

# Determinants of Freshman CGPA: High School Result, Entrance Exam Result and EGSECE GPA

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**Abstract** The primary purpose of this study was to determine the degree to which high school result, entrance exam result and EGSECE GPA predict freshman CGPA in KUC. From a total of 733(370 males and 363 females) pre-service diploma teacher education program students who were admitted to the KUC in 2013/14, 533 (269 males and 264 females) were selected using stratified sampling technique. High school result, entrance exam result, EGSECE GPA and freshman CGPA of these students were collected from the Registrar Office of KUC. Correlation and regression analyses were employed on the data. The results indicated that high school result, entrance exam result, EGSECE GPA in order as selection instruments appeared to be valid predictors and determinants of freshman CGPA for 2013/14 academic year entrants and jointly accounted for 41.40 percent of the variation in freshman college performance. On the basis of their predictive ability, high school result was found out to be more important than entrance exam result and EGSECE GPA as an admission variable. High school result was also found out to be more significant variable for male and female students. Based on these findings, the practical implications of the study to the country's system of education in general and its college admission criteria in particular were discussed.

**Keywords** Determinants, Predictive Validity, Selection Criteria, Criterion Measure

## 1. Introduction

New student selection is one of the most important regular activities in higher learning institutions. Many higher learning institutions select prospective students of their program based on a set of their own admission requirements. The selection criteria they usually consider include the applicants' potentials to succeed in their studies, the economic need of the society, the spaces available in the program offering institutions and the like ([1]; [2]). Therefore, the main goal of their admission criteria is to identify students who can successfully complete the study program they are supposed to attend and further address the needs of the society in their future careers as professional. Thus, the value of selection criteria can be assessed by the degree to which such objectives are fulfilled. In fact, such an assessment should not be expected to be done at once, but rather as a continuing and systematic evaluation of the selection techniques ([3]; [4]).

Applicants for college admission should be typically selected based on several variables, which are used as predictors of their potential to perform successfully in training program ([5]). This is to reveal that when certain

variables are used as predictors in selection process a significant relationship should be made between those predictor variables and the criterion variable, which measure the training performance. Accordingly, questions about the adequacy of predictor variables for the purpose they serve are answerable on scientific grounds by evaluating psychometric evidence ([6]; [7]). Most of the predictor variables in selection of students for higher institutions are based on cognitive variables such as test scores, high school average score, entrance examination and the like. Predictive validity studies have been conducted in different corner of the world on some of these selection criteria. It was found that high school results and test scores were the most important predictors of college performance (e.g.; [8]; [9]; [10]). Besides, the combination of high school results and test scores yield somewhat better prediction than either taken alone ([1]; [11]; [12]).

In the words of [13], the mission of teacher education programs is to identify and prepare effective teachers. Attempting to assure quality in the graduates of teacher education programs is equally as pressing as predicting the effectiveness of a particular teacher in a particular job setting. Substantiating the above idea, [14] comments, on the quality of teacher education and training in Ethiopia as follows:

.... if we want the best teachers available, then a first step is to recruit into training those who already have the best range of relevant attributes and abilities and that these include considerably more than the narrowly academic

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ability which tends to dominate the usual selection procedures (p.363).

[14] emphasizes the usefulness of considering various criteria while recruiting students for college of teacher education.

Of the various criteria suggested, KUC recruits students for the 10+3 diploma teacher education pre-service program using three selection criteria quantified as follows- Ethiopian General Secondary Education Certificate Examination /EGSECE GPA (with 20% weight), entrance exam result (with 35% weight) and high school result (with 45% weight). The Ministry of Education of the Federal Democratic Republic of Ethiopia has changed the curriculum of pre-service 10+3 diploma teacher education program since 2013/14 with the aim of filling gaps students have in secondary education using bridging courses to be offered in freshman year college program.

Hitherto no study has been made that determine the degree of relationships between high school result, entrance exam result, EGSECE GPA with freshman CGPA in KUC. That is why the investigator is initiated to assess whether or not the criteria (i.e., high school result, entrance exam result, EGSECE GPA) set by AACAEB (Addis Ababa City Administration Education Bureau) and KUC (Kotebe University College) to admit students to diploma program really predict first year academic success in KUC.

