Predictive Association between Learners' Entry Marks and Academic Performance in KCSE Business Studies in Public Secondary Schools in Nandi County, Kenya

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ABSTRACT

Academic performance at the Kenya Certificate of Secondary Education (KCSE) remains an important concern, particularly in Business Studies, where learners demonstrate varying levels of achievement. Prior academic achievement may provide an indication of learners' preparedness for secondary education and their subsequent academic outcomes. However, limited empirical evidence exists on the predictive association between learners' entry marks and performance in KCSE Business Studies in public secondary schools in Nandi County, Kenya. This study examined the predictive association between learners' entry marks and academic performance in Business Studies at KCSE. Specifically, the study sought to determine learners' entry marks, establish their performance in Business Studies, and determine the predictive association between the two variables. The study was anchored on the Basic Input–Output Education Production Function model and adopted a positivist philosophical paradigm and a cross-sectional design based on retrospective analysis of existing school records. The target population comprised 180 public secondary schools in Nandi County, from which 118 schools were selected using stratified and simple random sampling procedures. Data were obtained through document analysis; with mean KCPE entry marks and KCSE Business Studies mean scores extracted from school records. The analysis was based on 95 schools with complete observations. Descriptive statistics and simple linear regression were used. Findings indicated that entry marks ranged from 176 to 314, with a mean of 249.40 (SD = 36.25), while Business Studies mean scores ranged from 2.00 to 10.80, with a mean of 4.96 (SD = 2.21). Regression analysis revealed a statistically significant positive predictive association between entry marks and Business Studies performance ($\beta = .723$, $t = 10.083$, $p < .001$), with the model accounting for 52.2% of the observed variance in performance. The study concludes that higher school-level mean entry marks were statistically associated with higher school-level mean KCSE Business Studies performance in the sampled schools. It recommends that schools use entry-level academic information, together with other relevant educational evidence, to identify learners who may benefit from early academic support.

Keywords: entry marks, academic performance, Business Studies, KCSE, predictive association

INTRODUCTION

Academic performance refers broadly to the extent to which learners attain expected educational outcomes. It is commonly reflected through examination scores, grades, tests, assignments, competencies, and other forms of assessment. Lozano-Blasco et al. (2022) conceptualize academic performance in terms of measurable educational achievement, while Kumar, Agarwal, and Agarwal (2021) associated it with outcomes demonstrated through examinations, tests, assignments, and grades. In secondary education, academic performance provides an indication of the extent to which learners attain intended learning outcomes and acquire knowledge and competencies. In Kenya, one of the principal measures of secondary school achievement is performance in the Kenya Certificate of Secondary Education (KCSE), which marks completion of secondary education and provides a basis for progression to further education and training.

Prior academic achievement has frequently been examined as an indicator of subsequent educational performance. International evidence generally suggests that learners who enter a new level of education with relatively higher prior achievement may also demonstrate relatively higher subsequent achievement. Al Husaini and Shukor (2022), for example, reported that entry grades were significant predictors of students' academic performance. Ferrao and Almeida (2019) found that university entrance scores were associated with subsequent academic achievement, while Richardson et al. (2012), through a systematic review and meta-analysis, identified prior academic attainment as an important correlate of university students' academic performance. Almalawi et al. (2024) similarly identified prior achievement as a relevant component of predictive models of educational outcomes. Such evidence suggests that prior academic attainment may provide useful information about learners' academic preparedness as they transition to a subsequent level of education.

In Kenya, prior academic achievement has traditionally been reflected through performance in the Kenya Certificate of Primary Education (KCPE), which historically served as an important indicator in transition and placement into secondary education. Kenyan studies have reported associations between KCPE achievement and subsequent secondary school performance. Sidi et al. (2020), for example, reported that high-performing schools in Mombasa County admitted learners with higher entry marks than schools with comparatively lower performance. Irungu and Nyagah (2013) similarly reported an association between low KCPE entry marks and subsequent KCSE performance. Agingu (2017) found KCPE scores useful in predicting KCSE scores across school categories, while Wekesa and Namusonge (2021) reported an association between entry marks and academic performance in Kenyan secondary schools.

Evidence is not, however, completely consistent. Njoroge (2023) reported no statistically significant relationship between students' entry behaviour and academic achievement in public secondary schools in Machakos County. Other studies have emphasized the importance of factors beyond prior achievement, including instructional quality, school climate, learner characteristics, parental support, and school resources (Chowa et al., 2019; Otieno & Odhiambo, 2022). These variations suggest that the relationship between prior academic achievement and subsequent performance may differ according to educational context, population, subject, school characteristics, and the measures used.

