A DISCRIMINATIVE MODEL FOR COLLEGE ADMISSION TEST PERFORMANCE

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ABSTRACT: *A college admission test is required for colleges to admit qualified student candidates for various degree programs. Higher education institutions in the Philippines changed admission standards and examinations in response to the curriculum shift toward K to 12 Basic Education. This paper used discriminant analysis to examine the 415 test results of college entrants applying to a state university's teacher education program in Northern Mindanao, Philippines. The findings suggest that the college admission test can discriminate between competencies in the following order: Science and Technology, Language Proficiency, Mathematics, and Reading Comprehension. The emerging discriminant model can account for 67.8% of the variance in the grouping variable. Furthermore, cross-validated classification revealed that 95.4 percent of test-takers were appropriately classified as high or low performers on the college admissions exam. As a result, the paper's findings may be used to improve the student placement policy and even the admission exam questions.*

Keywords: College Admission Test, Discriminant Analysis, Student Placement

INTRODUCTION

A college admission test is a broad term that refers to the standardized instrument that senior high school graduates must take to enter a college or university. This test helps academic institutions determine and admit students qualified to the degree program. It will also predict students' success and potential in hurdling college education. This tool is instrumental for accepting quality student applicants to the various degree programs.

The quality of university education is determined considerably by the abilities of those it admits and retains as students. Researchers have shown that success in university education is strongly related to pre-university academic preparation and the achievement of students [1]. Future academic success emphasizes two types of predictors: Cognitive-standardized entrance tests and achievement measures such as high school general point average and high school rank in class; and non-cognitive-personality characteristics and socioeconomic status [2]. These studies provide insight into the academe's admission, retention, and completion of specific degree programs.

College admission exams, according to Wang [3], are government-developed criteria and academic institutions use authoritative regulation of higher education opportunities. It is the most critical factor affecting equality of access to higher education. However, policy discussions and studies have explored fairness issues in examination policies that have covertly aggravated existing inequalities within access to higher education. In addressing these issues to impede fairness, the college admission examination must be studied systematically and scientifically, which will be the basis for refining policy on admission and retention.

In Croatia, Divjak and Oreski [4] identified the predictor variables for student success. Two hundred twenty-three students-participants answered the first and second questionnaire administration. Their study found that the following variables determined students' success or completion of the program: admission exam score, personal responsibility, first grade obtained at the faculty, good time management and ability to allocate time for studying, learning style, and preparation for classes.

Another study by Zekarias, Aba-Milki, and Mikre [2] identified the predictors of academic achievement for first-year college students in Wolaita-Soddo University, Ethiopia. The Grade 12 average mark was a variable that accounted for the highest variation in students' academic achievement. They stressed that admission personnel should give reasonable weight to grade 12 average marks because of its greater predictive power to university success in the first-year study.

Tantoy and Villanca [5], in the Philippines, emphasized that admission tests are valuable measures of student achievement. Their study investigated the characteristics and qualities of students taking the college admission test at Bukidnon State University using factor analysis. Results revealed that takers possess qualities characterized by their scholastic-economic, paternal work status, socio-demographic profile, socio-academic achievement, and developmental-aptitude aspects.

Discriminant analysis is widely used in literature as a tool to identify predictor variables in examinations, even in the development of models. Labad and colleagues [6] crafted a discriminant model to explain preservice teachers' achievement at the University of Southeastern Philippines. It was recommended to revisit other measures like content subjects in English, Mathematics, and Science as these are not part of the discriminant model. Also, Akaboha and Kwofie [7] from Ghana employed discriminant analysis to determine students' performance in their final West African Senior Secondary School Certificate Examination (WASSCE). Six factors emerged as predictors, including grades in Science and Mathematics representing the difference between students who performed very well and those who performed poorly.

Discriminant analysis is used as a multivariate method of data analysis to predict differences among a set of predefined groups of another variable [8]. A college admission test has to be examined as to what competencies, factors, or dimensions it discriminates to guide the university and the students for placement and guidance purposes.