The primary purpose of this study, therefore, is to determine the degree to which high school result, entrance exam result, EGSECE GPA predict freshman academic performance in college. Based on this purpose, an attempt was made to answer the following basic questions.

1. Is there a statistically significant relationship between high school result, entrance exam result, EGSECE GPA and freshman CGPA in college study?
2. Do the high school result, entrance exam result, EGSECE GPA collectively have significant contribution to the prediction of freshman college performance?
3. Which one of the predictor variables is the most important in explaining the variation in freshman CGPA in college study?
4. Do the predictor variables have different predictive values for male and female students?

According to their usage in this study the following terms are defined in the manner stated below.

- **EGSECE GPA** refers to the average of the scores in seven subjects where mathematics and English are compulsory and minimum of C grade.
- **High school result** refers to the overall average score of the averages of each of grades 9 and 10 scores.

## 2. Methods

### 2.1. Subjects

The subjects of this study were diploma pre-service

program students who were admitted to the university college in 2013/14 academic year. A total of 733 students were admitted to the KUC. Out of 733 (370 males and 363 females) students, 533 (269 males and 264 females) were selected using stratified sampling technique.

### 2.2. Variables

The predictor variables were high school result, entrance exam result, EGSECE GPA of 2013/14 regular diploma program entrants of KUC. For statistical purposes, the independent variables were identified by the following symbols:  $X_1$  = high school result,  $X_2$  = entrance exam result and  $X_3$  = EGSECE GPA. The criterion measure used was student's first year cumulative grade point average in the college exam. Thus, the dependent variable was a two semester CGPA at KUC in the 2013/14 academic year.

### 2.3. Procedure

Permission to have access to the academic performance records of students admitted in 2013/14 was obtained from the KUC authorities. Then, the researcher collected high school result, entrance exam result, EGSECE GPA and freshman CGPA from the Registrar Office of KUC.

### 2.4. Data Analysis

Descriptive statistics such as means and standard deviations were computed to describe the average score and variability of scores. This was followed by analysis of relationships among variables. Using the Pearson product moment method, correlation coefficients were computed to see the relationships among variables. In addition, multiple regression analysis was conducted to see the contribution of predictor variables for the variations on the criterion measure. Following the regression analysis, stepwise regression analysis was employed to identify and select the predictor variable that best explains the variation in the criterion variable. The above analyses were carried out using SPSS version 20.

## 3. Results

### 3.1. Descriptive Statistics and Correlation Matrix

The first research question was concerned with assessing the extent of relationships between high school result, entrance exam result, EGSECE GPA to freshman CGPA. Accordingly, the results of the study in this regard are summarized in Table 1.

Table 1 presents means, standard deviations and correlation coefficients of high school result, entrance exam result, EGSECE GPA and freshman CGPA. The means of high school result, entrance exam result, EGSECE GPA and freshman CGPA are 65.03, 31.89, 2.40 and 2.39; their standard deviations are 5.28, 6.77, 0.32 and 0.43 respectively. This indicates that the mean of students' entrance exam results is below average while the means of their high school

results, EGSECE GPA and freshman college CGPA are above average.

Besides, Table 1 presents the correlation of predictor variables (high school result, entrance exam result, and EGSECE GPA) with the criterion variable (freshman college CGPA). The highest correlation coefficient observed was the correlation between high school result and freshman college CGPA,  $r = 0.461$ ,  $p < 0.01$ , which is statistically significant at 0.01 level. Higher correlation coefficient was observed between entrance exam result and freshman college CGPA,  $r = 0.417$ ,  $p < 0.01$ , which is statistically significant at 0.01 level while statistically significant correlation coefficient was observed between EGSECE GPA and freshman college CGPA,  $r = 0.399$ ,  $p < 0.01$ . On the other hand, correlations among predictor variables are also statistically significant. As shown in Table 1, high school result was moderately correlated with entrance exam result,  $r = 0.109$ ,  $p < 0.05$  and EGSECE GPA,  $r = 0.191$ ,  $p < 0.01$ . Entrance exam result was moderately correlated with EGSECE GPA,  $r = 0.198$ ,  $p < 0.01$ . This indicates that there are some overlaps among the predictor variables. The inspection of the results of correlations among the variables in Table 1 also showed that the directions of the relationships are all positive.

