

Predictive Validity of University Entrance Examinations, a Case of College of Technology Education, University of Education, Winneba, Ghana.

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ABSTRACT

Entrance examination is common in many countries. In Ghana Entrance examination has become a fundamental means of admitting students into Top Universities and colleges for both graduate and undergraduate programs. Applicant that is of age twenty-five and above is usually given the chance to participate. Entrance examination has a rich history in the admissions process of many countries and institutions across the globe. However, the unanswered question remains whether those admitted through entrance examination perform to the standards of the Universities they are admitted to. Moreover, it would be prudent to compare performance of direct applicants to that of students gaining admission through entrance examination. The study used Analyses of Covariance (ANCOVA) Model. The study used a cross section data (2103) obtained from the College of Technology Education, Kumasi. Both descriptive and inferential analyses are provided. The number of credit hours a student takes has an adverse impact on the performance as indicated by the regression co-efficient (-0.0142). Being a mature student lowers the CGPA by 0.1121 (i.e. -0.1121). The combined effect of credit hours and type of student (mature) had an adverse effect on CGPA. Mature students should be encouraged to take initiatives to advance their knowledge whiles they are cautioned to be steadfast at the beginning of higher academic achievement. Higher academic institutions are also advised to give mature students the opportunity to enroll. Meanwhile, it is recommended that preliminary classes are organized for mature students before they take entrance examination since they might be rusty at the beginning. The academic institutions should reconsider the number of credit hours that students take whiles in school since it can affect their performance.

Keywords: Entrance Examination, Credit Hours, Direct Students, Mature Students, Cumulative Grade Point Average, Analysis of covariance.

INTRODUCTION

The Free Dictionary defines entrance examination as examination to determine a candidate's preparation for a course of studies. Moreover, the term College entrance examination may refer to any standardized test which is needed in order for one to be considered eligible for application by a post-secondary (Senior High) institution. Entrance examination is common in many countries such as Australia, Brazil, Burma, Chile, China, France, Germany and United Kingdom. An entrance examination is an examination that many educational institutions use to select students for admission. This examinations may be administered at any level of education, from primary to higher education, although they are more common at higher levels. In West Africa a number of countries use the entrance examination systems: In Nigeria there is Unified Tertiary Matriculation Examination (UTME) and National

Common Entrance Examination. In Ghana Entrance examination has become a fundamental means of admitting students into Top Universities and colleges for both graduate and undergraduate programs. Amongst these top Universities are University of Education, Winneba, University of Ghana, Legon, University of Cape Coast, Cape Coast, and Kwame Nkrumah University of Science and Technology, Kumasi. Common amongst the entrance examinations conducted by these Universities is the mature entrant examination. Here applicant that is of age twenty-five and above is usually given the chance to participate.

The aforementioned evidence has shown that entrance examination has a rich history in the admissions process of many countries and institutions across the globe. However, the unanswered question remains whether those admitted through entrance examination perform

to the standards of the Universities they are admitted to. Moreover, it would be prudent to compare performance of direct applicants to that of students gaining admission through entrance examination. It is against this background that the Predictive Validity of University Entrance Examinations is conducted using College of Technology Education, Kumasi which is one of the Campuses of the University of Education, Winneba, Ghana.

LITERATURE REVIEW

The word "valid" is derived from the Latin validus, meaning strong. Validity is the extent to which a concept, conclusion or measurement is well-founded and corresponds accurately to the real world. The validity of a measurement tool (for example, a test in education) is considered to be the degree to which the tool measures what it claims to measure; in this case, the validity is an equivalent to accuracy. In psychometrics, validity has a particular application known as test validity: "the degree to which evidence and theory support the interpretations of test scores). Validity is important because it can help determine what types of tests to use, and help to make sure researchers are using methods that are not only ethical, and cost-effective, but also a method that truly measures the idea or construct in question.

Bachman (1990) defines construct validity as "the extent to which performance on tests is consistent with predictions that we make on the basis of a theory of abilities, or constructs." Alderson, Clapham and Wall (1995) mention different ways for establishing the construct validity of a test. Some of these are assessing whether the test is based on its underlying theory, internal correlations among different components of a test, multitrait-multimethod analysis, convergent-divergent validation and factor analysis.

Tesema (2014) examined the predictive validity of university entrance examination scores and high school GPA for college performance in different programs at Addis Ababa University. Differential validity was also measured across gender and school type (private vs. public). The study evaluated Predictive validity as an index of the relationship between the predictors (High school GPA and the University entrance exam scores), and the criterion (first year college GPA). Statistical procedures utilized in the study included descriptive, bivariate correlation and regression analyses. Results showed that both

high school GPA and the University entrance examinations scores significantly predict first year college GPA in general and for each study program as well.

Golnaz Jamalifar et al (2014) investigated the relationship between the general English courses offered at the B.A. program of translation studies at Islamic Azad University and the students' general English performance in M.A. entrance examination of the master program in TEFL at Islamic Azad University. The study used multiple regression method of analyses. Results of analyses showed that the general courses explained 67 percent of the variance in the UEE performances.