Business Studies occupies an important position in Kenya's secondary school curriculum. The subject integrates areas such as Commerce, Accounting, Office Practice, and Economics and is intended to equip learners with knowledge and skills relevant to business and economic activities. It also seeks to develop inquiry, critical thinking, rational judgment, self-discipline, and positive attitudes towards work (MoEST, 2002). Performance in KCSE Business Studies therefore provides an important indication of learners' achievement in the subject at the end of the secondary school cycle.

Despite the importance of Business Studies, performance in the subject has remained a concern. National examination data presented in the study indicate that the mean mark declined from 42.82 in 2020 to 33.05 in 2024, although there was an increase to 45.76 in 2021. The mean subsequently declined to 31.47 in 2022 and 35.06 in 2023. In Nandi County, mean Business Studies scores were 4.15, 2.96, 2.38, and 2.41 in 2020, 2021, 2022, and 2023, respectively, giving a four-year average of 2.975 out of 12 points. This pattern provides a basis for examining factors that may be statistically associated with Business Studies performance.

Although previous research has examined prior academic achievement, entry marks, and subsequent academic performance, relatively limited attention has been given specifically to the predictive association between learners' entry marks and KCSE Business Studies performance in public secondary schools in Nandi County. Much of the Kenyan literature focuses on general academic performance, school-category differences, or broad determinants of KCSE achievement. Consequently, there is a subject-specific and contextual gap concerning whether differences in learners' entry marks are statistically associated with differences in subsequent performance in Business Studies in Nandi County. The present study therefore examined the predictive association between learners' entry marks and academic performance in Business Studies at KCSE in public secondary schools in Nandi County, Kenya.

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Study Aim and Purpose

The primary aim of the study was to examine the predictive association between learners' entry marks and academic performance in Business Studies at KCSE in public secondary schools in Nandi County. The purpose was to provide empirical evidence concerning the association between learners' academic preparedness at entry into secondary education and their subsequent performance in Business Studies.

Objectives

The study was guided by the following objectives:

1. To determine the entry marks of learners studying Business Studies in public secondary schools in Nandi County.

2. To establish the academic performance of students in Business Studies at the Kenya Certificate of Secondary Education in public secondary schools in Nandi County.

3. To determine the predictive association between learners' entry marks and students' academic performance in Business Studies at the Kenya Certificate of Secondary Education in public secondary schools in Nandi County.

Research Questions

The study sought to answer the following questions:

1. What are the entry marks of learners studying Business Studies in public secondary schools in Nandi County?

2. What is the academic performance of students in Business Studies at the Kenya Certificate of Secondary Education in public secondary schools in Nandi County?

3. What is the predictive association between learners' entry marks and academic performance in Business Studies at the Kenya Certificate of Secondary Education in public secondary schools in Nandi County?

Hypothesis

H_0: There is no statistically significant predictive association between learners' entry marks and academic performance in Business Studies at the Kenya Certificate of Secondary Education in public secondary schools in Nandi County.

Statement of the Problem

Business Studies is a practical and life-oriented subject that equips learners with knowledge and skills relevant to business activities, entrepreneurship, economic participation, and everyday decision-making. Through its constituent areas, including Economics, Commerce, Accounting, and Office Practice, the subject contributes to the development of critical thinking, inquiry, judgment, and practical competencies. Its successful learning is therefore relevant to further education, self-reliance, self-employment, and participation in economic development. Performance in Business Studies at KCSE level is consequently an important educational outcome.

However, available examination evidence indicates that performance in Business Studies remains a concern. National mean performance declined from 42.82 in 2020 to 33.05 in 2024, despite an increase to 45.76 in 2021. The mean subsequently declined to 31.47 in 2022 and 35.06 in 2023. In Nandi County, mean Business Studies scores were 4.15 in 2020, 2.96 in 2021, 2.38 in 2022, and 2.41 in 2023. The resulting four-year average

of 2.975 out of 12 points indicates relatively low achievement in the subject. This pattern raises questions concerning factors associated with learners' subsequent performance in Business Studies.

One factor that may provide information about subsequent academic performance is learners' academic preparedness at entry into secondary education. Learners enter secondary school with different levels of prior academic achievement, which in the Kenyan context has traditionally been reflected by KCPE results. Prior achievement may capture aspects of academic preparedness, including knowledge, learning skills, study habits, and familiarity with academic tasks. Several studies have reported positive associations between prior achievement and later academic performance. Nevertheless, the evidence is not uniform, and much of the available research has examined overall academic performance rather than performance in a particular subject.

