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Gender as a Factor in the Prediction of Performance in Botswana General Certificate of Secondary Education Physical Education Examinations by Coursework and Forecast Grades among Senior Secondary School Students

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Selection bias is an educational and a social malady which is of concern to every educator especially educational administrator when allocating educational opportunities to learners based on previous performance. Bias in predicting who passes or who fails and hence in selection exists if the same prediction equation is used for different groups, for example, for both gender when in fact such prediction, given the tests involved, is different for male and female learners. As a check for this, there is always the need to perform differential prediction for the sexes. The purpose for this descriptive study is to investigate gender as a factor in the prediction of performance in BGCSE physical examination by coursework and forecast grades among secondary school students in Botswana. The sample composed of 2292 (1432 males and 860 females) students who, based on Botswana Examination Council (BEC) records, obtained grades in coursework, forecast and BGCSE physical education grades for 2005 through 2008. The Pearson correlation and regression analyses done using SPSS revealed that though coursework and forecast grades significantly predict the BGCSE grades in physical education among senior secondary school students in Botswana, based on each year's data, gender does not influence such prediction significantly, but for cumulative data across all the years it does.

Keywords: Differential Prediction; Gender Bias in Selection; BGCSE Physical Education Examination; Coursework Grades; Forecast Grades; Botswana

Introduction and Background

Education is the single most expensive enterprise globally and especially so in Botswana where government spends about 26% of her annual budget on this enterprise. It is common practice to determine academic readiness and hence perform selection of learners for the next level of education based on the results of their performance in previous related examinations. Conducting examinations within and at the end of each and every school year is a part of the school curriculum and in Botswana, like in other countries; learners take public examinations to determine their academic standing at each level of education. Coursework grades from continuous assessment and Mock examination or forecast grades are often used to predict students' readiness to take the final school public examination. Public examination grades are commonly used as a measure of academic achievement for a given level of education. Achievement at a given level of education is often used to determine or predict the probable level of achievement in the next level of education or at the workplace.

In Botswana at the end of basic education, and at the end of secondary education, students are expected to sit for public examinations such as the Junior Certificate in Education (JCE) and Botswana General Certificate of Secondary Education (BGCSE) examinations respectively. BGCSE examination started in 1993 in partnership with the University of Cambridge Local Examination Syndicate (UCLES). Later when it was realized that the country was in sufficient control of the education standards and could develop and administer examinations across all levels, localization of marking examinations took place as a recommendation by the Report of the National Commission on Education (RNPE) of 1993. BGCSE physical education examinations were first administered in 2005 taking the form of practical and theory based examinations.

Theoretical Foundation

The mean of scores on several measures of the same ability is likely to give a more valid indication of that ability than the result of a one-shot measure of the ability. It is on this premise that continuous assessment is advocated in schools as it provides for opportunity for improvement based on occasional feedback. But if the instruments used in the repeated measurements are differentially invalid for the different groups involved, then the sum of the scores would not provide an unbiased measure of the ability under consideration. The case of continuous assessment of students contributing to their final grade in the graduating examination is a well argued one (Little, 1992). Teachers are in stronger position to assess the attainment of their students than the external examiner who has only the evidence of a few hours work to draw from. Little highlighted that the rationale for coursework in GCSE has been that it can explore aspects of physical education knowledge and practice

which short time written examinations questions cannot reach and do not provide enough time to investigate in any depth.

In any setup, academic achievement is generally assumed to be an indication of the student ability to succeed in the educational program. The first difficulty with any consideration of these purposes is that the functions and values of public examinations and coursework are not constant. Both are determined by the wider purpose of education and the changing needs of the society involved (Robbins, 1997). Assuming the purpose of coursework, given that it is properly administered and weighted, is determined by the overt function of the examination which might not perfectly reflect the needs of the society. In that case, the realization of these purposes is unlikely to be achieved (Ramatlala, 2009). In other words to what extent could one count on what the student has done in school, as reflected by his/her performance, in admitting him/ her to the next level of education, or in employing him/her in an area that requires the same or related skills?

Iramaneerat (2007) stated that different countries use different measures to evaluate academic readiness of students. Botswana's Ministry of Education in collaboration with Botswana Examination Council recommended class or theory based sessions in addition to practice-based sessions for performance of coursework in physical education. According to Ramatlala (2009) teachers assess the students in practical activities and grade them for assessment of learning purpose. The assessment is carried at each and every teaching and practical activity. The marks from physical activities are combined with theory based assessment at the end of two years of high school to determine the learning outcome.

