

School Differences in the Predictive Validity of Primary School Examinations among Secondary School Students in Kenya

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ABSTRACT

The purpose of this study was to determine school category differences in the predictive validity of KCPE among public secondary school students in Kisii central Sub-county, Kenya. The study adopted Correlational and Ex-post-facto research designs. The study population was 3,897 KCSE candidates from 55 public secondary schools. Stratified random sampling based on school type (day and boarding) was used to select 16 public secondary schools for the study. Saturated sampling was employed to include all KCSE candidates whose KCPE marks were available in each sampled school, yielding a sample of 1,391 students. Data used included 2006 KCPE scores and 2010 KCSE scores of the same students under study. It was analyzed quantitatively using correlations and regression analyses. There was no statistically significant difference in correlation of KCSE and KCPE scores based on school category. The study concluded that KCPE scores is a good predictor of KCSE scores regardless of school category. It recommended that KCPE should continue to be used as selection tool for secondary school admission and that learners should be encouraged to join any type of school convenient to them regardless of whether they are day or boarding schools.

Keywords: Kenya Certificate of Primary Education (KCPE), Kenya Certificate of Secondary Education (KCSE), Predictive Validity, Academic Achievement, School category.

1.0 INTRODUCTION

Success in educational instruction is measured by the performance of students in external examinations. The examinations are used to measure the level of candidates' achievement. (Jagero, 2013). Examinations are also used for selection of students to advanced training programs (Masibau & Adigun, 2010)

In Kenya, one use of public examinations is for selection for further education. The Kenya Certificate of Primary Education (KCPE) is the first public examination used for selecting learners into secondary schools. After a four year course in secondary school, learners are subjected to the second public examination, the Kenya Certificate of Secondary Education

(KCSE). The KCSE is then used to select learners for various courses at the tertiary level of education. It is ordinarily expected that learners who excelled in KCPE should also excel in KCSE. It was therefore necessary to determine the effectiveness of using KCPE as a selection tool for admission into different types of secondary schools.

In test validity, any device employed by an individual or an examining body for the purpose of selecting candidates for any training program in a given field should be able to measure as accurately as possible the probability that such candidate will pass or fail (Alonge, 1989 as cited in Ugwuda & Okechukwu, 2013; Masibau & Adigun, 2010). This is to say that success or failure is an effect of the method of selection of candidates for such a training program. This is the core of test validity. Since one important use of KCPE scores is to select learners to various cadres of secondary schools, its predictive validity needs to be clearly known. This was the purpose of this study.

Problem Statement

Selection of form one students to various cadres of secondary schools in Kenya is merit-based in such a way that high achieving learners are placed in national and provincial boarding schools while low achievers are placed in day schools as others fail to secure any place in secondary school at all due to very low KCPE scores.

Parents and many education stakeholders believe that there is better chance for excelling in examinations in boarding schools compared to day schools. While parents struggle to enroll their children in boarding secondary schools, a section of parents who cannot afford the boarding school fees always feel disadvantaged as they enroll their children in day schools. It was therefore important to carry out this study to answer this question, "Is there a significant difference in correlation between primary school scores and secondary school scores for learners enrolled in day and boarding secondary schools?"

A study conducted in the neighboring Nyamira sub-county in Nyamira County, Ondima, Nyamasege, Mogwambo and Ochoti (2013) reported that learners' performance in KCPE was very crucial in determining their final grade in KCSE. Depending on the institution learners were admitted to, they would improve, maintain or drop their grade. This study did not investigate the effect of the type of secondary school a learner was admitted to on the relationship between their KCPE and KCSE scores.

2.0 LITERATURE REVIEW

In a study conducted by Bista and Costick (2005), for UNESCO Asia and Pacific Regional Bureau for Education, it was observed that boarding schools had been used in order to ensure access to education for children who might otherwise be deprived of it. It was reported that feeder hostels (boarding schools) for girls promoted girls enrollment, retention and achievement in education.

In Malawi, a study by de Hoop (2010), reported that the best performers in the Primary School Leaving Certificate Examination (PSLCE) were admitted to conventional national schools, which were boarding schools; the next best performers were selected into conventional sub-County boarding schools while the next group was selected into conventional sub-County day schools. The results presented in the paper suggested that boarding did not significantly influence pupil (academic) performance. The observations by Bista and Costick (2005) and de Hoop (2010) could be due to the fact that most boarding schools took in students with high primary school scores. They were therefore bound to perform better, academically, than those in day schools. They did not correlate the score of learners at the given stage with their score in an earlier examination score to find out how boarding or day schools differed in the predictive validity of earlier examination scores. This would help parents and learners make informed decision on whether to choose day or boarding school based on how they differed in their prediction of secondary school examination scores from primary school examination scores.

