

Validity of High School GPA and the College Aptitude Test (CAT) in Predicting College Academic Performance

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Abstract

A significant body of literature has shown that future academic success has been predicted from cognitive factors. In fact, both high school grade point averages and standardized test scores are generally significant predictors of student success during their undergraduate studies. This study examined the ability of the Cagayan State University College Aptitude Test (CAT) and High School GPA in predicting the performance of freshman students based on their first-year college GPA. Multiple linear regression analyses were used to answer the research questions. These analyses evaluated whether the CAT was an accurate predictor in predicting college academic success and whether adding the high school GPA improved the prediction validity as measured by first-year college GPA. It was found out that both the CAT scores and High school GPA are positively and significantly related to first year college GPA. The results also revealed that CAT scores is a significant predictor of academic performance as measured by first-year college GPA. The addition of High School GPA to the prediction equation along with CAT scores enhanced further the predictive power of academic performance. Moreover, the scores on Numerical Reasoning and Language Usage have positive correlation to Mathematics and Language related subjects respectively. They are also significant predictors of performance in Mathematics and Language related subjects. However, the tests showed that great amount of variance in the criteria variable is still unexplained by the predictor variables. Hence, there is room for more research to study the unexplained portion of academic performance.

Keywords: *Predictive Validity, Multiple Regression Analysis, Aptitude Test, Correlational*

I. Introduction

Admission requirements may vary respective to universities or from country to country. The admission process may require academic variables like High School General Point Average (GPA), aptitude tests like the Scholastic Aptitude Test (SAT), college admission tests, institute-based entrance exams/tests, and non-academic variables like portfolio on extra-curricular activities, recommendation letters are also used (Sawyer, 2002). In Cagayan State University, a higher level educational institution in Region II in the Philippines, a College Aptitude Test or “CAT” is being administered to incoming freshmen to assess their aptitude and will eventually become the basis of evaluation of student upon enrolment. Apparently, the results of the College Aptitude Test have been integrated to the admission policies of almost all colleges in the University System. The ratings achieved by the enrolling student will serve as basis in the decision making of the college in admitting students. As such, some students are denied taking their chosen programs by virtue of the CAT result. With the conflict it has contributed, there is a movement questioning the integrity of the CAT result to dictate whether or not they can perform well in their preferred field of study. Aside from the results of the CSU-CAT, colleges also base students’ admission thru their high school GPA.

The said variables are employed with the belief that they have certain power to predict future college students’ academic performance. Future academic success has, traditionally, been predicted from cognitive factors used as the sole criteria of academic success. Many literatures show that both high school grade point averages and standardized test scores, such as the SAT or ACT used in the United States, are generally significant predictors of student success during their undergraduate studies (Noble, 1991). Moreover, a significant body of literature suggests that high school GPA more accurately predicts academic success in college than standardized tests or any other factor (McDonald, 1979). However, other studies on the predictive validity of entrance test scores (such as the SAT) suggest that the prediction validity of academic success is enhanced by using entrance test scores (Johnston, 2006).

Meanwhile, high school GPA provides admission personnel with summary of students’ achievement in high school, and university entrance exam scores provide them with an index of students’ potential to perform well in university. However, using high school GPA as a criterion for admission into higher education institutions has been criticized by educators, parents, and faculty for various reasons. One of these is that high school GPA is not a cumulative measurement of the entire high school career of a student but is calculated based on student scores gained in the fourth-year high school only. College entrance tests have also been criticized as they are not different from high school exams, that is, they are still tests that measure the students’ knowledge of subjects taken in high school. The existing college aptitude test of the university is an adapted test used abroad. That means that the author is foreign and thus the context of the test may be out of place. Furthermore, there were no validity and reliability test done so far for the aptitude test of the university. This study is deemed significant such that admission personnel will have the most proper criteria to ensure valid and fair admission decisions.

