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Predictive Validity of Students' Entry Qualifications into Diploma in Basic Education Programme in Colleges of Education in Ghana

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Abstract

The study was conducted to investigate the relationship between students' West Africa Senior School Certificate Examination (WASSCE) grades and their performance in the Diploma in Basic Education (DBE) programme at the Colleges of Education level in Ghana. The purpose was to determine the extent to which the WASSCE results adequately predict performance of students at the College of Education level. The stratified random sampling technique was used to select a sample of seven Colleges of Education with a total of 1,443 students. The Pearson Product Moment Correlation coefficient statistic was used to determine the validity coefficients. The results showed a statistically significant positive but low relationship between the two variables ($r=0.209$ at 0.01 α). It was also found out that using only the core subjects results will better predict performance at the CoE than using the core and some electives. This meant that though the WASSCE results can be used for selection, they do not adequately predict performance at the Colleges of Education for the DBE programme. It is, therefore, suggested that for effective selection of students for the DBE programme, the Colleges of Education may resort to additional predictors such as entrance examination and/or oral interviews beside the WASSCE result.

Key words: Predictive validity, validity coefficient, predictor, criterion, coefficient of determination, diploma in basic education, academic performance.

Introduction

The Colleges of Education in Ghana are institutions designated for the training of teacher trainees. Successful completion of the training leads to the award of Diploma in Basic Education (DBE)

certificate. The process for the award of the Diploma in Basic Education certificate begins with the admission of candidates to pursue the programme. The requirements for admission into Colleges of Education to pursue the DBE since 2004 had not been consistent. In 2004, when the programme began, the requirement for admission was passes in six subjects in the Senior School Certificate Examination (SSCE) of the West Africa Examinations Council with, at least, Grade 6 in each of the subjects. The six subjects included three core subjects of Core Mathematics, English and Integrated Science and three other subjects. Those who satisfied this criterion were made to go through an interview and verification of certificates and results. The successful candidates were admitted for the programme. This criterion changed in 2007 when those with Grade 7 in the core subjects were considered for admission. In 2010, the minimum requirement of Grade D7 for the core subjects was reverted to Grade D6. However, in the 2015/2016 academic year the requirements were pegged at passes in six subjects including the three core subjects and three others with a minimum of Grade D7. However, three of the subjects, irrespective of their being core or elective must have a minimum of C6 (NCTE circular to principals of COE, 2015).

The West Africa Senior School Certificate Examination (WASSCE) (which had replaced the SSCE) results are not used as a criterion for admissions into Colleges of Education only but as a criterion for selection into a wider range of educational institutions and employment. Educationally, they are used for selection of candidates for admission into tertiary institutions, polytechniques, nursing, etc. In cases of recruitment into the security services they are included in the criteria for recruiting personnel into the army, police service, immigration service, Fire service and so on. The WASSCE results are also used as the basis for employing middle income personnel. In some of these situations no other criterion is required for the selection but in others, other criteria are required especially, interviews.

These suggest that some test scores may not adequately be used as criteria for a specific purpose. But they are used to determine the extent of the existence of an attitude, skill, performance, events, etc. in an individual. Miller, McIntire and Lovler (2011) observed that when test scores correlate with specific behaviours, attitudes or events, it is confirmed that there is evidence of validity. In other words, test scores may be used to predict the existence of those specific behaviours,

attitudes or events. Consequently, it is not clear if WASSCE grades can adequately predict performance of students at the College of Education for the DBE programme.