With the latest curriculum shift in the basic education system in the Philippines, higher education institutions like Bukidnon State University made a new college admission test for the pioneering senior high school graduates in the various career

tracks and academic strands. As a result, this paper aims to determine which variables could discriminate the students' college admission test results and derive a discriminant model that could best explain their performance.

MATERIAL AND METHODS

The study followed a quantitative research design utilizing discriminant analysis in processing the 415 admission test results of the first-year entrants for the school year 2018-2019 of the College of Education in Bukidnon State University, Philippines. The performance in the college admission test result is grouped either as high or low. The first-year entrants are enrolled in three-degree programs of the college: Early Childhood Education, Elementary Education, and Secondary Education with various majors.

The information and records of the selected students who were admitted to the college were obtained from the admission files of the program chairpersons of the college of education. Ethical considerations were observed by following the proper protocol of getting the data and results of the admission tests through the consent of the dean of the student services, the testing officer of the guidance center, college deans, and degree program chairs. The researchers observed the confidentiality of the results and processed only the numerical data of the admission test results.

A preliminary analysis tested whether the basic assumptions of discriminant analysis were satisfied. The equality of group means test provided statistical evidence of significant differences between mean scores depicted in Wilk's lambda and F-values for all independent variables: language proficiency, mathematics, science and technology, and reading comprehension. The pooled within-groups matrices also supported that the independent variables' intercorrelations are low.

The test for homogeneity of variance was conducted. When tested by Box M, the result is 61.877 with F = 6.113 and significant at $p < 0.000$. The covariance matrices of the two groups appear not to be equal, which suggest that the variances differ in the groups and that the homogeneity assumption is not upheld. However, a non-significant result is not considered necessary with large samples because it can still be robust even when this assumption is violated [9].

RESULTS

This section presents the discriminant analysis results meant to determine which variables could discriminate the college admission test result and later produce a discriminant model that could best explain their scores.

Table 1 depicts the significant factors resulting from the stepwise method. All the initial variables turned out to predict the college admission test performance. Wilk's lambda can determine the contribution of the independent variables to the college admission test performance. Wilk's lambda is a standard statistic used to assess the statistical significance of the discriminating power of the discriminant function [10]. The scale ranges from 0 to 1, where o means total discrimination and 1 means no discrimination.

The table suggests that Science and Technology is the highly influential factor in predicting students' performance in the college admission test, among the four variables, as it is nearest to 0. The poorer the score in Science and Technology, the poorer the performance in the admission test. Language proficiency and Mathematics follow as the next most influential. Reading comprehension is at the bottom regarding its influence on the college admission test result.

Table 1. Predictor Variables and their Wilk's Lambda

Predictor Variable	Wilk's Lambda	F-value	p-value
Science and Technology	0.701	176.379	0.000
Language Proficiency	0.728	154.459	0.000
Mathematics	0.769	124.338	0.000
Reading Comprehension	0.824	88.264	0.000

Figure 1 presents the correct classification of the admission test competencies to enhance the discussions about the four competencies. In language proficiency, more entrants are proficient in the language (267) than less proficient in the language (148). Among the 415 test-takers, only 306 or 73.7% are correctly classified. It can be observed from the figure that the admission test can classify 83.1% less proficient in language entrants. Moreover, the overall results in the reading comprehension proficiency reveal that 68.20% of observations were placed in the correct group. The less proficient takers were classified correctly at 73.30%.

The admission test results in terms of Mathematics proficiency reveal that the test discriminates 82.8% of the entrants who are less proficient in Mathematics. It simply means that the test can easily classify college entrants who do poorly in Mathematics, where 344 out of 415 (82.9%) college entrants were correctly classified. Also, the college admission test can discriminate 78.2% of the takers as less proficient in Science and Technology. With only 316 of 415 or 76.1% correctly classified, competency is considered the most influential predictor of admission test results based on the previous table.