Therefore, the question of whether high school GPA and college entrance exam scores used as admission criteria are sufficient predictors of future academic success should be always be validated to ensure fair admission decisions. Recognizing that any measure that is commonly used for selection has direct and indirect effects throughout the educational system, those

measures need to be validated or be justified as admission decision can make a critical impact on student' future and on the quality of the output of education system. Hence, this study.

II. Statement of the Problem

This study examined the ability of the CSU College Aptitude Test and High School GPA in predicting the performance of students in their First Year based on their 1st year college GPA. Specifically, this study aims to answer the following research questions

1. Is there a relationship between the performance of the students in the College Admission Test and their 1st Year College General Point Average (GPA) and between their High School GPA and 1st Year College GPA?
2. Are high school GPA and college aptitude test scores significant predictors of first-year college GPA? Does the addition of high school GPA enhance the prediction of college performance? What is the extent of the predictive power?
3. Is there a relationship between the language usage and numerical reasoning CAT scores to the performance of the students in their language related subjects and mathematics subjects?
4. Are the scores of the students in the Numerical Reasoning and Language Usage in their CAT significant predictors of their performance in their mathematics subjects and language related subjects? What is the extent of the predictive power?

III. Methodology

Research Design

This study was designed to examine the predictive validity of high school grade point average and college aptitude test scores in predicting students' college academic success, as measured by first-year college grade point average. High school GPA and college aptitude test scores were chosen as predictors (independent variables) and first-year college GPA as the criterion (dependent variables) in this study. In order to answer the main research questions, multiple linear regression analyses were employed. Furthermore, separate analyses were done to determine the extent of the CAT scores in the Language Usage and Numerical Reasoning areas can explain difference in the grades of the students in mathematics and language related subjects.

Study Locale and Participants

The study comprises 118 students of the College of Human Kinetics. All are taking Bachelor of Physical Education Major in School Physical Education. The students are already in their fourth year and their records for the past three years are complete. They were chosen as the participants because they have had similar subjects taken with at least common teachers. This will make sure that the effects of extraneous variables are minimized; thus, increasing the validity of the inferences of this study.

Description of the Data

Essentially, there are three major data needed in this study: High School GPA, CAT results, and 1st year college GPA. The high school GPA and the students' college GPA were gathered from the database of the Campus Registrar's Office. The CAT results were taken from the Guidance and Counselling Office. The gathering of data considered due protocols of the University's Administration.

This study also aims to correlate the numerical reasoning and language usage score to the grades of the students in mathematics and language related subjects. The mathematics subjects comprise of two subjects, Basic Mathematics and College Algebra. On the other hand, the language related subjects includes two English and two Filipino subjects; Grammar and Composition 1 and 2, *Pagbasa at Pagsulattungosa Pananaliksik and Komunikasyon sa Akademikong Filipino*.

Analysis of Data

Multiple linear regression analyses with stepwise and forced entry methods were used to answer the research questions. These analyses evaluated whether the College Aptitude Test was an accurate predictor in predicting college academic success and whether adding the high school GPA improved the prediction validity as measured by first-year college GPA. Simple Linear Regression was used to determine the extent by which the Numerical Reasoning and Language Usage Scores can explain the differences in the students' grades in mathematics and language related subjects.

Prior to conducting hierarchical multiple linear regression analyses, a Pearson product moment correlation was used to determine the extent to which each of the independent variables was related to the dependent variable. The assumptions underlying regression were also examined to assess the appropriateness of the regression models. Normality was screened using histograms, scatterplots, and Q-Q plots. Normality and linearity were also assessed using Shapiro-Wilk test.

The hypotheses in the study were tested at the .05 level of significance. All the analyses were conducted using Statistical Package for the Social Sciences (IBM SPSS Statistics v.20, 2011.).

IV. Results and Discussions

This chapter presents the results of the data analyses. It is presented according to the order of the research questions.

Descriptive Statistics

As reflected in Table 1, the overall mean percentage score of high school grade point average was 87.50 (SD = 3.21). The overall mean score of college aptitude test was 3.02 (SD = .86). This means that on average students received 87.50% and 3 in high school GPA and college aptitude test scores respectively. The language usage and numerical reasoning score have means of 2.70 and 3.75 respectively.