In Uganda, an article by Property International Network (PIN) (n.d), an NGO, reported that children in Uganda almost always preferred to go to boarding schools and not day schools. In Ugandan boarding schools, children were provided with a better education as they got to fully concentrate on their studies and received extra lessons in the evenings. When the day school pupils went home after classes, the teachers were at last able to work on a more individual basis with the boarders. That is why at PIN International, it was preferred that all children in their program to attend boarding schools where they would receive the best education that they could get. This report does not give results of any empirical study that investigates the academic performance of secondary school students in boarding against those in day schools to ascertain the claims made by PIN.

A study conducted in Tanzania by Komba, Kafanabo, Tryphone and Kira (2013) which investigated the predictive validity of Form Two Secondary Education Examination (FTSEE) on students' performance in the Certificate of Secondary Education Examination (CSEE) in Biology reported a higher relationship for females between the two examinations than for males when the whole sample was considered. However when school category was considered, male students who studied in day schools had a higher correlation coefficient between the two examinations than female students. This study focused on only one subject, Biology. A study which considered learners' aggregate score in all examinable subjects would be more informative.

In Kericho County, Kenya, an analytical study conducted by Ngeno, Simatwa and Soi (2013) to examine the determinants of girl students' academic achievement in mixed day and boarding secondary schools, it was reported that boarding students performed better at KCSE than day school students in the same schools that had both day and boarding options. Teachers interviewed in this study were reported to have the opinion that domestic chores seriously interfered with girls' concentration on school work. This study did not take into account how day or boarding school affected academic achievement of boys as well. This would give a better

picture of school category differences in learners' academic achievement. In addition, the study did not correlate the learners' academic achievement at the time of study with an earlier examination score.

Wanjohi and Yara (2011) conducted a study on performance determinants of KCSE in mathematics in schools of Nyamaiya Division, Nyamira Sub-County, which concluded among other findings that the type of school students go to greatly influences their performance in mathematics. The researchers further noted that boarding students performed better in mathematics at KCSE compared to their day school counterparts. In the same vein, Yeya (2002 as cited in Wanjohi & Yara, 2011) observed that students in boarding schools cover the syllabus in time and are exposed to more remedial exercises because they are ever in school as compared to day schools which are characterized by absenteeism of both teachers and students which lead to non-completion of the syllabus in a given year.... students with impressive marks avoid day schools in favor of boarding schools. The study by Wanjohi and Yara was conducted in one division, Nyamaiya, in Nyamira County, which neighbors Kisii Central sub-county. It employed descriptive survey design of the ex-post facto type with a total student population of 151 and 12 teachers. It did not include a large geographical area, had a small sample and considered only one examinable subject. It was therefore necessary to find out the boarding and day school differences in the relationship between KCPE and KCSE, which included all examinable subjects, in Kisii central sub-county which was a larger geographical area.

As mentioned in the introduction of this study, Ondima, Nyamasege, Mogwambo and Ochoti (2013) while carrying out a study in Nyamira sub-county postulated that a student admitted in secondary school may end up scoring lower grades, higher grades or maintain their grades at KCSE depending on the type of school the learner was admitted into. They did not however include in their study how the category or type of secondary school a learner is admitted to may affect the relationship between their KCPE and KCSE scores. The current study in Kisii Central Sub-county sought to investigate how the relationship between KCPE and KCSE scores differed for the learners in boarding and day schools.

KCSE outcomes in Kisii Central Sub-County indicate that learners in boarding schools have been performing better than those in day schools. For instance in the 2009 KCSE results, the top five schools in the sub-County were all boarding schools; and in the list of top 10 schools, only one was purely day school. Five were boarding while four were day and boarding schools. However, given that boarding schools select students with higher KCPE scores than day schools, it can not be concluded that the good academic performance of students in these boarding schools was purely because of the boarding facilities. Only a predictive validity study, such as the one carried out in Kisii Central sub-county, could verify the true facts.

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The study adopted *ex-post facto* and correlational designs. The *ex-post facto* design is a non-experimental research technique in which preexisting groups are compared on some dependent variable. The assignment of participants to the levels of independent variables is based on events that occurred in the past (Lammers & Badia, 2005).

