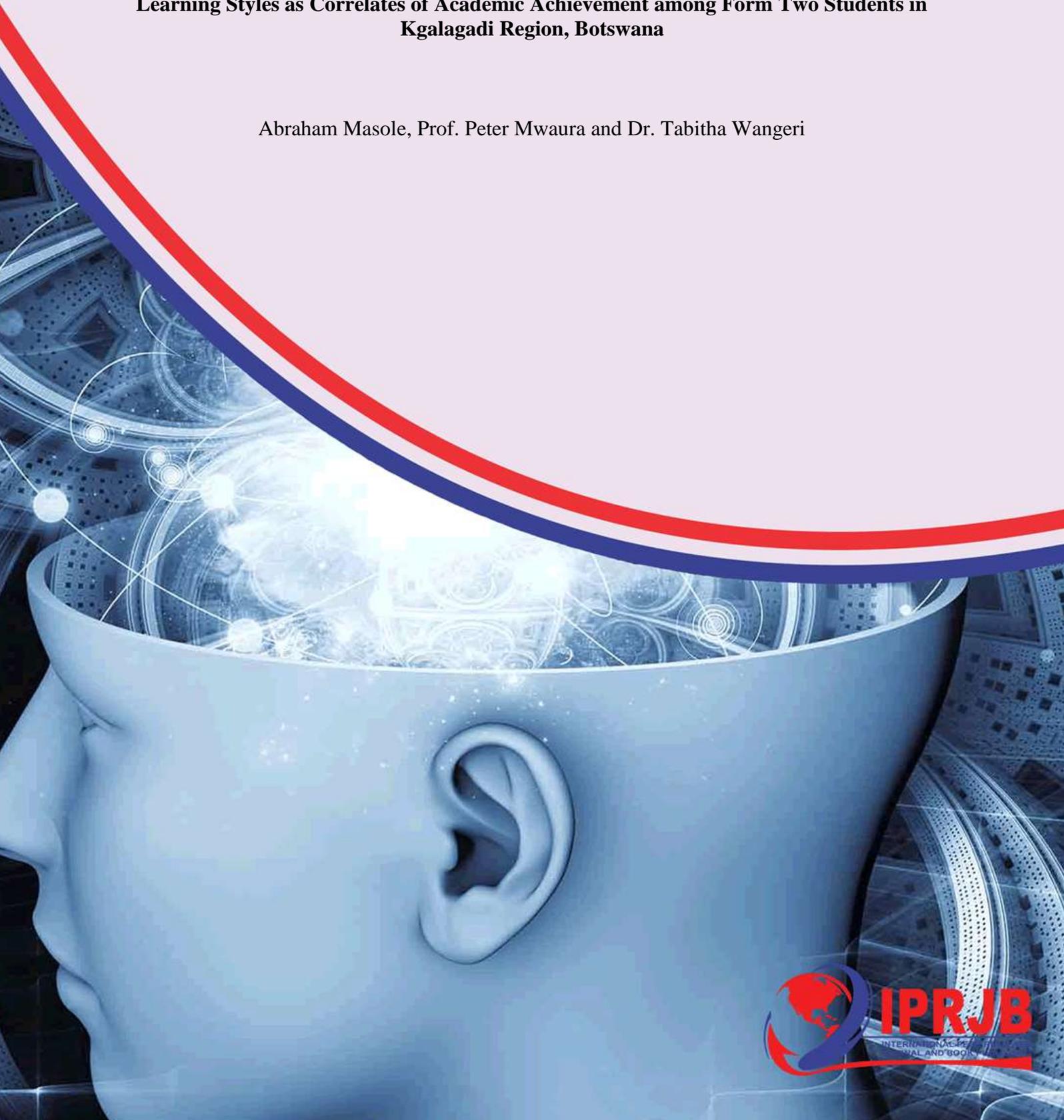


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**Learning Styles as Correlates of Academic Achievement among Form Two Students in
Kgalagadi Region, Botswana**

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Abstract

Purpose: For more than a decade, junior secondary schools in the Kgalagadi region of Botswana have recorded persistently poor academic achievement, raising concerns about the instructional and systemic factors influencing learner outcomes. Despite ongoing national reforms, little empirical work has examined how learner characteristics, particularly learning styles relate to performance in this rural context. This study investigated the relationship between Kolb's learning styles and academic achievement among Form Two students in Kgalagadi region, Botswana. The study aimed to determine whether a significant relationship exists between learning styles and academic achievement, with the broader goal of informing contextually responsive teaching and assessment practices in rural junior secondary schools.

Methodology: A quantitative correlational research design was employed. Using a multistage sampling approach, 309 Form Two students were selected from a population of 1,359 across five public junior secondary schools. Proportional sampling ensured adequate representation from schools of varying sizes. Data on learning styles were collected using Kolb's Learning Style Inventory, administered in supervised group sessions, while academic achievement scores were extracted from official end-of-year examination records. Data analysis, conducted in SPSS, comprised descriptive statistics (frequencies, percentages, and cross-tabulations) and inferential tests, including chi-square analysis and one-way ANOVA at a 0.05 significance level.