In addition to the above, studies had shown that the credibility of the West African Examination Council School certificates had been questioned in Nigeria (Achigbe & Bassey, 2012; Ajuonuma & Mkpa, 2009). Achigbe and Bassey (2012) reported that the Nigerian educational scene had been riddled with a lot of controversies with the approval of a new and indigenous examining body, the National Examination Council (NECO), in 1999 to conduct the Senior School Certificate Examination (SSCE) alongside the more experienced WAEC. They observed that such action had raised the consciousness of stakeholders and agitations of the general public on the credibility of the SSCE being conducted by WAEC. In support of this view is the study by Ajuonuma and Mkpa (2009) which indicated that the credibility of public examinations conducted by WAEC was being queried and its certificates subjected to public scrutiny locally and in many foreign countries. They wondered if the universities have been admitting the right students. To compound the problem there is paucity of studies of WASSCE results in predicting performance in Colleges of Education, especially, in Ghana. The few studies on the relationship of the WASSCE results and academic performance in CoE pertain to other countries but those pertaining to Ghana concern Senior Secondary Schools. The problem of the study, therefore, is to investigate how adequately the WASSCE results predict performance of candidates who are admitted into the CoE to pursue the DBE programme in Ghana.

The purpose of the study

The purpose of the study was to provide evidence to support the decision to use the WASSCE results to predict performance of students pursuing the DBE at the Colleges of Education in Ghana. It is also intended to determine whether the Colleges should employ other predictors, such as entrance examination and oral interview in addition to the WASSCE results to reinforce the admission process.

Research questions

To guide the conduct of the study, the following research questions were formulated.

1. What evidence supports the decision to use the WASSCE results to predict the performance of students in the DBE programme?
2. What is the difference in using the WASSCE results of the core subjects only and core with some elective subjects in predicting performance of the DBE at the Colleges of Education?

Hypothesis:

The following hypothesis was also stated to guide the study.

H_0: The evidence to support the WASSCE results in predicting performance of students who pursue the DBE programme at the CoE in Ghana is not statistically significant.

H_1: The evidence to support the WASSCE results in predicting performance of students who pursue the DBE programme at the CoE in Ghana is statistically significant.

Literature review

To ensure the extent to which the WASSCE results predict performance in the Colleges of Education for the DBE programme calls for a predictive validity studies. Predictive validity refers to the extent to which a test could accurately forecast the extent to which a person would perform in a future related activity. It is an important sub-type of criterion-related validity, and it is the extent to which a test performance is related to some other measure of performance in the future. The concept of predictive validity was described by Faleye (2015) as a term used to describe the capacity of a measuring instrument to forecast future performance in a related task. Similarly, Afolabi (2012) described predictive validity as the degree of correlation between the scores on a test and some other measures that the test is designed to predict. Most educational and employment tests are used to predict future performance. Hence, predictive validity is regarded as essential in these fields.

A number of psychologists and assessment experts have described the predictive validation procedure (Miller, McIntire & Lovler, 2011; Kane, 2006; Crocker & Algina, 1986; Fraenkel, Wallen, & Hyun, 2012). The predictive validation method involves administering a test (predictor) to a large group of individuals and holding their scores for a pre-established period of time. Miller, McIntire and Lovler (2011) indicated that the time should usually, be

six months or more. When the time has elapsed, a measure of one or more behaviours (criterion) is designed and taken with the same individuals. Then the test scores that were gathered earlier are correlated with the scores on the criterion. A test has a predictive evidence of validity when its scores are significantly correlated with the scores on the criterion. This means if examinees who obtained high scores on the predictor also obtained high scores on the criterion while those who obtained low scores on the predictor also obtained low scores on the criterion then it can be established that the test shows predictive evidence of validity. A high correlation indicates that the selection procedure worked perfectly, a low correlation signifies that there is something wrong with the selection procedure.

In criterion-related validation studies, the relationship between the test and the criterion is determined by the statistic called correlation coefficient (Miller, McIntire & Lovler, 2011). Crocker and Algina (1986) called such a statistic validity coefficient. Fraenkel, Wallen and Hyun (2012) noted that a key index in both forms of criterion-related validity is the correlation coefficient and observed that it indicates the degree of relationship that exists between the scores individuals obtain on two instruments. It may further be explained as a quantitative estimate of a linear relationship between two variables (predictor and the criterion).