Correlational research design shows relationship between two variables thereby showing a cause and effect relationship (Rippy, 2012). It also shows predictions of future event or outcome from a variable. In this study *ex-post facto* research design was used to get data from the data banks in the Sub-County Education offices, Kisii Central Sub-County on school category and general data on 2010 KCSE examinations in the sub-County. It was also used to retrieve data on 2010 KCSE scores and the corresponding 2006 KCPE scores of the students from the data banks of the sampled schools. A researcher-made profoma containing school category, a column for KCPE score and another for KCSE score was used to collect the data from schools.

Study Population

The study comprised 3,897 KCSE candidates of the year 2010 from 55 public secondary schools in Kisii Central Sub-County.

Sampling Technique and Sample Size

Two sampling techniques were used in this study. The first was stratified random sampling technique which was used to select 16 public secondary schools for the study and thereafter saturated sampling technique was used to select learners from each sampled school. In this study, the stratification was based on school category whereby the researcher first listed all the 55 schools according to their strata, and selected the required number from each stratum randomly.

From the 16 selected schools, saturated sampling technique was used whereby scores for all KCSE graduates whose KCPE marks were available in each sampled school was used in the study. The sample yielded a total of 1,391 students from 16 secondary schools, 352 from day schools and 1039 from boarding schools. The disparity in the numbers was in proportion to the number of learners in the two school categories where boarding schools admitted more students compared to day schools.

Data Analysis

In this study, data analysis was quantitative. The collected data was analyzed using descriptive statistics namely scatter plots and pie charts. Scatterplots indicated whether KCPE and KCSE were positively or negatively related. Inferential statistics including correlation and regression analyses were also used. Pearson's product moment correlation coefficients were determined to show the strength of relationship between KCPE and KCSE scores for various sub-groups in the study. Linear regression analyses were preceded by the necessary regression diagnostics such as violation of normality assumption for the dependent variable, checking outliers and extreme values.

Simple linear regression analysis with KCSE scores as the dependent variable and KCPE scores, as the independent variables were conducted for learners from boarding and day schools. A linear regression equation was determined in each case which could be used to predict mean KCSE scores from the independent variable (KCPE scores) in the regression model.

4.0 RESULTS AND DISCUSSION

Descriptive statistics was used to investigate differences in the level of relationship between KCSE and KCPE scores for learners in boarding and those in day schools. Scatterplots generated, yielding the result displayed in Fig. 1.

