serves as a vital component in the development of students' analytical reasoning, critical thinking, problem-solving, and decision-making abilities, which are crucial for their effective participation in modern society. The Economics course equips students with the knowledge and skills to comprehend the allocation of scarce resources, market interactions, public policy, and sustainable economic development. Thus, Economics holds a significant place in the senior secondary school curriculum in Nigeria and is a prerequisite subject for various tertiary-level courses in the social sciences, management sciences, accounting, finance, business administration, and related courses (Mohammed & Pitan, 2023).

One of the key elements of Economics learning is the graphical method, which is a technique to represent and interpret the relationships between economic variables. The concepts of demand and supply, market equilibrium, elasticity, production, costs and revenues, and consumer behaviour are frequent topics of study in Economics, and graphs are essential to this learning process, and so are graphical skills. Instead of memorisation, students should develop, understand, and use graphical representations to interpret economic phenomena. In this regard, graph competence has become an indispensable criterion for conceptual understanding because it necessitates the incorporation of all the aforementioned elements of economic reasoning, mathematical knowledge, and visual literacy (Cohn et al., 2004; Ikwueze, 2024; Ring & Oberrauch, 2024).

However, the students still have problems with graphical concepts. In the explicit area of weakness of the West African Examinations Council (WAEC, 2023) Chief Examiner's Report, it was noted that the interpretation of graphical representation of economic concepts was a subject area that many candidates lacked in their performance in Economics paper 2; a deficiency that was also reported by the Chief Examiner in subsequent Chief Examiner's Reports (WAEC, 2022, 2023, 2024) and confirmed by empirical research conducted by Arsaythamby & Julinamary (2015) as well as





Mohammed (2022) which note that the graph-related content is one of the most difficult areas in Economics in secondary schools. Similarly, at the state level, Mawak et al. (2024) noted that the continuous assessment test (CATE) was poor, as it is made by teachers but not of high-quality standards, which was also a major cause of the failure of external Economics examinations results' failure for Plateau State students, while Bulus and Chukwuma (2021) found that the poor performance in Economics examination in Jos metropolis, Plateau State, over the years was attributed to the lack of consistency in examination syllabus coverage and general unpreparedness of Economics candidates in the metropolis. Most relevant for the present work is the study by Idakwoji et al. (2025), which was conducted in Pankshin LGA; they observed in the classes that Economics teachers gave tests that focused on memorising and repeating rather than understanding the graphs, as students were expected to do for at least a credit pass. Fortunately, a body of intervention studies demonstrates that learning outcomes in this area can be enhanced through personalised mastery learning using formative assessment (Ede & Oleabhiele, 2020; Okeke et al., 2023), which indicates that this is a challenge that can be addressed, not overcome.

Some of the factors that have been related to the students' academic performance in Economics are instructional factors, mathematical ability, classroom environment, learning resources, students' attitude, among others (Ajayi & Kayode, 2016; Mohammed, 2022; D. O. Oyeniran & M. F. Oyeniran, 2024). Of these, student attitude has received significant research interest as it affects the motivation, engagement, persistence, and willingness of students to undertake challenging learning activities. The proposition is supported by Bandura's (1986) Social Cognitive Theory and Eccles and Wigfield's (2020) Expectancy-Value Theory, which propose that students who think academic tasks are important and that they can succeed will exhibit positive learning behaviours and better academic results. In line with these theoretical propositions, empirical studies have documented the significant positive correlation between students' attitude and academic performance in the area of Economics (Ajayi & Kayode, 2016; Filade et al., 2020; Ibrahim, 2025).

Also, there is a positive association between attitude and achievement in Economics, and three gaps were identified. The first is that most of the studies concern attitude towards Economics in general and not specifically towards graphics. Second, Nigerian studies on graph-related Economics have been limited to instructional interventions and assessment strategies, but with little attention paid to learners' affective variables. Third, there is limited research carried out on the relationship between attitude and graphical performance among senior secondary students in Plateau State, and more specifically in Kanke and Pankshin LGAs. Thus, the link between students' attitude towards graphical analysis and their ability in this context is still not clear.

This third gap is directly manifested in the choice of Kanke and Pankshin LGAs as study locations, which is based on the most localised evidence available, and not on a blanket assumption of rural disadvantage. There is no official disaggregated series of WAEC results by LGA against which to include Kanke and Pankshin, so no direct LGA-level pass-rate data is available for the study to use as a benchmark for Kanke and Pankshin's performance. Building on this finding, Idakwoji et al. (2025), using baseline classroom observation, found that in Pankshin, Economics teachers implemented continuous-assessment tests, which favoured rote learning and memorisation, instead of the skill of comprehending graphs that the WAEC syllabus and the specific population that this study samples demand: another site-specific instructional-practice finding that plausibly explains why performance with respect to graphs is lower in the population sampled than it is in the general rural classification. Kanke is included with Pankshin because the two LGAs have a similar rural and agrarian profile, occupy the same resource-constrained environment, and their closest study in terms of education is the study conducted by Bature and Barki (2019) on structural access constraints to schooling in Pankshin, which shows that the performance of secondary Economics has not been examined in the LGA before; this gap in evidence is not a reason for excluding it from the study as would be expected. There is a reasonable amount of existing research in the two LGAs, but none of them has examined this study's focus, which is secondary Economics, and especially its graphical aspect, as Bature and Barki (2019) was the only closely related study in Kanke.

It was also narrowed down to SS II students alone because they are at the advanced stage of the senior secondary Economics curriculum, have been introduced to major graph-related concepts, and are not yet mainly involved in the external examination process of SS III.

This study therefore investigated the relationship between attitude and academic performance of the graphical aspect of Economics among the Senior Secondary School II students of the public secondary schools of Kanke and Pankshin Local Government Areas of Plateau State in Nigeria with a view to addressing the identified gaps.



Objectives of the Study

The study sought to:

1. To determine the proportion of SS II students with negative, neutral and positive attitudes towards the graphical aspect of Economics;
2. To determine the distribution of SS II students across performance levels in the graphical aspect of Economics; and
3. To determine the strength and direction of the relationship between students' attitudes towards the graphical aspect of Economics and their academic performance in graph-related Economics.

Research Questions

1. What proportions of SS II students have negative, neutral, and positive attitudes towards the graphical aspect of Economics?
2. What is the distribution of SS II students across performance levels in the graphical aspect of Economics?
3. What is the strength and direction of the relationship between students' attitudes towards the graphical aspect of Economics and their academic performance in graph-related Economics?

Research Hypothesis

H₀: There is no significant relationship between students' attitudes and academic performance in the graphical aspect of Economics.

H₁: There is a significant positive relationship between students' attitudes and academic performance in graph-related Economics.

Literature Review

This study has three important implications for the Economics education literature. First, it focuses students' attention on their general attitudes towards Economics, rather than their attitudes towards the graphical dimension of Economics, which involves the use of economic reasoning, mathematical understanding, and visual interpretation. Secondly, it offered empirical evidence to the effect that students' attitude positively affects their performance in graph-related Economics in Second Secondary Schools in Kanke and Pankshin LGAs of Plateau State, beyond the study conducted at the general Economics level and in other geographical contexts. Thirdly, the results offer context-specific evidence that can guide curriculum implementation, curriculum professional development, and instructional design. However, the study revealed that negative attitudes towards the graph-related aspects of Economics were predominant, which indicated a need to find more engaging, understandable, and practical ways to teach the subject. The results may, therefore, help teachers, school administrators, and curriculum developers develop learning activities to build students' confidence, interest, and engagement in graphical analysis.

Economic Education - Graphical Analysis

The use of graphical analysis in Economics education is essential as it helps the learner to visualise, interpret, and explain the relationship between variables. The concepts of demand and supply, market equilibrium, elasticity, production, costs, revenues, and market structures are frequently explained using graphs, and graph interpretation plays an important role in the conceptual understanding of the Economics topic. Thereby, students are expected not only to build up graphs correctly but also to interpret, evaluate, and use the graphical representations for the analysis of economic phenomena (Ring & Oberrauch, 2024).

Over the last few years, economic graph competence has gained importance in the literature as a specific aspect of Economics competence. According to Ring and Oberrauch (2024), economic graph competence is the ability of the students to construct, interpret, evaluate, and apply graphical representations to explain economic relationships. They showed that the acquisition of graph competence is not solely dependent on graphical skills, but on the integration of knowledge of the economy, mathematical reasoning, and visual literacy. The same applies to the way economic graphs are used as multiple representations in the teaching and learning of Economics. Ring (2020) explained that the use of economic graphs as multiple representations would enable a deeper conceptual understanding and meaningful learning, as economic graphs relate abstract economic theories to the phenomena in the real world. Overall, the results of these studies have indicated that graph competence is a multidimensional phenomenon that allows for good learning in Economics.



Further, empirical evidence suggests that cognitive factors as well as affective factors are important in students' success in graph-related Economics. Cohn et al. (2004) discovered that the attitudes of learners towards economic graphs and their achievement in learning Economics were significantly correlated. When they had positive attitudes towards economic graphs, it was found that they were more willing to interpret economic graphs and had greater achievement in learning Economics. From their results, they conclude that the learning of graphs was not only a cognitive skill, but also learners' interest, confidence, and attitudes towards graphical analysis.