Findings: The assimilating learning style was most prevalent (47.6%), followed by converging (24.6%), accommodating (15.5%), mixed (7.1%), and diverging (5.2%). Achievement levels were generally low, with 40.5% scoring grade D and 19.1% ungraded (U), while only 2.3% attained grade A and 0.3% Merit. Although assimilating and converging learners appeared overrepresented in higher-grade categories, one-way ANOVA revealed no statistically significant differences in mean achievement across learning styles, $F(4, 304) = 0.94$, $p = 0.4385$, with learning styles accounting for only 1.2% of the variance.

Unique Contribution to Theory, Practice and Policy: Theoretically, the study extends Experiential Learning Theory into a rural African junior secondary context, demonstrating that learning styles, while identifiable, have limited predictive power for achievement. Practically, the findings highlight the need for differentiated, learner-centred instruction that integrates reflective, analytical, and experiential activities. Policy recommendations include embedding learning-style awareness in teacher training, diversifying assessment methods, and promoting equity-focused reforms to support learners in resource-constrained rural settings.

Keywords: *Learning Styles, Academic Achievement, Experiential Learning Theory, Junior Secondary Education, Quantitative Analysis, Human Capital*

JEL Codes of Classification: *I21, J24, C12*

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INTRODUCTION

Botswana has recorded significant achievements in the growth of access to basic education since the independence with high enrolment and literacy levels. However, similar to most countries on their way to Sustainable Development Goal 4, there are still some worries about the quality of learning achievements and especially in the rural and underserved areas. In the world, education reforms by the European Union through the ET2020 model and significant curriculum changes in Africa are still focused on equity and competency development and better learning environments (Camanho et al., 2023; Adeneyi et al., 2024). The performance of Botswana at the junior secondary level has exhibited a consistent downward trend in spite of the similar investments with national examination pass rates often being lower than 50 percent (BEC, 2019-2024).

These difficulties are heightened in rural communities like Kgalagadi where schools have always recorded lower results and none of them had reached the national 60 percent target in recent years (BEC, 2024). This perpetual poor performance constrains the advancement opportunities of learners and their socio-economic perspectives in the long term. Despite a number of interventions including, workshops on teacher training, motivational programmes, and school-based interventions, little has been done to improve and it implies that critical factors of learning have not been adequately studied.

International literature identifies the importance of psychological and pedagogical factors especially learning styles in influencing the engagement and performance of learners. Based on the four learning styles, Kolb Experiential Learning Theory (1984, 2015) describes the variations of preferences in processing and transforming experience and identifies four learning styles: assimilating, converging, diverging and accommodating. Although there is still controversy in the modern literature, especially the criticisms of the weak empirical support and the highly deterministic nature of claims, this paper has positioned learning styles as the perceptual preferences and metacognitive orientations of the learners that are likely to influence the interaction with learning instructions. Learning styles were considered to be flexible adaptive tendencies based on the Experiential Learning Theory (ELT) by David A. Kolb with the help of which students perceive, process, reflect on, and utilize academic information.

The results showed significant differences in the self-reported learning preferences of the students and relatively weak and selective statistical connections among individual learning dimensions and academic performance. The implication of these findings is that learning styles can be thought of as patterns of engaged metacognition as opposed to deterministic or predictive academic performance. The idea of academic achievement seems to be conditioned by a complex of interacting factors that do not depend on perceptual preferences. On the whole, the research contributes to the context-specific empirical data in a rural African context and makes suggestions in the area of differentiated instructional practices in the Botswana junior secondary education system without making over-the-top arguments concerning the causal role of learning styles.

Statement of the Problem

The Botswana junior secondary schools are supposed to attain a national standard of at least 60 percent in JCE exams. Nevertheless, the schools in Kgalagadi region have always not been able to meet this standard, as the highest-achieving school in the last 5 years achieved a score of only 42.65. Continual poor performance in academic activities has adverse consequences to the self-esteem, furtherance, and socio-economic future of learners.

With the focus on the policy and numerous reform measures, such as teacher development workshops and learners' motivation programmes, the mean performance in the region is still way lower than the national goal. This implies that the existing interventions could be inadequate to accommodate major learner-centred variables that determine achievement.

The adoption or lack of conformity between the learning styles of students and the teaching and assessment culture that prevails in junior secondary schools is one of the unexplored factors in Botswana context. The experience of other countries indicates that in case the instruction is highly theory-focused and the assessment is based more on written work and exams, learners whose preferences do not correspond to reflective and abstract forms can be disadvantaged (Mutlu, 2021; Evans et al., 2020).

However, there is a lack of empirical studies concerned with the relationship between learning styles and academic achievement in Botswana, especially in the rural areas like Kgalagadi. In the absence of these evidences, educators and policy makers will have no significant foundation in which to base their differentiation and inclusive teaching methods that accommodate diverse learners.

As structural reforms (workshops, infrastructure) have proven to be futile, the Pedagogical Alignment Gap is explored in the study. The main issue of this research is, then: Do systemic concerns in the present standardized, lecture-based curriculum mean that students with certain experiential preferences are systematically disadvantaged?