All correlation coefficients fall between +1.00 and -1.00 (Fraenkel, Wallen & Hyun, 2012). A positive validity coefficient indicates that there is a relationship between the predictor and the criterion and that a high score on one of the variables is accompanied by a high score on the other (Fraenkel, Wallen & Hyun, 2012). In other words, the performance, attitude or behaviour of an applicant can be determined from the scores on the predictor. Similarly, (Fraenkel, Wallen & Hyun, 2012) observed that a negative relationship is indicated when a high score on one variable is accompanied by a low score on the other. However, a correlation coefficient of zero (0) is an indication that no relationship exists between the variables. Therefore, validity coefficients must be evaluated to represent a level that makes the test useful and meaningful. In view of this, Miller, McIntire & Lovler (2011) suggested that validity coefficient must be evaluated using a test of significance and by examining coefficient of determination.

Miller, Mclntire and Lovler (2011) noted that the test of significance is to determine the likelihood that the relationship between the predictor and the criterion resulted by chance or sampling error and that anytime test developers report validity coefficient they should also report the level of significance. They further noted that coefficient of determination determines the amount of variance that the test and the criterion share in common. It is possible for a validity coefficient to be statistically significant but the test can account for only a small portion of the variance (Miller, Mclntire & Lovler, 2011).

Studies had identified a number of problems associated with validity coefficient. Among these problems is the criterion problem. Thorndike cited in Crocker and Algina (1986) identified three measures of criterion. These are immediate, intermediate and ultimate. According to Crocker and Algina (1986), the immediate is readily available and easy to obtain but are often not sufficiently complete or important. In contrast, the ultimate criteria are recognised as substantially important but are difficult and expensive to obtain. Therefore in selecting a criterion for a study, there is a judicious trade-off to select one which can be reliably measured within the time and cost constraint and will have a relationship with the ultimate. Kane (2006) observed that the main limitation in the criterion model is the difficulty in obtaining an adequate criterion. In making reference to Cronbach (1980), Guion (1998) and Lord & Novich (1968), Kane (2006) further explained that it is difficult to obtain a criterion that is clearly better than the test itself.

Studies had shown that sample size affects the computation of validity coefficient. When validity coefficients are estimated for small sample sizes sampling errors are relatively large. Schmidt, Hunter and Uzry (1976) found that if sample sizes are between 30 and 50 a predictor that has acceptable level in the population is likely to have acceptable validity levels in the samples only 25% to 35% of the time. They, however, contend that sample size of 200 or more may be needed to reflect validity levels of population data accurately at level 90% of the time.

Crocker and Algina (1986) opined that if people who handle criterion scores have pre-knowledge of predictor scores they are likely to influence criterion scores. They contend that if they realize that candidates obtain low scores on the predictor, they will put in more efforts to improve their performance on the criterion. On the other hand, if they noticed that candidates obtained high scores on the predictor,

they will be prejudiced in awarding high scores on the criterion variable to such candidates. Such actions reduce reliability. Consequently, Crocker and Algina (1986) described such situation as criterion contamination.

Another problem associated with validity coefficient determination has been identified by assessment experts as restriction of range (Crocker & Algina, 1986; Miller, Mclntire & Lovler, 2011; Anastasi & Urbina, 2007). Not all those who participated in the predictor test are selected for admission or employment. Normally, those who perform well are selected. Therefore, the number of scores for the criterion becomes less than the number of the predictor scores thereby creating a restriction of range. Anastasi and Urbina (2007) referring to restriction of range as a problem of preselction of sample observed that the effect of such situation lowers the validity coefficient.

Literature report of positive relationship between WASSCE results, as entry requirement (predictor) and academic performance at Universities and Colleges of Education. Ajogbeje and Borisade (2012) conducted a study to investigate, among other things, the relationship between cognitive entry characteristics (CEC) and students' achievement in mathematics. The results of the study revealed that there is a positive and significant correlation between the criterion variable (Cumulative Grade Point Average CGPA) and CEC (Senior School Certificate Examination (SSCE) however, a correlation coefficient of 0.158 between CGPA and SSCE was considered a low relationship. Consistent with this low relationship are the studies conducted by Goldberg and Alliger (1992) and Morrison and Morrison (1995). Goldberg and Alliger meta-analyzed the validities of the Graduate Record Examination (GRE) for psychology graduate programmes, cumulating results across 10 studies. They obtained a correlation coefficient of 0.15 for both the GRE-V and GRE-Q in predicting graduate grade point average (GGPA; N = 963). Morrison and Morrison obtained similar but slightly larger correlations in their meta-analysis of 22 studies on predicting GGPA in various fields; the GRE-V and GRE-Q displayed correlations of 0.28 and 0.22 with this criterion. Consequently, the researchers remained critical of the GRE, stating that the observed average correlation was too small to be of use in prediction.