### 3.2. Multiple Regression Analysis

The second research question was concerned with determining the combined contribution of the predictor variables together to the prediction freshman CGPA. For this purpose, a multiple regression analysis was carried out. The results are presented in Table 2.

From Table 2, it can be seen that the multiple correlation coefficient ( $R$ ) obtained is 0.643, which describes the extent to which freshman CGPA is related to high school result, entrance exam result and EGSECE GPA. The coefficient of determination ( $R^2$ ) is 0.414, which means the variance accounted for by the predictor variables jointly (or together) is 41.40 percent. The F-value,  $R^2 = 0.414$ ,  $F(3, 529) = 124.453$ ,  $p < 0.01$ , shows that the three predictor variables combined together makes a statistically significant contribution to the prediction of freshman college CGPA. In other words, when 41.40 percent of the variance in freshman CGPA is explained by the three-predictor variables, the remaining 58.60 percent of the variance in the criterion measure is left unexplained.

### 3.3. Stepwise Regression Analysis

The third research question was concerned with identifying the predictor variable that was the most important in explaining the variation in freshman CGPA. In order to answer this question, a stepwise regression analysis was employed. The results are presented in Table 3.

As it is indicated in Table 3, high school result ( $X_1$ ), entrance exam result ( $X_2$ ) and EGSECE GPA ( $X_3$ ) were entered into the regression model but in different steps. High school result was entered into the regression model in the first step. Accordingly, as shown in Table 3, it accounts for 21.30 percent of the variation in freshman CGPA. Thus, high school result can be said the most important predictor variable in explaining the variation in freshman college CGPA than entrance exam result and EGSECE GPA,  $R^2 = 0.213$ ,  $F(1, 531) = 143.664$ ,  $p < 0.01$ . When entrance exam result was entered into the regression model in the second step, as it can be seen in Table 3, the prediction of freshman college CGPA has improved by 13.6 percent, change in  $R^2 = 0.136$ ,  $F(1, 531) = 110.807$ ,  $p < 0.01$ . Entrance exam was the second important variable, in explaining the variation in college CGPA that entered the regression model in the second step. EGSECE GPA was the third important variable, in explaining the variation in college CGPA that entered the regression model in the third step.

### 3.4. Multiple Regression Analyses for Male and Female Students

The fourth research question was concerned with comparing the predictive values of the predictor variables for male and female students. For this purpose, multiple regression analyses were employed. The results are shown in Table 4.

The result in Table 4, for male students, shows that the proportion of explained variance of the criterion measure (freshman college CGPA) accounted for by the linear combination of the three predictor variables (high school result, entrance exam result and EGSECE GPA) is 40.60 percent. The F-value,  $R^2 = 0.406$ ,  $F(3, 265) = 60.426$ ,  $p < 0.01$ , shows that the three predictor variables combined together makes a statistically significant contribution to the prediction of freshman college CGPA.

**Table 1.** Mean, SD and Correlation Matrix among Variables (N=533)

Variables	Mean	S	$X_1$	$X_2$	$X_3$	Y
High School Result ( $X_1$ )	65.03	5.28	1.000	0.109*	0.191**	0.461**
Entrance Exam Result ( $X_2$ )	31.89	6.77		1.000	0.198**	0.417**
EGSECE GPA ( $X_3$ )	2.40	0.32			1.000	0.399**
Freshman CGPA (Y)	2.39	0.43				1.000

\*  $P < 0.05$  [Correlation is significant at 0.05 level (2-tailed)]

\*\*  $P < 0.01$  [Correlation is significant at 0.01 level (2-tailed)]

The maximum possible results in  $X_1$ ,  $X_2$ ,  $X_3$  and Y are 100, 80, 4.00 and 4.00 respectively.

