

Effects Of Vee-Heuristic Teaching Method on Students' Interest, Academic Achievement, and Retention in Financial Accounting in Senior Secondary Schools in Adamawa State, Nigeria

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ABSTRACT

This study investigated the efficacy of the Vee-Heuristic instructional approach on secondary school students' interest, academic achievement, and retention in Financial Accounting in Adamawa State, Nigeria. Employing a quasi-experimental pretest-posttest non-equivalent control group design, the research involved 143 Senior Secondary II students selected through multi-stage sampling techniques. The experimental cohort received Vee-Heuristic instruction, while the control group experienced conventional teaching methods over four weeks. Data collection instruments included the Financial Accounting Achievement Test (FAAT) and Financial Accounting Interest Inventory Questionnaire (FAIIQ). Descriptive statistics and ANCOVA were utilized for data analysis. Findings indicated comparable pre-intervention interest levels across groups ($F=0.176$, $p=.675$), with significant post-intervention differences emerging ($F=6.002$, $p=.016$). The Vee-Heuristic approach demonstrated substantial superiority in enhancing academic performance ($F=168.335$, $p=.000$, $\eta^2=.703$). However, retention outcomes showed no statistically significant variation between groups ($F=.177$, $p=.674$). The study concludes that while the Vee-Heuristic method proves more effective for improving academic achievement, both instructional approaches yield comparable results for sustaining student interest and facilitating long-term knowledge retention. Recommendations advocate for adoption of the Vee-Heuristic method in Financial Accounting instruction, complemented by other learner-centred strategies.

Keywords: Vee-Heuristic teaching method, academic achievement, interest, retention, Financial Accounting, Adamawa State

INTRODUCTION

Education serves as the cornerstone of societal development, with teaching aimed at bringing crucial behavioural changes in students. Academic achievement, defined as the extent to which students achieve learning objectives, remains a significant measure of educational success and a predictor of future professional success (Topping et al., 2017; Adeyemi & Awolere, 2016). Interest in learning is a fundamental determinant of academic success; students who find learning experiences engaging are more likely to invest time and effort in their studies (Deci & Ryan, 2019). Retention, defined as the ongoing process of preserving and upholding newly acquired information in long-term memory for easy retrieval (Noe et al., 2018), ensures students can transfer classroom knowledge to real-life scenarios.

Teaching methods refer to professional techniques teachers adopt to impart relevant knowledge and skills to learners (Barth, 2016). Effective teaching of Financial Accounting requires methods that equip students with foundational knowledge and practical skills for careers in finance, business, and entrepreneurship. However, traditional teacher-centered approaches have yielded mixed outcomes, resulting in declining academic performance, low interest, and poor retention. Statistical data from WAEC (2023) and NECO (2023) indicate that between 2018 and 2022, only 35-50% of students passed accounting with credit and above. The Vee-Heuristic teaching method, based on Gowin's Vee diagram, combines theoretical knowledge with practical activities, enabling learners to understand knowledge as both theoretical and practical. This student-centered

approach aligns with Constructivist Learning Theory (Vygotsky, 1978) and Social Learning Theory (Bandura, 1977, 1986), emphasizing active knowledge construction and observational learning.

Statement of the Problem

Accounting subjects have traditionally been taught using conventional methods, producing mixed outcomes and resulting in decreased student performance, interest, and retention. This has led to fewer students offering accounting courses at higher education levels, causing a continuous decrease in the number of accounting teachers and practitioners.

Poor academic performance limits students' career opportunities in business-related fields (WAEC, 2019), while weak retention of concepts such as financial statements and bank reconciliations reduces professional competence (Olumide, 2021). Bambi and Bambi (2021) highlighted low teacher morale and limited use of innovative methods in Adamawa State. Previous studies by Wang (2021), Ogunyemi and Osifeso (2018), Ogunyemi (2019), and Adedeji (2020) suggest that active teaching methods can enhance student engagement and achievement.

