

Regression Analysis of Learning Styles and Academic & Skills among in Students in San Julian District

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Abstract

This study examined the predictive relationship between learning styles and academic performance of Grade 8 students enrolled in Technical and Vocational Education (TVE) programs in the San Julian District. Anchored on the VAK (Visual, Auditory, Kinesthetic) learning style framework, the research employed a descriptive-correlation design using regression analysis to determine how students' preferred learning modalities influence their performance. The study involved 100 Grade 8 students randomly selected from two public high schools offering TVE programs. Data were collected through a 30-item Learning Style Inventory and the students' first-quarter grades in TVE subjects. Descriptive statistics characterized the predominant learning styles, while linear regression evaluated the predictive relationship between visual, auditory, and kinesthetic learning styles and academic performance. Results revealed that the students predominantly exhibited a visual learning style, with auditory tendencies moderately present, and kinesthetic tendencies seldom observed. The majority of students achieved a "very satisfactory" level in TVE subjects, with 54% rated "outstanding." Regression analysis indicated that visual, auditory, and kinesthetic learning styles collectively did not significantly predict academic performance ($R^2 = 0.172$, $p > .001$), suggesting that other factors may influence student achievement in TVE. The study concluded that while recognizing students' learning preferences is valuable, teaching strategies should incorporate multiple modalities to enhance learning outcomes. Recommendations include reinforcing visual strategies, exploring interventions to strengthen auditory and kinesthetic engagement, and investigating additional factors influencing performance. The study aligns with Sustainable Development Goal 4 by promoting quality education and learner-centered approaches, and contributes to educational sustainability by informing teaching practices that optimize student competencies and workforce readiness in the local community.

Keywords: Academic Performance, Auditory Learning, Kinesthetic Learning, Learning Styles, Regression Analysis, Technical-Vocational Education, Visual Learning

1. Introduction

Learning is a complex, dynamic process that varies across individuals, with the effectiveness of instruction depending on alignment with students' learning styles (Fleming & Baume, 2006). In TVE, which emphasizes practical and skill-based competencies, knowledge of students' preferred learning modes enhances performance outcomes (Nwosu et al., 2023). Despite the K to 12 curriculum's goal to produce technically proficient and employable graduates (DepEd, 2022), disparities in student performance persist due to varied learning styles and lack of differentiated instruction (Cruz & Ocampo, 2021). Regression analysis offers a method to empirically determine which learning styles best predict student success (Mendoza & Santos, 2020), particularly in contexts requiring both academic and hands-on competencies (Garcia & Flores, 2022).

Learning styles—classified as visual, auditory, and kinesthetic (VAK)—shape how students acquire and process knowledge (Kolb & Kolb, 2013; Fleming, 2021). Visual learners excel with imagery and diagrams, auditory learners benefit from discussions, and kinesthetic learners perform best through hands-on activities (Balasubramanian et al., 2022). Kinesthetic learning often dominates in TVE due to the physical nature of vocational tasks (Alrabai, 2021; Castillo et al., 2023). Research indicates that aligning instruction with learning preferences improves engagement, comprehension, and performance (Ahmed et al., 2021; Prusty & Dash, 2023). However, excessive reliance on a single style may be ineffective; multimodal strategies are recommended for holistic learning (Pashler et al., 2008; Singh & Lee, 2022). Regression analyses confirm that learning styles can predict academic outcomes, although variance explained ranges from 35–45% and may depend on external factors such as teaching methods and resources (Musa & Ibrahim, 2020; Alqurashi, 2021; Peterson & Liu, 2023).

In the Philippines, TVE programs under DepEd's K to 12 curriculums focus on producing graduates ready for employment and entrepreneurship (DepEd, 2022). While CHED emphasizes the dual importance of theoretical knowledge and practical skills (CHED, 2022), local evidence shows mixed student performance levels, highlighting a need for targeted pedagogical

interventions (Torres & Hernandez, 2021; Gaitan & Navarro, 2023). Globally, competency-based vocational education has become crucial under Industry 4.0, requiring graduates to demonstrate adaptability, creativity, and lifelong learning skills (Garcia & Flores, 2022).

