



Perceived influence of Selected Learning Models on Students' Academic Performance in Public Junior Secondary Schools in Port Harcourt Local Government Area, Rivers State, Nigeria

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Abstract

This study examined teachers' perceptions of the influence of 4MAT, VARK, and Kolb's experiential learning models on students' academic performance in public junior secondary schools in Port Harcourt Local Government Area (PHALGA), Rivers State. The study was guided by three specific objectives and three corresponding research questions. A descriptive survey design was adopted. The population comprised 790 teachers across 18 junior secondary schools in PHALGA. Cluster sampling was used to select 12 schools, followed by simple random sampling to select 20 teachers from each selected school, yielding a sample of 240 teachers. Data were collected using a structured questionnaire titled Teachers' Perceptions of Learning Models and Students' Academic Performance (TPLMSAP), designed on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). The instrument was reviewed by experts in Educational Foundations and Measurement and Evaluation, and internal consistency was established using Cronbach's alpha, yielding coefficients of 0.88, 0.74, and 0.81 across the three sections. Data were analysed using mean and standard deviation, with a criterion mean of 2.50; values of 2.50 and above were interpreted as Agree, while values below 2.50 were interpreted as Disagree. Findings showed that teachers generally perceived 4MAT, VARK, and Kolb's experiential learning model positively in relation to students' academic performance, with grand means of 3.36, 3.20, and 3.31, respectively. These findings represent teachers' perceptions and do not constitute direct measures of students' academic achievement. It was recommended that school administrators provide continuous professional development on varied instructional approaches and that teachers use flexible, multimodal instruction without assuming that learners have fixed learning styles.

Keywords: Learning Models, Teachers' Perceptions, Academic Performance, 4MAT Learning Model, VARK, Kolb's Experiential Learning Model.

Introduction

Learning is central to the acquisition of knowledge, skills, values, and dispositions through study, instruction, experience, and interaction. In school settings, effective learning requires teachers to organize instructional experiences that enable learners to engage with content, reflect on ideas, apply knowledge, communicate, solve problems, and receive feedback. Learning models provide structured ways of organizing teaching and learning activities and may help teachers vary instruction in response to differences among learners. However, claims about the effectiveness of particular learning-style models should be distinguished from evidence that students actually achieve better academic outcomes when instruction is matched to a stated preference.

Academic performance refers to the level of achievement demonstrated by learners in relation to educational tasks and expected learning outcomes. Teachers may use instructional models to promote participation, reflection, application, communication, and problem solving, but perceptions of these benefits are not equivalent to

independently measured achievement. In the present study, the outcome of interest is therefore teachers' perception of how 4MAT, VARK, and Kolb's experiential learning model relate to students' academic performance. This distinction is important because the study collected data from teachers and did not report students' examination scores, continuous-assessment scores, standardized achievement-test scores, grade point averages, or pre-test/post-test achievement data.

The 4MAT instructional system was developed by Bernice McCarthy and organizes instruction around an experiential cycle intended to engage learners through different forms of participation, reflection, conceptualization, and application (McCarthy, 2000). The model is commonly presented as a cycle involving four broad questions—why, what, how, and if—and an eight-step sequence of instructional activities. Research on 4MAT has reported positive achievement, retention, or attitude outcomes in particular instructional contexts (Cengizhan & Özer, 2016; Uyangör, 2012). Such evidence should not be interpreted as proof that teachers' perceptions in the present study represent actual changes in students' achievement.

The VARK framework, associated with Neil Fleming, describes four sensory modalities: visual, aural, read/write, and kinesthetic (Fleming, 1995). It is important to distinguish a learner's preference for particular ways of receiving or engaging with information from the stronger claim that instruction should be matched to that preference. Evidence concerning learning-style matching remains contested. Pashler et al. (2008) concluded that there was insufficient evidence to justify incorporating learning-style assessments into general educational practice. A 2024 meta-analysis found a small overall benefit of matching instruction to modality learning styles, but only a minority of learning outcomes demonstrated the crossover interaction required to support the matching hypothesis; the authors therefore cautioned against widespread adoption (Clinton-Lisell & Litzinger, 2024). Thus, the present study treats VARK as a framework for describing teachers' perceptions of learner preferences rather than as evidence that matching instruction to a fixed learning style improves achievement.