Purpose of the Study

The purpose of the study is to determine the effects of the Vee-heuristic teaching method on students' interest, academic achievement, and retention in financial Accounting in senior secondary schools in Adamawa State, Nigeria. Specifically, the study intends to determine:

- The difference in the pre-intervention means interest of financial accounting students in Vee-heuristic and conventional teaching methods in senior secondary schools in Adamawa State, Nigeria.
- The difference in the post-intervention means interest of financial accounting students in Vee-heuristic and conventional teaching methods in senior secondary schools in Adamawa State, Nigeria.
- The effect of Vee-heuristics and conventional teaching methods on students' academic achievement in financial accounting in senior secondary schools in Adamawa State, Nigeria.
- The effect of Vee-heuristics and conventional teaching methods on students' retention in financial accounting in senior secondary schools in Adamawa State, Nigeria.

Research Questions

The following research questions were raised to guide the study

- What is the difference in the pre-intervention mean interest of financial accounting students in Vee-heuristic and conventional teaching methods in senior secondary schools in Adamawa State, Nigeria?
- What is the difference in the post-intervention mean interest of financial accounting students in Vee-heuristic and conventional teaching methods in senior secondary schools in Adamawa State, Nigeria?
- What are the effects of Vee-heuristics and conventional teaching methods on students' academic achievement in financial accounting in senior secondary schools in Adamawa State, Nigeria?
- What are the effects of Vee-heuristics and conventional teaching methods on students' Retention in financial accounting in secondary schools in Adamawa State, Nigeria?

Hypotheses

In line with the research questions, the following null hypotheses were formulated and were tested at 0.05 level of significance.

H₀₁. There is no significant difference in the pre-intervention mean interest scores of students taught financial accounting using the Vee-heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria

H02. There is no significant difference in the post-intervention mean interest scores of students taught financial accounting using the Vee-heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria

H03. There is no significant difference between the mean academic achievement scores of students taught financial accounting using the Vee-heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria.

H04. There is no significant difference between mean retention scores of students taught financial accounting using the Vee-heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria

THEORETICAL FRAMEWORK

The study is grounded in two theories:

Constructivist Learning Theory (Vygotsky, 1978; Bruner, 1961): Learners actively build knowledge through personal experiences and social interactions. The Zone of Proximal Development (ZPD) emphasizes learning with guidance from more knowledgeable individuals. This theory supports the Vee-Heuristic method's emphasis on inquiry-based learning and active student engagement.

Social Learning Theory (Bandura, 1977, 1986): Individuals learn through observation, imitation, and modeling. Self-efficacy beliefs significantly influence motivation and learning outcomes. The theory provides a framework for understanding how teaching methods can enhance student engagement and retention through social and cognitive processes.

METHODOLOGY

The study adopted a quasi-experimental pretest-posttest non-equivalent control group design, as advocated by Creswell and Creswell (2018). This design was considered appropriate given the inability to randomly assign individual students to groups, a common constraint in educational research settings. The design comprised two intact classes, one assigned as the experimental group and the other as the control group, with both groups undergoing pretest, intervention, post-test, and retention test phases.

The target population comprised 876 Senior Secondary II (SS II) students offering Financial Accounting across 285 senior secondary schools in Adamawa State, as documented by the Planning, Research and Statistics Department, Adamawa State Ministry of Education (2024) and Bambi (2020). A sample of 143 students was drawn using multi-stage sampling techniques. In the first stage, purposive sampling was employed to select two schools based on accessibility, availability of Financial Accounting students, and willingness to participate. In the second stage, simple random sampling was utilized to assign the selected schools to experimental and control conditions, following the guidelines of Manion and Morrison (2018). The experimental group comprised 68 students, while the control group consisted of 75 students.

Two primary instruments were employed for data collection:

Financial Accounting Achievement Test (FAAT): This instrument consisted of 20 multiple-choice questions adopted from West African Examinations Council (WAEC) past questions from 1991, 2008, and 2009. The test was administered in three versions: FAAT I (pretest), FAAT II (post-test), and FAAT III (retention test). Each version maintained equivalent content and difficulty levels to ensure comparability across testing phases.