**Table 2.** Summary of Multiple Regression Analysis (N = 533)

Variables	B	Beta	t	R	R <sup>2</sup>	F
Constant	-1.090	-	-5.615**	0.643	0.414	124.453**
X <sub>1</sub>	0.030	0.376	11.051**			
X <sub>2</sub>	0.020	0.324	9.513**			
X <sub>3</sub>	0.354	0.264	7.642**			

\*\*p < 0.01, the regression equation is  $y' = -1.090 + 0.030X_1 + 0.020X_2 + 0.354X_3$

On the other hand, the result indicated in Table 4, for female students, indicates that the proportion of variance of freshman college CGPA accounted for by the three predictor

variables (high school result, entrance exam result and EGSECE GPA) altogether is 47.60 percent. The F-value,  $R^2 = 0.476$ ,  $F(3, 260) = 78.840$ ,  $p < 0.01$ , shows that the relationship between the criterion variable and the three predictor variables is statistically significant at the 0.01 level of significance.

### 3.5. Stepwise Regression Analyses for Male and Female Students

The stepwise multiple regression analyses were employed to identify and select the predictor variable that explains more variation in the criterion measure for male and female students. The results are presented in Table 5.

**Table 3.** Summary of Stepwise Regression Analysis

Step	Variables Entered	Beta	R	R <sup>2</sup>	R <sup>2</sup> change	F	F change
1	X <sub>1</sub>	.461	.461	.213	.213	143.664**	143.664**
2	X <sub>1</sub>	.421	.591	.349	.136	142.090**	110.807**
	X <sub>2</sub>	.371					
3	X <sub>1</sub>	.376	.643	.414	.065	124.453**	58.400**
	X <sub>2</sub>	.324					
	X <sub>3</sub>	.264					

\*\*p < 0.01

**Table 4.** Summary of Multiple Regression Analyses for Male and Female Students

Gender	Variables	B	Beta	t	R	R <sup>2</sup>	F
<b>Male</b> (N= 269)	Constant	-0.979	-	-3.666**	0.637	0.406	60.426**
	X <sub>1</sub>	0.028	0.352	7.182**			
	X <sub>2</sub>	0.017	0.278	5.692**			
	X <sub>3</sub>	0.405	0.297	5.976**			
<b>Female</b> (N=264)	Constant	-1.537	-	-5.552**	0.690	0.476	78.840**
	X <sub>1</sub>	0.035	0.416	9.189**			
	X <sub>2</sub>	0.025	0.381	8.383**			
	X <sub>3</sub>	0.386	0.283	6.173**			

\*\*p < 0.01

**Table 5.** Summary of Stepwise Regression Analyses for Male and Female

Gender	Step	Variables Entered	Beta	R	R <sup>2</sup>	R <sup>2</sup> change	F	F change
<b>Male</b> (N= 269)	1	X <sub>1</sub>	.466	.466	.217	.217	73.979**	73.979**
	2	X <sub>1</sub>	.383	.578	.334	.117	66.580**	46.557**
		X <sub>3</sub>	.352					
	3	X <sub>1</sub>	.352					
		X <sub>3</sub>	.297	.637	.406	.073	60.426**	32.400**
		X <sub>2</sub>	.278					
<b>Female</b> (N= 264)	1	X <sub>1</sub>	.469	.469	.220	.220	73.741**	73.741**
	2	X <sub>1</sub>	.448	.632	.400	.180	86.854**	78.230**
		X <sub>2</sub>	.425					
	3	X <sub>1</sub>	.352					
		X <sub>2</sub>	.297	.690	.476	.077	78.840**	38.111**
		X <sub>3</sub>	.278					