Though graph competency is acknowledged as a critical skill, it is one of the most challenging topics for students learning Economics. Arsaythamby and Julinamary (2015) indicated that students faced a significant challenge with graphs, symbols, and quantitative problem-solving, as they were involved in interpreting the mathematical and economic information at once. Mohammed (2022) also reported in the Nigerian context that topics of graph-related concepts are among the most challenging topics in the economic curriculum at the senior secondary school level. In line with these findings, the subsequent WAEC Chief Examiners' Reports 2022-2024 have continuously highlighted the following weaknesses in the areas of graph construction, graph interpretation, and application of graphical principles among candidates during external exams.

Instruction must go beyond mechanically drawing graphs, since economic graph competence involves the integration of economic concepts, mathematical reasoning, and visual interpretation. Teaching methods should include opportunities for students to make, analyse, compare and use graphs, and link graphs with economic phenomena. This instructional requirement contributes to understanding why interventions that involve teaching with multiple representations, active engagement and feedback, and learner-centred approaches have become more common than teacher-talk alone in Economics with a graph focus.

The use of approaches to teaching that engage students in graphical reasoning is supported by evidence in Economics education. For instance, Ede and Oleabhielle (2020) showed that personalised mastery learning resulted in superior achievement and retention of graph-related concepts compared to conventional teaching. Likewise, Okeke et al. (2023) found that the use of self-assessment and peer-assessment had positive effects on the performance of students in Economics, indicating that opportunities for reflection, feedback and active participation in learning can be useful in enhancing students' performance.

Instructional strategies that offer opportunities for learners to interact with, manipulate, and/or apply visual representations could be especially useful given that the graphical approach involves learners integrating concepts of economics with mathematical reasoning and visual interpretation. The studies of digital learning in Economics education in recent years have confirmed the possibility of using technology-enhanced learning to encourage the transfer of knowledge and student involvement. In a quasi-experimental study with 63 trainee teachers, Reichert-Schlax et al. (2023) tested digital learning tools to foster applicable pedagogical knowledge and were able to record positive developments in the facets of the pedagogical knowledge they wanted to change, and to also elicit positive feedback on the tools' usability and usefulness. Likewise, Kuzmina and Kuzmin (2025) studied interactive digital tools in the field of Economics education and identified some of the tools which are not widely used or known by students and teachers, but are becoming relevant in Economics teaching. The results show that digital and interactive media can offer further opportunities for active, multimodal and application-oriented learning in the subject of Economics. Such tools may help learners in graphical Economics to interact dynamically with representations and economic relationships, apart from relying solely on the teacher's presentation of static graphs.

However, it is necessary to treat these existing pieces of digital learning evidence with caution when considering secondary-school graphical Economics. Reichert-Schlax et al. (2023) have studied higher education trainee teachers, and Kuzmina and Kuzmin (2025) have investigated the context of higher education within the field of Economics students and educators. Therefore, these studies provide evidence of the potential relevance of digital tools to the teaching of Economics, but fail to determine if digital graphical learning approaches yield equivalent benefits to secondary-school students learning about economic graphs. The limitation of this context highlights the importance of ongoing research into effective ways of teaching graphical Economics at the secondary-school level.

Generally, the literature reviewed shows that graphical analysis is a key component in meaningful learning in Economics, and continues to cause significant problems for students even after the subject is made a priority in the curriculum and innovative classroom practices are introduced. Most importantly, previous research has focused mainly on graph competence and instructional strategies, with very few research efforts being directed towards the effect of student attitude on learning in the graphical component of Economics, especially for senior secondary school students in Plateau State,



Nigeria. This gap is the basis for the present study and naturally leads to the students' attitudes towards the graphical aspect of Economics.

Students' Attitudes towards the Graphical Aspect of Economics

Students' attitude is one of the most researched affective variables in the field of education since it affects the motivation, involvement, persistence, and study behaviours of learners. In an educational setting, attitude is a predisposition that has been acquired that shapes the way students think, feel, and act about a subject, learning activity, or educational experience. It involves learners' belief in a topic (cognitive component), attitude towards a topic (affective component), and their willingness to respond positively or negatively during learning activities (behavioural component). Attitudes are considered significant factors for students' active involvement in learning activities in the classroom, as they influence their academic success (O'Donnell et al., 2024).

However, in the field of Economics education, it is imperative to differentiate the students' attitude in Economics from the attitude of students towards the graphical aspect of Economics. General attitude towards Economics indicates the students' overall attitude towards the subject, which involves their interest in Economics, perceived usefulness, confidence/difficulty in learning economics, and willingness/behavioural intentions to do economics in general. Attitude towards the graphical aspect of Economics is more specific and relates to the attitude of students with respect to their beliefs, feelings, and behavioural tendencies towards graph-related learning activities, including construction of graphs, interpretation, and application of economic graphs. Therefore, one student could have a positive outlook on Economics as a subject but feel uneasy, lack confidence, and not like working with graphs when asked to do so. But if the overall attitude of a student towards Economics is less favourable, he/she might enjoy the graphical presentation and feel interested in Economics-related activities.

Cohn et al. (2004) have shown that students who had attitudes that were positive towards economic graphs had significantly higher academic performance than students who had less favourable attitudes. The authors found that positive attitudes facilitated students' motivation and interest in doing graph-related activities and thus helped to improve conceptual knowledge and achievement. The factors influencing graph competence have been discussed more recently by Ring and Oberrauch (2024), who suggested that motivational and affective factors that promote active understanding of graphical representations also have an impact on graph competence. Likewise, Oyewole and Egbetola (2026) reported that the students' learning styles highly predict their attitudes towards the concepts of graphs in Economics, implying that the experiences of the learner during the teaching of the concepts of graphs were significant to the formation of their positive or negative attitudes.

The studies presented here are significant since they suggest that students' affective response to graphs is a more specific aspect of their learning of Economics than general attitude towards Economics. The attitudes of the students towards graphical representations, enjoyment of graph-related activities, perceived difficulty of graphs, and willingness to solve graph problems may affect students' responses to the learning tasks that are presented as graphs. These answers can be particularly useful when students engage with economic concepts within a visual and/or mathematical context.

However, the literature is scanty in the study of students' attitudes towards the graphical component of Economics at secondary school level, specifically in the Nigerian context of the study. The majority of the studies available have focused on attitudes towards Economics as a school subject, not on attitudes towards graph concepts specifically. For example, the work of Ajayi and Kayode (2016), Filade et al. (2020) and Ibrahim (2025) supports the link between attitudes and academic outcomes of students of Economics, but their studies were only on the subject of Economics in general and not specifically on the attitudes of students on graph-based learning tasks. However, their conclusions should not be taken as proof of a similar relationship between students' attitudes and their performance in graphical concepts. Moreover, there is limited empirical data on the attitudes of students towards graphical analysis in Plateau State, and it is not clear if there is any relationship between the attitudes of the students and their academic performance. This gap motivated the present study, which focuses on the relationship between students' attitude and their performance in the graphical aspect of Economics among senior secondary school students in Nigeria.

The difference is significant because graphical learning could have affective demands which may not necessarily be apparent in students' general attitude towards Economics. Some tasks in relation to graphs may involve handling unfamiliar visual data, associating graphical data with economic data, applying mathematical concepts, and making choices based on the graphical data. These requirements can create graphical anxiety or students' lack of confidence, even for students who are generally fond of Economics. On the other hand, continued successful experiences of creating and interpreting graphs can lead to better confidence and understanding of graphical representations. This graphical nature of

these experiences thus suggests that attitudes towards the graphical aspect of Economics need to be explored separately from general attitudes towards Economics and not as a good substitute.

Based on the above literature, it could be concluded that students' attitudes towards the graphical aspect of Economics are multidimensional, involving students' cognitive beliefs, affective responses, and behaviour towards the learning activities related to the graphical aspect of Economics. The attitudes as indicated by the students in this study are their attitudes towards learning the concepts of graphs, their attitude towards using graphs in understanding the concept of Economics, their attitude towards making and interpreting graphs, their attitude towards enjoying graph-related activities in class, and their attitude towards enjoying problem-solving activities related to graphs. Pupils showing positive attitudes are expected to have a more active involvement in class discussions, to perform more graph construction exercises, and to be more persistent in answering more difficult questions presented graphically. In contrast, learners whose attitudes are negative are likely to be less engaged in learning, lack self-confidence, and reject graph-related activities. The present study used the Students' Attitude towards the Graphical Aspect of Economics Questionnaire (SATGAEQ) to measure students' attitudes, which is based on those dimensions.

Academic Performance in the Graphical Aspect of Economics

It is a common assumption that academic attainment is a good measure of the effectiveness of student learning in a programme of education in reaching its intended learning outcomes. It is a reflection of what learners have learnt in terms of knowledge, skills, competences, and how they have applied what they have learnt to solve academic problems. In education, academic achievement can be assessed by scores from standardised tests, summative tests, ongoing assessments, or other reliable sources of achievement measures. Academic performance is concrete proof of students' cognitive achievement due to quality teaching, relevant learning experiences, and sustained engagement of learners (O'Donnell et al., 2024).