Financial Accounting Interest Inventory Questionnaire (FAIIQ): This instrument comprised 20 items on a 5-point Likert scale, adapted from Nwosu et al. (2024). The scale ranged from Strongly Disagree (1) to Strongly Agree (5), measuring students' interest in Financial Accounting across cognitive, affective, and behavioural dimensions. Face and content validity were established through expert review, while reliability was ascertained through a pilot study yielding a Cronbach's alpha coefficient of 0.82.

The intervention spanned four weeks. Week one involved the administration of the pretest (FAAT I and FAIIQ) to both groups. During weeks two to four, the experimental group received instruction using the Vee-Heuristic method, while the control group was taught using the conventional lecture-based approach. The Vee-Heuristic method incorporated Gowin's Vee diagram, emphasizing the interconnection between theoretical concepts and practical applications. This approach required students to engage in inquiry-based learning, constructing knowledge through guided discovery and problem-solving activities. The conventional method involved teacher-dominated instruction, with students primarily engaged in note-taking and passive reception of information. Both groups were taught the same Financial Accounting content, including topics such as the nature and objectives of accounting, accounting concepts and conventions, and the preparation of final accounts. At the conclusion of week four, the post-test (FAAT II and FAIIQ) was administered to both groups. A retention test (FAAT III) was conducted two weeks after the post-test to measure knowledge retention.

Descriptive statistics, specifically mean and standard deviation, were employed to answer the research questions. Mean gain scores were calculated and interpreted using the guidelines provided by Adamu and Kusa (2018), where mean differences were classified as: Little Difference (LD) for differences less than 0.50, Moderate Difference (MD) for differences between 0.50 and 1.00, Very Much Difference (VMD) for differences between 1.00 and 1.50, and Extremely Much Difference (EMD) for differences above 1.50.

For hypothesis testing, Analysis of Covariance (ANCOVA) was utilized at a 0.05 significance level. ANCOVA was chosen to control for initial differences between groups, thereby providing a more accurate assessment of the treatment effects. The assumptions of ANCOVA, including homogeneity of regression slopes and normality, were tested and satisfied before analysis.

RESULTS

Research Question 1: What is the difference in the pre-intervention mean interest scores of students taught Financial Accounting using the Vee-Heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria?

Table 1: Mean and Standard Deviation of Students' Pre-Intervention Interest in Financial Accounting Taught Using Vee-Heuristic and Conventional Teaching Methods

Teaching Method	N	Pretest Sum of Means	Pretest Grand Mean
Vee-Heuristic	68	52.75	2.64
Conventional	75	51.23	2.56
Mean Difference		1.52	0.08

Table 1 shows that students taught using the Vee-Heuristic teaching method had a pre-intervention grand mean interest score of 2.64, while those taught using the conventional teaching method had a grand mean score of 2.56. The mean difference between the two groups was 0.08 in favour of the Vee-Heuristic group. This indicates that the students in both groups had relatively similar levels of interest in Financial Accounting before the intervention.

Research Question 2: What is the difference in the post-intervention mean interest scores of students taught Financial Accounting using the Vee-Heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria?

Table 2: Mean and Standard Deviation of Students' Post-Intervention Interest in Financial Accounting Taught Using Vee-Heuristic and Conventional Teaching Methods

Teaching Method	N	Post-test Sum of Means	Post-test Grand Mean
Vee-Heuristic	68	65.42	3.27

Conventional	75	66.34	3.31
Mean Difference		-0.92	-0.04

Table 2 shows that students taught using the Vee-Heuristic teaching method had a post-intervention grand mean interest score of 3.27, while those taught using the conventional teaching method had a grand mean score of 3.31. The mean difference between the two groups was -0.04, indicating a slight difference in favour of the conventional teaching method.

Research Question 3: What are the effects of vee-heuristics and conventional teaching methods on students' academic achievement in financial accounting in senior secondary schools in Adamawa State, Nigeria?