LITERATURE REVIEW

Theoretical Framework

This paper was based on Experiential Learning Theory (ELT) created by Kolb (1984, 2015). ELT assumes that the process of learning is holistic and cyclical in nature and individuals generate knowledge through experience transformation. The learning cycle consists of four steps, namely Concrete Experience (CE) - direct experience with particular situations, Reflective Observation (RO) - the reflection of these experiences, Abstract Conceptualization (AC) - generalization, deriving concepts or theories, and Active Experimentation (AE) - is trying these concepts towards new situations. There are four learning styles that are formed by learners as they tend to prefer a specific combination of these modes (Diverging (CE/RO), Assimilating (AC/RO), Converging (AC/AE), and Accommodating (CE/AE), (Kolb, 2015; Maya et al., 2021). Divergent learners are good at seeing concrete situations in multiple ways and like working in groups; assimilating learners are good at dealing with abstract ideas and thinking; convergent learners are good at applying new ideas practically; and accommodating learners are good at using experience, intuition, and trial and error. According to Dantas and Cunha (2020), learning styles are comparatively constant preferences in terms of the way learners intercept and process information. They also contend, however, that these styles are dynamic and contextual and are influenced by educational experiences and disciplinary pressures. ELT is a frequent application in psychology, education, health sciences, engineering, and business education to investigate the relations between the preferences of learners and the technique and results of instructions (Maya et al., 2021; Kolb and Kolb, 2017).

In this paper Experiential Learning Theory (ELT) was applied as a structuring lens in order to categorize learners in the Kgalagadi Region according to the four learning styles proposed by David Kolb. The theory also allowed to study the relationship between these styles in different respects and academic achievement in a junior secondary school setting dominated by an examination oriented and theory-driven culture. Moreover, ELT provided an explanation of

how to interpret academic advantage and disadvantage trends that can arise, when teaching methods fall into the favorable or unfavorable relationship with the desired learning styles of the learners.

According to Maya et al. (2021), learning is a cyclical process where the knowledge is built by the transformation of an experience in two interacting dimensions - how experience is created (Concrete Experience versus Abstract Conceptualization) and how the experience is transformed (Reflective Observation versus Active Experimentation). Among learners aged 14–15 years, Concrete Experience is reflected in practical and socially interactive classroom activities; Reflective Observation is evident in structured reflection and peer dialogue; Abstract Conceptualization appears through the development of abstract thinking and theoretical comprehension; while Active Experimentation is demonstrated when learners apply newly developed ideas in practical or problem-solving situations. The authors further argue that, at this developmental stage, effective learning occurs when instruction deliberately progresses through experiencing, reflecting, conceptualizing, and applying, thereby fostering metacognitive development and deeper academic engagement rather than viewing learning styles as fixed and unchanging characteristics.

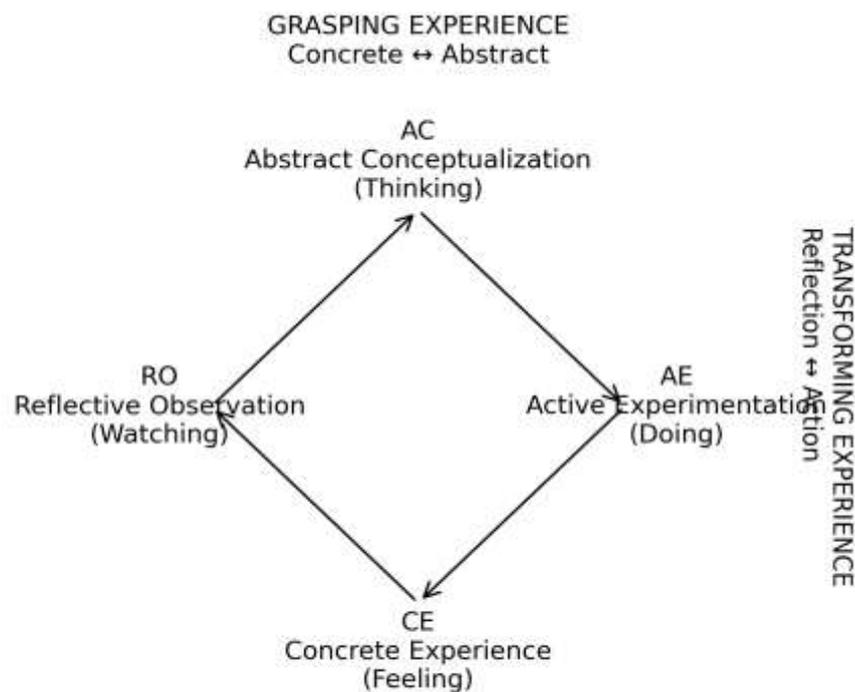


Figure 1: Kolb's Experiential Learning Cycle

Note. The vertical dimension represents Grasping Experience (Concrete ↔ Abstract), and the horizontal dimension represents Transforming Experience (Reflection ↔ Action). Adapted from Kolb (1984).

Conceptual Framework

The conceptual framework for this study hypothesized a direct relationship between learning styles (independent variable) and academic achievement (dependent variable), within the broader schooling context of Kgalagadi region.