For the criterion variables, the students’ mean score on first-year college grade point average is 85.55% and has a standard deviation of 2.93. The average grade of the students in their mathematics subjects ($x=82.69$, $SD=4.09$), is relatively lower than their average grade in their language related subjects ($x=86.53$, $SD=2.91$).

The data also reveal that the scores of the study participants in their language usage and numerical reasoning are inconsistent to their grades in their language and mathematics subjects. The participants’ numerical reasoning score is higher than their language usage score but their grades in language and mathematics subjects during their first year is the reverse.

Table 1. Descriptive Statistics of the Variables of the study.

	Minimum	Maximum	Mean	Std. Deviation
College Aptitude Test Scores	2.00	5.25	3.02	.86
1 st year College GPA	80.35	94.48	85.55	2.93
High School GPA	80.41	93.95	87.50	3.21
Language Usage Score	1	5	2.70	1.04
Numerical Reasoning Score	2	7	3.75	1.28
Language Related Subjects	81.50	94.75	86.53	2.91
Mathematics Subjects	75.00	95.0	82.69	4.09

Predictive Validity as Measured by First-Year College Grade Point Average

It is well described in the literature that the usefulness of any assessment is judged by its effectiveness in achieving its purposes. That is essentially referred to as validity. There are many types of validity evidence: predictive validity is one of them. A measure is said to have predictive validity in such a way that it predicts students’ future academic success.

As such, the correlation coefficients between CAT Scores and first-year college grade point average ($r=.611$, $p<0.01$) and High School GPA with first-year college grade point average ($r=.511$, $p<0.01$) are presented in Table 2. Based on the descriptions set by Evans in 1996, the results indicated that there were significant strong correlation between CAT Scores and first-year college GPA and moderate correlation between high school GPA and first-year college GPA.

There are many related studies which evidently show that high school GPA is significantly correlated to academic performance even up to graduation level. While Platt, Turocy and McGlumphy (2001) found positive association among students in the United States; Wharrad, Chapple and Price (2003) found the same association in the United Kingdom. A similar positive relation was also found among nursing students by Ayyaf and Magzoub (2014). All these studies were however conducted among students of various disciplines.

Table 2. Relationship of the High School GPA and CAT scores (Predictor Variables) to 1st Year College GPA (Criterion Variables).

		1 st Year College GPA
CAT Scores	Computed r-value	.611**
	Probability value	.000
High School GPA	Computed r-value	.511**
	Probability value	.001
**.-Correlation is significant at the 0.01 level (2-tailed).		

The study also attempted to evaluate if college aptitude test scores and high school GPA were significant predictors of first-year college grade point average and whether the addition of high school GPA to college aptitude test scores improved the prediction power of college performance. Hierarchical multiple regression analyses were implemented to examine the predictive validity of college aptitude test scores and high school GPA. College aptitude test scores and high school GPA were entered in blocks, Model 1 and Model 2 (Table 3) respectively. The change in R² (coefficient of determination) was appraised to see if High School GPA provided incremental information for the prediction of first-year college GPA.

In Model 1, first-year college grade point average was regressed on college aptitude test scores. Table 3 presents proportion of variance (R²) in first-year college GPA accounted for by college aptitude test scores. The statistical test showed that college aptitude test score is a significant predictor for first-year college GPA (R²=0.373, p<0.01). It accounted for 37.3% of the total variance in first-year college GPA. The addition of high school GPA as a predictor in Model 2 made a statistically significant contribution to R². An increase of 9.8% explained variance is accounted for the addition of High School GPA.

The findings suggest that making the results of the college aptitude test a factor to consider in admitting students may have a strong basis as the statistical test reveals that it is a significant predictor. Furthermore, the results imply that the addition of High School GPA as enhances the predictive power of college aptitude test to determine future academic performance of students. Therefore, reviewing the two (college aptitude test and high school GPA) credentials of enrolling students may help enrolling teachers and the whole college to that effect in determining students who may succeed in their academics.