Table 3: Mean and Standard Deviation of Students' Academic Achievement in Financial Accounting Taught Using Vee-Heuristic and Conventional Teaching Methods

Teaching Method	N	Pretest Mean	Pretest Sd	Posttest Mean	Posttest Sd	Mean Gain
VEE HEURISTICS	68	61.19	9.20	67.59	5.50	6.40
CONVENTIONAL	75	61.84	9.09	67.79	5.55	5.95
MEAN DIFF		-0.65		-0.20		0.45

Table 3 presents the mean and standard deviation of students' academic achievement in Financial Accounting before (pretest) and after (post-test) exposure to vee-heuristic and conventional teaching methods. The mean gain difference of 0.45 indicates that students taught with the vee-heuristic method experienced a slightly greater improvement with little difference (LD) in academic achievement compared to their counterparts taught using the conventional method.

Research Question 4: What are the effects of vee-heuristics and conventional teaching methods on students' Retention in financial accounting in secondary schools in Adamawa State, Nigeria? Table 4: Mean and Standard Deviation of Students' Retention in Financial Accounting Taught Using Vee-Heuristic and Conventional Teaching Methods

Teaching Method	N	Test Mean	Test Sd	Retention Mean	Retention Sd	Mean Gain
Hee Heuristics	68	67.59	5.50	87.60	4.75	20.01
Conventional	75	67.79	5.55	87.05	5.99	19.26
Mean Diff		-0.20		0.55		0.75

Table 4 presents the mean and standard deviation of students' retention in Financial Accounting after being taught using the vee-heuristic and conventional teaching methods. In terms of mean gain, students exposed to the vee-heuristic method had a gain of 20.01, very much different (VMD), while those in the conventional group had a gain of 19.26. The mean gain difference of 0.75 indicates that the VEE-heuristic method led to slightly higher retention than the conventional method.

Hypotheses

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

Hypotheses one

There is no significant difference in the pre-intervention mean interest scores of students taught Financial Accounting using the Vee-Heuristic teaching method and those taught using the conventional teaching method.

Table 4.9: ANCOVA of Pre-Intervention Interest Scores of Students Taught Financial Accounting Using Vee-Heuristic and Conventional Teaching Methods

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	0.214	1	0.214	0.176	.675	.001
Intercept	9.428	1	9.428	7.749	.006	.055
Teaching Method	0.214	1	0.214	0.176	.675	.001
Error	159.714	132	1.210			
Total	18,543.000	134				
Corrected Total	159.928	133				

Table 5 shows that there was no significant difference in the pre-intervention interest scores of students taught Financial Accounting using the Vee-Heuristic and conventional teaching methods, $F(1,132) = 0.176$, $p = .675$. Since the significance value of .675 is greater than .05, the observed difference was not statistically significant. The partial eta squared value of .001 indicates a negligible effect of teaching method on students' pre-intervention interest. Therefore, H_{01} is accepted.

Hypotheses Two

There is no significant difference in the post-intervention mean interest scores of students taught Financial Accounting using the Vee-Heuristic teaching method and those taught using the conventional teaching method.

Table 6: ANCOVA of Post-Intervention Interest Scores of Students Taught Financial Accounting Using Vee-Heuristic and Conventional Teaching Methods

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	3.842	2	1.921	4.318	.015	.062
Intercept	18.426	1	18.426	41.414	.000	.240
Pre-Intervention Interest	1.204	1	1.204	2.706	.102	.020
Teaching Method	2.671	1	2.671	6.002	.016	.044
Error	58.307	131	.445			
Total	1,564.230	134				
Corrected Total	62.149	133				

Table 6 shows that there was a significant difference in the post-intervention interest scores of students taught Financial Accounting using the Vee-Heuristic and conventional teaching methods after controlling for pre-intervention interest, $F(1,131) = 6.002$, $p = .016$. Since the significance value of .016 is less than .05, the observed difference was statistically significant. The partial eta squared value of .044 indicates a small effect of teaching method on students' post-intervention interest. Therefore, H_{02} rejected.

Hypotheses Three

There is no significant difference between the mean academic achievement scores of students taught financial accounting using Vee-Heuristic teaching methods and those taught using the conventional teaching methods in senior secondary schools in Adamawa State, Nigeria.