Independent variables

Dependent variables

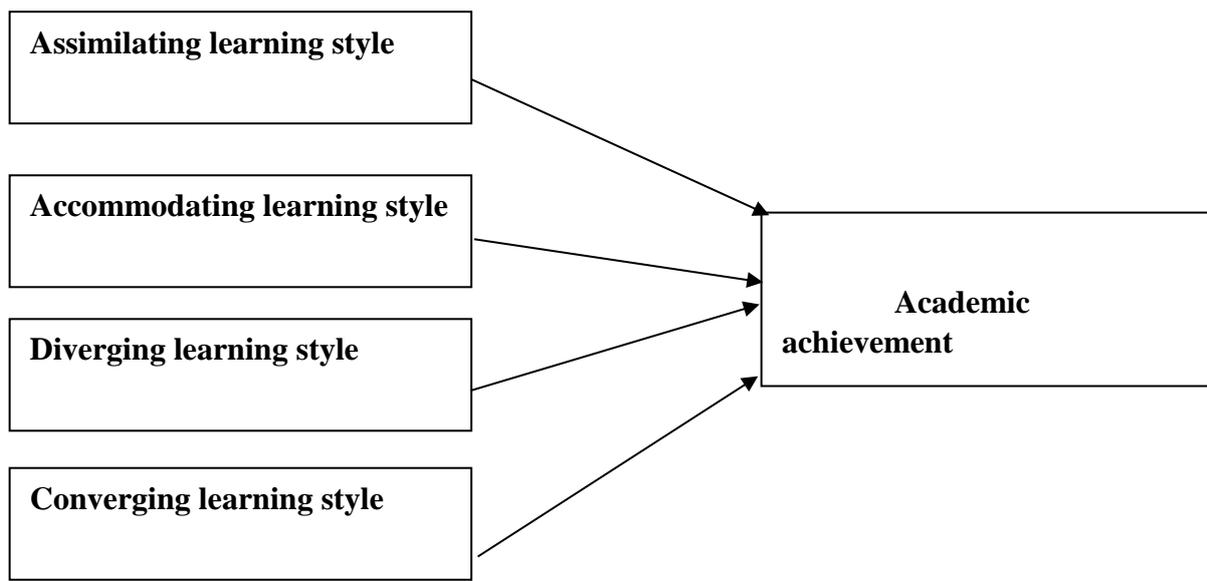


Figure 2: Hypothesized Relationship between Learning Styles and Academic Achievement (Narrative description)

The figure above shows the hypothesized relationship between the dependent and the independent variables investigated in the current study, where Learning styles, categorized into diverging, assimilating, converging and accommodating based on Kolb's Learning Style Inventory is the independent variable. Academic achievement, operationalized as learners' end-of-year examination grades (Merit, A, B, C, D, E, U) is the dependent variable.

The framework assumes that, learners' preferred styles influence how they engage with instructional tasks and assessments. It further undertakes that, in systems that favour reflective and abstract processing, assimilating and converging learners may have a systemic advantage. In contrast, accommodating and diverging learners may struggle when instruction is heavily lecture-based and assessment relies on written examinations, especially where opportunities for hands-on, collaborative, and creative learning are limited.

The framework also acknowledges that other contextual factors (such as teacher quality, resources, and socio-economic background) may influence academic achievement. Although these were not directly modeled in the present analysis, they are recognized as important background variables that may moderate or mediate the relationship between learning styles and achievement.

Empirical Review

Learning Styles and Academic Achievement

Internationally, numerous studies have examined how learning styles relate to academic performance, with mixed results. Some studies suggest that certain styles are associated with higher achievement in particular disciplines, while others report weak or non-significant relationships.

Anwar et al. (2024), in a study conducted among lower secondary school learners, investigated the distribution of Kolb's learning styles and their association with performance in geometry. Using the Learning Style Inventory and a standardized geometry test, the study found that most learners were divergers or assimilators, and that different styles aligned with different instructional methods (e.g., lecture and Q&A for divergers, problem-based learning for accommodators, and inquiry-based learning for convergers).

In Nigeria, Akuezuilo and Egenti (2024) examined how study habits and learning styles jointly predicted academic achievement in English among senior secondary students. Using a predictive correlational design and Kolb's inventory, they reported a modest positive relationship between learning styles and achievement, concluding that organized study practices and awareness of learning preferences can enhance performance.

Amin (2024), in Pakistan, directly explored the effect of learning styles on academic achievement in General Science using a post-test-only experimental design. Findings indicated that assimilating learners consistently outperformed those with convergent, divergent, or accommodating styles, especially when instruction aligned with their preferred modes of reflective and abstract learning.

In mathematics education, Jatau (2017) compared converging and diverging styles among secondary school learners in Nigeria using a quasi-experimental design. Results showed that converging learners attained higher post-test scores in algebra than diverging learners, highlighting the advantage of analytical, problem-solving orientations in exam-based subjects.

Conversely, Taheri et al. (2021), in a study of dental students, found that the accommodating learning style and emotional creativity were not significantly related to academic performance. This suggests that in highly competitive, exam-intensive programmes, learning styles may be overshadowed by other factors such as prior preparation, motivation, and institutional demands.