In the context of Economics education, academic performance is measured by students' capacity to comprehend, analyse, interpret, and apply economic concepts to real-life situations. It is not just about memorising economic theories, but involves analytical thinking, critical reasoning, problem-solving, and understanding quantitative and graphical information. Therefore, students who score high marks in the Economics exam are expected to be able to explain economic relationships, analyse economic issues, interpret economic graphs, and apply economic principles in new situations (Mohammed & Pitan, 2023).

The graphical aspect of Economics is about the skills students develop when they create, interpret, analyse, and apply graphical representations to solve economic problems. Tasks involving assessment of graphs typically involve identifying relationships between economic variables, explaining movement along curves and shifts, interpreting equilibrium conditions, and drawing logical conclusions from the evidence provided in a graph. Ring and Oberrauch (2024) suggested that the ability to interpret graphs is an important component of economic literacy, as it demonstrates students' skills in applying mathematical knowledge and understanding to visual interpretation. Likewise, Ikwueze (2024) noted that students' analytical and graphical ability, which serves as a good proof of their conceptualisation from the learning process, can be used as an early sign of learning problems in Economics.

Graphical Economics, then, may be regarded as a series of cognitive demands, rather than a single, undifferentiated graph skill. Students should, at the most basic level, know and use conventions of graphical representation, know and interpret the terms used in economics, understand axes and scales, and be able to draw graphs correctly from data. At a higher level, students should be able to describe, interpret, and explain movements and shifts, analyse relationships between economic variables, and solve economic problems using graphical information. In the upper grades, the student might be expected to interpret visual data, make inferences based on visuals, and make decisions about unfamiliar economic scenarios. This sequence corresponds with the thinking stages outlined in the updated Bloom's taxonomy (Anderson & Krathwohl, 2001) from Remembering and Understanding to Applying and Analysing to Evaluating and Creating.

This is important to graphically evaluate Economics because being able to build a good graph is not sufficient to show that a student can think graphically. A learner may be able to graph a demand and supply curve correctly but may have trouble understanding a change in the curve, describing the economic impact of a change in the curve, or applying the curve to solve an unfamiliar problem. Therefore, evaluation of graphical performance should include both graph construction skills, as well as interpretation, analysis, and application skills.

Although graph-related competence is an important part of the curricula, studies repeatedly show students persevering problems with this area. Some of the topics most frequently perceived as difficult

by Nigerian secondary school students were graph-related concepts, according to Mohammed (2022), while Arsaythamby and Julinamary (2015) reported that many learners had problems with interpreting graphs and using quantitative reasoning to solve economic problems. In tandem with this, though, successive WAEC Chief Examiners' Reports (2022-2024) revealed that a major challenge that faced candidates in the West African Senior School Certificate Examination was in graph construction, economic curve interpretation, and the application of graphical principles. The reports indicate that the topic of graph-related learning is still one of the problems that face Economics learning in secondary schools.

There are a number of empirical studies that have examined ways to enhance the achievement of students in graph-related Economics. Ede and Oleabhiele (2020) concluded that personalised mastery learning led to a significant improvement in students' academic outcomes and retention of the concepts of graphs in mathematics compared to normal teaching. Likewise, Okeke et al. (2023) found that self-assessment and peer-assessment were effective tools for boosting students' performance in the economics topic on graphs content and fostered active engagement in learning among the students. The above studies suggest that the learning outcomes of students in graph-based Education in Economics can be enhanced by applying appropriate teaching and evaluation techniques, but most of the studies did not address learners' characteristics.

It has also been found that students' learning achievement is affected by the combination of cognitive, affective, instructional, and environmental factors. Research conducted by Ajayi and Kayode (2016), Ibrahim (2025), and D. O. Oyeniran and M. F. Oyeniran (2024) showed that factors like students' attitude, study habits, learning styles, mathematical ability, classroom environment, and school characteristics greatly affected achievement in Economics. However, few studies focus on the graphical aspect of the subject, specifically on students' attitude towards the subject in Nigeria, especially senior secondary school students' performance in Economics in Nigeria.

In the current study, academic achievement was measured in terms of students' performance on the Academic Achievement Test in Graphical Aspect of Economics (AATGAE) created by the researcher to test the students' competence in constructing and interpreting graphs, applying the graphical aspects, and solving problems graphically. Higher scores on the AATGAE represent higher competence in graph-related economics, and lower scores represent less understanding of the concept of graphs and lower analytical ability.

This meant that the AATGAE was designed to assess more than just the ability to recreate graphical representations. The material it included encompassed competencies in building graphs, interpreting them, applying them, and graphical problem-solving, thus giving an indication of the level of cognitive engagement with graphical Economics that a student had.

Reviewed literature shows that achievement in the graphical part of Economics is a multi-faceted product of both the learner and instruction. Existing research has offered some illumination for strategies to enhance learners' achievement in graph component of economics, but there is limited empirical evidence on the impact of students' attitude on achievement in the graphical component of Economics in the context of Plateau State, Nigeria. This gap further motivated the current study.

Theoretical Framework

The study is based on the Social Cognitive Theory developed by Bandura (1986) and the Expectancy-Value Theory proposed by Eccles and Wigfield (2020). As a combination of these theories, they can account for the influence of students' beliefs, motivation, and attitudes on their learning behaviours and academic performance.

Social Cognitive Theory

Bandura (1986) developed Social Cognitive Theory to explain human learning as the result of reciprocal interactions between the person, behaviour, and environment. The theory suggests that learning is more than just being taught, but is also a process that can be obtained by observation, experience, reflection, and interaction with the learning environment. Self-efficacy, the subject's confidence in his/her ability to plan and execute the behaviour necessary to achieve a specific goal, is one of the basic ideas in the theory.

Bandura (1986) found that students with high self-efficacy tend to undertake challenging learning tasks with confidence, make more effort, persist, and overcome failures. On the other hand, pupils who have low self-efficacy tend not to take up challenges, become anxious when faced with difficulties, put in less effort, and tend to give up more quickly when they encounter problems. The differences in learning behaviours eventually impact learning outcomes.

The theory is largely relevant to the graphic aspect of Economics because, when preparing and interpreting a graph, students must combine conceptual understanding, mathematical reasoning, and visual analysis. Students who think that they can interpret an economic graph are more inclined to take part in classroom activities of the classroom that are related to the graph, and they practise constructing a graph regularly and are not easily discouraged from solving graph problems. These positive learning behaviours should facilitate better academic achievement. Students who lack confidence in their graph-related skills, on the other hand, will avoid using graphs, form negative attitudes, and get poor grades in assessments.

While the Social Cognitive Theory mainly emphasises the learners' self-efficacy, it acknowledges that attitudes influence the learners' motivation, participation, and learning behaviour in the classroom. The theory thus offers a useful perspective on the possible link between positive attitudes towards the graphical component of Economics and academic performance.

Expectancy-Value Theory

The theory of expectancy-value, advanced by Eccles and Wigfield (2020), is used to describe achievement-oriented behaviour and posits two important factors: the learners' expectation of success and their value attached to a learning task. The theory suggests that students will be more actively involved in school activities if they think they will be successful at them and if they think that the activity will be useful, interesting, and important to them.

Expectancy is the students' belief about the probability that they will be successful in a specific task, and task value includes the following component factors: intrinsic interest, perceived usefulness, personal importance, and perceived cost. The theory indicates that students who believe that learning an activity is worthwhile are likely to put in effort, persevere through problems, and perform better academically.

The students who think that graphical analysis is an important means of comprehending Economics, and who think that they can interpret the economic graph successfully, are expected to have favourable attitudes towards graphical-related learning in the context of the present study. These students are more likely to engage in class conversations, work through the building of graphs, ask questions when they encounter problems, and work harder to understand the concepts of graphs. On the other hand, when students feel that graph-related tasks are too hard, not applicable to them, or out of their reach, it can lead to negative attitudes, lower motivation, and less engagement with learning.

The theory gives sufficient explanation as to why the attitude of students towards the graphical aspect of Economics may affect their academic performance. It also helps confirm the idea that raising students' perceptions of graph-related learning improves students' motivation, engagement, and achievement.

Relevance of the Theories to the Present Study

The two theories complement one another in explaining the relationship investigated in this study. Social Cognitive Theory focuses on students' belief of abilities and their effect on learning behaviour, while Expectancy-Value Theory focuses on the impact of students' perceived value and utility of graph-related learning on their motivation and persistence. The theories indicate that if students have positive attitudes towards the graphical part of Economics, they would be more motivated to actively participate in learning tasks involving graphs, persist in performing difficult tasks, and achieve better learning outcomes.

Both theories discuss similar motivational processes, but present them from two different perspectives. In contrast, the attention of Social Cognitive Theory is paid to perceived capability and the interaction of personal, behavioural and environmental components, while that of Expectancy-Value Theory is paid to the students' expectations of success and the value or cost they attach to a task. In graphical Economics, these viewpoints can reinforce each other: if a student thinks he or she can interpret graphs, he or she is likely to find the activities associated with doing so worthwhile; similarly, whether the student successfully engages in an activity or not may affect his or her sense of competence and the activity's value.