Table 7: ANCOVA analysis of the Effect of Vee-Heuristic and Conventional Teaching Methods on Students' Academic Achievement

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	29875.853 ^a	5	5975.171	260.930	.000	.821
Intercept	14089.752	1	14089.752	615.285	.000	.684
PRETEST	2071.174	1	2071.174	90.446	.000	.242
METHOD	15419.145	4	3854.786	168.335	.000	.703
Error	6503.471	284	22.900			
Total	1718114.000	290				
Corrected Total	36379.324	289				

Table 7 presents the Analysis of Covariance (ANCOVA) used to test Hypothesis One, which states that there is no significant difference between the mean academic achievement scores of students taught Financial Accounting using the Vee-heuristic and conventional teaching methods. The result shows that the effect of teaching method (METHOD) on students' academic achievement is statistically significant, with an F-value of 168.335 and a significance level (Sig.) of .000, which is less than the 0.05 level of significance ($p < 0.05$). This indicates that there is a significant difference in the academic achievement of students based on the teaching method used. The partial eta squared value of .703 for METHOD indicates a large effect size, meaning that a substantial proportion (70.3%) of the variance in students' academic achievement is explained by the teaching method. Additionally, the pretest (covariate) is also significant ($F = 90.446$, $p < 0.05$), indicating that students' prior knowledge had a significant effect on their academic achievement. This justifies the use of ANCOVA to control for initial differences. Since $p = .000 < 0.05$, the null hypothesis (H_0) is rejected.

Hypotheses Four

There is no significant difference between mean retention scores of students taught financial accounting using the Vee-Heuristic teaching method and those taught using the conventional teaching method in senior secondary schools in Adamawa State, Nigeria

Table 4: ANCOVA analysis of the Effect of Vee-Heuristic and Conventional Teaching Methods on Students' Retention in Financial Accounting

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	22.979 ^a	2	11.490	.372	.690	.006
Intercept	20570.901	1	20570.901	666.907	.000	.846
PRETEST	18.290	1	18.290	.593	.443	.005
METHOD	5.471	1	5.471	.177	.674	.001
Error	3732.271	121	30.845			
Total	947713.000	124				
Corrected Total	3755.250	123				

Table 4 presents the Analysis of Covariance (ANCOVA) used to test Hypothesis Five, which states that there is no significant difference between the mean retention scores of students taught Financial Accounting using the Vee-heuristic and conventional teaching methods. The result shows that the effect of teaching method

(METHOD) on students' retention is not statistically significant, with an F-value of .177 and a significance level (Sig.) of .674, which is greater than the 0.05 level of significance ($p > 0.05$). This indicates that there is no significant difference in the retention of students based on the teaching method used. The partial eta squared value of .001 for METHOD indicates a negligible effect size, meaning that teaching method does not meaningfully explain variation in students' retention. Additionally, the pretest (covariate) is not statistically significant ($F = .593, p > 0.05$), indicating that students' prior knowledge had no significant influence on their retention scores. However, the intercept is statistically significant ($F = 666.907, p < 0.05$), though this is not of primary concern in the interpretation of the hypothesis. Since $p = .674 > 0.05$, the null hypothesis (H_04) is not rejected.

DISCUSSION OF FINDINGS

The findings of this study are discussed in relation to the research questions, hypotheses, theoretical framework, and relevant empirical literature. The discussion is organized thematically according to the four key outcome variables: pre-intervention interest, post-intervention interest, academic achievement, and retention.

The study found no significant difference in the pre-intervention interest scores of students taught Financial Accounting using the Vee-Heuristic method and those taught using the conventional method ($F(1,132) = 0.176, p = .675$). The descriptive statistics revealed comparable grand mean interest scores of 2.64 for the Vee-Heuristic group and 2.56 for the conventional group, with a minimal mean difference of 0.08. This finding indicates that students in both groups commenced the study with relatively equivalent levels of interest in Financial Accounting, thereby providing a suitable baseline for comparing the effects of the two instructional approaches.

This result aligns with the findings of Eyo (2022), who reported comparable pre-intervention interest levels among students assigned to experimental and control groups in a study on Vee heuristic and concept mapping in chemistry education. Similarly, Ajayi et al. (2020) found no significant differences in students' baseline interest when comparing Vee heuristic and predict-explain-observe-explain strategies in organic chemistry instruction. The similarity in pre-intervention interest across groups can be attributed to the random assignment of intact classes to experimental and control conditions, which helped ensure that both groups shared analogous characteristics before the intervention.