Overall, the empirical literature highlights three key themes:

1. **Contextual specificity:** The relationship between learning styles and achievement varies across disciplines, levels of education, and institutional cultures.
2. **Systemic alignment:** Styles that align with dominant teaching and assessment practices (often assimilating and converging) tend to show better performance.
3. **Modest predictive power:** While learning styles sometimes show significant associations with achievement, effect sizes are often small, indicating that other variables contribute substantially to performance (Evans et al., 2020; Mutlu, 2021).

Assessment Bias and Systemic Alignment

According to recent empirical studies on equity in assessments, patterns of observed achievement can sometimes be a result of the alignment of assessment structures with specific varieties of cognitive activity, as opposed to difference in ability of the learner. When

evaluation systems consistently end up rewarding certain forms of demonstration of knowledge- abstract knowledge, text-based knowledge, time-bounded analytical reasoning, etc.- and pay minimal attention to experiential, practical, or collaborative competence, assessment bias arises.

In the context of the experiential learning model of David Kolb, the system focusing on examinations will benefit presumably those learners who are stronger in the Abstract Conceptualization and Reflective Observation as these two orientations relate well to the written theoretic tasks and formal analytical procedures. On the other hand, students that mostly learn by means of Concrete Experience or Active Experimentation might simply have less time to present their potential properly in the setting of standardized tests. It does not mean that the academic performance is caused directly by the learning styles but only indicates that assessment practice is more relevant to some engagement tendencies than to others.

The national policy discussion in Botswana expressed in the Vision 2036 focuses on inclusive human capital growth and equity in the educational delivery. Meanwhile, the secondary education system remains largely examination-based, and the development of the learners largely relies on the results in standardized national exams offered by the Botswana Examinations Council. Though there has been a change to reforms that include segments of constant and results-based evaluations, written tests still form the major determinant of scholastic achievement.

The institutional setting justifies the focus of the study, where the researcher focuses on correlation, but not causation. Observing the possibility of a statistical correlation between learning style preferences with the academic success of Form Two students, the research questions the possibility that the results in terms of the performance could also be partly explained by the correspondence between the favorable mode of engagement adopted by learners and the existing assessment options. High associations may indicate systemic consistency or implicit bias and low or inconsistent associations would indicate that the achievement differences are more well influenced by environmental contextualization like socio-economic status, quality of instruction, school climate, or accessibility of resources.

Placing learning styles in an assessment bias scheme thus makes the study more interpretive. It diverts the focus on classifying the learners and on discussing the possibilities that the characteristics of the Botswana assessment system might be biased to favor specific learning styles, according to the current equity and education reform agenda.

Learning Styles within African and Botswana

Literature on learning styles in secondary school level in the sub-Saharan region is also sparse. Nonetheless, multiple studies connected to the topic have also investigated the effects of teaching strategies, school-level variables, and exam-oriented systems on the engagement and the performance of learners (Asimeng-Boahene and Baffoe, 2022; Owuor, 2021). The results always indicate that most of the education systems in Africa are still highly exam oriented and there is little room to have experiential or problem-based learning.

Dennis and Ndege (2024) found in Kenya that the achievement in chemistry was partly predicted by learning styles, but the magnitude of these relationships varied depending on school and practice. Such results have also been observed in other studies, such as South Africa and Ghana, where the differences between the learner preferences and the existing pedagogy that the minority is subjected to are associated with engagement disruption and poor performance (Pillay and van der Westhuizen, 2020; Bervell and Umar, 2017).

The school-based and socio-economic variables are mostly examined in Botswana (Nonfo et al., 2022; Makwinja et al., 2022; Mungoo, 2017). These pieces of work point out large classrooms, shortage of teachers, rural-urban inequality as well as insufficient teaching material. Nevertheless, very minimal empirical research has focused on the contribution of psychological and pedagogical factors like learning styles.

The current research thus fills a major gap by identifying defining the learning styles and academic performance in junior secondary students in Kgalagadi region, which is a rural district which has yet to achieve good performance in any national examination.

Research Gaps

An analysis of the literature shows that there are various gaps. Majority of research on learning styles has been done in urban or tertiary settings with extremely minimal evidence generated in rural African junior secondary environments especially in Botswana (Asimeng-Boahene and Baffoe, 2022). The available literature also has a tendency of targeting older learners (senior secondary or university) and junior secondary learners, which is a significant period of development, have not been thoroughly studied (Jatau, 2017). In as much as scholars observe that exam-oriented systems can benefit some learning styles as opposed to others, not many researchers have investigated the dynamics between systemic practices and the preferences of learners in low-resource rural settings. In Botswana, the studies have focused mostly on structural and socio-economic variables affecting performance, but little emphasis is directed to learning styles that are psychological constructs (Mungoo, 2017). This research thus comes in an imperative gap since it analyzes the relationship between learning styles and academic performance under the special education environment of the Kgalagadi region.

METHODOLOGY

Research Design

The study adopted a correlational research design, which was appropriate for examining the relationship between learning styles and academic achievement without manipulating any variables. As Patten and Newhart (2017) observe, correlational designs are well suited to studies that investigate naturally occurring associations where experimental control is impractical or unethical. In this study, learning styles (a categorical variable) and academic achievement (an ordinal/interval variable based on examination grades) were measured within their real school context. This design enabled the use of descriptive statistics to characterize learner patterns and inferential statistics to determine whether the observed relationships between learning styles and academic performance were statistically significant.