The issue is particularly relevant in Nandi County, where Business Studies performance remained relatively low over the period considered. Despite the availability of entry-level academic information, there is limited empirical evidence establishing whether differences in learners' entry marks are statistically associated with differences in their subsequent performance in KCSE Business Studies in public secondary schools in the county.

The problem addressed by the study was therefore the limited subject-specific and contextual evidence concerning the predictive association between learners' entry marks and academic performance in Business Studies at KCSE in public secondary schools in Nandi County, Kenya. Establishing this association provides evidence that may contribute to understanding the relevance of prior academic achievement in explaining differences in Business Studies performance.

The Concept of Academic Performance

Academic performance refers to the extent to which learners attain educational objectives as demonstrated through measurable outcomes. Such outcomes may include examination scores, grades, tests, assignments, knowledge, competencies, problem-solving abilities, and other forms of assessment. Kumar, Agarwal, and Agarwal (2021) describe academic performance in terms of measurable outcomes demonstrated through examinations, tests, assignments, and related assessments. Lozano-Blasco et al. (2022) similarly recognize both quantitative outcomes, such as examination scores and grades, and qualitative outcomes, including knowledge, creativity, critical thinking, and problem-solving.

Academic performance is associated with a range of learner, teacher, school, family, and contextual conditions. Recent literature has associated academic achievement with self-regulated learning, self-efficacy, learning strategies, understanding of instructional content, and the ability to manage learning tasks (Raemy et al., 2026). Tzachrista et al. (2023) emphasize higher-order cognitive processes, while Jin et al. (2026) identify teacher support, family background, school climate, and individual efforts as relevant to academic achievement. These perspectives demonstrate that academic performance is multidimensional and cannot ordinarily be attributed to one factor alone.

In Kenya, academic performance is commonly evaluated through school-based assessment and national examinations, particularly KCSE. Studies such as those by Opiyo et al. (2024), Karimi et al. (2020), and Kirui et al. (2021) use examination and assessment outcomes as measures of academic performance. In the present study, academic performance was operationalized as the school-level mean KCSE Business Studies score.

The use of the school mean score was appropriate because the unit of analysis was the school and the study relied on existing school records. The measure provided a numerical indicator of performance that could be compared with the corresponding school-level mean entry mark. It also enabled the study to examine whether variation in prior academic achievement across schools was statistically associated with variation in Business Studies performance.

Learners' Entry Marks and Academic Performance

Learners' entry marks refer to academic scores attained before admission to a subsequent level of education. Such scores may provide an indication of prior academic achievement and preparedness. In the Kenyan context, KCPE results historically provided an important measure of academic attainment at the end of primary education and before transition to secondary education.

Prior achievement may reflect a combination of knowledge, learning skills, study habits, familiarity with assessment, and academic engagement. It may therefore provide useful information about learners' preparedness for subsequent educational tasks. However, entry marks should not be interpreted as comprehensive measures of future academic potential because educational performance is also associated with the learning environment, instructional practices, school resources, learner characteristics, and other contextual conditions.

International evidence generally supports an association between prior academic achievement and later performance. Al Husaini and Shukor (2022) found that entry grades were significant predictors of academic performance. Ferrao and Almeida (2019) reported an association between university entrance scores and subsequent achievement, while Richardson et al. (2012) identified prior academic attainment as an important correlate of academic performance through a systematic review and meta-analysis. Almalawi et al. (2024) likewise identified prior achievement as an important component of predictive models of educational outcomes.

Evidence from African contexts provides broadly similar findings. Adeyemi (2021) reported a positive association between entry qualifications and academic achievement among secondary school students in Nigeria. Omodan and Tsotetsi (2020) examined academic readiness and students' achievement in secondary schools, while Kyoshaba (2019) identified previous academic records among factors associated with subsequent academic achievement.

Kenyan evidence has also linked prior achievement to later academic outcomes. Waseka and Simatwa (2016) identified student-related factors, including prior achievement, among factors associated with secondary school performance. Sidi et al. (2020) found that high-performing schools in Mombasa County admitted learners with higher entry marks than lower-performing schools. Agingu (2017) reported that KCPE scores were useful in predicting KCSE performance across school categories. Wekesa and Namusonge (2021) similarly reported an association between entry marks and academic performance in Kenyan secondary schools.