The study is grounded in VAK learning style theory (Kolb & Kolb, 2013; Fleming, 2021) and the application of regression analysis as a predictive statistical method (Shukla & Rahman, 2020; Jung & Park, 2024; Kumar et al., 2023). These frameworks collectively support the examination of how different sensory preferences influence both academic and skill-based performance in TVE settings. While prior studies link learning styles to academic achievement in general and higher education (Aljaberi, 2022; Husmann & O'Loughlin, 2019), empirical research in Philippine TVE programs using regression analysis remains limited. Few studies analyze the combined impact of VAK modalities on both theoretical and practical performance (Nwosu et al., 2023; Prusty & Dash, 2023). Addressing this gap can inform differentiated instruction, optimize student outcomes, and guide policy in vocational education contexts (Mendoza & Santos, 2020; Magulod, Jr., 2019).

This research contributes to: SDG 4 – Quality Education: Enhances learner-centered strategies and instructional quality. SDG 8 – Decent Work and Economic Growth: Prepares TVE students with employable skills for workforce readiness. SDG 9 – Industry, Innovation and Infrastructure: Supports TVE programs aligned with Industry 4.0 competencies. The study promotes educational sustainability by providing evidence-based insights for optimizing teaching strategies in TVE. It fosters socio-economic sustainability by equipping students with skills applicable to employment and entrepreneurship. Additionally, it supports institutional sustainability through data-driven recommendations for educators, administrators, and policymakers, encouraging long-term improvements in vocational training and curriculum implementation (Cruz & Ocampo, 2021; DepEd, 2022; Torres & Hernandez, 2021).

2. Material and methods

2.1 Research Design

A descriptive-correlation approach was used to first identify and analyze students' learning styles and academic performance, then determine the significance of their relationship. Regression analysis was applied to assess which learning style could predict academic achievement and test the proposed hypotheses.

2.2 Locale of the Study

The research was conducted in San Julian District within the Schools Division of Eastern Samar during the first quarter of the 2025–2026 academic year. Two secondary public national high schools offering TVE programs were selected, coded as School A and School B to ensure anonymity. School A was located mid-municipality, approximately 15 minutes by tricycle or car from the town center, while School B was seven kilometers away, accessible within 20–25 minutes by tricycle or car.

2.3 Respondents of the Study

The participants were one hundred Grade 8 students enrolled in TVE programs from the two schools, with fifty students randomly selected from each school to ensure equal representation.

2.4 Sample and Sampling Procedure

Random sampling was employed, guided by the Morgan and Krejcie table, to select a representative sample from the population of TVE students in the district. Equal representation from both institutions ensured a balanced perspective across the study.

2.5 Research Instrument

Data on learning styles were collected using a 30-item Learning Style Inventory adapted from the University of Arkansas Center for Learning and Student Success. The instrument measured visual, auditory, and tactile/kinesthetic learning preferences. Students indicated the extent of their engagement with each statement using a 5-point Likert scale. Academic performance data were obtained from students' first-quarter TVE subject grades.

2.6 Data Gathering Procedure

Prior to data collection, permission letters and consent forms were approved by the Schools Division Superintendent of Eastern Samar, followed by district supervisors and school principals. Students were informed of their voluntary participation, and consent forms ensured anonymity and confidentiality. The Learning Style Inventory was administered, and the first-quarter TVE grades were secured for analysis. Data collection commenced only after all approvals and ethical considerations were fulfilled.

2.7 Data Analysis Techniques

Descriptive statistics, including mean and standard deviation, were employed to assess students' learning styles, while frequency and percentage were used to analyze academic performance. Linear regression analysis was conducted to determine which learning style significantly predicted student performance in TVE subjects.

2.8 Ethical Considerations

The study adhered to ethical standards, reviewed and certified by the university's Ethics Committee. Letters of consent were secured from authorities, and respondents' participation was voluntary, with assurances that their information remained confidential and free from risk of harm.

3. Results and Discussion

3.1 Students' Learning Styles

3.1.1 Visual Learning Style

Grade 8 students exhibited a high level of visual learning preference, as indicated by a mean score of 2.82 on the 5-point scale. Students strongly responded to indicators such as reacting to colors, visualizing textbook content in their minds, and writing down directions for better comprehension. Overall, these learners demonstrated competence and interest in visually-oriented tasks, highlighting the importance of integrating visual aids, diagrams, and organized instructional materials in teaching (Qasserras, 2024).