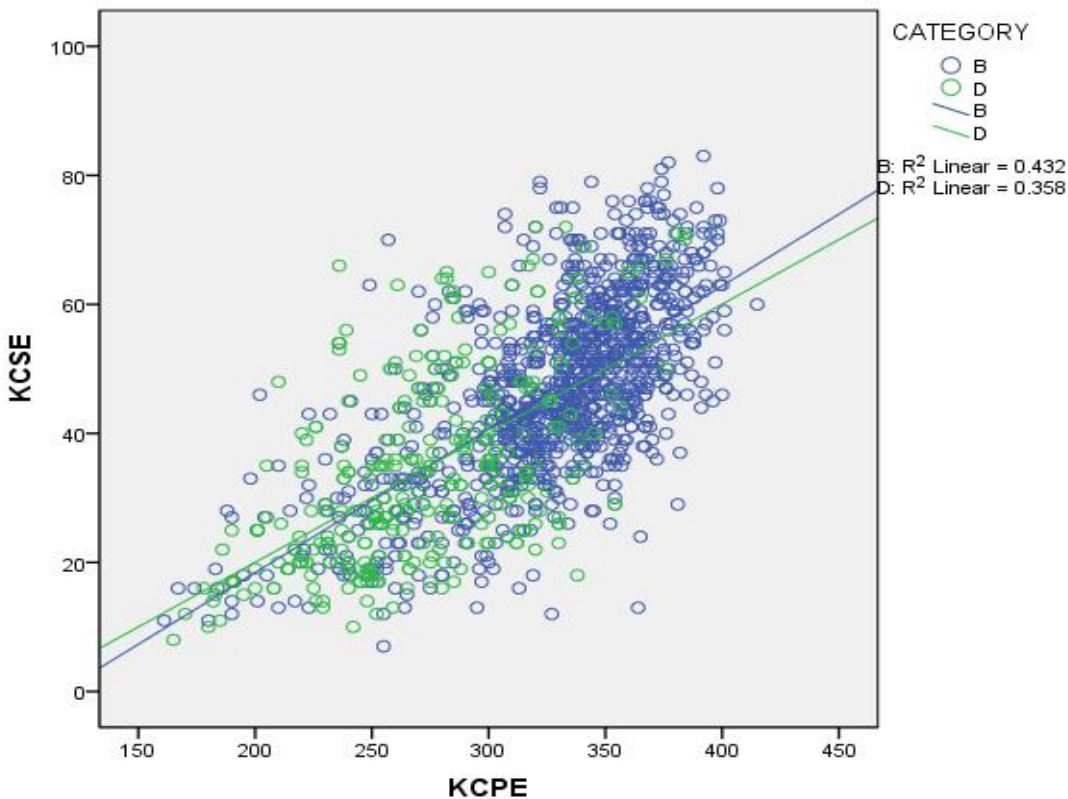


Fig 1: Bivariate Scatter plots of KCSE against KCPE for Boarding and Day school students

Key: B=Boarding Students D= Day School Students

Source: Field Data

From Fig. 1, it is noted that there was a positive relationship between KCPE and KCSE scores for learners in both boarding and day schools. There was however a slight difference in KCPE-KCSE relationship between boarding and day school students as observed in the regression lines. The graph for school category was disordinal as shown by the KCSE-KCPE relationship being slightly higher for day school learners at lower levels of KCPE score but it was higher for boarding school students at higher levels of KCPE score.

This suggests that learners who score low KCPE marks tend to perform better at KCSE in day schools while those scoring high KCPE marks tend to perform better when admitted to boarding

schools for their secondary school education. For more details, data was further analyzed using Pearson’s correlation coefficient as shown in Table 1.

Table 1: Pearson’s correlation coefficients between KCSE and KCPE for Boarding and Day school students

CATEGORY			KCPE	KCSE
Boarding	KCPE	Pearson Correlation	1	.657**
		Sig. (2-tailed)		.000
	KCSE	Pearson Correlation	.657**	1
		Sig. (2-tailed)	.000	
	N		1039	1039
Day	KCPE	Pearson Correlation	1	.598**
		Sig. (2-tailed)		.000
	KCSE	Pearson Correlation	.598**	1
		Sig. (2-tailed)	.000	
	N		352	352

** . Correlation is significant at the 0.01 level (2-tailed).

Source: Field data

Preliminary results of this study revealed that boarding school students showed a higher correlation coefficient between KCPE and KCSE scores ($r=.657$; $n=1039$; $p<0.05$) compared to their day school counterparts ($r=.598$; $n=352$; $p<0.05$) as shown in Table 8. The impact of KCPE scores on KCSE scores was stronger for those in boarding schools than for those in day schools. It was necessary to test whether the differences in the correlation coefficients between KCPE and KCSE scores for day and boarding students was statistically significant. The r values were first converted into z values and the observed z value calculated as shown below;

$$Z_{obs} = \frac{z_1 - z_2}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}} = \frac{.784 - .658}{\sqrt{\frac{1}{1039 - 3} + \frac{1}{352 - 3}}} = \mathbf{1.5996}$$

Where Z_{obs} = the observed z value

z_1 = the z value for boarding students correlation coefficient

z_2 = the z value for day school students correlation coefficient

N_1 = sample size for boarding students

N_2 = sample size for day students

The decision rule: if $-1.96 < Z_{obs} < 1.96$, correlation coefficients are not significantly different (Pallant, 2007).

From the above calculation Z_{obs} value of 1.5996 fell within the range of -1.96 and 1.96 meaning that the difference in correlation coefficients between KCSE and KCPE for boarding and day

school students were not statistically significant. Therefore the predictive validity of KCPE scores for KCSE scores for boarding and day school students had no statistically significant difference. To investigate the difference in prediction of KCSE from KCPE scores between boarding and day school students further, regression analysis was run on the data and the result presented in Table 2.

Table 2: Regression Analysis of KCSE scores on KCPE scores for Boarding and Day School Students

School Category	Model	R	R ²	Adjusted R ²	Standard Error estimated	F	Sig
Boarding	1	.657	.432	.432	10.596	788.986	.000
Day	1	.598	.356	.356	11.984	194.843	.000
	Model	Unstandardized Beta	Coefficient Standard error	Standardized Beta	t	Sig	
Boarding	1(constant)	-26.009	2.619		-9.930	.000	
	KCPE	.222	.008	.657	28.089	.000	
Day	1(constant)	-19.996	3.985		-5.018	.000	
	KCPE	.200	.014	.598	13.959	.000	