Irungu and Nyagah (2013) reported an association between low KCPE entry marks and subsequent KCSE performance. Korir and Kipkemboi (2019) found a positive relationship between prior academic achievement and KCSE performance, while Chebet (2020) identified KCPE performance among predictors of KCSE achievement. Waweru and Mutiso (2022) further examined institutional and learner-related factors associated with academic performance in Kenyan secondary schools.

Despite this evidence, the association is not universally reported. Njoroge (2023), for example, found no statistically significant relationship between students' entry behaviour and academic achievement in public secondary schools in Machakos County, reporting $p = .863$. Other research has emphasized factors such as instructional quality, learner discipline, parental support, school climate, and school resources (Chowa et al., 2019; Otieno & Odhiambo, 2022). The differing findings indicate that the association between prior academic achievement and subsequent performance may vary across educational settings.

The present study extends this literature by focusing specifically on Business Studies performance at KCSE and on public secondary schools in Nandi County. The emphasis on a specific subject is important because learners' prior general academic achievement may not necessarily translate into identical performance patterns across all subjects. Subject content, teaching practices, learner interest, school resources, and assessment characteristics may affect the observed association.

THEORETICAL FRAMEWORK

The study was anchored on the Basic Input–Output Education Production Function (EPF) model developed by Hanushek (1979, 1986). The Education Production Function conceptualizes education as a process in which educational inputs are associated with measurable outputs. The model has been applied in educational economics to examine how learner, teacher, school, and other educational inputs relate to educational outcomes.

The model was appropriate for the present study because learners' entry marks constitute an educational input that precedes their subsequent performance. KCPE entry marks were therefore treated as the predictor variable, while KCSE Business Studies performance represented the educational outcome. The framework provides a theoretical basis for examining whether differences in an input represented by prior academic achievement are

statistically associated with differences in a subsequent educational output.

The EPF perspective does not imply that entry marks alone determine academic performance. Educational outcomes are likely to be associated with multiple inputs, including teacher characteristics, school resources, instructional processes, learner characteristics, parental support, and the wider learning environment. The present study deliberately focused on one input—learners' entry marks—in order to examine its predictive association with Business Studies performance.

The application of the model therefore provides a conceptual link between prior achievement and subsequent achievement while recognizing that educational production is multidimensional. The study's findings should consequently be interpreted as evidence concerning one measurable input rather than as evidence that entry marks causally determine performance.

CONCEPTUAL FRAMEWORK

The conceptual framework was derived from the Education Production Function perspective and focused on the relationship between learners' prior academic achievement and subsequent Business Studies performance.

Learners' Entry Marks (KCPE Scores) → Academic Performance in Business Studies (KCSE Mean Score)

Learners' entry marks were operationalized using the school-level mean KCPE score, representing prior academic achievement at entry into secondary education. Academic performance was operationalized using the school-level mean KCSE Business Studies examination score.

The framework assumes that differences in learners' prior academic achievement may be statistically associated with differences in subsequent Business Studies performance. The framework does not imply a causal relationship and does not exclude the contribution of other learner, teacher, school, and contextual factors.

Research Gaps

The literature reviewed demonstrates substantial interest in the association between prior academic achievement and subsequent educational outcomes. International, African, and Kenyan studies generally provide evidence that previous achievement may be associated with later academic performance. However, three gaps remain relevant to the present study.

First, there is a subject-specific gap. Much of the available Kenyan evidence examines overall KCSE performance or general academic achievement rather than Business Studies as a specific subject. The present study therefore focuses specifically on KCSE Business Studies performance.

Second, there is a contextual gap. Limited empirical evidence specifically examines the association between learners' KCPE entry marks and KCSE Business Studies performance in public secondary schools in Nandi County. Findings from other counties cannot automatically be assumed to apply to Nandi County because educational environments, school characteristics, learner populations, instructional conditions, and resource availability may differ.

Third, there is an empirical inconsistency gap. Several studies report significant positive associations between prior achievement and subsequent performance, whereas Njoroge (2023) reported no statistically significant relationship in Machakos County. This inconsistency supports the need for further evidence from different educational and geographical contexts.

The present study therefore addresses a subject-specific, contextual, and empirical gap by examining the predictive association between learners' KCPE entry marks and KCSE Business Studies performance in public secondary schools in Nandi County.

METHODOLOGY

Philosophical Paradigm of the Study

The study adopted the positivist philosophical paradigm. Positivism emphasizes the objective observation and measurement of phenomena and is commonly associated with quantitative research and statistical analysis. The paradigm was appropriate because the study examined numerical information contained in school records and sought to determine whether a measurable predictive association existed between learners' entry marks and Business Studies performance.