Theories can, however, give different explanations of the same learning behaviour. A student might think it helpful and relevant to study graphical Economics but be less confident of his or her maths and/or graphical skills and so prefer not to do tasks within this area. A student also might be very

sure of his/her ability to do a graph-related task but have little value in doing the activity and consequently invest little effort. Positive expectancy or self-efficacy does not guarantee positive engagement or positive academic outcomes.

Moreover, the applicability of these theories in terms of explanation may be restricted in some cases when students' performance is evaluated in a high-stakes examination scenario like the West African Senior School Certificate Examination (WASSCE). Self-efficacy, expectations, and task values of students are intertwined with examination pressure, time limitation, prior knowledge, teacher quality, instructional experiences, and other contextual factors. A student can have a positive attitude and high expectancy of success but still perform poorly due to poor preparation or to the unfamiliar demands of the exams. On the other hand, those students who are only interested in exam preparation might be able to earn a reasonable grade without being very interested in graphical Economics. The two theories are, therefore, beneficial in the explanation of the motivational and affective aspects of the relationship analysed in this study, but they are not considered to be comprehensive explanations of academic achievement.

This is why, in this current study, it is assumed that having positive attitudes towards the graphical aspect of Economics will foster positive learning behaviours, which in turn will lead to good scores for the students. This proposition is the basis for studying the relationship between students' attitudes and academic performance of Senior Secondary School II in public secondary schools in Kanke and Pankshin Local Government Areas of Plateau State, Nigeria.

This theoretical proposition is used as the basis of the expected relationship; however, because the present study is correlational in nature, it is not the same as evidence for the cause of academic performance in terms of attitudes. Empirical analysis involves the strength and direction of the relationship between the two variables.

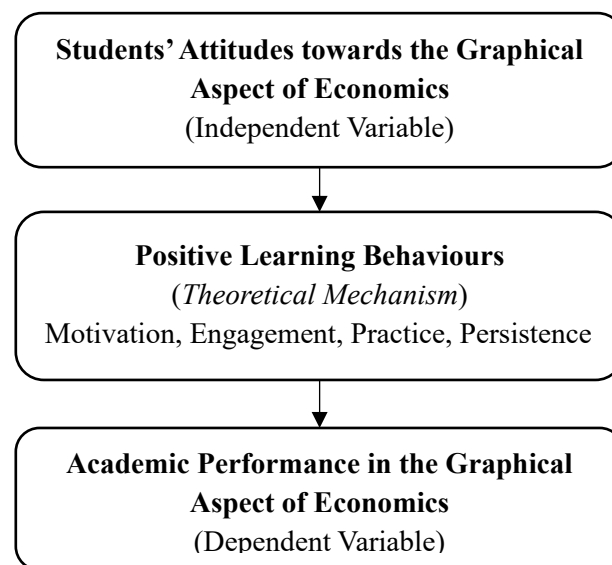


Figure 1: Conceptual Framework Illustrating the Relationship between Students' Attitudes and Academic Performance in the Graphical Aspect of Economics

The framework suggests that students' attitudes with respect to the graphical aspect of Economics can affect academic performance through positive learning behaviours such as students' motivation, engagement, practice, and persistence. The theoretical mechanism is based on Bandura's (1986) Social Cognitive Theory and Eccles and Wigfield's (2020) Expectancy-Value Theory.

It should be noted, however, that the framework is a conceptual model of the prospective relationship and does not contain direct evidence for a tested causal pathway. The two theories suggest that motivation, engagement, practice, and persistence may be behavioural mechanisms, but these were not measured as mediators in the present study. Likewise, other conditions of the students and context beyond the key relationship studied could affect students' achievement. These can include prior



mathematics skills, prior knowledge of Economics, teacher quality, teaching method, class environment and learning resources.

These factors can impact students' attitudes, the opportunities they have to participate in graph-related learning tasks, and their performance of that learning. Thus, their inclusion in the conceptual framework should not be taken as evidence of statistical testing of their role as a mediator or moderator in the present study, but merely as a way to more realistically describe the process of graphical Economics learning.

Empirical Review

Students' attitudes and academic performance in Economics

Students' attitudes have always been known to be one of the important factors that determine learning outcomes in Economics. The findings of the Nigerian study and the international studies all point to the fact that students whose attitude is favourable towards Economics are more motivated to participate in classroom activities, exhibit good study habits, and perform better than their counterparts with a negative attitude. Correlational and regression designs were used by Ajayi and Kayode (2016), Filade et al. (2020), and Ibrahim (2025), who consistently reported a positive relationship between students' attitude and academic achievement in Economics and found the relationship significant.

The methodology employed in these studies applies to the present study since the correlational and regression designs allow an analysis of the relationships between the learner characteristics and academic outcomes without affecting the learning environment. The results should be viewed as associations and not causation, however. Moreover, since these studies focused on attitudes toward Economics in general, it is unclear whether students' attitudes toward specific graph-related tasks are also correlated with achievement. This generality of the attitude construct is also an important limitation in using the results in graphical Economics.

The findings from these studies indicate that positive attitudes foster increased learning engagement, persistence and academic commitment, leading to enhanced achievement. The studies, however, have been conceptualised in a general way without a distinction between attitudes towards specific curriculum components such as graphical analysis.

Recent research also indicates that learners take on different attitudes, and these attitudes, combined with other learner factors, impact achievement. For example, students' attitudes, learning styles, and mathematical ability all predicted their achievement in the Economics course, as shown in the study by Oyewole et al. (2022), while the study by D. O. Oyeniran and M. F. Oyeniran (2024) showed that there was a significant relationship between student- and school-level characteristics that account for the variation in Economics achievement.

This is very useful since it shows that there is a relationship between academic performance and attitude beyond the basic level. Because attitude was taken into consideration, besides learning styles and mathematical ability, by Oyewole et al. (2022), a wider learner-level perspective was considered, while D. O. Oyeniran and M. F. Oyeniran (2024) further extended the explanation to student- and school-level characteristics. These studies collectively imply that attitude is a cognitive, affective, and contextual factor among other factors involved in Economics achievement.

The sum of these results suggests that while many factors affect academic success, students' attitudes toward learning are one of the reliable learner-related factors affecting academic performance.

Although the available evidence strongly supports the importance of students' attitudes in Economics education, relatively few studies have examined attitudes towards the graphical aspect of Economics specifically. Previous studies have usually considered economics as a single entity, ignoring graph-related concepts that involve conceptual knowledge, mathematical reasoning and visualisation. As a result, information about the attitudes of secondary school learners toward graphical analysis is still very scarce.

Relationship between graphical analysis and students' academic achievement in Economics

Graphical analysis is a problem area in Economics education, as consistently demonstrated by research into graph-related learning. Cohn et al. (2004) showed that a positive attitude towards economic graphs was significantly correlated with students' performance, thus indicating that graph learning is closely linked to cognitive skills and affective attitudes. Recently, Ring and Oberrauch

(2024) suggested that graph competence is a multidimensional phenomenon that involves conceptual knowledge, mathematical reasoning, and visual literacy. Similarly, Ikwueze (2024) pointed out that the graphical and analytical skills of students present good evidence of their understanding of the concept and can help detect learning challenges as early as they occur.

In the Nigerian context, research has been primarily focused on instructional interventions to enhance achievement in the area of graphs. Ede and Oleabhiere (2020) reported that personalised mastery learning resulted in significant improvement in students' achievement and retention of the graph-related concepts, and Okeke et al. (2023) reported that the use of personalised self- and peer-assessment strategies yielded positive results, with increased learner involvement and formative feedback contributing to the improvement in students' performance.

While the above intervention studies can be useful as evidence that instructional and assessment strategies can lead to improvements in graph-related achievement, these studies do not share the methodology of the present study. Ede and Oleabhiere (2020) investigated the impact of a personalised mastery-learning approach, and Okeke et al. (2023) investigated self- and peer-assessment. The studies are therefore focused on how the way instruction is given could be improved to influence learners' performance when given graphic Economics, rather than on the relationship between attitude and performance of learners towards graphic Economics. Based on their findings, their results confirm the relevance of the achievement aspect related to the graph, but the learner-affective dimension is relatively under-researched.

The results show that effective instruction can decrease the gap in achievement in the area of graph-related achievement. However, they offer little evidence to support their claim that students' attitude toward graphical analysis is related to student achievement.

The evidence from the field is thus suggesting two complementary, but not so much connected lines of research. One strand shows that general attitudes towards Economics are linked to academic achievement, and another shows how approaches to teaching and assessment can affect academic achievement related to graphs. Less known is the relationship between students' attitudes to the graphical aspect and their achievement of the graph-related tasks in Economics. This distinction serves as a starting point for the current research that is empirical.

Summary of Empirical Literature and Identified Gap

The empirical studies reviewed in this paper have consistently shown that positive attitudes among students are significantly related to their achievement in Economics and that the difficulty of the graph-related concepts is one of the most challenging areas in Economics. It has also been proven from previous research that a learner-centred teaching and learning approach is effective in enhancing students' achievement in graph concepts in Economics.