\*\*p < 0.01

As it is shown in Table 5, high school result ( $X_1$ ), entrance exam result ( $X_2$ ) and EGSECE GPA ( $X_3$ ) were entered into the regression model but in different steps for male students. That is, high school result entered the regression model in the first step which explained 21.70 percent of the variation in freshman CGPA for male students. Thus, high school results was the most important predictor variable in explaining the variation in freshman CGPA than EGSECE GPA and entrance exam result [ $R^2 = 0.217$ ,  $F(1, 267) = 73.979$ ,  $p < 0.01$ ]. EGSECE GPA was entered the regression model in the second step. When EGSECE GPA is entered, the prediction of freshman CGPA is improved by 11.70 percent, change in  $R^2 = 0.117$ ,  $F(1, 266) = 46.557$ ,  $p < 0.01$ . Entrance exam result was entered the regression model in the third step. When entrance exam result is entered, the prediction of freshman CGPA is improved by 7.30 percent, change in  $R^2 = 0.073$ ,  $F(1, 265) = 32.400$ ,  $p < 0.01$ .

On the other hand, it can be seen from Table 5 that high school result ( $X_1$ ), entrance exam result ( $X_2$ ) and EGSECE GPA ( $X_3$ ) were entered into the regression model but in different steps for female students. That is, high school result entered the regression model in the first step which explained 22.00 percent of the variation in freshman CGPA for female students. Thus, high school result was the most important predictor variable in explaining the variation in freshman CGPA than entrance exam result and EGSECE GPA,  $R^2 = 0.220$ ,  $F(1, 262) = 73.741$ ,  $p < 0.01$ . Entrance exam result was entered the regression model in the second step. When entrance exam result is entered, the prediction of freshman CGPA is improved by 18.00 percent, change in  $R^2 = 0.180$ ,  $F(1, 261) = 78.230$ ,  $p < 0.01$ . EGSECE GPA was entered the regression model in the third step. When EGSECE GPA is entered, the prediction of freshman CGPA is improved by 7.70 percent, change in  $R^2 = 0.077$ ,  $F(1, 260) = 38.111$ ,  $p < 0.01$ .

## 4. Discussion

Regarding the first two research questions, the findings revealed significant relationships between predictor variables and freshman CGPA. As the computation of correlations among variables showed (Table 1), the predictor variables (high school result, entrance exam result and EGSECE GPA) are significantly related to the freshman CGPA independently. In addition to the correlation analysis, multiple regression analysis (Table 2) was worked out and it revealed that the predictor variables together made a significant contribution in the prediction of freshman CGPA,  $R = 0.643$ ,  $R^2 = 0.414$ ,  $F(3, 529) = 124.453$ ,  $p < 0.01$ . The study indicates that high school result, entrance exam result and EGSECE GPA appeared to be important and significant variables in determining freshman CGPA. Thus, the admission measures, which were used in 2013/14 academic year by KUC, were found to be significant predictor freshman CGPA.

Truly, this finding is not the first of its kind since there are some studies that reported similar findings. For example, the

study done by [15] reported that preparatory school average score, university entrance exam result and aptitude scores appeared to be statistically significant predictors of first semester GPA of the students at Adama University.

The result of this study revealed that 41.40 percent of the variance in freshman CGPA was accounted for by variation in high school result, entrance exam result and EGSECE GPA. What this means is that about 58.60 percent of variance remains unexplained. The possible explanations for such large unexplained variance in freshman CGPA may be due to the fact that other factors such as achievement motivation, study habit and specific content background affect performance in college ([4]). Besides, researchers (e.g., [16]; [17]) indicate that non cognitive variables such as these play an important role in determining students' success in educational activities. Similarly, [11] state that there are many other factors that affect students' undergraduate experience after admission, such as financial aid, social support and academic engagement in college.

The third research question that is to be answered in this study was identifying the predictor variable that is more important in explaining the variation in freshman CGPA. In order to answer this question, step-wise regression analysis was used. The results of the stepwise regression analysis (Table 3) revealed that high school result was found to be the most important variable in explaining the variation in freshman CGPA. High school result alone accounted for 21.30 percent of the variance on the first year CGPA,  $R^2 = 0.213$ ,  $F(1, 531) = 143.664$ ,  $p < 0.01$ . This means that students who performed better in high school also performed better in college. Probably these students had the potential to cope with the academic atmosphere in college more easily than others. This may also imply the relevance of the content being taught in high school in preparing students for college.