The study therefore relied on numerical measures of the two variables and employed descriptive and inferential statistics. Simple linear regression enabled the researcher to estimate the predictive association between the school-level mean entry mark and the school-level mean Business Studies score.

Research Design

The study employed a cross-sectional research design based on retrospective analysis of existing school records. The design involved obtaining historical information from school records during the research period. The records contained information concerning learners' entry marks and their subsequent KCSE Business Studies performance.

Neither variable was manipulated by the researcher. The study therefore examined naturally occurring differences among schools and statistically assessed the association between the predictor and outcome variables. The design was appropriate because the purpose was to establish a predictive association rather than to determine a causal effect.

The Study Area

The study was conducted in Nandi County, located in Kenya's North Rift region, with its headquarters in Kapsabet town. The county covers approximately 2,884 square kilometres and comprises six sub-counties: Nandi North, Chesumei, Nandi Central, Nandi East, Tindiret, and Nandi South.

Public secondary schools distributed throughout the county provided the setting for the study. The county was appropriate because it contained public secondary schools representing different school categories and provided the school records necessary for examining learners' entry marks and Business Studies performance.

Target Population

The target population comprised 180 public secondary schools in Nandi County that had presented

candidates for KCSE examinations for at least four consecutive years preceding 2023. The schools comprised 4 National, 23 Extra-County, 34 County, and 119 Sub-County schools.

The schools were considered appropriate because they had records containing information relevant to the variables under investigation. The inclusion of schools with records covering several examination years also provided a basis for obtaining sufficiently established measures of Business Studies performance.

Sample Size and Sampling Procedure

A sample of 118 schools was selected from the target population of 180 schools using the Krejcie and Morgan sample size determination procedure. All 4 National, 23 Extra-County, and 34 County schools were included because of their relatively small numbers. From the 119 Sub-County schools, 57 were selected through simple random sampling using computer-generated random numbers.

The sampling procedure ensured representation of the different school categories while allowing a manageable number of schools to be included in the study. Although 118 schools were selected, complete data for both learners' entry marks and Business Studies performance were available for 95 schools. Consequently, the infe-

rential analysis was based on 95 valid school-level observations.

Research Instruments

Document analysis was the principal data-collection method. A structured document analysis schedule was used to systematically extract information from official school records. Admission and related academic records provided information on learners' entry marks, while KCSE records provided Business Studies performance data.

The use of official records reduced dependence on respondents' recall and minimized respondent-related bias. The document analysis schedule was reviewed by university supervisors to establish whether it adequately captured the variables required for the study.

The instrument and data-extraction procedures were piloted in neighbouring Uasin Gishu County. The pilot exercise facilitated identification and correction of issues relating to data extraction, recording, and interpretation before the main data-collection exercise.

Data Analysis and Presentation Techniques

Data obtained from school records were coded, entered into the Statistical Package for the Social Sciences (SPSS), cleaned, and analysed. Descriptive statistics, including minimum, maximum, mean, standard deviation, and variance, were used to summarize the two study variables.

Simple linear regression was employed to determine whether learners' entry marks significantly predicted academic performance in Business Studies. The school-level mean KCPE entry mark was treated as the predictor variable, while the school-level mean KCSE Business Studies score was treated as the outcome variable.

Hypothesis testing was conducted at the 0.05 significance level. The null hypothesis was rejected when the probability value associated with the regression coefficient was less than .05. Results were presented using tables and narrative interpretation.

Assumptions of Simple Linear Regression

Before conducting the regression analysis, the assumptions underlying simple linear regression were considered. These included linearity, normality of residuals, homoscedasticity, independence of errors, and the absence of unduly influential observations.

Linearity and homoscedasticity were examined using scatterplots. Normality was assessed using a histogram and normal probability plot. Independence of errors was examined using the Durbin–Watson statistic. Standardized residuals, Cook's Distance, and leverage values were also considered in assessing potentially influential observations.

The regression results were therefore interpreted with consideration of these diagnostic procedures and the limitations associated with the school-level nature of the data.

RESULTS

Learners' Entry Marks and Business Studies Performance

The first two objectives sought to determine learners' entry marks and establish academic performance in Business Studies at KCSE. The analysis was based on 95 valid school-level observations with complete information for both variables.

Table 1. Descriptive Statistics of Learners' Entry Marks and Business Studies Performance

Variable	N	Minimum	Maximum	Mean	SD	Variance
Business Studies mean score	95	2	10.8	4.9621	2.21331	4.899
Learners' entry mark	95	176	314	249.4	36.251	1314.14

Source: Researcher's analysis of school records.