According to Robbins (1997), examination is a process of measuring, scrutinizing and investigating the knowledge, understanding and capability of the candidate. Coursework is any sort of performance or work produced to meet the purpose of the curriculum. Forecasting, on the other hand, is to estimate or calculate in advance, the likely performance level of the learners, and could be determined through analysis of relevant data. The expectation is that students getting good grades in coursework and forecast test should be in a position to attain good grades during final examinations. Coursework and forecast grades represent academic achievement over a period of time and given that they are based on the same content with BGCSE, they can be appropriately used as predictors of BGCSE final examination grades.

Studies on coursework have revealed a significant predictive strength of coursework in final examination (Masole & Utlwang, 2005; Thobega & Masole, 2008). Daniels and Schouten as cited by Adeyemi (2010) argued that a prediction of a future examination result could be made with reasonable success on the basis of the result of an earlier examination and that grades may serve as prediction measures and as criterion measures.

This boils down to finding the validity of the measures used to determine the likely achievement of the learners in the criterion measure. According to Young (2001), validity is not the inherent characteristics of a test but it must be determined for each use of a test and for the population of interest. Mock and forecast grades are used in Botswana to predict who would earn what level of pass during Botswana General Certificate of Secondary Education Examination (BGCSE) (Masole & Utlwang, 2005; Thobega & Masole, 2008). Depending on the predictor and criterion variables involved, sometimes the results from such analysis are often used to select students for advancement to the next level of education. But some extraneous variables especially gender, school location, type of school, etc. may pose extraneous influences that bring about invalidity in such exercise. It might lead to differential prediction which results in bias in the selection purpose. This depends on the predictive validity of the variables used in such exercise.

Bias in Testing and in the Use of Test Results

Bias in testing exists when the influences of extraneous sources in a testing situation result in members of one group performing significantly higher or lower than members with the same ability but from other groups taking the same test. In other words, when examinees with different group membership have been determined to have the same ability in what the test was designed to measure, are matched up, members from one group systematically influenced by the extraneous variable show significantly different performance in the test items. So, extraneous sources that influence performance on a test can make the test biased against one group or the other because the test items, influenced by extraneous sources, function differentially across members of groups taking the test. In other words, scores that results from a biased test have different meaning for different groups who took the same test (Nenty, 1979).

The use of test results can also be biased if they differentially over-predict a criterion of interest for one group while under-predicting it for another group of examinees. That is, if the same test (or tests) has significantly different predictive validity for the different groups involved in the testing. Therefore, predictive bias has to do with differential validity which leads to differential prediction. This study is concerned with the second meaning of bias. Selection bias is an educational and a social malady which is of concern to every educator especially educational administrator when allocating educational opportunities to learners based on previous performance. According to Kyei-Blankson (2005), questions about differential prediction, therefore, are questions related to whether the prediction models obtained for the different groups of examinees are different. Such questions are generally approached by comparing regression systems for equality of regression slopes and equality of regression intercepts in the respective prediction equations across groups of interest (p. 48).

Statement of the Problem

Every examination results serve the fundamental purpose of predicting the readiness of the learner for the next level of education or suitability for employment. Some examination might lack predictive validity and hence predict such suitability falsely and sometimes differently for different groups of students, for example males and females. The predictive validity of certain examinations has been a matter of concern to many researchers (Adeyemi, 2008). Prediction bias is a source of and might lead to social injustice which a selection process might unknowingly commit. Studies have shown that certain examinations such as Scholastic Aptitude Test (SAT) validly predicts university grades, while certain low-quality examinations could not effectively predict performance at higher level examinations (Kobrin et al., 2008; Young, 2001). This is more so for teacher made classroom tests and some public examinations in Africa. Using grades from school coursework examinations and forecast grades from mock examinations to predict who passes or who fails and hence for selection is likely to lead to biased decision-making especially if the same prediction equation

is used for both gender whereas such prediction might be different for male and female learners. This is unfair for the group whose performance is under predicted and unfairly limits their opportunity to be selected or allocated educational opportunities based on the results of previous examinations.