All of the reviewed literature indicates that a number of learning and teaching factors have an impact on students' graphical achievement in the field of Economics. Research in general Economics education has identified an attitudinal subscale in students' achievement and research in specific Graphs has identified three cognitive demands for graphical reasoning and the possibility of interventions in instruction and assessment. However, these two lines of evidence have not been integrated to focus on attitudes specifically towards graphical Economics and the students' performance in graphical tasks.

There are three key problems that cannot be overcome.

First, the majority of the previous studies focused on students' attitude towards Economics as a whole, and not on the graphical part of the subject. This results in a content-specific gap, as general attitudes towards Economics do not necessarily reflect students' level of confidence, interest, perceived difficulty, or willingness to deal with graphical tasks.

Second, investigations of the learner-related affective factors have been largely neglected in the study of graph-related Economics. This leads to an affective gap in the literature of graphing, as there have been more efforts in research and writing in the field of instructional strategies, assessment methods, and graph competence than in affective reactions relating to graphical learning.

Thirdly, there is limited empirical research on the relationship between the attitude of the students and their performance in the graphical aspects of Economics among the senior secondary school students in Plateau State, Nigeria. This is a contextual gap because evidence that has been produced in other contexts (educational levels or more expansive Economics) does not necessarily provide evidence



for the nature of the relationship among SS II students in public secondary schools in Kanke and Pankshin Local Government Areas of Plateau State.

The current study is addressed through a correlational research design, which is a type of research that looks for a correlation between the variables. The design is appropriate because it is intended to determine the nature, strength, and direction of the relationship between students' attitudes towards the graphical aspect of Economics and their academic performance without manipulation of either variable. The study therefore builds on the extant literature, which has been limited to General Economics attitude to the attitude of the students towards the graphs, and General Economics achievement to their achievement in graphical Economics. Also, the study extends the existing literature on the general geographical contexts to the specific contexts of the public secondary schools in Kanke and Pankshin Local Government Areas of Plateau State. Measures explicitly linked to the two constructs studied, the SATGAEQ and the AATGAE, are also used.

The present study was therefore conducted to explore this aspect to fill the above-mentioned gap by studying the correlation between students' attitude and their performance in the graphical aspect of Economics.

The study therefore gives empirical evidence on whether the attitude of the students of graphical economics is significantly correlated with the performance of students in graph-related economics tasks in the study context. As the study is correlational in nature, the results are designed to determine the association (direction and strength) between students' attitudes and academic performance, but not to provide evidence of the cause-and-effect relationship between the two.

Methodology

Research Design

A correlational research design was used in the study. The design was suitable, since the study sought to assess the strength of the relationship between the attitudes of students towards the graphical aspects of Economics and academic performance in Economics, without having to manipulate both variables. This design allowed the researchers to study the differences in students' attitudes and performance that occur in natural conditions. The study was not experimental, so the relationship between the variables, if any, should not be considered causation. The study's purpose prevented the use of either an experimental or quasi-experimental design because it clearly sought to determine whether there was a relationship, the direction of the relationship, and the strength of the relationship between the study variables.

Area of the Study

The study was conducted in two Local Government Areas (LGAs) of Plateau Central Senatorial District, namely Kanke and Pankshin in Plateau State, Nigeria. The reasons for this choice are explained in the Introduction, which notes that the two LGAs are demographically and geographically rural, and that evidence at both the examination and state and LGA levels indicates a need for a study on the graphical component of Economics.

Population of the Study

The population of the study consisted of 1,090 SS II students taking Economics in the public secondary schools in Kanke and Pankshin LGAs of Plateau State in total, which comprised 42 secondary schools (18 and 24 schools in Kanke and Pankshin, respectively) in the study area during the 2025/2026 academic session. The population size was 453 students (198 males and 255 females) in Kanke LGA and 637 students (278 males and 359 females) in Pankshin LGA. Hence, 41.6% of the population was from Kanke, and 58.4% was from Pankshin. Table 1 provides the distribution of the population.

Table 1: Number of Schools and Population of SS II Economics Students by LGA and Sex

LGA	No. of Schools	Male	Female	Total (Male + Female)	% of Student Population
Kanke	18	198	255	453	41.6%
Pankshin	24	278	359	637	58.4%
Total	42	476	614	1,090	100%

Note. Population = 1,090. Source: Fieldwork, 2026



Sample Size and Sampling Technique

300 students in SS II Economics were selected as the sample for the study. The sample size was chosen based on the Krejcie and Morgan (1970) table, which has a sample size of 285 for a population of 1090, and the researchers increased the sample size to 300, which will give a slightly larger sample for the correlational analysis.

A two-stage sampling procedure was used. The researchers conducted a preliminary survey in the two LGAs, namely Kanke and Pankshin, of public secondary schools to determine the schools offering Economics at SS II in the two LGAs. Twenty schools were selected purposively (10 schools per LGA). It is important to note that this was not a random selection of the schools, and the sampling was purposive since the subject of study was Economics, which is an elective subject; it was emphasised that, in this case, it should not be interpreted as a random selection of the schools.

The second stage involved getting the list of eligible SS II economics students in each of the 20 selected schools. The respondents were then picked from each of the selected schools by simple random sampling (balloting method), which ensures equal opportunity for selection of respondents in each school participating. So, 20 schools $\times$ 15 students gave a total of 300 students, of which 150 students were drawn from Kanke and 150 from Pankshin.

The sample was purposively selected, and therefore, the findings cannot be generalised to all the students of SS II Economics in all the schools of the two LGAs indiscriminately, as noted under Limitations.

Instruments for Data Collection

For data collection, two instruments were created by the researchers: Students' Attitude towards the Graphical Aspect of Economics Questionnaire (SATGAEQ) and Academic Achievement Test in the Graphical Aspect of Economics (AATGAE). The SATGAEQ consisted of 22 items that were broken down into the four attitudes of students towards the graphical nature of Economics: interest, perceived usefulness, confidence/difficulty, and behavioural intentions towards graph-related learning activities. Items were scored on a 4-point scale from Strongly Agree (4) to Strongly Disagree (1), and higher scores represented more positive attitudes. Affective and behavioural dispositions of students towards graphical Economics were captured as they were the target of the items. For instance, interest was measured using statements such as "I like graphical aspects of Economics" and "Graphical aspects of Economics are interesting to me"; beliefs about usefulness were measured by statements such as "Graphical aspect of Economics is important to everyday life"; beliefs about confidence/difficulty were measured by negatively worded statements such as "Graphical aspect of Economics is always confusing" and "Studying graphical aspect of Economics makes me feel nervous"; and behavioural intention was measured by statements such as "I will like to study Economics because of graphical aspect of Economics after secondary school." All the items were reverse-scored before the overall attitude scores were computed, and higher scores on items consistently indicated more positive attitudes towards the graphical component of Economics.

The AATGAE consisted of 40 multiple-choice questions based on the SS II Economics curriculum and essential content related to graphs, which encompassed the topics on demand, supply, basic tools of economic analysis, price system mechanism, and theory of consumer behaviour. Test items were selected and distributed based on the Table of Specification (Table 2), which was prepared to take care of proportional representation of the identified content areas required for learning the graphical aspect of Economics. The content areas were weighted in the ratio of 3: 3: 2: 1: 1, i.e., 30% Demand, 30% Supply, 20% Basic Tools for Economic Analysis, 10% Price System Mechanism, and 10% Theory of Consumer Behaviour, which correspond to 12, 12, 8, 4, and 4 items, respectively.

The cognitive dimension of the 40 items was represented by 30% knowledge (12 items), 50% comprehension (20 items), and 20% thinking (8 items). The relative weighting of comprehension was meant to give a good representation of the students' capacity to interpret and understand economic information visually, and the thinking category would be covered in tasks that involved applying and analysing the acquired principles of the graph. Items measured in terms of knowledge included recall or recognition of relevant economic concepts, terms, graphical conventions and relationships. Comprehension items tested students' understanding of the information displayed in graphs and their



knowledge of economic relationships that are depicted in graphs. Thinking items required students to apply or analyse graphical information to solve economic problems.

Table 2 demonstrates that for each content area there were items across all three cognitive levels. Four Knowledge, 6 Comprehension and 2 Thinking items were provided by each of Demand and Supply; 2 Knowledge, 4 Comprehension and 2 Thinking items were provided by Basic Tools for Economic Analysis; and 1 Knowledge, 2 Comprehension and 1 Thinking item were provided by each of Price System Mechanism and Theory of Consumer Behaviour. This resulted in 12 Knowledge, 20 Comprehension, and 8 Thinking items, for a total of 40 items. The table of specification was thus used to ensure that the content domain and cognitive levels addressed by the assessment were sufficiently represented in the AATGAE.

Table 2. *Table of Specifications for the Academic Achievement Test in the Graphical Aspect of Economics (AATGAE)*

Content area	Weight	Knowledge	Comprehension	Thinking (Application/Analysis)	Total
Demand	30%	4	6	2	12
Supply	30%	4	6	2	12
Basic Tools for Economic Analysis	20%	2	4	2	8
Price System Mechanism	10%	1	2	1	4
Theory of Consumer Behaviour	10%	1	2	1	4
Total	100%	12 (30%)	20 (50%)	8 (20%)	40(100%)

Validity of the Instruments

Both the SATGAEQ and AATGAE went through face and content validation with four experts from the University of Jos, two of whom are experts in Economics Education and two are experts in Research, Measurement and Evaluation. The validators looked at the clarity and appropriateness of the items, the suitability of the language, the alignment of items with the study objectives, the relevance to the Economics curriculum, and the content of item coverage.