Farrokhi-Khajeh-Pasha et al (2012) examined the predictive validity of Konkoor (*university entrance examination*) scores, alone and in combination with high school grade point averages, for the academic performance of public medical school students in Iran. The study followed the cohort of 2003 matriculates at public medical schools in Iran from entrance through internship. The predictor variables were Konkoor total and subsection scores and high school grade point averages. The outcome variables were Comprehensive Basic Sciences Examination scores; Comprehensive Pre-Internship Examination scores; and medical school grade point averages for the courses taken before internship. Pearson correlation and regression analyses were used to assess the relationships between the selection criteria and academic performance. The Comprehensive Basic Sciences Examination had the strongest association with the Konkoor total score followed by medical school grade point averages and the Comprehensive Pre-Internship Examination. While adding high school grade point averages to the Konkoor total score almost doubled the power to predict medical school grade point averages, however, did not have a substantial effect on Comprehensive Basic Sciences Examination scores and Comprehensive Pre-Internship Examination prediction. Alavi (2012) investigated the relationship between English scores of high school and pre-university with the English scores of the learners in Iranian National University Entrance English Examination (INUEEE). Students final English scores in grade three and pre-university 1 and 2 were collected and all sets of scores were correlated with the students' scores on INUEEE. Results showed that all the correlations were significant at (.01) level of significance.

MODEL SPECIFICATION

The study used an Analyses of Covariance (ANCOVA) Model. ANCOVA is an Analysis of Variance (ANOVA) model that has a general linear model with a continuous outcome variable (Cumulative Grade Point Average -CGPA) and two or more predictor variables, where at least one is continuous (Credit Hours-CH) and at least one is categorical (Type of Student-TS). Generally, the model is specified as

$$CGPA_i = f(CH_i, TS_i, CH_TS_i) \quad (1)$$

Where $CGPA_i$ =Cumulative Grade Point Average, CH_i =Credit Hours, TS_i = Type of student, CH_TS_i =joint impact of credit hours and type of student and δ_{ij} = stochastic error term.

The purpose of introducing covariate(s) in ANOVA to obtain ANCOVA is to reduce within-group error variance. In ANOVA the effect of an experiment by comparing the amount of variability in the data that the experiment can explain, against variability that it cannot explain. If part of the Unexplained is explained by the covariate then error variance is reduced.

Also in experiment there may be unmeasured variables that confound the results. If any variable is known to influence the dependent variable then ANCOVA is ideally suited to remove the bias of these variables. The introduction of the Credit Hours was necessary because whenever a confounding variable is identified the biases are removed with its introduction. Specifically the model is stated as

$$CGPA_i = \alpha_0 + \alpha_1 CH_i + \alpha_2 TS_i + \alpha_3 CH_TS_i + \delta_{ij} \quad (2)$$

Since the Type of Student is categorical dummies are used. That is Type of Student=1 if student enrolled through entrance examination; Type of student=0 if student was a direct entrant or otherwise. The equation (2) above therefore becomes

$$CGPA_i = \alpha_0 + \alpha_1 CH_i + \alpha_2 \binom{1}{0} + \alpha_3 CH_TS_i + \delta_{ij} \quad (3)$$

The model was chosen based on the fact that the predictor variables (Credit Hours-CH and Type of Student-TG) do not have any relationship with each other. And this is one of the preconditions for a successful working of an ANCOVA model. The credit hours were used as a proxy for the number of hour's student study. The inherent assumptions of the ANCOVA include Independence of covariate and treatment effect; Homogeneity of regression slopes.

DATA TYPE AND SAMPLE SIZE

The study used a cross section data obtained from the College of Technology Education, Kumasi. That is the data used is a secondary. The Sample focused on second, third and fourth year students of the college. This was to aid the attainment of the Cumulative Grade Point Average ($CGPA_i$) over at least three semesters. The study used a total of 2103 students.

DATA ANALYSES

Both descriptive and inferential analyses are provided. The descriptive analysis concentrates on gender distribution of respondents, distribution of Type of Students and $CGPA_i$. The inferential analyses concentrate on the ANCOVA model and its possible predictions. SPSS 16.0 was used in the analyses.

RESULTS AND DISCUSSIONS

This section shows both descriptive and inferential results. The Descriptive aspects represent the summary of the data statistics whiles the inferential shows regression (ANCOVA) results.

Descriptive Results

Table 1 shows that out of the total number of 2103 students that were studied 1150 were males whiles 953 were in the female category. The unbalanced number of males and females was due to the fact that the sample selected were chosen at random and therefore the study assumed equal chances for both males and females. In addition Table 1 shows that 1516 out of the total number are direct students whiles 587 were mature students. Again the random nature of the sampling might have accounted for the unbalanced numbers of direct and mature students included.