Purpose and Objectives

This study seeks to determine whether coursework and forecast grades significantly predict performance in BGCSE physical education examinations and equally so for male and female students. Some earlier studies (Thobega & Masole, 2008; Masole & Utlwang, 2005) have revealed coursework and forecast grades to be good predictors of BGCSE grades and in agriculture grades, but none have been found trying to determine gender-based predictive validities of these measures across many years and for physical education grades. Hence this study aims at investigating the predictive strength of these two variables on BGCSE physical education examinations.

Given the fear of gender-based differential prediction by these two variables the study specifically aims at determining the extent to which gender influences the prediction of students performance in BGCSE physical education examination by both coursework and forecast grade. Hence the objectives of the study are to:

- determine the extent to which performance in school-based coursework and forecast grades predict performance in BGCSE physical education examinations for all, male and for female students;
- determine the extent to which gender influences the prediction of BGCSE physical education performance by coursework and forecast grades.

Research Hypothesis

In the null form, these state that:

Ho_1: Coursework and forecast grades do not significantly predict BGCSE physical education performance for male and female students.

Ho_2: Gender has no significant influence on the ability of coursework and forecast grades to predict BGCSE physical education performance.

Methodology

The population for the study was students who took BGCSE physical education examinations for the four years: 2005 through 2008. There were a total of 3190 of such students. Out of this number, those that came from schools with grades in coursework, forecast grades as well as in BGCSE were 2292 (1432 males and 860 females) students. These served as the sample for the descriptive study.

Measures

Secondary data were used for the study, and were retrieved with permission from Botswana Examination Council (BEC) academic records. In BEC, intensive panel-based content analysis and face validation is carried by each subject panel. So the grades were deemed valid for use in the study.

Procedure

Data were coded and entered into the computer and analysis were done by carrying out Pearson correlation coefficient and three multiple regression analyses. All the analyses were done using SPSS version 16 for Windows. The prediction model for coursework and forecast grades were determined by fitting the values of the relevant parameters in the linear regression model. The predictor variables in the regression analysis were the students' coursework and forecast grades and BGCSE as the criterion variable. The significance level for testing the hypotheses set at .05 for all statistical tests.

Data Analysis and Interpretation of Results

A descriptive analysis of the research data gave the means and standard deviation as well as the Pearson correlation values among the three variables of the study for all students as well as for males and females separately (see **Table 1**).

To test the first hypothesis, a multiple regression analysis was done with BGCSE grades as the dependent variable and coursework grades and forecast grades as the independent variables (see **Table 2**). The result showed that coursework grades accounted for 42% of the variability of grades in the BGCSE while with forecast grades it accounted for about 51% of such variance. The analysis gave an F-value of 44.668 which given 2 & 2289 degrees of freedom was found to be significant beyond .01 alpha level. Hence among secondary school students in Botswana the null hypothesis was rejected and the research hypothesis that both coursework grades and forecast grades significantly predict the final BGCSE grades in physical education was retained. The analysis gave a prediction equation as indicated in Formula 1.

To test the second hypothesis, the same analysis was done for data collected for males and females students separately (see **Tables 3** and **4**). With a predictive validity of .473 (R^2 = .473) for males and .551 for females, the two variables were found, in each case, to account for a substantial variability in the BGCSE grades respectively. The regression formula for both gender are given in Formula 2 for males and 3 for females. The resulting predictive validities were then compared using Fisher's transformed Z-test (see **Table 5**) to determine whether gender has significant influence on the prediction of BGCSE

Table 1.
Mean, standard deviation and inter-correlation matrix of variables in the study.

Variable	All Subjects (n = 2292)				Female (n = 860) and Male (n = 1432)[1]				
	Mean (SD)	BGCSE	Forecast Grade	Course-work	Mean (SD)	BGCSE	Forecast Grade	Course-work	Mean (SD)
BGCSE	4.72 (1.03)	1.000	.421*	.648*	4.49 (1.01)	1.00	.399*	.619*	4.86 (1.03)
Forecast Grade	4.81 (1.41)	.421*	1.000	.185*	4.77 (1.38)	.467*	1.00	.166*	4.84 (1.43)
Coursework	4.32 (1.18	.648*	.185*	1.000	4.00 (1.24)	.663*	.212*	1.00	4.52 (1.09)

*p< .01; [1]Means and correlation values for males are above the diagonal and that for females are below the diagonal.