Population and Sampling Procedure

The target population consisted of 1,359 Form Two students enrolled in five public junior secondary schools in the Kgalagadi region of Botswana. All schools are co-educational and serve predominantly rural communities. A multistage sampling procedure was used. First, the Kgalagadi region was purposively selected from the ten national education regions due to its consistently low JCE performance. Second, all five junior secondary schools were included, constituting a census of schools. Third, within each school, learners were sampled proportionally to enrollment size to ensure representativeness. The final sample comprised 309 learners, with a 100% return rate as shown in Table 1. All questionnaires were completed and returned, exceeding the minimum 60% response rate recommended for survey studies (Pekrun, 2020)

Data Collection Procedure

Data collection was conducted during normal school hours with the approval of regional and school authorities. At each school, the researcher met with administrators, assembled sampled learners, and explained the purpose of the study while assuring confidentiality. Informed consent/assent was obtained prior to participation. Questionnaires were administered in group settings, and learners were guided through the instructions for Kolb's Learning Style Inventory. Completed questionnaires were collected immediately to ensure data integrity. Academic achievement data were obtained from school examination records and matched to questionnaire responses using anonymous codes to protect confidentiality.

Research Instrument

Data on learning styles were collected using Kolb's Learning Style Inventory (LSI), adapted from Kolb (1984). The instrument consists of 80 items measuring preferences across four learning modes (Concrete Experience, Reflective Observation, Abstract Conceptualization, and Active Experimentation). Learners indicated agreement by checking items that reflected their preferred ways of learning. The LSI has been widely used in educational research, including studies involving secondary learners (e.g., Ocampo et al., 2023; Jatau, 2017). Scoring followed Kolb's guidelines to generate learning-mode profiles and classify learners into diverging, assimilating, converging, accommodating, or mixed-style categories.

Data Analysis

Quantitative data were coded and analyzed using SPSS. Data cleaning involved checking completeness and correcting coding errors. Descriptive statistics (frequencies, percentages, and cross-tabulations) were used to summarize learner characteristics, learning-style distributions, and achievement patterns. Inferential analysis included chi-square tests to examine associations between learning-style categories and achievement grades, and one-way ANOVA to compare mean achievement scores across learning styles. Statistical significance was set at $\alpha = 0.05$.

The null hypothesis tested was:

H₀₁: *There is no significant relationship between learning styles and academic achievement among Form Two students in Kgalagadi region, Botswana.*

RESULTS

Response Rate

All 309 distributed questionnaires were completed and returned, yielding a 100% response rate. This high rate was facilitated by administering the instruments in group settings under the researcher's direct supervision.

Demographic Information

The gender distribution of the respondents is presented in Table 2. Of the 309 learners who participated in the study, 147 (47.6%) were male and 162 (52.4%) were female, reflecting a relatively balanced sample with a slight predominance of female students. This pattern is consistent with recent observations in sub-Saharan African basic education systems, where female enrolment in lower-secondary levels has shown gradual growth and, in some regions, now slightly exceeds male participation (UNESCO, 2023). The near-even distribution in this study ensures adequate representation of both genders for subsequent analyses.

Table 1: Gender of the Students

| Sex of the Students | Frequency (n) | Percent (%) |
|---------------------|---------------|---------------|
| Male | 147 | 47.57 |
| Female | 162 | 52.43 |
| Total | 309 | 100.00 |

Learning Styles among Students

Table 3 shows the distribution of learners' preferred learning styles. Nearly half (47.6%) were assimilating learners, followed by converging (24.6%), accommodating (15.5%), mixed (7.1%), and diverging (5.2%). Overall, reflective–abstract orientations dominated the sample, with assimilating and converging styles accounting for over 70% of learners, a pattern consistent with findings from other exam-oriented secondary school contexts (Anwar et al., 2024; Dennis & Ndege, 2024).

Table 3: Descriptive Statistics for Learning Styles

| Learning Style | Frequency (n) | Percent (%) |
|------------------------------|---------------|---------------|
| Diverging Learning Style | 16 | 5.18 |
| Converging Learning Style | 76 | 24.60 |
| Assimilating Learning Style | 147 | 47.57 |
| Accommodating Learning Style | 48 | 15.53 |
| Mixed Learning Styles | 22 | 7.12 |
| Total | 309 | 100.00 |

Academic Achievement Levels

Table 4 displays the distribution of learners by academic achievement grade. The majority of learners attained grade D (40.5%), followed by U (ungraded) at 19.1% and C at 14.6%. Only 2.3% attained grade A, and 0.3% achieved Merit. Overall, this pattern reflects generally low academic performance among learners in Kgalagadi region

Table 4: Distribution of Learners' Academic Achievement Grades

| Achievement Grade | Frequency (n) | Percent (%) |
|-------------------|---------------|---------------|
| Merit | 1 | 0.32 |
| A | 7 | 2.27 |
| B | 29 | 9.39 |
| C | 45 | 14.56 |
| D | 125 | 40.45 |
| E | 43 | 13.92 |
| U | 59 | 19.09 |
| Total | 309 | 100.00 |

Learning Styles by Gender

Table 5 presents the distribution of learning styles by gender. Both male and female learners were most commonly assimilators, followed by convergers. The distributions suggest broadly similar patterns of learning style preferences across genders, with only slight variations in proportions.