The results in Table 1 indicate that learners' entry marks ranged from 176 to 314, representing a range of 138 marks. The mean entry mark was 249.40, with a standard deviation of 36.25. The variation indicates differences in school-level prior academic achievement among the sampled schools.

Business Studies mean scores ranged from 2.00 to 10.80, with a mean of 4.96 and a standard deviation of 2.21. The results therefore indicate considerable variation in school-level Business Studies performance.

The descriptive findings address the first and second objectives. The first objective is addressed through the distribution of school-level entry marks, while the second is addressed through the distribution of Business Studies mean scores. However, descriptive statistics alone do not establish whether the two variables are statistically associated. The predictive association was therefore examined using simple linear regression.

Predictive Association Between Learners' Entry Marks And Business Studies Performance

The third objective sought to determine the predictive association between learners' entry marks and academic performance in Business Studies. Simple linear regression was conducted using the school-level mean KCPE entry mark as the predictor and the school-level mean KCSE Business Studies score as the outcome.

Table 2. Regression Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of Estimate
1	0.723	0.522	0.517	1.538

Predictor: Learners' entry mark.

Outcome: Business Studies mean score.

The regression model produced R = .723, indicating a positive linear association between learners' entry marks and Business Studies mean performance. The coefficient of determination was $R^2 = .522$, indicating that 52.2% of the observed variance in school-level Business Studies mean performance in the sample was accounted for by the fitted model containing learners' entry marks.

The adjusted R^2 was .517, while the standard error of the estimate was 1.538. The remaining 47.8% of the observed variance was not accounted for by the model. Because no other predictors were included, this remaining variance should not be attributed to particular variables that were not measured or entered into the regression model.

Table 3. ANOVA for the Regression Model

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	240.498	1	240.498	101.671	< .001
Residual	219.986	93	2.365	—	—
Total	460.484	94	—	—	—

The ANOVA results show that the regression model was statistically significant, $F(1, 93) = 101.671$, $p < .001$. The result indicates that the fitted linear regression model provided statistically significant evidence of a predictive association between learners' entry marks and Business Studies mean performance.

Table 4. Regression Coefficients for Learners' Entry Marks

Predictor	B	SE B	β	t	p	95% CI for B
Constant	-6.042	1.103	—	-5.48	< .001	[-8.232, -3.853]
Entry mark	0.044	0.004	0.723	10.083	< .001	[.035, .053]

The fitted regression equation was:

$$\hat{Y} = -6.042 + 0.044X$$

where $\hat{Y}$ represents the predicted school-level mean KCSE Business Studies score and X represents the school-level mean KCPE entry mark.

The unstandardized regression coefficient for entry marks was B = .044. This indicates that a one-unit increase in the school-level mean entry mark was associated with an estimated 0.044-unit increase in the predicted school-level mean Business Studies score. The 95% confidence interval for the slope ranged from .035 to .053 and did not include zero, indicating statistical significance.

The standardized coefficient was $\beta = .723$, with $t = 10.083$ and $p < .001$. This indicates a statistically significant positive predictive association between learners' entry marks and Business Studies performance in the sampled schools.

Because the model contained only one predictor, the standardized coefficient should not be interpreted as indicating that entry marks were the "strongest" predictor relative to other variables. No comparison among multiple predictors was undertaken in this study.

Hypothesis Testing

The null hypothesis stated that there was no statistically significant predictive association between learners' entry marks and academic performance in Business Studies at KCSE in public secondary schools in Nandi County. The regression results produced a statistically significant coefficient for learners' entry marks, $\beta = .723$, $t = 10.083$, $p < .001$. Since the probability value was less than the 0.05 significance level, the null hypothesis was rejected.

The finding indicates that there was a statistically significant positive predictive association between school-level mean entry marks and school-level mean KCSE Business Studies performance among the sampled public secondary schools in Nandi County.

DISCUSSION

The study found a statistically significant positive predictive association between learners' entry marks and academic performance in Business Studies at KCSE. The sampled schools recorded entry marks ranging from 176 to 314, with a mean of 249.40 and a standard deviation of 36.25. Business Studies mean scores ranged from 2.00 to 10.80, with a mean of 4.96 and a standard deviation of 2.21.

The regression analysis produced $R = .723$ and $R^2 = .522$, while the entry-mark coefficient was statistically significant ($B = .044$, $\beta = .723$, $p < .001$). The result indicates that, within the sampled schools, schools with higher mean entry marks tended to have higher mean KCSE Business Studies scores. The model accounted for 52.2% of the observed variation in school-level Business Studies performance.