After the review by the experts, the wording and phrasing of some items were changed for clarity and to eliminate ambiguity before the instruments were trial-tested. In order to obtain evidence of face and content validity, the validation process was therefore conducted prior to the administration of the instruments in the main study. It should be noted that the Content Validity Index (CVI) was not formally calculated, so the validity evidence reported in this study is based on expert judgment rather than CVI. This limitation is acknowledged and serves as a methodological direction for improvement in future replications of this instrument.

Reliability of the Instruments

The instruments were trial-tested with 30 SS II students, who had similar characteristics to the main-study students but were not part of the main-study sample. The 30 students represent 10% of the projected sample size of 300 students.

The reliability of the items on the instrument was determined by internal consistency using pilot data. The Cronbach's alpha coefficient for the SATGAEQ was .944. The AATGAE items were dichotomously scored (1 = correct, 0 = incorrect), and reliability was determined using the Kuder-Richardson Formula 20 (KR-20), which resulted in a coefficient of .956. The internal consistency of these coefficients was high on both instruments and supported the use of the instruments in the main study.

Data Collection Procedure

Principals of the schools that participated in the study permitted data collection. Aided by two trained research assistants, every school sampled was visited. It took over a period of two weeks for the

administration of the SATGAEQ and AATGAE across the sampled schools. The selected students were given the instruments at each school and retrieved immediately after completion of the instruments, which took about one hour and 30 minutes to administer and complete per session.

The purpose of the study was explained to the participants, and they were guided on how to answer the questionnaire and the achievement test. The AATGAE was applied in a strictly monitored manner to reduce the possibility of consultation and examination malpractice. The identities of participants were maintained during data collection and analysis. Consistency was achieved by following the same administration procedures in all schools participating in the study.

Data collection was followed by screening of the responses for completeness. 157 (2.4%) of all item cells (6,600 item cells: 300×22 SATGAEQ items) contained missing responses from the participants. Responses to the items not completed in the SATGAEQ were handled using person-mean imputation, which involved substituting the mean of the items that were completed for the missing item(s) for a specific respondent. It is consistent with Downey and King (1998) who compared the replacement methods and found that person-mean substitution yielded the lowest level of bias in the mean score, standard deviation, and correlation for Likert-type data, especially when the proportion of missing values is low, and when the items are from the same construct, as Hair et al. (2019) recommend person-mean imputation for the items of scales where less than 5% of data are missing. Unanswered items for the AATGAE were coded as 0, as with the dichotomous coding used for the achievement test, a correct answer to an achievement item was given a score of 1 and an incorrect or omitted answer was given a score of 0. In doing so, it was possible to have complete scores for the 300 participants in the subsequent analyses.

Method of Data Analysis

The Statistical Package for the Social Sciences (SPSS), Version 20, was used to analyse the data. The descriptive statistics used were frequency, percentage, mean, and standard deviation, which were used to respond to the research questions. A neutral midpoint of 2.50 was used for the four-point SATGAEQ. This score was calculated by aveplus 3 plus 2 plus 1 onse, $\frac{4 + 3 + 2 + 1}{4} = 2.50$. Based on this, a mean score of more than 2.50 was considered positive attitudes, a mean score of less than 2.50 as negative attitudes, and a mean score of 2.50 as neutral attitude. Frequency and percentage distributions of students' performance in the categories of achievement were used to summarise the students' academic performance.

Pearson Product-Moment Correlation (PPMC) at $\alpha = .05$ level of significance was used to test the hypothesis. The null hypothesis was rejected when the corresponding p -value was $< .05$, and retained if the p -value was $\geq .05$. The normality and linearity assumptions required for this test were verified and met prior to running the test, as described below.

Skewness and kurtosis statistics were used to assess normality, and values within ± 2 of the normal mean were regarded as an acceptable approximation to normality, as were values within ± 7 of the normal mean. By examining the skewness values for students' attitude and academic performance (1.788; 0.655, respectively) and the kurtosis values (2.019; -0.567 , respectively), it is found that both the attitude and academic performance of the students were within the acceptable range of ± 2 (skewness) and ± 7 (kurtosis). The distributions of the two study variables were not seen to have problematic deviations from normality in these results.

The linearity between the SATGAEQ mean score and the AATGAE score was determined by visual inspection of a scatterplot (Figure 2), which indicated a positive linear trend, supporting the use of Pearson's r to investigate the strength of the relationship between the scores.

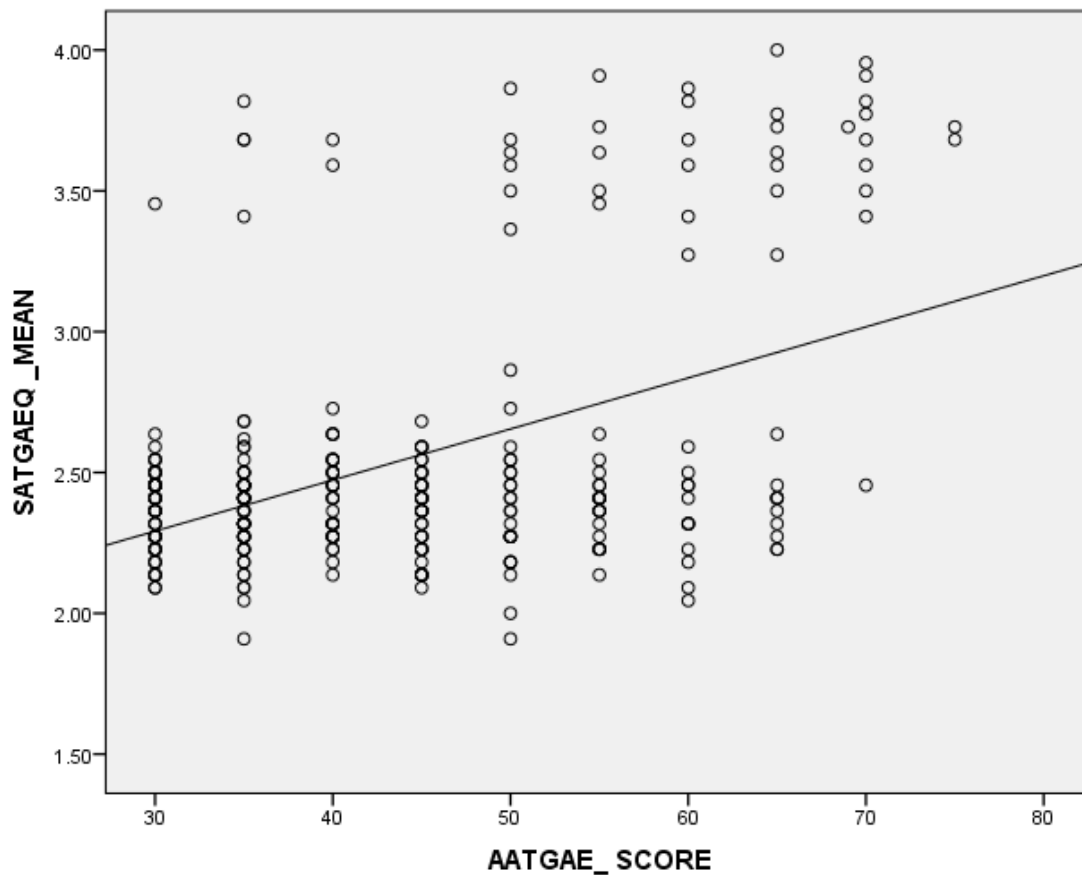


Figure 2: Scatterplot Depicting the Linear Relationship Between SATGAEQ Mean Score and AATGAE Score (%)

Ethical Considerations

The ethical guidelines for educational research with human subjects were followed throughout the research. Before data collection, the principals of the schools in the study gave their consent. Participants were informed of the purpose and procedure of the study, and they were given the choice of participation. It was explained to participants that they had the right to refuse to participate or to withdraw without penalty. Confidentiality was maintained, and no data were collected on the research instruments that mentioned the person's name. The completed instruments were only used for academic research purposes and handled in a way that would respect participants' privacy.

Results

Research Question 1: What proportions of SS II students have negative, neutral, and positive attitudes towards the graphical aspect of Economics?

Table 3: Attitudes of Secondary School Students towards the Graphical Aspect of Economics

Mean Range	Frequency	Percentage (%)	Attitude
Below 2.50	204	68.0	Negative
2.50	20	6.7	Neutral
Above 2.50	76	25.3	Positive
Total	300	100	Attitude

Table 3 shows the attitude of students to the graphical aspect of Economics. The result revealed that most of the respondents had a negative attitude towards the graphical aspect of Economics, as evidenced by the overall mean. In particular, 204 (68.0%) of the students showed negative attitudes,



and 20 (6.7%) showed neutral and 76 (25.3%) showed positive attitudes. This result suggests that students have negative attitudes towards the concepts related to graphs in Economics.