Table 5: Distribution of Learning Styles by Gender of the Students

| Learning Style | Male n (%) | Female n (%) | Total n (%) |
|-----------------------|--------------------|--------------------|------------------|
| Diverging | 9 (56.25) | 7 (43.75) | 16 (100) |
| Converging | 31 (40.79) | 45 (59.21) | 76 (100) |
| Assimilating | 68 (46.26) | 79 (53.74) | 147 (100) |
| Accommodating | 27 (56.25) | 21 (43.75) | 48 (100) |
| Mixed Learning Styles | 12 (54.55) | 10 (45.45) | 22 (100) |
| Total | 147 (47.57) | 162 (52.43) | 309 (100) |

Academic Achievement by Gender

Table 6 presents the distribution of academic achievement across gender. For both male and female learners, grade D constituted the largest proportion of outcomes, accounting for 40.1% of males and 40.7% of females. Female learners, however, recorded higher frequencies in the upper-grade categories: 3.1% attained grade A, 14.2% achieved grade B, and 17.9% achieved grade C, compared to 1.4%, 4.1%, and 10.9% of males respectively. In contrast, male learners were more represented in the lower-grade bands, particularly in the U category, where 29.9% of males fell compared to 9.3% of females. The overall distribution reflects variation in performance patterns across gender, as summarized in Table 6.

Table 6: Distribution of Learners' Academic Achievement Grades by Gender

| Achievement Grade | Male n (%) | Female n (%) | Total n (%) |
|-------------------|------------|--------------|-------------|
| Merit | 1 (0.7) | 0 (0.0) | 1 (0.3) |
| A | 2 (1.4) | 5 (3.1) | 7 (2.3) |
| B | 6 (4.1) | 23 (14.2) | 29 (9.4) |
| C | 16 (10.9) | 29 (17.9) | 45 (14.6) |
| D | 59 (40.1) | 66 (40.7) | 125 (40.5) |
| E | 19 (12.9) | 24 (14.8) | 43 (13.9) |
| U | 44 (29.9) | 15 (9.3) | 59 (19.1) |
| Total | 147 | 162 | 309 |

Academic Achievement by Learning Style

As shown in Table 7, assimilating learners accounted for the largest share of higher performers, contributing most of the A, B, and C grades in the sample. Converging learners also appeared in the upper-grade categories and produced the only Merit grade. However, across all learning styles, the majority of learners were concentrated in the lower grades (D, E, U), reflecting the overall pattern of low achievement. Mixed-style learners recorded the weakest outcomes, with over 80% attaining grade D and no representation in the A–C range.

Table 7: Distribution of Academic Achievement by Learning Style

| Learning Style | Merit | A | B | C | D | E | U | Total |
|----------------|---------------|---------------|----------------|-----------------|------------------|-----------------|-----------------|-----------------|
| Diverging | 0 | 0 | 0 | 5(31.3) | 3(18.8) | 3(18.8) | 5(31.3) | 16(100) |
| Converging | 1(1.3) | 3(3.9) | 9(11.8) | 8(10.5) | 28(36.8) | 14(18.4) | 13(17.1) | 76(100) |
| Assimilating | 0 | 4(2.7) | 18(12.2) | 22(15.0) | 55(37.4) | 20(13.6) | 28(19.1) | 147(100) |
| Accommodating | 0 | 0 | 2(4.2) | 10(20.8) | 21(43.8) | 4(8.3) | 11(22.9) | 48(100) |
| Mixed | 0 | 0 | 0 | 0 | 18(81.8) | 2(9.1) | 2(9.1) | 22(100) |
| Total | 1(0.3) | 7(2.3) | 29(9.4) | 45(14.6) | 125(40.5) | 43(13.9) | 59(19.1) | 309(100) |

Hypothesis Testing: One-Way ANOVA

A one-way ANOVA was conducted to determine whether mean academic achievement differed significantly across the five learning style categories. As shown in Table 8, the analysis revealed no statistically significant differences in mean scores, $F(4, 304) = 0.94$, $p = 0.4385$. Learning styles explained only 1.2% of the variance in academic achievement ($R^2 = 0.0123$), indicating that observed descriptive differences were minimal and not statistically meaningful. Consequently, the null hypothesis (H_{01}), stating that learning styles are not significantly related to academic achievement, could not be rejected.