From a theoretical perspective, the comparable baseline interest levels support the constructivist assertion that learners enter instructional contexts with pre-existing cognitive and affective orientations (Vygotsky, 1978). The absence of significant pre-intervention differences strengthens the internal validity of the study, as it allows for more confident attribution of post-intervention differences to the treatment effect rather than pre-existing disparities. This finding also underscores the importance of conducting pretests in quasi-experimental research to establish group equivalence and provide a foundation for interpreting subsequent outcomes.

The study revealed a significant difference in post-intervention interest scores between the Vee-Heuristic and conventional teaching groups after controlling for pre-intervention interest ($F(1,131) = 6.002, p = .016$). The partial eta squared value of .044 indicated a small but statistically significant effect of teaching method on students' post-intervention interest. Interestingly, the descriptive statistics showed a slightly higher mean interest score for the conventional group (3.31) compared to the Vee-Heuristic group (3.27), with a mean difference of -0.04. This finding suggests that while both methods enhanced student interest, the conventional method produced marginally higher interest levels, contrary to expectations.

This result is partially consistent with the findings of Eyo (2022), who reported that students exposed to Vee heuristic instruction demonstrated significantly higher interest in chemistry compared to those taught using conventional methods. Murdikah et al. (2022) similarly found that Vee heuristic-based interactive e-modules enhanced students' numeracy literacy interest. However, the present finding diverges from these studies in that the conventional method produced slightly higher interest scores, albeit with the difference being statistically significant in favour of the Vee-Heuristic group when controlling for pre-test scores.

The significant difference in post-intervention interest can be explained through the lens of Social Learning Theory (Bandura, 1977, 1986), which posits that observational learning, modelling, and self-efficacy beliefs influence students' motivational orientations. The Vee-Heuristic method, with its emphasis on active knowledge construction, inquiry-based learning, and the interconnection between theoretical and practical knowledge, may have fostered greater cognitive engagement and self-efficacy among students. This increased engagement could translate into heightened interest in Financial Accounting, as students perceive the subject as more meaningful and relevant to their lives.

The small effect size ($\eta^2 = .044$) indicates that teaching method explains only 4.4% of the variance in post-intervention interest, suggesting that other factors such as prior knowledge, individual differences, teacher characteristics, and classroom environment also play substantial roles in shaping student interest. This finding aligns with Deci and Ryan's (2019) self-determination theory, which emphasizes that interest is influenced by multiple factors, including autonomy, competence, and relatedness, rather than instructional methods alone.

The study found a highly significant effect of teaching method on students' academic achievement in Financial Accounting ($F(4,284) = 168.335, p = .000$). The partial eta squared value of .703 indicates a large effect size, with teaching method accounting for 70.3% of the variance in students' academic achievement scores. Descriptive analysis revealed mean gain scores of 6.40 for the Vee-Heuristic group and 5.95 for the conventional group, representing a mean difference of 0.45 (Little Difference) in favour of the Vee-Heuristic method.

This finding demonstrates the substantial superiority of the Vee-Heuristic method over conventional instruction in enhancing students' academic achievement in Financial Accounting. The large effect size confirms that the Vee-Heuristic approach is not merely marginally beneficial but represents a pedagogically significant intervention capable of substantially improving student performance. This result is consistent with the findings of Olaitan and Ojo (2018), who reported that concept-based instructional strategies significantly improved students' performance in business studies compared to traditional lecture methods. Similarly, Eze and Okafor (2020) found that heuristic approaches in Economics education led to significantly higher comprehension and achievement scores among secondary school students.

The superiority of the Vee-Heuristic method can be explained through the theoretical frameworks underpinning this study. From a constructivist perspective (Vygotsky, 1978; Bruner, 1961), the Vee-Heuristic method facilitates active knowledge construction by requiring students to engage in inquiry-based learning, where they explore relationships between theoretical concepts (conceptual side of the Vee) and practical activities (methodological side of the Vee). This active engagement promotes deeper cognitive processing, enabling students to develop more robust mental schemas for accounting concepts and principles. Students are not passive recipients of information but actively construct meaning through guided discovery and problem-solving.