Empirical findings on learning styles and academic achievement are mixed. Awang et al. (2017) reported no significant difference between learning-style preferences and academic achievement among Malaysian polytechnic students. Almigbal (2015) likewise found that VARK learning-style preferences were not related to academic achievement or GPA among medical students. These findings caution against presenting VARK matching as an established mechanism for improving achievement. At the same time, teachers may reasonably vary instructional modalities so that learners encounter information through explanations, visuals, reading/writing, discussion, demonstrations, and practical activities without assigning learners to rigid categories.

Kolb's experiential learning model describes learning as a cycle in which learners move through concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). The model treats knowledge as something created through the transformation of experience, and it underlies many activity-based approaches to instruction. As with the other frameworks discussed here, teachers' favourable views of experiential learning are not the same as measured improvements in students' achievement.

Learning models may be useful instructional frameworks in mainstream and inclusive classrooms because teachers routinely encounter differences in learners' prior knowledge, motivation, participation, language, pace, and preferred ways of engaging with content. Learning difficulties can also affect students' reading, writing, numeracy, communication, attention, or problem-solving performance. In such circumstances, flexible instructional approaches may help teachers provide multiple opportunities for engagement and demonstrate learning. Nevertheless, the effectiveness of an instructional approach should be judged from appropriate evidence rather than inferred solely from agreement with positively worded questionnaire items.

The aim of the study was to determine teachers' perceptions of the influence of learning models on students' academic performance in public junior secondary schools in PHALGA, Rivers State. Specifically, the study sought to:

1. Determine teachers' perceptions of the influence of the 4MAT learning model on students' academic performance in public junior secondary schools in PHALGA.
2. Determine teachers' perceptions of the influence of the VARK learning model on students' academic performance in public junior secondary schools in PHALGA.

3. Determine teachers' perceptions of the influence of Kolb's learning model on students' academic performance in public junior secondary schools in PHALGA.

The following research questions were asked to guide the study:

1. What are teachers' perceptions of the influence of the 4MAT learning model on students' academic performance in public junior secondary schools in PHALGA?
2. What are teachers' perceptions of the influence of the VARK learning model on students' academic performance in public junior secondary schools in PHALGA?
3. What are teachers' perceptions of the influence of Kolb's learning model on students' academic performance in public junior secondary schools in PHALGA?

Methodology

The study adopted a descriptive survey design because it sought to describe teachers' perceptions concerning the relationship between learning models and students' academic performance rather than to establish causal effects or statistical associations between independently measured variables. The study was carried out in Rivers State, specifically among teachers in public junior secondary schools in PHALGA. Based on records from the Rivers State Basic Education Board (2022), the population comprised 790 teachers in 18 junior secondary schools. A sample of 240 teachers, about 30% of the population, was selected. For a population of 790, a conventional calculation at the 95% confidence level with a 5% margin of error would suggest about 260 teachers, so the achieved sample is somewhat smaller than that benchmark and the findings are interpreted descriptively. Cluster sampling was used to select 12 of the 18 schools followed by simple random sampling to select 20 teachers from each selected. Equal allocation of 20 teachers per school was used so that each selected school would contribute comparably to the descriptive results.

Data were collected using a structured questionnaire titled Teachers' Perceptions of Learning Models and Students' Academic Performance (TPLMSAP), designed on a four-point Likert scale of Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). The instrument was divided into three sections covering the 4MAT learning model, VARK learning model, and Kolb's experiential learning model in relation to students' academic performance. To establish content validity, the instrument was subjected to expert review by specialists in Educational Foundations and Measurement and Evaluation. The three sections contained nine (4MAT), eight (VARK), and eight (Kolb) items, respectively, giving 25 items in all. Reliability was established using Cronbach's alpha, yielding coefficients of 0.88, 0.74, and 0.81. Data were analysed using the mean and standard deviation. The criterion mean was 2.50; mean scores of 2.50 and above were interpreted as Agree, while scores below 2.50 were interpreted as Disagree. No correlation coefficient, p-value, regression coefficient, or causal effect estimate was calculated because the analysis was descriptive. No factor analysis was conducted, so construct validity was not tested statistically; this is noted as a limitation of the study.