Per the results it is self evident that if the study counts on the predictions of random sampling then the conclusion is that the College of Technology Education, Kumasi (COLTEK) is a male dominated institution. Similarly, the result indicates that there are more direct applicants who gain admission into COLTEK than mature applicants. Table 1 further indicates that males on average had better CGPA than Females. That is for the CGPA (males=3.41 and Females=3.12). The implication is that males have better academic performance than females.

Table 1 moreover, shows that direct students have a higher CGPA than Mature students. The difference between Direct CGPA and mature CGPA is 0.27 (i.e. 3.38-3.11=0.27).

Table1. Descriptive results of AGE and CGPA

	N	Minimum	Maximum	Mean
AGE				
MALE	1150	18.00	46.00	23.5391
FEMALE	953	19.00	42.00	26.4213
DIRECT	1516	18.00	21.00	19.2214
MATURE	587	25.00	46.00	28.4251
CGPA				
MALE	1150	2.41	3.68	3.41
FEMALE	953	2.01	3.59	3.12
DIRECT	1516	2.03	3.68	3.38
MATURE	587	1.98	3.33	3.11

Source: Authors' construction (2017)

Table 2 shows the progression of CGPA between direct and mature students as they move up. It is seen that at the initial levels the gap between the average CGPA of direct students and average CGPA of mature students is relatively higher (0.87).

Table2. Progression of Average CGPA Difference for Direct and Mature Students

	LEVEL 200	LEVEL 300	LEVEL 400
CGPA :			
DIRECT	3.64	3.58	3.52
MATURE	2.77	2.83	3.10
DIFFERENCE (DIRECT-MATURE)	0.87	0.75	0.42

Source: Authors' construction (2017)

Following LEVEL 200 the difference in the average CGPA between direct and mature students continue to dwindle. That is 0.75 for LEVEL300 and 0.42 for LEVEL 400. The implication is that students that get direct entry are able to cope with the University academic standards right from the beginning to the end. This might be due to the fact that the direct students are fresh from the senior high schools and therefore becomes easier to fine-tune to the University academic environment. Contrary, mature students are observed to be slow starters. That is observing their average CGPA over time

is upward trending. Thus 2.77 for LEVEL200, 2.83 for LEVEL300 and 3.10 for LEVEL400. Here too the implication would be that mature candidates might have stayed in the house four quiet longer period and therefore might have become rusty. But as they join the academic environment they heat up to standards by the end of their study period.

Inferential Results

This section contains regression results for the ANCOVA model specified in equation (3)

Table3. Regression Results for the ANCOVA

Dependent Variable: CGPA

INDEPENDENT VARIABLES	B	SIG
INTERCEPT	1.5866	0.254
CH**	-0.0142	0.021
TS (i.e. Mature)**	-0.1121	0.045
CH_TS	-0.4213	0.331

R-SQUARED=0.62, ADJUSTED R-SQUARED=0.54, **STATISTICALLY SIGNIFICANT AT 5%

Source: Authors' construction (2017)

Table 3 indicates that the number of credit hours a student takes has an adverse impact on the performance as indicated by the regression coefficient (-0.0142). That is the more credit hours

the students had the weaker the academic performance becomes. The meaning is that students might have been over loaded and therefore have become mentally tired. It is also

possible that students lose focus as they progress on the academic ladder. The CH variable was statistically significant at 5% error level. Also, Table 3 shows that being a mature student lowers the CGPA by 0.1121 (i.e. -0.1121). Thus the results have shown that mature students progress in terms of performance, however, their performance is on the average 0.1121 lower than direct students. The type of Student (TS) variable was statistically significant at 5% error level. The combined effect of credit hours and type of student (mature) had an adverse effect on CGPA. Though statistically insignificant it helps to remove biases in the model. Overall, the credit hours and type of student was able to explain 62% of the behavior of CGPA. And this also suggests that there other variables that could affect performance apart from credit hours and type of student.

CONCLUSION AND RECOMMENDATIONS

Credit hours and type of student are crucial in determining the CGPA that a student is likely to get. However, there are still hidden variables that may also affect CGPA. Mature students should be encouraged to take initiatives to advance their knowledge whiles they are cautioned to be steadfast at the beginning of higher academic achievement. Higher academic institutions are also advised to give mature students the opportunity to enroll. Meanwhile, it is recommended that preliminary classes are organized for mature students before they take entrant exams since they might be rusty at the beginning. The academic institutions should reconsider the number of credit hours that students take whiles in school since it can affect their performance.

FOR FURTHER STUDIES

Future studies should be done on type of program basis. This would bring to light differences that exist between the sciences and the humanities. It is also recommended that future studies take into account availability of academic facilities. Whether a student has other

responsibility such being a parent or a worker must be factored into the analysis.

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Citation: Eric Effah, Sarkodie et al. "Predictive Validity Of University Entrance Examinations, A Case Of College Of Technology Education, University Of Education, Winneba, Ghana.". *International Journal of Research in Business Studies and Management*, vol 5, no. 4, 2018, pp. 9-13.

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