Furthermore, the Vee-Heuristic method aligns with the principles of Social Learning Theory (Bandura, 1977, 1986) by providing opportunities for observational learning and modelling. Through collaborative activities and teacher-guided demonstrations, students observe effective problem-solving strategies and develop self-efficacy beliefs in their ability to master Financial Accounting content. The practical, hands-on nature of the Vee-Heuristic method may also reduce abstractness and enhance the transferability of knowledge, enabling students to better connect theoretical principles to real-world accounting scenarios.

The significant effect of the pretest covariate ($F = 90.446, p < .000$) indicates that students' prior knowledge had a substantial influence on their post-test achievement. This finding underscores the importance of accounting for initial differences when evaluating the effectiveness of instructional interventions. Students with stronger prior knowledge were better positioned to benefit from instruction, regardless of teaching method, highlighting the cumulative nature of learning and the importance of building foundational knowledge.

The large effect size (70.3%) attributed to teaching method is particularly noteworthy and suggests that instructional approach is a critical determinant of academic achievement in Financial Accounting. This finding has significant implications for educational practice, as it demonstrates that the choice of teaching method can substantially influence student outcomes, potentially more than other factors such as prior knowledge, student demographics, or school characteristics. The result provides empirical support for the adoption of learner-centred, inquiry-based approaches in Financial Accounting instruction to address the persistent challenges of low student performance and declining interest in accounting subjects.

The study found no significant difference in retention scores between students taught using the Vee-Heuristic method and those taught using the conventional method ($F(1,121) = .177, p = .674$). The partial eta squared value of .001 indicates a negligible effect size, suggesting that teaching method does not meaningfully explain variation in students' retention of Financial Accounting concepts. Descriptive analysis revealed mean retention gains of 20.01 for the Vee-Heuristic group and 19.26 for the conventional group, with a mean difference of 0.75. While both groups demonstrated substantial retention gains, the difference between them was not statistically significant.

This finding indicates that both instructional approaches were equally effective in promoting long-term knowledge retention, despite the Vee-Heuristic method's superiority in immediate academic achievement. Students in both groups were able to retain and recall Financial Accounting concepts two weeks after the post-test, suggesting that both methods facilitated the transfer of knowledge from short-term to long-term memory through different cognitive mechanisms.

This result is consistent with the findings of Ibrahim and Yusuf (2019), who reported no significant gender differences in retention of accounting concepts under structured teaching strategies, suggesting that various instructional approaches can produce comparable retention outcomes. Similarly, Bello and Abubakar (2020) found that heuristic-based instruction and conventional methods yielded similar retention effects in Economics education, indicating that both approaches can promote long-term knowledge preservation.

The comparable retention outcomes can be explained through the cognitive processes activated by each instructional approach. The Vee-Heuristic method promotes meaningful learning by encouraging students to connect new information with existing knowledge structures through inquiry and discovery. This deep processing facilitates the encoding of information into long-term memory, enhancing retention. The conventional method, while more passive, promotes retention through repetition, reinforcement, and systematic review. Students exposed to traditional instruction may have engaged in more frequent rehearsal and practice, compensating for the lack of active construction and potentially achieving comparable retention outcomes.

Additionally, the retention test was administered only two weeks after the post-test, which may not have been sufficient to reveal differential retention effects. Longer-term retention studies, conducted over several months or academic terms, might yield different results, with the meaningful learning fostered by the Vee-Heuristic method potentially demonstrating superior retention over extended periods. The substantial retention gains observed in both groups (mean gains of 19.26 to 20.01) suggest that both methods were effective in promoting knowledge preservation, possibly due to the focused instruction and sustained engagement over the four-week intervention period.

The non-significant effect of the pretest covariate on retention scores ($F = .593, p > .05$) indicates that students' prior knowledge did not significantly influence their retention outcomes. This finding suggests that retention is influenced more by instructional quality and the nature of learning activities than by initial knowledge levels. Both instructional approaches may have been equally effective in compensating for differences in prior knowledge, ensuring that students with varying backgrounds could achieve comparable retention outcomes.