Table 1: Mean Responses on Teachers' Perceptions of the Influence of the 4MAT Learning Model on Students' Academic Performance

S/N	Items	Mean	S.D.	Rmks
1	4MAT learning models bring about self-confidence among students, which then results in improved academic performance	3.23	0.43	Agree
2	4MAT learning model can help develop learners' communication and listening skills in the classroom	3.81	0.61	Agree
3	The model helps to strengthen learners' problem-solving and critical thinking abilities, increasing the possibilities for academic achievement	3.05	0.81	Agree
4	4MAT learning model allows free participation of learners during the teaching and learning process.	3.01	0.51	Agree
5	The learning model can help to integrate positive attitudes in learning, thereby enhancing their academic achievement	3.34	0.82	Agree
6	4MAT exposes learners to a variety of learning experiences, thereby increasing the chances of improved academic performance	3.49	0.72	Agree
7	4. MAT encourages teachers' integration of creative teaching in the classroom, which would help students achieve better in academics	3.11	1.01	Agree

8	The model stimulates renewed interest in learning among learners, resulting in enhanced academic performance	3.40	0.65	Agree
9	4MAT enables teachers to consider the individual differences of learners to encourage individual performance	3.81	0.55	Agree
Grand Mean & S.D.		3.36	0.68	Agree

Source: Field Survey, 2024

Table 1 shows the mean responses of junior secondary school teachers concerning their perceptions of the 4MAT learning model in relation to students' academic performance in PHALGA. Based on the criterion mean of 2.50, respondents agreed with all nine statements. The item means ranged from 3.01 to 3.81. Respondents therefore generally perceived that the 4MAT model is associated with self-confidence, communication and listening skills, problem solving and critical thinking, participation, positive attitudes, varied learning experiences, creative teaching, interest in learning, and consideration of individual differences. The grand mean of 3.36 and standard deviation of 0.68 indicate overall agreement with the questionnaire statements. These results represent teachers' perceptions and do not constitute direct evidence that 4MAT improved students' academic performance.

Table 2: Mean Responses on Teachers' Perceptions of the VARK Learning Model in Relation to Students' Academic Performance

S/N	Items	Mean	S.D.	Remark
1	The VARK learning model aids students in identifying the preferred sensory modalities for learning	3.20	0.65	Agree
2	This learning model enhances the possibilities of taking in more new information among students	3.42	0.78	Agree
3	The VARK learning model equips teachers with information on the preferred learning style of individual students, thereby increasing their performance	3.04	0.69	Agree
4	Using VARK learning models, teachers are able to identify the effective means of presenting new information to students, thereby improving students' achievement.	3.14	0.57	Agree
5	VARK learning model informs teachers on the instructional material that would help learners learn effectively	3.13	0.87	Agree
6	It helps students to understand their preferred ways of learning new information, thereby building self-confidence and achieving more academically	3.55	0.60	Agree
7	VARK learning model necessitates that teachers effectively deliver according to the needs of the student.	3.21	0.73	Agree
8	The VARK learning model encourages a student-centered teaching method	2.91	1.02	Agree
Grand Mean & S. D		3.20	0.74	Agree

Source: Field Survey, 2024

Table 2 shows teachers' perceptions of the VARK learning model in relation to students' academic performance in public junior secondary schools in PHALGA. The criterion mean of 2.50 indicates that respondents agreed with all eight statements. The item means ranged from 2.91 to 3.55. Respondents perceived that VARK could help learners recognize preferred sensory modalities, support the presentation of new information, inform teachers about learner preferences, guide instructional-material selection, build self-confidence, encourage attention to learner needs, and support student-centred teaching. The grand mean of 3.20 and standard deviation of 0.74 indicate overall agreement. These perceptions should not be interpreted as evidence that matching instruction to VARK categories causes higher achievement.

Table 3: Mean Responses on Teachers' Perceptions of Kolb's Experiential Learning Model on Students' Academic Performance

S/N	Items	Mean	S.D.	Remark
1	Kolb's learning model encourages voluntary self-engagement among learners, thereby increasing their academic performance	3.29	0.67	Agree
2	The model helps to capture students' attention during learning, leading to improved academic performance	3.21	0.72	Agree
3	Kolb's learning model serves as an effective pedagogical tool for teachers, which improves students' performance	3.44	0.59	Agree
4	Kolb's Model provides collaborative and innovative opportunities for teachers and students in the classroom, thereby improving students' academic performance	3.23	0.67	Agree
5	Kolb's model provides learners with the opportunity to experience real-life display of classroom concepts	3.54	0.59	Agree
6	It encourages learners to form new ideas and modify old ones in the classroom, which leads to academic creativity	3.26	0.62	Agree
7	This model encourages learners to put their knowledge into practice to enhance their academic achievement	3.54	0.71	Agree
8	It extends opportunities for students to reflect on new concepts and information	2.99	1.02	Agree
Grand Mean & S. D		3.31	0.70	Agree