The finding is consistent with Sidi et al. (2020), who reported that high-performing schools in Mombasa County admitted learners with higher entry marks than lower-performing schools. Their findings provide contextual support for the observation that differences in learners' prior academic achievement may be associated with differences in later academic performance.

The finding also accords with Agingu (2017), who reported that KCPE scores were useful predictors of KCSE performance across school categories. Similarly, Wekesa and Namusonge (2021) reported an association between entry marks and academic performance in Kenyan secondary schools. Irungu and Nyagah (2013) also reported an association between low KCPE entry marks and subsequent KCSE performance. Collectively, these studies provide evidence from the Kenyan context that prior academic achievement may be relevant to subsequent educational outcomes.

The present finding is also broadly consistent with international evidence. Al Husaini and Shukor (2022) identified entry grades as significant predictors of academic performance, while Ferrao and Almeida (2019) reported an association between university entrance scores and subsequent achievement. Richardson et al. (2012), through a systematic review and meta-analysis, similarly identified prior academic attainment as an important correlate of academic performance. Almalawi et al. (2024) further identified prior achievement as relevant in predictive educational models.

Although these studies were conducted in different educational systems and, in some cases, at different levels of education, their findings provide broader support for the proposition that prior academic achievement can be statistically associated with subsequent academic outcomes. The consistency is particularly relevant because the current study focuses on the transition from primary-level achievement, represented by KCPE entry marks, to secondary-level performance in a specific subject.

However, the finding should also be considered alongside studies that report different results. Njoroge (2023), for instance, found no statistically significant relationship between students' entry behaviour and academic achievement in public secondary schools in Machakos County, reporting $p = .863$. The difference between the current findings and those of Njoroge may reflect variation in the populations studied, definitions and measures of entry achievement, educational settings, subjects considered, school characteristics, and analytical procedures.

The present findings should therefore not be interpreted as establishing that the association between entry marks and academic performance is uniform across all Kenyan secondary schools. Rather, the study provides evidence from public secondary schools in Nandi County and specifically concerns school-level Business Studies performance.

The findings also provide an empirical perspective on the Education Production Function framework. Hanushek (1979, 1986) conceptualized education as a production process in which educational inputs are associated with educational outputs. The present results are consistent with the idea that prior learner achievement constitutes one measurable input associated with subsequent educational output.

Nevertheless, the results do not imply that entry marks alone determine Business Studies performance. The regression model contained only one predictor and therefore does not account for teacher characteristics, school resources, instructional practices, learner motivation, family background, school climate, or other factors that may be associated with academic achievement. The finding is therefore appropriately interpreted as evidence of predictive association rather than causal effect.

The school-level nature of the analysis is also important. Both the predictor and outcome variables were represented by school-level means. Consequently, the finding concerns differences among schools and should not be interpreted as evidence that every individual learner with a higher KCPE score will necessarily achieve a higher KCSE Business Studies score. Such an interpretation would constitute an inappropriate individual-level inference from aggregated data.

The finding that entry marks accounted for 52.2% of the observed variance in school-level Business Studies performance is substantial within the fitted model, but it should also be interpreted cautiously. The statistic indicates the proportion of variation accounted for by the single predictor in the sample; it does not indicate that 52.2% of an individual learner's eventual achievement is determined by the learner's entry mark. Nor does it establish that the remaining 47.8% is attributable to any specific set of factors.

Overall, the results strengthen the evidence that prior academic achievement may be an informative indicator of subsequent Business Studies performance in the study context. They also reinforce the need to interpret entry marks as one source of educational information rather than as a complete measure of learners' academic potential.

CONCLUSION

The study established a statistically significant positive predictive association between learners' entry marks and academic performance in Business Studies at KCSE among the sampled public secondary schools in Nandi County.

Learners' entry marks ranged from 176 to 314, with a mean of 249.40 and a standard deviation of 36.25. Business Studies mean scores ranged from 2.00 to 10.80, with a mean of 4.96 and a standard deviation of 2.21.

The simple linear regression model was statistically significant, $F(1, 93) = 101.671$, $p < .001$, with $R = .723$ and $R^2 = .522$. The entry-mark coefficient was also statistically significant ($B = .044$, $\beta = .723$, $t = 10.083$, $p < .001$). The findings therefore indicate that differences in school-level mean entry marks were statistically associated with differences in school-level mean KCSE Business Studies performance.