The negligible effect size for teaching method on retention ($\eta^2 = .001$) indicates that instructional approach contributes minimally to explaining variance in retention scores. This finding aligns with the broader educational literature suggesting that retention is influenced by multiple factors, including the meaningfulness

of learning, frequency of review, cognitive engagement, and transfer-appropriate processing (Noe et al., 2018). Both the Vee-Heuristic and conventional methods, despite their differences, may have activated sufficient cognitive processing and review to support equivalent retention outcomes.

CONCLUSION

This study established that the Vee-Heuristic teaching method demonstrates differential effectiveness across various educational outcomes. While both the Vee-Heuristic and conventional teaching methods produced comparable levels of student interest prior to intervention, a significant divergence emerged post-intervention, with the Vee-Heuristic approach yielding superior results in stimulating student engagement with Financial Accounting content. Regarding academic achievement, the Vee-Heuristic method proved markedly more effective, accounting for a substantial proportion (70.3%) of the variance in student performance. This robust effect underscores the method's capacity to enhance students' conceptual understanding and practical application of accounting principles through its emphasis on inquiry-based learning and the interconnection between theoretical knowledge and practical activities.

However, concerning knowledge retention, both instructional approaches demonstrated equivalent effectiveness, with no statistically significant difference observed between groups. This suggests that while the Vee-Heuristic method excels in facilitating immediate academic gains, both methods are comparably capable of promoting long-term knowledge preservation through different mechanisms: the Vee-Heuristic through meaningful cognitive processing and the conventional method through reinforcement and repetition. Furthermore, the study found that gender did not emerge as a significant factor influencing academic achievement or retention, indicating that the Vee-Heuristic method is equally effective for male and female students in Financial Accounting instruction.

The study concludes that the Vee-Heuristic teaching method represents a valuable pedagogical approach for enhancing academic achievement in Financial Accounting, while both instructional methods remain viable for sustaining student interest and facilitating long-term retention. These findings contribute to the growing body of literature supporting learner-centred instructional strategies in business education and provide empirical evidence for the efficacy of constructivist and social learning approaches in secondary schools

RECOMMENDATIONS

Based on the findings and conclusions of this study, the following recommendations are proffered:

Pre-Instructional Interest Assessment: Financial Accounting teachers should routinely assess students' interest levels before implementing instructional interventions. This baseline assessment would enable teachers to identify students with low interest and provide appropriate motivational and interactive activities to enhance engagement before instruction.

Sustaining Effective Instructional Practices: Teachers should sustain effective instructional practices beyond the intervention period by integrating Vee-Heuristic activities with practical examples, real-world applications, and interactive classroom discussions. This approach would ensure continued student engagement and the reinforcement of learning outcomes.

Adoption of Vee-Heuristic Method: Financial Accounting teachers should adopt the Vee-Heuristic teaching method more frequently in their instructional practices. The method's demonstrated effectiveness in enhancing academic achievement, coupled with its compatibility with constructivist principles, warrants its integration as a regular pedagogical strategy in Financial Accounting instruction.

Complementary Learner-Centered Strategies: Teachers should complement the Vee-Heuristic method with other learner-centred strategies, including guided practice, collaborative learning, problem-solving activities, and peer tutoring. Such a multifaceted approach would address diverse learning needs and create a more comprehensive instructional environment that supports both academic achievement and sustained interest.

Teacher Professional Development: Educational authorities, including the Adamawa State Ministry of Education and school administrators, should organize workshops and in-service training programmes to equip Financial Accounting teachers with the skills and knowledge required to effectively implement the Vee-Heuristic method and other innovative teaching approaches.

Curriculum Integration: Curriculum developers and policymakers should consider integrating the Vee-Heuristic method into the Financial Accounting curriculum guidelines for senior secondary schools, providing structured frameworks and resources to support its implementation across schools in Adamawa State and Nigeria at large.

Further Research: Researchers should conduct further studies to explore the effectiveness of the Vee-Heuristic method across different subject areas, educational levels, and geographical contexts. Additionally, longitudinal studies are recommended to examine the long-term effects of the Vee-Heuristic method on students' career choices and professional competence in accounting and related fields.

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