Faleye (2015) investigated the relationship between students' performance in entry examination and students' mathematics

performance in College of Education (CoE) in Nigeria. Results showed that the Unified Tertiary Matriculation Examination (UTME) was the best predictor of College performance. Results also indicated that there is no significant relationship between students' performance in entry examination and their mathematics performance at the CoE. Finally, it was discovered that there was no significant relationship between students' entry qualifications and their mathematics performance at the CoE.

Obioma and Salau (2007) conducted a study on predictive validity with regard to university admissions in Nigeria. The study was to determine the extent to which scores in examinations conducted by the West Africa Examination Council (WASSCE), National Examinations Council (SSCE) and National Business and Technical Examination Board (NBCE/NTCE) in conjunction with the Joint Admissions and Matriculation Board (JAMB) predict future academic achievement of students in university degree examinations. The study revealed that there were low but positive relationships ($0.118 \leq r \leq 0.298$) between each of the predictor variables under study. Although, generally public examinations poorly predicted students' university academic achievement, when compared individually with other predictors, WASSCE was the best single predictor of the students' Cumulative Grade Point Average (CGPA).

Methodology

Research Design

The study is mainly a descriptive survey design. Borg and Gall (1983) described descriptive studies as those aimed at finding out state of objects. Descriptive survey is an attempt to obtain data from members of a population or a sample to determine the current status of that population with respect to one or more variables (Burnham, Gilland, Grant, & Layton-Henry, 2004; Fraenkel, Wallen & Hyun, 2012). A survey is often conducted to obtain description of a particular group of individuals (Gravetter & Forzano, 2006).

This design is suitable for the study because data were collected from the current natural setting of Colleges of Education to obtain the desired information. The study was conducted using a sample from the population of colleges of education in Ghana. Gravetter and Forzano (2006) observed some advantages of a survey to include its flexibility and efficiency in collecting a wide variety of information about

different variables. One disadvantage has been noted to be its low response rate and non-response bias. In order to address such weakness the researcher tried to reach the sampled colleges personally and convinced them to make the data available, though with some difficulty.

Population and sample

The population included all first year students of the colleges who were admitted in the 2015/2016 academic year and offered English Language, Core Mathematics and Core Science. The total number of such students was 13,352 (Report on the 2015/2016 first year end-of-second semester examination results). As at 2016, there were 38 public and eight private colleges of education in Ghana.

The stratified random, sampling technique was adopted in selecting the sample. The study was conducted in seven Colleges of Education constituting 15.2% of the population. Using the stratified random sampling technique, three public Colleges of Education Zones in Ghana were randomly sampled out of the five zones. These zones were Eastern/Greater Accra, Volta and Central/Western Zones. In addition to these, a private College of Education was randomly selected. Names of the sampled public Colleges of Education in each sampled zone were written on pieces of paper, folded and placed in a bowl. The researcher shook the bowl vigorously and asked an eleven-year- old girl to pick two from the zone at random with replacement. This was done to ensure equal chance of a college being selected. The same process was used to select the sample for the private college.

Instrumentation

The main instrument used in the study was document analysis guide. A document is an instrument in language which has, as its origin and for its deliberate and express purpose to become the basis of, or to assist, the activities of an individual, an organisation or a community (Webb & Webb, 1932 cited in Burham, Gilland, Grant & Layton-Henry, 2004). Webb and Webb, (1932) cited in Burnham, Gilland, Grant and Layton-Henry opined that the social investigator must insist on the original document or an exact verbatim copy and that the aim of the investigator must be to consult the original source.