Table 2.
Prediction of BGCSE performance in physical education using coursework and forecast grades for all students (n = 2292).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df_1	df_2	Sig. F Change
1	.648[a]	.421	.420	.7912	.421	1661.863	1	2290	.000
2	.717[b]	.515	.514	.7243	.094	44.668	1	2289	.000

		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	1273.121	2	636.561	1213.388	.000[b]
	Residual	1200.842	2289	.525		
	Total	2473.963	2291			

Constant/Variables	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
	B	Std. Error	Beta		
(Constant)	1.360	.071		19.072	.000
Coursework Final Grades (CW)	.522	.013	.591	39.881	.000
Forecast Grade (FG)	.229	.011	.312	21.063	.000

Dependent Variable: Student BGCSE final grades.
[a]Predictors: (Constant), coursework final grades; [b]Predictors: (Constant), coursework final grades, forecast grades. BGCSE = 1.360 + .522CW + .229FG.

Table 3.
Prediction of BGCSE performance in physical education using coursework and forecast grades for all male students (n = 1432).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df_1	df_2	Sig. F Change
1	.619[a]	.383	.383	.8072	.383	888.3785	1	1430	.000
2	.688[b]	.473	.473	.7460	.090	244.952	1	1429	.000

		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	715.118	2	357.559	642.442	.000[b]
	Residual	795.328	1429	.557		
	Total	1510.446	1431			

	Constant/Variables	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
		B	Std. Error	Beta		
2	Constant	1.380	.100		13.801	.000
	Coursework Final Grades (CW)	.484	.018	.568	29.204	.000
	Forecast Grade (FG)	.256	.014	.305	15651	.000

Dependent Variable: Student BGCSE final grades.
[a]Predictors: (Constant), coursework final grades; [b]Predictors: (Constant), coursework final grades, forecast grades. BGCSE = 1.380 + .537CW + .219FG.

Table 4.
Prediction of BGCSE performance in physical education using coursework and forecast grades for all female students (n = 860).

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df_1	df_2	Sig. F Change
1	.663[a]	.439	.439	.7613	.439	672.196	1	858	.000
2	.742[b]	.551	.550	.6819	.111	212.338	1	857	.000

		Sum of Squares	df	Mean Square	F	Sig.
2	Regression	488.315	2	244.157	525.053	.000[b]
	Residual	98.518	857	.465		
	Total	886.833	859			

	Constant/Variables	Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig.
		B	Std. Error	Beta		
2	Constant	1.360	.102		13.292	.000
	Coursework Final Grades (CW)	.483	.019	.590	25.192	.000
	Forecast Grade (FG)	.251	.017	.341	14.572	.000

Dependent Variable: Student BGCSE final grades.
[a]Predictors: (Constant), coursework final grades; [b]Predictors: (Constant), coursework final grades, forecast grades. BGCSE = 1.360 + .483CW + .251FG.

Table 5.
Validity of coursework and forecast grades in predicting BGCSE in physical education from 2005 to 2008.

Year	Gender	N	From Simple Regression				From Multiple Regression		Unique Contribution of Forecast Grades	
			Coursework Grade		Forecast Grade		Coursework & Forecast Grades	Z-Value	R_1^2 - R_2^2	Z-Value
			R_1^2	Z-Value	R_2^2	Z-Value				
	Male	366	.407		.190		.472		.068	–1.18
2005	Female	272	.442	–1.04	.271	–1.37	.528	–1.00	.086	–.97
	Total	638	.457		.209		.521		.064	–1.61
	Male	317	.512		.357		.555		.043	–.78
2006	Female	213	.544	–.50	.354	.03	.592	–.66	.048	–.78
	Total	530	.562		.368		.601		.039	–1.01
	Male	403	.453		.277		.560		.107	–2.18*
2007	Female	205	.454	–.02	.245	.05	.583	–.41	.129	–1.89*
	Total	608	.459		.266		.574		.115	–2.89*
	Male	346	.566		.170		.659		.093	–2.00*
2008	Female	170	.627	–1.03	.230	–.09	.745	–1.82	.118	–1.89
	Total	516	.591		.192		.691		.100	–2.89*
	Male	1432	.383		.159		.473		.090	–3.11*
Total	Female	860	.439	–1.71	.218	–1.91	.551	–2.53*	.112	–3.25*
	Total[2]	2292	.421		.177		.515		.094	–4.39*

*p < .05; Critical Z = 1.96.

grades using coursework grades and forecast grades. This gave a Z-value of –2.53 (p = .005) which, in absolute value, is higher than the critical Z-value of 1.96 (α = .05). Hence the second null hypothesis was rejected for the combined data, meaning that the prediction lines for BGCSE from coursework and forecast grades for males and females have significantly different slopes.