Source: Field Survey, 2024

Table 3 shows the mean responses of junior secondary school teachers concerning their perceptions of Kolb's experiential learning model in relation to students' academic performance in PHALGA. Based on the criterion mean of 2.50, respondents agreed with all eight statements. The item means ranged from 2.99 to 3.54. Respondents perceived that Kolb's model encourages self-engagement, captures attention, serves as a pedagogical resource, provides collaborative opportunities, connects classroom concepts with real-life experiences, supports the formation and modification of ideas, encourages application of knowledge, and provides opportunities for reflection. The grand mean of 3.31 and standard deviation of 0.70 indicate overall agreement. These results describe teachers' perceptions rather than measured changes in students' academic achievement.

Discussion

The findings for Research Question 1, presented in Table 1, indicate that teachers generally perceived the 4MAT learning model positively in relation to students' academic performance, with a grand mean of 3.36. Respondents agreed that the model is associated, in their perception, with self-confidence, communication and listening skills, problem solving and critical thinking, participation, positive attitudes, varied learning experiences, creative teaching, renewed interest, and consideration of individual differences. This is broadly consistent with research reporting favourable outcomes associated with 4MAT in particular instructional contexts (Cengizhan & Özer, 2016; Uyangör, 2012). Those studies used different designs and outcomes, however, and the present study did not directly measure students' achievement.

For Research Question 2, the grand mean of 3.20 indicates that teachers generally perceived VARK positively in relation to students' academic performance. This finding must be interpreted alongside evidence that the relationship between learning-style preferences and academic achievement is inconsistent. Awang et al. (2017) reported no significant difference between learning-style preferences and academic achievement, and Almigbal (2015) found that VARK preferences were not related to academic achievement or GPA. Pashler et al. (2008) concluded that evidence was insufficient to justify routine matching of instruction to learning styles. More recently, Clinton-Lisell and Litzinger (2024) reported a small overall benefit in a meta-analysis, but only a minority of outcome measures showed the crossover interaction needed to support the matching hypothesis; they therefore concluded that the evidence was not sufficiently consistent to warrant widespread adoption. Thus, the present result demonstrates positive teacher perceptions, not proof that VARK matching improves achievement.

For Research Question 3, the grand mean of 3.31 indicates that teachers generally perceived Kolb's experiential learning model positively in relation to students' academic performance. Baker and Robinson (2016) reported favourable effects of experiential learning on selected creativity and practical-knowledge outcomes in secondary agricultural education, but those findings came from a different population and design. Overall, the three sets of findings indicate that teachers generally perceive 4MAT, VARK, and Kolb's experiential learning model as useful instructional frameworks. Because the study used a descriptive survey and collected perception data from teachers rather than direct student achievement measures, the findings should be interpreted as evidence of perceived usefulness rather than causal or statistically significant influence.

This study has limitations. First, the data are teachers' perceptions and not measured student achievement, so no conclusion about actual effects on achievement can be drawn. Second, the analysis was descriptive, and no inferential statistics were computed. Third, the sample of 240 teachers is somewhat smaller than a conventional 95% confidence, 5% margin-of-error calculation would suggest for a population of 790, and it was drawn from one local government area. Fourth, construct validity was not examined through factor analysis, and the evidence on instrument quality is limited to expert review and Cronbach's alpha. Future studies could combine teachers' perceptions with measured achievement scores and appropriate inferential analysis.

Conclusion

Teachers in public junior secondary schools in PHALGA generally perceived the 4MAT, VARK, and Kolb's experiential learning models positively in relation to students' academic performance, with grand means of 3.36, 3.20, and 3.31, respectively, all above the criterion mean of 2.50. These results show favourable teacher perceptions only. They do not show that any of the models improved students' measured achievement, and the VARK result in particular should not be taken as support for matching instruction to fixed learning styles. Varied and flexible instruction informed by these frameworks may be useful, but its effect on achievement needs to be tested with measured student outcomes.

Recommendations

Based on the findings, the following recommendations are made:

1. School administrators should train and retrain teachers on the use of different learning models to enable them to adapt to students' learning needs at any given time.
2. Teachers should be encouraged to develop flexible instructional delivery plans through the use of varied learning models and multimodal instructional activities, while responding to learners' varied needs without assuming that learners have fixed learning styles.
3. School administrators should ensure that teachers and guidance counsellors work closely together using learning models, especially when students perform poorly in the school or in a particular subject.

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