Table 8: One-Way ANOVA Results for Academic Achievement Scores by Learning Style

| Source of Variation | Sum of Squares (SS) | df | Mean Square (MS) | F | p-value |
|---------------------|---------------------|------------|------------------|------|---------|
| Model | 713.65 | 4 | 178.41 | 0.94 | 0.4385 |
| Learning Style | 713.65 | 4 | 178.41 | 0.94 | 0.4385 |
| Residual | 57,430.93 | 304 | 188.92 | — | — |
| Total | 58,144.58 | 308 | 188.78 | — | — |

$R^2 = 0.0123$; Adjusted $R^2 = -0.0007$; Root MSE = 13.74

Discussion

The research gives significant information on learning styles and academic achievement within a rural Botswana setting. The unusually high response rate enhanced the reliability of the data and indicates the efficacy of administering it on a school basis under supervision (Ponto, 2021). The gender balance was even with the latest tendencies in the region where female enrollment in lower-secondary education has been slightly higher than that of males (UNESCO, 2023).

Patterns of learning styles revealed that there was high dominance of assimilating and converging learning styles, which constitute greater than 70 percent of the learners. Such focus on reflective abstract orientations is consistent with findings that examination-based schooling cultures are characterized by and supportive of cognitively analytical learning orientations (Anwar et al., 2024; Dennis and Ndege, 2024). The scarcity of diverging and accommodating styles could be understandable by the lack of access to practical or inquiry-based education in resource-limited rural schools (Asimeng-Boahene and Baffoe, 2022).

Academic achievement on a general basis was low with majority of learners concentrated on grades D and U. This observation aligns with published performance gaps in the rural and semi-arid areas of Botswana, where the lack of qualified educators and scant learning materials are still limiting performance (Makwinja et al., 2022; Nonofu et al., 2022). The difference between male and female learners was not huge, but significant: female students were overrepresented in higher-grade groups, which is becoming more common in sub-Saharan Africa (UNESCO, 2023).

Assimilating and converging learners were highest contributors of upper-grade performers, which is in line with reflective-abstract preference being more consistent with theory-based assessments (Amin, 2024; Akuezilo and Egenti, 2024). Nonetheless, the ANOVA results revealed no significant and statistically significant differences in the means of academic achievement with differences in the categories of learning styles. The finding of 1.2 percent of variance by learning style supports the growing belief that learning-style categories have a nonetheless small predictive value of high-stakes academic performance (Cuevas, 2020; Hattie,

2023). The mixed-style learners fared the lowest, which does not support the allegations that hybrid learning preferences can offer the benefit of flexibility (Dantas and Cunha, 2020).

In general, the findings indicate that though learning styles are used to describe significant learner preferences, they do not significantly influence academic performance in the strict, exam-focused instruction context that is inherent in rural Botswana. Systemic and pedagogical influences may be of much broader impact on achievement patterns, which reflects broader results in research on African rural education (Asimeng-Boahene and Baffoe, 2022).

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The paper has discussed the connection between academic performance and learning styles among the learners of Form Two in Kgalagadi region in Botswana. The sample was balanced both in gender (47.6% male and 52.4% female) and response rate (100%), so that, all the data were available to analyse. Almost half of the learners did like assimilating learning style followed by converging, accommodating, mixed and diverging styles. The overall performance in academics was poor with the highest number of learners achieving grade D and a significant number without grades (U). The gender-based patterns indicated that females were more in the higher achievement categories (A-C), and males were concentrated on the U category. Further descriptive analyses revealed that the assimilating and converging learners provided the greatest proportion of higher grades where the accommodating, diverging and in particular mixed-style learners were overrepresented in the lower performance categories. The results of one-way ANOVA, though, indicated that they were not statistically significant; the learning style was not a very useful predictor of the academic achievement.

Conclusion

The research finds out that reflective-abstract learning preferences, especially assimilating and converging styles are dominant in most Form Two learners in the Kgalagadi region. This correspondence to the theory-oriented curriculum of Botswana does not correspond to the academic success. The general performance is still poor meaning that there are larger systemic and instructional issues that control than there are learning styles. Despite a slightly better descriptive performance of assimilating and converging learners, learning styles proved to be less predictive and no statistically significant effects were identified. Students who use experiential or mixed learning styles seem to be disadvantaged in a system of assessment where written and theoretical competency takes precedence. In turn, the enhancement of academic performance in the area will necessitate comprehensive changes in the area of teacher capacity enhancement, pedagogical diversification, and structural obstacles instead of focusing on the learner-type factors.

Recommendations

In order to enhance the learning results in rural junior secondary settings, a composite approach between practice on the classroom level and policy change on the system level is necessary. The instructors are to endeavor to embrace differentiated instruction models which suit all the four learning styles of Kolb in a balanced manner between theoretical learning and problem-solving, reflective, collaborative, and practical activities by use of learning-style awareness programmes and on-going professional learning based on the Experiential Learning Theory. Teacher training institutions at the policy level ought to incorporate learner-centred pedagogy in training curricula, and examination bodies in the array of assessment modes, adding practical and project-based assignments that are more likely to capture various learner competencies.

Considering the ongoing poor performance in some of the regions like the Kgalagadi, there is need to provide special assistance to the rural schools by providing quality resources, planned mentoring, and enhanced monitoring to enhance inclusive and responsive classrooms.

Further Research

Further studies are required to build on the current findings in terms of comparing the patterns of learning style and the outcomes of learning styles in rural and urban settings, to test the effectiveness of learning-style-based intervention, to explore the interaction of learning styles with other psychological constructs, including achievement goal orientations and self-efficacy to influence academic achievement.

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