A similar comparison for each of the four years separately did not result in any significantly different predictive validity for male and female students (see **Table 5**). Therefore, for the combined data for all the four years, a significant gender-based differential prediction was observed, but for each of the years, gender was not found to have a significant influence on the prediction of BGCSE grades using coursework grades and forecast grades among secondary school students in Botswana. A closer study of the related regression equations shows that based on data for the four years combined coursework grades and forecast grades significantly under-predict the BGCSE grades in physical education for males and over-predict for females students. Such significant trend was not found when the parameters for regression equations for each of the four years were examined (see **Table 5**).

In summary therefore coursework and forecast grades significantly predict the BGCSE grades in physical education among secondary school students in Botswana and gender is found to influence such prediction significantly across the years but not for each of the years. A summary of the effect sizes and prediction differential prediction indicators are presented in **Table 5**.

For each of, and for all the years 2005 to 2008, both coursework grades and forecast grades individually are significant predictors of BGCSE grades in physical education (see **Table 5**). But coursework grades are always significantly superior to forecast grades in predicting BGCSE grades in this subject. Generally such prediction is always significantly improved if both independent variables are used together. For physical education, whether coursework grades or forecast grades are used singly or combinely to predict BGCSE grades for each of the years, gender does not constitute a significant biasing factor in such prediction, but predictive validity for females is always higher than that for males (see **Table 5**). A significant sign of such effect appears when the prediction is based on a combined four years' data, but it is rare to use more than one year's data for such exercise.

Discussion of Findings and Recommendations

Fair selection has a lot of implications for social justice, access and for equality in the identification and development of potential through education. Selection based on incorrect prediction may deprive some learners of the opportunity to continue their education or channel them into areas to which they are not naturally endowed. This may result in inefficient utilization of manpower as well as of resources. Invalid prediction often results in under-predicting the criterion variable for one group of students while over-predicting it for the other(s). This often leads to bias in selection, which is of very high social and educational concern.

Given the cumulative data for the four years under consideration, in this study the two measures used coursework and forecast grades—significantly predict performance at BGCSE grades in physical education and based on data cumulated over four years, such prediction differs between male and female secondary school students in Botswana. This confirms the differential prediction often found in similar studies (Young, 2001). The very high percentage (about 40%) of criterion variance accounted for by continuous assessment grades for each of the three (male, female, & total) predictions is indicative of the predictive validity of this class exercises given BGCSE in physical education. This tells a lot about the quality of continuous assessment in physical education in Botswana schools. The nature of this assessment is its strength. It takes into consideration all

that BGCSE examination involves, plus incorporating the practical work aspects of the subject. Over and above the contribution of continuous assessment, forecast grades accounted for some significant percentage (9% to 11%; see **Table 5**) of the criterion variance in each of the three predictions based on the four years' data. This is partly due to the significant amount of variance it shares with continuous assessment (2.75% to 4.50%) in the three predictions and partly due to it seemingly lack of content validity as it does not involve the practical aspects of physical education. But for these, given its close resemblance to the criterion, one would have expected forecast grades from Mock examination to account for more of the criterion variance.

Predicting BGCSE performance in physical education from grades in coursework and forecasting in Botswana differentiates between male and female students and hence lead to bias in any selection if such prediction is based on cumulative data. The significantly different prediction validities (.473 for males and .551 for females; $Z = -2.53$, $p < .05$) is indicative of bias in prediction if and when cumulative data across the years are used.

The story was not quite the same if the prediction is based on yearly data. In none of the years is such differentially significant prediction observed (see **Table 5**). For each of these years, coursework grades and forecast grades were seen to individually and combinely predict grades in BGCSE physical education significantly with predictive validities ranging from .457 to .591 for coursework grades, .192 to .368 for forecast grades, and from .521 to .691 for both predictors combined. Though the significant predictive validities of each and both coursework and forecast grades persisted across each of the four years, the significant differential prediction was not observed for any of the years considered separately. One can then say that the observed significant differential prediction for the combined four years' data is an artifact of the increased sample size. In other words, the likelihood of improved predictive validity was enhanced by combining data for four years and hence increasing the sample size.