Table 3. Regression Coefficients and Percent of Variance in First-year College GPA explained by the College Aptitude Test (Model 1) and College Aptitude Test with High School GPA (Model 2).

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig.	R Square Change	Durbin-Watson
1	.611 ^b	.373	.356	2.349	0.000	.373	
2	.686 ^c	.470	.442	2.187	0.000	.098	1.495

- a. Dependent Variable: first-year college GPA
- b. Predictors: (Constant), College Aptitude Test
- c. Predictors: (Constant), College Aptitude Test, High School GPA

The regression coefficients presented in Table 4 may be interpreted that in each added point on the college aptitude test increases the first year college GPA by 1.661 point. Moreover, in terms of high school GPA, the first year college GPA increases by 0.305 for every unit of high school GPA.

Therefore, using both high school GPA and college entrance test scores could help admissions personnel to make more accurate predictions and more appropriate admission decisions than using the college aptitude test scores alone.

Table 4. Regression Parameters on the predictors (Model 2) of First Year College GPA

Predictors	Adjusted R ²	Regression Coefficient	Standard Error	T-value	Probability
Constant		53.873	9.826	5.482	0.000
CAT Scores	.356	1.661	.434	3.829**	0.000
High School GPA	.442	.305	.117	2.611*	0.013

**- significant at 0.01

*- significant at 0.05

The aforementioned findings of this study are similar to the findings of many studies which indicated that high school GPA and college entrance test scores are generally significant predictors of students’ academic performance during their undergraduate studies (Klugh& Bierly,1959). Mathiasen (1984) reviewed more than 60 studies and concluded that high school GPA and standardized entrance test scores are the best predictors of college performance when predicting first-year college GPA. Similar to many studies, the prediction power of college success was enhanced by adding high school GPA to college entrance tests (Camara&Echternacht, 2000). Further, the above findings are in consistency with the findings of Ayyaf and Magzoub (2014).

Meanwhile, this study examined the relationship between the language and math related subjects and the scores in CAT. The data in Table 5 presents a moderate positive correlation (R=.419, p<0.01) between the score of the students in the Language Usage part of the college aptitude test and their grades in their Language Related Subjects. This implies that if one scores high in language usage, high grades on languages related subjects may also correspond.

Table 5. Relationship of the Language Usage Score based on the CAT Results to average grade in Language Related Subjects

		Language Related Subjects
Language Usage Score	Computed r-value	.419**
	Probability value	.007
** . Correlation is significant at the 0.01 level (2-tailed).		

The study hypothesized that there is no relationship between Numerical Reasoning Score based on the CAT Results and the participants’ grades in Mathematics Subjects. Based on this

correlation analysis presented in Table 6, the correlation coefficient is 0.603 which has an associated probability value of less than 0.01; thus, the null hypothesis is rejected. Therefore, numerical Reasoning and performance in Mathematics subjects have a strong correlation. One who has high score in numerical reasoning performs also well in mathematics subjects.

Table 6. Relationship of the Numerical Reasoning Score based on the CAT Results to average grade in Mathematics Subjects

		Mathematics Subjects
Numerical Reasoning Score	Computed r-value	.603**
	Probability value	.000
**. Correlation is significant at the 0.01 level (2-tailed).		

The next table, Table 7 indicates that the regression model predicts the dependent variable significantly well ($p < 0.01$). This indicates the statistical significance of the regression model that was run. The table also reveals that 17.6% of the variance in the grades of the students in their language related subjects is accounted to their score in language usage. The test further implies that in every unit increase in the language usage score, the mean grade in the four language related subjects also increases by 1.169.

Table 7. Regression parameters of Language Usage Score based on the CAT Results in predicting average grade in Language Related Subjects

Predictors	R ²	Adjusted R ²	Regression Coefficient	Standard Error	T-value	Probability
Constant			83.370	1.187	70.28**	0.00
Language Usage	.176	.154	1.169	.411	2.847**	0.00

**= significant at 0.01 level

A higher explained variance in the grades of the students in mathematics ($R^2 = 0.364$, $p < 0.01$), compared to language usage, is accounted to numerical reasoning score. Table 8 reveals that an increase of 1.935 in the mean grade of the students in their two mathematics subjects can be observed for every unit increase in their numerical reasoning score.