CI = 95%

N (boarding) = 1039 N (day) = 352

Total df (boarding) = 1038 Total df (day) = 351

Source: Field Data

Linear regression was used to assess the difference in the ability of KCPE scores to predict KCSE scores for boarding and day school learners. Preliminary analyses were conducted to ensure no violation of the assumptions of normality and linearity. From the outcome shown on Table 2, R² for boarding learners = .432, F (1, 1038) = 788.97, p < 0.05. On the other hand, R² for day school learners = .358, F (1, 351) = 194.84, p < 0.05. This implied that for boarding learners 43.2% of the variance in KCSE scores could be explained by the KCPE scores while for day school learners, 35.8% of the variance in KCSE scores could be explained by the KCPE scores. The remaining 56.8% of the variance in KCSE scores for boarding learners and 64.2% for day scholars could be explained by other factors other than KCPE scores. These results indicate that the KCPE scores for boarding learners had slightly more impact on their KCSE scores compared to day school learners.

The Univariate regression analysis results shown on Table 2 further indicates unstandardized coefficients of .222 for KCPE for boarding learners and .200 for day scholars. Both the t values of 28.089 for boarding learners and 13.959 for day scholars were greater the critical 2.00 value and their significance was 0.000 (less than .05) indicating that KCPE had a major impact on their KCSE scores. The values of the unstandardized beta coefficients imply that one unit increase in the boarding learners' KCPE scores results in a corresponding increase in their KCSE scores by 0.222 units. Similarly, one unit increase in KCPE scores for day school learners results in a corresponding increase in KCSE scores by 0.200 units.

Using the unstandardized beta values and constants for KCPE, regression equations were drawn from table 2 for both boarding and day school learners. The regression equation for boarding school students was $y=0.222x - 26.009$ while that for day school students was $y= 0.200x - 19.996$ where y was the KCSE scores while x was the KCPE scores. This implies that given circumstances similar to those in Kisii Central, the above equations can be used to predict learners' KCSE scores early from their KCPE scores.

The finding of this study is consistent with the findings of de Hoop (2010) who reported that although boarding schools in sub-Saharan Africa were considered to be top notch schools, they did not significantly influence pupil academic performance. Othuon and Kishor (1994) also concluded that the predictive validity of KCPE did not significantly vary from one school to another.

Komba, Kafanabo, Tryphone and Kira (2013) in their study reported that in day schools, boys exhibited a stronger relationship ($r=0.65$) between form two examination scores and form four certificate examination scores in Biology subject than girls ($r=0.442$), suggesting that day schools favour boys than girls in academic achievement. A further test was not conducted on the calculated r values to find out whether the reported differences were statistically significant. This is a weakness in the findings of Komba, Kafanabo, Tryphone and Kira.

Bista and Costick (2005) however reported that feeder hostels (boarding schools) for girls promoted enrolment, retention and achievement in education. Wanjohi and Yara (2011) concluded in a separate study among other findings that the type of school students go to greatly affects their performance in mathematics and that boarding learners attained better scores compared to their counterparts in day schools.

The studies which reported superior academic scores for boarding school learners (Bista & Costick, 2005; Ngeno, Simatwa & Soi, 2013; Wanjohi & Yara, 2011) could have emanated from the fact that boarding schools especially in Africa usually select high achieving learners from primary schools while the lower academic achievers are left to attend day schools as reported by de Hoop (2010). There are however a few learners with high KCPE scores who end up in day schools, which only forms a small fraction compared to the majority of day scholars with lower

KCPE scores. This then makes boarding school learners to achieve higher scores than day scholars when they sit for their secondary school examinations. When the relationship between primary school and secondary school examination score is established however there is no significant difference in this relationship between boarding and day school students. It can therefore be concluded that the main predictor of success in secondary school examination is the KCPE scores and not school category. A learner who scores highly in primary school examination can score highly in secondary school examination whether admitted to a day or boarding school. Similarly, a learner who scores low grades in primary school will equally score low grades in secondary school regardless of whether he or she is admitted to a day or boarding secondary school.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

KCPE scores is a strong predictor of KCSE scores for learners in both boarding and day schools and there is no significant difference in the predictive validity of KCPE for KCSE scores between learners in boarding and in day public secondary schools in Kisii Central Sub-County. In other words, a learner's academic performance in secondary school is not dependent on the secondary school category. One can do well in either day or boarding secondary school as long as they did well in the primary school examination.

5.2 Recommendation

Learners should be allowed to join boarding or day secondary schools depending on which category is convenient to them whether they have low or high KCPE scores. This is because there is no significant difference in the relationship between KCPE and KCSE scores based on school category.

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