The findings suggest that visual learners benefit from structured, visually-rich instructional approaches that enhance engagement, comprehension, and critical thinking. Aligning teaching materials with visual cues supports learners in processing and retaining information more effectively, consistent with previous studies emphasizing multimodal strategies in TVE (Qasserras, 2024).

3.1.2 Auditory Learning Style

Students displayed a moderate inclination toward auditory learning, with an average score of 2.21. They "sometimes" engaged with auditory-related learning activities, with occasional exposure to listening and discussion tasks. Indicators such as difficulty following written directions and challenges in writing were rated higher, indicating specific areas where auditory support is beneficial. This result underscores the necessity for teachers to recognize auditory learners' needs and incorporate verbal explanations, discussions, and interactive dialogues. Comparable findings in applied sciences suggest that while auditory skills are moderate, instructional methods that integrate verbal reinforcement alongside visual and kinesthetic approaches enhance overall learning outcomes (Magulod, Jr., 2019).

3.1.3 Kinesthetic Learning Style

Kinesthetic learning was the least predominant among the respondents, with a mean score of 1.63, corresponding to "seldom" exposure to hands-on learning activities. Students occasionally applied trial-and-error problem solving and rewriting notes, but overall, they did not frequently engage in activities that require physical interaction or manipulation of learning materials. This indicates that Grade 8 students in San Julian District are less inclined toward kinesthetic learning. Teachers should therefore focus on instructional strategies that integrate tactile or movement-based activities to diversify learning experiences. The finding contrasts with prior studies where kinesthetic learning strongly influenced performance in hands-on vocational subjects (Magulod, Jr., 2019).

3.2 Level of Academic Performance in TVE Subjects

The majority of students performed well in their TVE subjects. Fifty-four percent of respondents achieved "outstanding" scores (90–100), 24% were "very satisfactory" (85–89), and 22% achieved "satisfactory" performance (80–84), with an overall average of 88.1%, classified as "very satisfactory." These results indicate that, despite varying learning styles, students demonstrate strong academic competence in TVE programs. The findings align with Nachon (2016), who emphasized that mastery of technical and vocational skills contributes to both academic success and preparation for employment, particularly for students with limited access to higher education.

3.3 Predictive Relationship Between Learning Styles and Academic Performance

Multiple regression analysis revealed that visual, auditory, and kinesthetic learning styles did not significantly predict students' performance in TVE subjects ($R^2 = 0.172$, $p > 0.001$). Visual learning showed the highest β value ($\beta = 0.334$), followed by auditory ($\beta = -0.427$) and kinesthetic ($\beta = 0.079$), but none had a statistically significant impact. This suggests that factors beyond learning styles—such as teaching methods, classroom environment, or resource availability—may play a more critical role in academic performance. The finding contradicts some prior research indicating significant relationships between learning style preferences and achievement, highlighting the need for holistic and multimodal instructional strategies (Magulod, Jr., 2019).

3.4 Summary of Findings

Overall, visual learning was the predominant style among Grade 8 students, while auditory skills were moderate and kinesthetic preference was low. Students achieved generally high academic performance in TVE subjects, yet learning styles alone were insufficient predictors of success. These findings support differentiated instruction strategies that combine visual, auditory, and kinesthetic modalities to optimize student outcomes.

4. Conclusion & Recommendations

Based on the study's findings, the predominant learning style among Grade 8 students in San Julian District is visual, while their overall academic performance in Technical-Vocational Education subjects was rated as very satisfactory. However, no significant relationship was found between students' learning styles and their TVE performance, and visual, auditory, and kinesthetic learning styles did not have a significantly positive impact on academic outcomes in the subjects studied.

It is recommended that teaching strategies reinforce students' visual learning preferences to enhance performance, while also promoting auditory and kinesthetic modalities to foster versatile learning. Additionally, educators should consider other influential factors beyond learning styles that may significantly affect student achievement, in order to optimize academic performance in Technical-Vocational Education programs.

Compliance with ethical standards

The authors declare no conflict of interest. This study complied with recognized ethical standards for human-participant research by ensuring voluntary participation with informed consent, the right to withdraw without penalty, and strict confidentiality through anonymous, secure, and aggregated data handling. Given the focus on psychological well-being, procedures were non-invasive, and safeguards were observed to minimize discomfort, with guidance to appropriate support services when needed, and required institutional permissions were secured for instrument use and access to academic records.

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