The findings support the view that prior academic achievement may provide useful information concerning subsequent educational performance. However, because the study used a cross-sectional design and school-level aggregated records, the results should be interpreted as evidence of predictive association rather than causal effect. In addition, the results should not be generalized to individual learners without appropriate individual-level evidence.

IMPLICATIONS AND RECOMMENDATIONS

The findings have implications for educational planning, school leadership, and classroom practice. The statistically significant association between entry marks and subsequent Business Studies performance suggests that entry-level academic information can provide schools with useful evidence about learners' academic preparedness.

Schools may therefore consider using available entry-level academic information together with continuous assessment and other relevant evidence to identify learners or groups of learners who may require additional academic support. Entry marks can serve as an early indicator for monitoring academic progress rather than as a basis for fixed expectations concerning learners' eventual achievement.

School leaders and Business Studies teachers may consider structured academic support for learners who demonstrate relatively lower prior academic achievement. Such support may include differentiated instruction, remedial teaching, peer tutoring, academic mentoring, continuous assessment, and early identification of learning difficulties.

The purpose of such approaches should be to identify and address learning needs rather than to label learners according to their entry marks. Since the present study did not examine the effectiveness of particular interventions, schools should monitor subsequent learner performance when implementing such support measures.

At the transition level, education stakeholders may consider strengthening continuity between primary and secondary education. Information on learners' prior academic achievement can be used to identify possible foundational learning gaps at or shortly after admission to secondary school. Appropriate support can then be provided to facilitate learners' adjustment to secondary education.

The findings may also be relevant to Business Studies departments. Departments may use early academic information to inform learner monitoring, allocation of additional academic support, and development of targeted instructional strategies. However, entry marks should be considered alongside classroom assessment, learner participation, motivation, attendance, and other relevant evidence.

The recommendations should not be interpreted as implying that entry marks cause subsequent performance. Rather, they are practical responses to the observed statistical association and should be evaluated through educational practice and further research.

LIMITATIONS OF THE STUDY

The study had several limitations that should be considered when interpreting the findings.

First, the cross-sectional design based on retrospective school records limits the extent to which the findings can be interpreted beyond predictive association. Although entry marks preceded KCSE performance temporally, the design does not provide sufficient evidence to establish a causal relationship.

Second, the analysis was based on school-level aggregated data. Both the predictor and outcome were represented by school means. Consequently, the results describe associations among schools rather than relationships among individual learners. Individual-level conclusions should therefore not be inferred directly from the findings.

Third, the study was conducted in public secondary schools in one county. The characteristics of Nandi County may differ from those of other counties, school systems, or educational environments. Generalization beyond the study population should therefore be undertaken cautiously.

Fourth, the regression model contained only learners' entry marks as the predictor. Other factors potentially associated with Business Studies performance were not included in the model. These may include teacher characteristics, instructional practices, school resources, learner motivation, parental support, school climate, and other contextual conditions. The study therefore does not provide a comprehensive explanation of variation in Business Studies performance.

Finally, the analysis depended on the completeness and accuracy of existing school records. Missing or inconsistently recorded information resulted in the analysis being based on 95 schools with complete observations rather than all 118 sampled schools. The use of official records nevertheless provided a relatively objective source of historical information for the variables examined.

Suggestions for Further Research

Future studies could employ longitudinal designs to follow learners from primary school through secondary education and examine the relationship between prior academic achievement and subsequent Business Studies performance over time. Such designs could provide stronger evidence concerning temporal patterns than the cross-sectional approach used in the present study.

Further research could also examine the predictive association between entry marks and performance using individual-level learner data. This would make it possible to determine whether the school-level pattern observed in the present study is also evident among individual learners and would reduce the limitations associated with ecological inference.

Future studies could incorporate additional learner, teacher, school, family, and contextual predictors to develop more comprehensive models of Business Studies performance. Variables such as teacher qualifications, teaching experience, instructional practices, learner motivation, attendance, school resources, parental support, and school climate could be examined alongside entry marks.

Research could also investigate whether the predictive association differs across school categories, geographical locations, gender composition, or other relevant educational characteristics. Such studies could provide further evidence concerning the conditions under which prior academic achievement is more or less strongly associated with subsequent Business Studies performance.

Finally, intervention-based research could examine whether differentiated instruction, remedial teaching, mentorship, peer tutoring, and other learner-support programmes are associated with improved performance among learners with different levels of prior academic achievement. Such research would provide evidence concerning educational responses to the association identified in the present study rather than assuming that the association itself establishes intervention effectiveness.

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