Table 8. Regression parameters of Numerical Reasoning Score based on the CAT Results in predicting average grade in Mathematics Subjects

Predictors	R ²	Adjusted R ²	Regression Coefficient	Standard Error	T-value	Probability
Constant			75.431	1.641	45.974**	0.000
Numerical Reasoning	.364	.347	1.935	.415	4.666**	0.000

**= significant at 0.01 level

Moreover, Table 7 and table 8 both shows that language usage and numerical reasoning are both significant predictors of students' performance in language related subjects and mathematics subjects respectively.

The preceding findings related to academic performance of the students in math and language related subjects against the specific CAT components are supported by the study conducted by Tesfa (2008). Results obtained showed Both high school GPA and the University entrance exam scores significantly predict first year college GPA in general and for each study program (mathematics, Geology, statistics & computer science) as well. The combination of both predictors explained approximately 59 % (for mathematics), 16 % (for Geology), 34% (for statistics) and 37% (for computer science students) of the total variance in the first-year college GPA.

On the other hand, other research show that standardized tests, such as Scholastic Aptitude Test (SAT), are significantly related to the college success (Camara&Echternacht, 2000). Lohfink and Paulsen (2005) also found that college entrance test scores have strong correlation with the performance of a student in higher education institutions.

The pool of related studies supporting the findings of this study may imply that the results of the admission test in particular components such as language usage and numerical reasoning may accurately predict performance of students in related subjects. This may be used therefore by colleges for decision making such as accepting students in courses or programs like engineering (for math), communication arts (for language), and other related degrees.

V. Conclusions and Recommendations

Based on the findings of the study, these conclusions can be drawn:

1. Both the college aptitude test scores and High school GPA are positively and significantly related to first year college GPA. The college aptitude test has higher correlation to first year college GPA than high school GPA.
2. The results revealed that college aptitude test score is a significant predictor of academic performance as measured by first-year college GPA.
3. The addition of High School GPA to the prediction equation along with college aptitude test scores enhanced the predictive power of academic performance.
4. The scores on Numerical Reasoning and Language Usage have positive correlation to Mathematics and Language related subjects respectively. Scores on Numerical Reasoning has a higher correlation to performance in Mathematics subjects than Language Usage scores and performance in Language related subjects.
5. Both scores on Numerical Reasoning and Language Usage are significant predictors of performance in Mathematics and Language related subjects.

To the best of the researcher's knowledge, there is no existing study that has dealt with the predictive validity of high school grade point average and college aptitude test scores in Cagayan State University. Hence, this simple investigation may serve a baseline data for further studies. However, with the limitations of this study, the researcher encourages future researchers

to consider a larger sample size so that the representation's validity to the population will increase.

Furthermore, based on the foregoing conclusions, the following recommendations are offered;

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1. Although the predictors are significant predictors, a great amount of variance in the criterion variable is still unexplained by the predictor variables in this study, there is room for more research to study the unexplained portion of academic performance. Admission committees could admit students based on other factors. These factors may include motivation and interest, high school class size, and socioeconomic status to account for more variance.
2. A study examining differential prediction across gender and other demographic variables is also encouraged and furthering it to conducting follow up studies on the main causes of gender and high school location differences in prediction to better understand a possible source of bias.
3. Future research could also examine whether the predictive validity of these two admission criteria is consistent across colleges in the university.
4. A study evaluating the content of the new college entrance exam relative to what skills are required in college is worth doing because succeeding in college requires students to have high levels of content knowledge as well as core academic skills. Measuring students' content knowledge helps to only identify whether applicants have been exposed to content that prepares them for introductory college courses.
5. Further, the results of this study can help high school administrators and teachers assist with the college transition needs of their graduating students, by being able to better identify students at risk of admission in college.

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