Research Question 2: What is the distribution of SS II students across performance levels in the graphical aspect of Economics?

Table 4 Academic Performance of Secondary School Students in Graphical Aspect of Economics

Score (%) Range	Grade	Frequency	% of Students
0-39	F	120	40.0
40-49	P	77	25.7
50-59	C	56	18.7
60-69	B	36	12.0
70-100	A	11	3.7
Total		300	100

The academic performance of students in the graphical aspect of Economics is given in Table 4. The results show that students' performance levels were generally low. Around 40.0% of the students achieved failing grades, with relatively few pupils gaining credit level or distinction grades. The poor achievement in relation to Economics concepts in graphs was found to be high, as only 3.7% of the respondents achieved distinction.

Research Question 3: What is the strength and direction of the relationship between students' attitudes towards the graphical aspect of Economics and their academic performance in graph-related Economics?

Table 5. Correlation between Students' Attitudes and Academic Performance in the Graphical Aspect of Economics

Variables	N	Mean	SD	<i>r</i>
Students' Attitude	300	2.54	.471	.45
Academic Performance	300	43.88	11.79	

The Pearson Product-Moment correlation between students' attitudes and their academic performance for the graphical aspect of Economics is shown in Table 5. The results of the analysis showed that the two variables were positively related at a moderate level, i.e., $r = .45$; students who have positive attitudes towards the graphical aspect of Economics tend to get better academic performance.

Test of Hypothesis

H₀: There is no significant relationship between students' attitudes and academic performance in the graphical aspect of Economics.

H₁: There is a significant positive relationship between students' attitudes and academic performance in graph-related Economics.

Table 6 Pearson Product-Moment Correlation Showing the Relationship between Students' Attitudes and Academic Performance

Variables	N	<i>r</i>	95% CI	<i>p</i>	Decision
Students' Attitude and Academic Performance	300	.45	[.358, .539]	< .001	Reject H ₀

Note. Significance level: $\alpha = .05$

Table 6 shows the results of the Pearson Product-Moment correlation analysis carried out to test the hypothesis. The analysis showed a positive relationship between the attitude and academic achievement of students in the graphical aspect of Economics with a statistically significant result ($r = .45$, 95% CI [.358, .539], $p < .001$). The *p-value* was found to be less than the level of significance of .05, so the null hypothesis was rejected in favour of the alternative hypothesis, which says there is a



significant positive relationship between students' attitudes and academic performance in graph-related Economics. This implies that students with positive attitudes are significantly associated with higher academic performance in the graphical aspect of Economics. The 95% confidence interval suggests that the relationship in the population is likely to be a moderate one between .358 and .539.

Discussion

The study investigated attitudes of SS II students of public secondary schools in Kanke and Pankshin LGAs of Plateau State, Nigeria towards the graphical aspect of Economics, academic performance of the students on graph-related concepts, and the relationship between the attitudes of the students towards the graphical aspect of Economics and their academic performance on the concepts of the graphical aspect of Economics.

Most students had a negative attitude towards the graphical aspect of Economics. There are multiple explanations at the classroom level that fit this pattern but were not directly tested in this study and are considered plausible interpretations, not causes. In both of the sampled LGAs in this study, namely Pankshin and Kanke, Economics teachers, in accordance with the baseline observation by Idakwoji et al (2025), use tests that focus more on rote learning and memorisation as opposed to graph comprehension skill, thereby giving students limited opportunity to gain mastery experience, one of the leading sources of self-efficacy according to Bandura (1986), which would explain why self-efficacy and thus attitude are low. In the same way, if graph-related content is viewed as a minor and distinct topic, rather than as part of the entire curriculum, students might see it as being of low value or relevance beyond the examination (Eccles & Wigfield, 2020), in line with low task-value judgements associated with disengagement. Also, as discussed in the Scope of the Study, the rural nature of the study area is another plausible contributing factor: the structural restrictions of having to travel a long distance to school and few resources for the classroom are likely to affect the type of sustained graph practice that fosters positive attitudes. The finding also corroborates that of Arsaythamby and Julinamary (2015), who reported that students were more challenged on graph-related topics, and Mohammed (2022), who reported that graph-related topics were among the most challenging in the Economics curriculum; meaning that negative attitude toward graphical analysis is not a peculiar phenomenon in the educational field within the two LGAs studied but is a general phenomenon.

In the graphical aspect of Economics performance was not good either, and a considerable number of students failed, while only a few distinguished themselves. This reflects the low performance in Economics among Plateau State candidates as reported in the WAEC Economics Paper 2 Chief Examiner's Report, 2023, and successive Chief Examiner's Reports by WAEC, 2022, 2023, and 2024; and is in line with poor teacher-made continuous-assessment tests reported by Bulus and Chukwuma (2021) and weak graph-related learning reported by Mohammed (2022). It seems plausible to suggest that a lack of conceptual understanding, poor graphical reasoning skill, and a negative attitude toward the learning of the graphical reasoning skill feed into each other to create this pattern.

The overall result, a moderate positive statistically significant attitude-performance relationship, $r(298) = .45$, 95% CI [.358, .539], $p < .001$, suggests that students with more positive attitudes toward graphical analysis tended to perform better academically. This provides empirical evidence of the interaction between personal belief and academic behaviour that is proposed in Social Cognitive Theory (Bandura, 1986), and of the proposition proposed in Expectancy-Value Theory that the greater the value placed on a task and the greater the likelihood of success at it, the more effort that will be invested and the more that will be achieved (Eccles & Wigfield, 2020). Attitude is a variable of this magnitude ($r = .45$) that suggests it would be reasonable to assume that it explains only a small, but significant portion of the variance in performance; attitude cannot be held responsible for students' low achievement in graph-related tasks, but it is a variable that is within the control of individual teachers – that is, it is a variable that could be reasonably changed without relying on curriculum-level change, as opposed to prior mathematical ability or school resourcing.

The findings are consistent with the previous findings of Ajayi and Kayode (2016); Filade et al. (2020); Ibrahim (2025) who established the relationship between attitude and Economics achievement generally, and also with those who established the relationship between attitude and graphical component of Economics achievement, like Cohn et al. (2004); in addition, the findings support that of



Ring and Oberrauch (2024) who argued that graph competence is cognitive and affective in nature. The study provides evidence of an attitude-achievement relationship in graph-related economics in Kanke and Pankshin LGAs, which so far has not been directly addressed in the local or national literature.

From the practical point of view, the results indicate that the improvement of students' attitude towards graphical analysis is a promising direction in improving students' performance. Direct instruction in building and interpreting graphs should be complemented by strategies that foster interest, confidence, and appreciation of graph-related concepts, such as active student involvement, problem-solving practice, feedback throughout the activity, and digital or low-cost visual tools suitable to a rural resource environment.

Limitations of the Study

Findings should be generalised with caution to the public SS II Economics students in the 20 purposively selected schools in the Kanke and Pankshin LGAs and particularly not to the private schools or to the schools that did not participate in the study or to other regions of the country unless a study is conducted; the schools were purposively selected in the first sampling stage and the sample was most representative of those schools with an established Economics programme large enough to meet the inclusion needs of the study. The correlational design allows for the identification of association relationships among attitude and performance, but does not allow for the determination of the cause-and-effect relationship between these variables; future researchers interested in determining the cause-and-effect relationship between attitude and performance might consider using a quasi-experimental or longitudinal design, which involves manipulating variables to produce change in attitude or tracking change in attitude over time. Social desirability bias may have influenced self-reported attitude measures; future research could incorporate self-report with observation or teacher-rated scale of engagement. A computed Content Validity Index was not calculated for the SATGAEQ and AATGAE, but content validity was established by expert judgement for these items in this replication of the experiment and should be investigated in subsequent replications. As explained in the Introduction, the selection of Kanke and Pankshin LGAs was justified based on the most specific localised evidence available, which comprised an LGA-specific instructional-practice finding for Pankshin and a rural profile of the two LGAs, rather than an official LGA-disaggregated WASSCE pass-rate data that WAEC does not publish; a subsequent study with access to the school- or LGA-level WASSCE examination records could further strengthen this justification. Lastly, as explained under the Conceptual Framework, constructs not measured directly in the attitude–performance pathway, such as the importance of mathematics to the students' lives, their prior mathematical abilities, as well as teachers' ability and rural resource constraints, may moderate the observed relationship; for example, students with higher mathematical ability can have high attitudes toward mathematics and high performance levels even if there is no causal effect of mathematical ability on attitude. Limit future research to quantification and partial control of such variables (e.g., partial correlation, or regression) to achieve a more precise measure of attitude–performance relation.

Conclusion

The correlational research design was used in this study to investigate attitudes of SS II students towards the graphical aspect of Economics and their academic performance amongst public secondary schools in Kanke and Pankshin LGAs of Plateau State, Nigeria, and the relationship between the variables.