The purpose of the instrument was to examine records of students' WASSCE grades with which they were admitted into the College of Education and students' cumulative grade point average as

at the end of second semester of the first year of the DBE programme. One advantage of examination of records is that it is relatively quick and complete since all the relevant information is usually stored in one location (Borg & Gall, 1983). Borg and Gall cautioned that the use of the technique involves invasion of subjects' privacy. In view of this, clearance was sought from the appropriate authorities of the Colleges of Education, Institute of Education and Institutional Review Board (IRB) of the University of Cape Coast.

Data collection and analysis

Data on documents were obtained from the Institute of Education and the sampled Colleges of Education. The researcher wrote to obtain permission from the Institute of Education, Institutional Review Board (IRB) of the University of Cape Coast and the sampled Colleges of Education to access the West Africa Senior School Certificate Examination (WASSCE) results with which the first year students (2015/2016 academic year) were admitted. This served as the predictor for the predictive validity of the admission requirement for the Colleges of Education. Similarly, for the criterion, the cumulative grade point average (CGPA) of the DBE at the end-of-second semester examination was also accessed from the Institute of Education records. The two sets of results were used to compute the correlation coefficient to determine the predictive validity of the WASSCE grades which are used for admission into Colleges of Education.

Data collected from the study were analysed using inferential statistics. The inferential statistics was suitable for the analysis because a generalisation to the population was made through the study of the data collected from the sample. The statistical tool used in the analysis was correlation. The statistical programme for Social Sciences (SPSS) was employed in computing this statistic.

Results

For research question 1, the Pearson product Moment Correlation Coefficient was used to compute the correlation coefficient (r) between the WASSCE results (predictor) and the final CGPA of the DBE results (criterion) of the sampled students to determine the predictive validity. In order to place the CGPA with the WASSCE grades on a uniform scale, the following weightings were assigned to the WASSCE grades; A1=4, B2=3.5, B3=3, C4=2.5, C5=2, C6=1.5,

D7=1and D8=0.5. In order to obtain the WASSCE grades equivalence of the CGPA of the DBE programme the average of the WASSCE grades for each candidate was computed. (For convenience, the DBE credit weightings follow; A=4, B+=3.5, B=3, C+=2.5, C=2, D+=1.5, D =1).

The average of the WASSCE grades and the CGPA were correlated to obtain the correlation coefficient. The correlation coefficient determined the degree of the prediction. For example, a correlation coefficient of 0.6 means that there is 60% chance of predicting the performance of a candidate on a DBE programme correctly from the WASSCE results. In another sense it means using the WASSCE results to predict performance on the DBE programme, 60% of them will be correct. In addition, a positive index means that a high score on the predictor will result in a prediction of a high score on the criterion and a negative index would imply that a high score on the predictor would lead to a low score on the criterion and vice versa. Table 1 shows the results of the correlation between the WASSCE grades (predictor) and CGPA of the DBE.

Table1: Results of the Pearson Product-moment correlation coefficient of the WASSCE results and CGPA of the DBE

Number	r	α	r^2
1,443	0.209	0.01	0.044

The results in Table 1 show that there is a positive and significant correlation coefficient index. However, the index (r=0.209) indicating low validity coefficient show low relationship between WASSCE results and DBE cumulative grade point average (CGPA). In support of this is the low level of coefficient of determination of 0.044 (Table 1). This means that only 4.4% of the variance is shared by both the WASSCE results and the CGPA. Miller, McIntire and Lovler (2011) observed that it is likely that a validity coefficient can be statistically significant but the test can account for only a small portion of the variance.