It could be concluded that in Botswana senior secondary schools, for students' performance in physical education between the years 2005 to 2008, coursework grades and forecast grades, individually and combinely, were significant predictors of BGCSE performance. They also showed gender-based significant differential prediction, over-predicting the criterion for females while under-predicting for male students. But when the analyses were done for each of the four years, such gender-based significant differential prediction was not observed for any of the four years.

Recommendations

Given that the results of predicting BGCSE grades may be used in flagging students whose BGCSE grades might be reviewed (Masole & Utlwang, 2005), Botswana Examination Council should ensure that the prediction of grades in this examination should be done with measures that will ensure no gender-based differential prediction. This would mean taking measures and procedures that enhance the predictive validities of each of the predictor variables through improving their content validities at the classroom levels.

Similar studies as to the validity of coursework, forecast grades and even other measures in predicting BGCSE grades in different subjects should be carried out. Other variable-selecting methods of multiple regression analysis could be used instead of the stepwise method used in this study. Such studies should also be carried out with other variables like ethnicity, location and socio-economic levels as factors in the prediction of performance in BGCSE physical education examination by coursework and forecast grades among secondary school students in Botswana.

REFERENCES

Adeyemi, T. O. (2010). Credit in mathematics in senior secondary certificate examinations as a predictor in educational management in universities in Ondo and Ekiti States. Nigeria. *Middle-East Journal of Scientific Research, 5,* 235-244.

Adeyemi, T. O. (2008). Predicting students' performance in senior secondary certificate examinations from performance in junior secondary certificate examinations in Ondo State, Nigeria. *Humanity & Social Sciences Journal, 3,* 26-36.

Akbari, R., & Alivar, N. K. (2010). L2 teacher characteristics as predictors of students' academic achievement. *The Electronic Journal for English as a Second Language, 13,* 1-22.

Gardner, D., & Deadrick, D. L. (2008). Understanding of performance for US minorities' cognitive ability measures. *Equal Opportunity International, 27,* 455-464. doi:10.1108/02610150810882305

Iramaneerat, C. (2007). Rater errors in a clinical skills assessment of medical students. *Evaluation & the Health Professions, 30,* 266-283. doi:10.1177/0163278707304040

Kobrin, J. F., Patterson, B. F., Shaw, E. J., Mattern, K. D., & Barbuti, S. M. (2008). *Validity of the SAT® for predicting first-year college grade point average.* College Board Report No. 2008-5.

Kyei-Blankson, L. S. (2005). *Predictive validity, differential validity, and differential prediction of the subtests of the medical college admission test.* Unpublished Doctoral Dissertation, Athens, OH: Ohio University.

Little, C. (1992). GCSE coursework: A retrospective assessment. *Teaching Mathematics and Its Applications, 11,* 56-63. doi:10.1093/teamat/11.2.56

Masole, T. M., & Utlwang, A. (2005). *The reliability of forecast grades in predicting students' performance in the final Botswana General Certificate of Secondary Education Examinations.*

Nenty, H. J. (1979). *An empirical assessment of the culture fairness of the Cattel Culture Fair Intelligence Test using the Rasch Latent Trait Measurement Model.* Unpublished Doctoral Dissertation, Kent, OH: Kent State University.

Ramatlala, M. S. (2009). *The validity of coursework scores in predicting performance in Botswana General Certificate of Secondary Education Physical Education examinations among senior secondary school students in Botswana.* Unpublished Master's Thesis, Gaborone: University of Botswana.

Robins, K. (1997). What in the world's going on? In P. D. Gay (Ed.), *Production of culture/cultures of production.* London: Sage/Open University.

Thobega, M., & Masole, T. M. (2008). *Relationship between forecast grades and component scores of the Botswana General Certificate of Secondary Education Agriculture.*

Young, J. W. (2001). *Differential validity, differential prediction, and college admission testing: A comprehensive review and analysis.* College Board Research Report No. 2001-6. New York: College Entrance Examination Board.

Young, J. W. (1991). Gender bias in predicting college academic performance: A new approach using item response theory. *Journal of Educational Measurement, 28,* 37-47. doi:10.1111/j.1745-3984.1991.tb00342.x