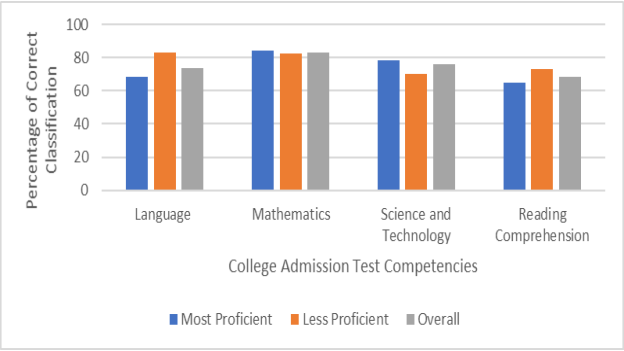

Figure 1. Percentage of Correct Classification of Competencies.

Table 2 shows the predictor variables and their corresponding function coefficient. Based on the table, the resulting canonical function is D= -13.867+ (0.294 x Science and

Technology) + (0.269 x Language Proficiency) + (0.270 x Mathematics) + (0.213 x Reading Comprehension). This formula can predict the college admission performance of the takers, either high or low.

Table 2. Canonical Discriminant Function Coefficients

Predictor Variable	Function Coefficient
Science and Technology	0.294
Language Proficiency	0.269
Mathematics	0.270
Reading Comprehension	0.213
Constant	-13.867

Table 3 presents the measures of the canonical discriminant function. The canonical correlation provides an index of overall model fit which is interpreted as the proportion of variance explained, also known as r-squared.

Table 3. Canonical Discriminant Function Measures

Measure	Value
Canonical R	0.824
Wilk's Lambda	0.322
p-value	0.000

In the table, a canonical correlation of 0.824 suggests that the model explains and accounts for 67.8% of the variation in the dependent variable. The percentage is the result of multiplying the canonical correlation value by itself. In addition, Wilk's lambda in the table indicates the significance of the discriminant function. The table indicates a highly significant function (p-value < 0.000) and provides a proportion of unexplained variability of 32.2%.

Table 4. Classification Results

			Predicted Group Membership		
		Classification	Low	High	Total
Original	Frequency	Low	272	1	273
		High	17	125	142
	Percentage	Low	99.60	0.40	100.00
		High	12.00	88.00	100.00
Cross-validated	Frequency	Low	272	1	273
		High	18	124	142
	Percentage	Low	99.60	0.40	100.00
		High	12.70	87.30	100.00

95.7% of the original grouped cases correctly classified
95.4% of cross-validated grouped cases correctly classified

Overall, the classification result in table 4 presents that 95.4% of the cross-validated grouped cases were classified correctly into "high" or "low" performance. It means that the probability of misclassification of the students' college admission test results is 4.6%, and its predictive accuracy is 95.4%. On the other hand, the original grouped cases have a predictive accuracy of 95.7% and a probability of miscalculation of 4.3%.

DISCUSSION

The results signify that the admission test can discriminate the four competencies tested: language proficiency, mathematics, science and technology, and reading comprehension. It implies that the entrance exam is relevant to its degree programs. Essential competencies in the sciences, language, reading comprehension and mathematics are considered pre-requisite in almost all degree programs. Thus, the admission examination can serve its purpose of screening the most qualified entrants.

The findings reveal that the college admission test is a good measure for the four competencies. The entrants can use the results as a springboard in choosing the most appropriate degree program for them based on the results of the competencies. Considering that they got a better result in language proficiency, they may consider choosing degree programs inclined to language arts and communication like Bachelor of Arts in English Language, Bachelor of Secondary Education major in English, Bachelor of Science in Developmental Communication, and others. College entrants can do the same if they do better in Mathematics, Science, and reading comprehension.

Placement officers and program evaluators can also use the results to make data-driven decisions in choosing the appropriate students for their programs. Whenever the program has a quota for the number of students, the evaluator can use the admission test result as baseline data.

CONCLUSION AND RECOMMENDATIONS

The College Admission Test is an essential tool for the institution to accept quality students. It has to be reliable, valid, and valuable measurement tools that help classify students' proficiency level: strengths and weaknesses, which could direct them to choose a course. The test can provide guidance counselors, advocates, and instructors inputs for career placement, academic guidance, or school counseling. The study results also provide insights for test-makers and academic heads to continually assess and revise the admission test to improve and refine its discriminant capacities. It will guide academic institutions in enhancing their admission and placement policies and standards.

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