This result is in conformity with the study of Obioma and Salau (2007) which revealed that though the WAEC result was the best predictor among other predictors, there was low but positive relationships ($0.118 \leq r \leq 0.298$) between each of the predictor variables under study including WAEC's. To buttress this result, Ajogbeje and Borisade (2012) also observed that there was a low correlation

coefficient of 0.158 between CGPA and SSCE. Consistent with this low relationship are the studies conducted by Goldberg and Alliger (1992); Morrison and Morrison (1995). They respectively meta-analyzed the validities of the Graduate Record Examination (GRE) in predicting graduate grade point average (GGPA) in psychology graduate programmes. They obtained correlations of 0.15, 0.22 and 0.28 for both the GRE-V and GRE-Q. in various fields. Consequently, the researchers criticised the GRE, stating that the observed average correlation was too small to be of use in prediction. The result that the validity coefficient of WASSCE results and CGPA of the DBE programme is low, therefore, indicates that there is a weak evidence to justify that WAEC results adequately predict performance at the Colleges of Education of students who pursue the DBE programme although the correlation coefficient is positive and significant.

With regard to the difference in using only the core subjects and the core subject with other elective subjects of the WASSCE results in predicting the performance in the CoE the correlations of the criterion (CGPA) and the two predictors were computed and compared. The results are presented in Table 2.

Table 2: The results of the correlation between only the core subjects and the core with other subjects

Type of predictor	N	r	A	r^2
Core & electives	1443	0.209	0.01	0.044
Only core	1163	0.258	0.01	0.067

The results show that both the core & electives (regular) and only core have low validity coefficients though both are significant at 0.01α. However, the core only, as a predictor has a higher degree of validity coefficient (0.258) than the core & electives (0.209). This shows that using only the core subjects may predict performance at the DBE better than using the regular system of core and other elective subjects. This is buttressed by the fact that the coefficient of determination of using the core only as a predictor (0.067) is larger than that of the regular system (0.044) (Table 2). This implies that while 6.7% of the variance is shared by only the core subjects (predictor) and performance at the DBE (criterion) only 4.4% of the variance is common to both the predictor (the core with electives) and the criterion (CGPA).

From Table 1, the validity coefficient is statistically significant at the 0.01 level of significance ($r=0.209$, $\alpha=0.01$). This implies that it is statistically significant at 99% confidence interval. In other words, out of every hundred (100) cases there is 99 chances of the validity coefficient to be significant. Comparing this with Miller, McIntire and Lovler's (2011) assertion that for educational purposes the level of significance should be less than 0.05, then the relationship between the WASSCE results and the CGPA of the DBE is not by chance or sampling error. Contrary to this is the study of Faleye (2015) involving SSCE and performance in Mathematics in COE in Nigeria. He observed that there is no significant relationship between the two variables. But Miller, McIntire and Lovler (2011) observed that it is likely that a validity coefficient can be statistically significant but the test can account for only a small portion of the variance. This view is supported by the low level of coefficient of determination of 0.044 (Table 1). Therefore, the null hypothesis that the statistical evidence to support the WASSCE results in predicting performance of students who pursue the DBE programme at the Colleges of Education in Ghana is not significant is rejected at 0.01 level of significance.

Conclusion and recommendations

In conclusion, the justification to use the WASSCE results as a means to select candidates to pursue the DBE programme at the Colleges of Education is not adequate. Although, the validity coefficient between the WASSCE grades and the DBE CGPA is positive and significant, the correlation coefficient between the WASSCE grades and students' CGPA of 0.209 shows a low relationship. In addition, the low coefficient of determination ($r^2=0.044$) confirms that there is a weak relationship between the two variables. This implies that the WAEC results are not very strong enough to predict performance of students admitted to pursue the DBE programme at the Colleges of Education in Ghana. The results also showed that where the WAEC results would be used for selection using only the core subjects is better than using the core with other elective subjects.

It is therefore, suggested that in addition to the WASCE results, other measures can be used to reinforce the admission selection for the DBE programme at the Colleges of Education in Ghana. Some of the measures can be special entrance examination and oral interview.

Furthermore, with the WASSCE results, using only the core subjects of English, Mathematics and Science/Social Studies will better predict performance at the DBE programme than adding some elective subjects to the core. It is further recommended that further studies may be conducted to cover other PRINCOF zones. Studies can also be conducted on how individual subjects of the WASSCE results predict performance in respective subject areas of the DBE programme in the Colleges of Education in Ghana.

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