The study revealed that there exists a significant and positive moderate correlation between the attitude and achievement of students in the graphical aspect of Economics, which confirmed earlier findings of the attitude–achievement relationship in Economics generally but had not yet been studied specifically in the graphical aspect in the study areas of Kanke and Pankshin LGAs respectively. This reinforces the propositions of the Social Cognitive and Expectancy-Value Theories, which state that learners' beliefs, motivations, and perceived value of a task are very closely related to learning outcomes, and indicates that tackling the negative attitudes towards graphical analysis can contribute to the overall systemic improvement of the content of Economics in secondary education rather than simply an affective peripheral issue.



Recommendations

Based on the results of this study, the following recommendations are made in order of ease of imminent implementation:

1. Economics teachers should engage in a learner-centred approach to teaching graph-related content in terms of guided practice in constructing, interpreting, and applying graphs to real-life economic scenarios without having to spend additional resourcing time and without having to dedicate extra lesson time.

2. Teachers and guidance counsellors should foster students' confidence and interest in graphical analysis by carefully guiding students in their academic counselling, peer learning arrangements, and through frequent encouragement and feedback throughout lessons involving graphical analysis.

3. School leaders and managers, aware of the limited resources common in rural LGAs like Kanke and Pankshin, should make a conscious effort to use low-cost graph-related instructional resources, such as charts, visual aids that are locally produced, and, where possible, digital or graphing tools, within the available budget.

4. It is recommended that curriculum developers and teacher training institutions provide better instructional guidelines and continuous professional development to teachers teaching graph-related economics content to ensure enhanced classroom practice beyond the effort of individual teachers in Pankshin, where Idakwoji et al. (2025) discovered that classroom practices favoured rote learning.

5. Further research should be conducted in other LGAs, states, and in private secondary schools, and quasi-experimental or longitudinal designs that would allow for testing whether attitude improvement leads to achievement improvement in graph-related Economics should be used.

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References

- Ajayi, O. K., & Adewale, K. A. (2016). Study habits and students' attitudes as determinants of students' academic achievement in economics in senior secondary schools in Ogun State. *Nigerian Inquiry in the Humanities*, 2(1), 35–43. <https://researchdev.eksu.edu.ng/wp-content/uploads/2021/04/NIITH-JOURNAL.-VOL.-2-NO.-1-2016.pdf>
- Anderson, L. W., & Krathwohl, D. R. (Eds.). (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Longman.
- Arsaythamby, V., & Julinamary, P. (2015). Students' perception of difficulties with symbols, graphs and problem solving in economics. *Procedia—Social and Behavioral Sciences*, 177, 240–245. <https://doi.org/10.1016/j.sbspro.2015.02.401>



- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.
- Bature, Y. A., & Barki, J. J. (2019). Accessibility standard of primary schools within Kanke Local Government Area of Plateau State, Nigeria. *FUDMA Journal of Sciences*, 3(1), 418–427. <https://fjs.fudutsinma.edu.ng/index.php/fjs/article/view/1470>
- Bulus, C. H., & Chukwuma, N. M. (2021). Comparative analysis of students' performance in NECO and WAEC economics examinations between 2014 and 2018 in Jos Metropolis, Plateau State. *Sapientia Foundation Journal of Education, Sciences and Gender Studies*, 3(1), 169–181. <https://www.sfjesgs.com/index.php/SFJESGS/article/view/142>
- Cohn, E., Cohn, S., Balch, D. C., & Bradley, J., Jr. (2004). The relation between student attitudes toward graphs and performance in economics. *The American Economist*, 48(2), 41–52. <https://doi.org/10.1177/056943450404800203>
- Downey, R. G., & King, C. V. (1998). Missing data in Likert ratings: A comparison of replacement methods. *The Journal of General Psychology*, 125(2), 175–191. <https://doi.org/10.1080/00221309809595542>
- Eccles, J. S., & Wigfield, A. (2020). From expectancy–value theory to situated expectancy–value theory: A developmental, social cognitive, and sociocultural perspective on motivation. *Contemporary Educational Psychology*, 61, Article 101859. <https://doi.org/10.1016/j.cedpsych.2020.101859>
- Ede, M. O., & Oleabhielle, E. O. (2020). Effects of personalized mastery learning strategy on students' academic achievement and retention in graph-related concepts in economics. *International Journal of Economics Education Research*, 3(1), 15–30.
- Filade, B. A., Omozokpia, D. O., Uwannah, N., Amanze, S., Ajibola, I. E., & Omotosho, T. (2020). The influence of students' attitude towards economics as a course of study on academic performance in the University of Lagos, Lagos State. *Advances in Social Sciences Research Journal*, 7(6), 528–540. <https://doi.org/10.14738/assrj.76.8430>
- Hair, J. F., Jr., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage. <https://au.cengage.com/c/multivariate-data-analysis-8e-hair-babin-anderson-black/9781473756540/>
- Ibrahim, A. A. (2025). Attitudes and environmental factors as determinants of academic achievement in economics among secondary school students in Kano Metropolis, Kano State, Nigeria. *International Journal of Education, Learning and Development*, 13(6), 103–113. <https://doi.org/10.37745/ijeld.2013/vol13n6103113>
- Idakwoji, S., Wakjissa, S. G., & Dadughun, S. I. (2025). Effects of portfolio assessment technique on senior secondary school students' achievement in economics in Pankshin, Plateau State, Nigeria. *Greener Journal of Educational Research*, 15(1), 44–52. <https://doi.org/10.15580/gjer.2025.1.011625008>
- Ikweze, C. (2024). Assessing student analytical and graphical skills in introductory economics as a tool of early intervention system. *Educational Research Quarterly*, 47(4), 3–27. <https://erquarterly.org/index.php?pg=content>
- Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607–610. <https://doi.org/10.1177/001316447003000308>
- Kuzmina, N. N., & Kuzmin, M. G. (2025). Application of interactive digital tools in economics students' education. *Bulletin of the South Ural State University. Series: Education. Educational Sciences*, 17(4), 83–95. <https://doi.org/10.14529/ped250407>
- Mawak, J. J., Efomo, Q. I., & Mustapha, A. Y. (2024). Development and item response theory calibration of economics achievement test for senior secondary school students in Plateau State, Nigeria. *Greener Journal of Education and Training Studies*, 7(1), 1–8.
- Mohammed, A. O. (2022). Perceived difficult topics and senior secondary school students' academic achievement in economics in Lagos State. *Albukhary Social Business Journal*, 3(2), 30–44.



- Mohammed, A. O., & Pitan, O. S. (2023). Innovation and renewal of economics curriculum in Nigerian secondary schools: Approaches, problems, and strategies. *Journal of Economics and Environmental Education*, 7(2), 1–14.
- O'Donnell, A. M., Dobozy, E., Nagel, M. C., Bartlett, B., Smala, S., Wormald, C., Yates, G., Reeve, J., & Smith, J. K. (2024). *Educational psychology* (4th Australian ed.). Wiley.
<https://higherred.au.wiley.com/catalogue/educational-psychology-4th-edition/>
- Okeke, A. O., Oguguo, B. C., & Ene, C. U. (2023). Effect of self and peer assessment techniques on secondary school students' achievement in graph content of economics in Nnewi Education Zone. *International Journal of Studies in Education*, 19(3), 59–68.
- Oyeniran, D. O., & Oyeniran, M. F. (2024). Pathways to economics achievement: Modeling student and school attributes mediated by abilities. *International Journal of Educational Researchers*, 15(3), 1–20. <https://doi.org/10.29329/ijer.2024.1061.1>
- Oyewole, O., & Egbeola, O. T. (2026). Auditory, kinesthetic, and visual learning styles as predictors of students' attitudes to graph-related concepts in economics among senior secondary schools in Ogun East Senatorial District. *Social Science Education Journal (SOSCED-J)*, 8(1), 1–7.
<https://soscedj.eksu.edu.ng/publication/sosced-j-vol-8-no-1-2026/>
- Oyewole, O., Oyekanmi, O. O., & Otubanjo, T. T. (2022). Effect of students' attitude, learning style, and mathematical ability on students' achievement in economics in Ibadan North Local Government, Oyo State. *Babcock University Journal of Education*, 8(3–4), 12–27.
- Reichert-Schlax, J., Zlatkin-Troitschanskaia, O., Frank, K., Brückner, S., Schneider, M., & Müller, A. (2023). Development and evaluation of digital learning tools promoting applicable knowledge in economics and German teacher education. *Education Sciences*, 13(5), Article 481.
<https://doi.org/10.3390/educsci13050481>
- Ring, M. (2020). *Visual representations in economic education from an interdisciplinary perspective* [Doctoral dissertation, University of Tübingen].
- Ring, M., & Oberrauch, L. (2024). Measuring economic graph competence. *International Review of Economics Education*, 47, Article 100302. <https://doi.org/10.1016/j.iree.2024.100302>
- West African Examinations Council. (2022). *Chief examiners' report: West African Senior School Certificate Examination for school candidates*. <https://www.waeconline.org.ng/e-learning/Economics/econsmain.html>
- West African Examinations Council. (2023). *Chief examiners' report: West African Senior School Certificate Examination for school candidates*. <https://www.waeconline.org.ng/e-learning/Economics/econsmain.html>
- West African Examinations Council. (2024). *Chief examiners' report: West African Senior School Certificate Examination for school candidates*. <https://www.waeconline.org.ng/e-learning/Economics/econsmain.html>