The result that high school result is the most important variable in explaining the variation in college performance goes along with the results of the previous studies (e.g., [15]; [18]; [18]; [20]; [21]), which suggest that high school result is the most important and significant variable in predicting students' ability to succeed in higher learning institutions than other variables. According to [8] and [12], there are frequent cases in which high school achievement predicted first year grades better than scholastic achievement or aptitude tests. This would not be surprising because high school performance is a work sample of college performance ([22]). Furthermore, high school average scores are rather based on performance over a period of time rather than on one-shot evaluation.

The second variable that entered the regression model was entrance exam result,  $R^2 = 0.349$ ,  $F(2, 530) = 142.090$ ,  $p < 0.01$ . This means when entrance exam result was added,  $R^2$  was increased to 0.349. The change in  $R^2$  due to entrance exam result is significant, change in  $R^2 = 0.136$ ,  $F(1, 530) = 110.807$ ,  $p < 0.01$ . When entrance exam result entered, the prediction of freshman CGPA has improved by 13.60 percent.

The third variable that entered the regression model was

EGSECE GPA,  $R^2 = 0.414$ ,  $F(3, 529) = 124.453$ ,  $P < 0.01$ ]. This means when EGSECE GPA was added,  $R^2$  was increased to 0.414. This variable, next to high school average score and entrance exam result, is found to play important role in the variation of freshman CGPA. This is confirmed by the fact that the change in  $R^2$  due to EGSECE GPA is significant, change in  $R^2 = 0.065$ ,  $F(1, 529) = 58.400$ ,  $P < 0.01$ . When EGSECE GPA entered, the prediction of freshman college CGPA has improved by 6.50 percent.

This finding is consistent with the result reported by [11]. They stated that significant correlations were observed between college GPA with high school GPA ( $r = 0.31$ ,  $p < 0.01$ ), SAT II ( $r = 0.14$ ,  $p < 0.01$ ), and SAT I ( $r = 0.07$ ,  $p < 0.01$ ). The possible explanation why EGSECE GPA contributed less to the prediction of college CGPA could be that this exam is a one shot examination. It is administered every year at one specific moment. Apparently, such examination is susceptible to factors that can distort students' true score. Among others, cheating and examination anxiety during examination can be mentioned.

As it is indicated above, it is not entrance exam result or EGSECE GPA, but high school result that accounts for the lion's share of the explained variance in freshman CGPA. According to [11], one hypothesis is that may account for the high school result to predict college CGPA may be "method covariance," or the methodological similarity in the way these academic indicators are constructed. That is, both high school result and college CGPA reflect student performance in a large number of courses taken over a period of time. Both measures are based on similar kinds of academic experiences - term papers, quizzes, labs, end - of - course examinations so that it should not be surprising that prior performance on these kinds of academic tasks tends to be predictive of later performance.

The fourth research question to be answered in this study was comparing the predictive values of the predictor variables for male and female students. The inspection of the results in Table 4 and Table 5 indicate that the amount of variance accounted by the linear combination of the three predictor variables (high school result, entrance exam result and EGSECE GPA) for male and female students are 40.60 percent and 47.60 percent respectively. This shows that there is a difference in the proportion of explained variance of the criterion measure accounted for by the linear combination of the three predictor variables for male and female students. On the other hand, high school result ( $X_1$ ) was the most important predictor variable in explaining the variation in freshman CGPA for both male and female students. This finding coincides with the study conducted by [15].

Nevertheless, this study is not free of limitations. Especially the following limitations should be taken into account before any form of generalization can be made of the result of the study. First, as the study was confined to one college, the results may not necessarily apply to students in other colleges. Second, this study focused on some potential determinants variables affecting performance at college. Non cognitive, institutional and environmental variables that play

important role in the prediction of college success (e.g., [16]; [17]; [4]) were not considered. Third, it is known that correlation coefficient is based on the reliability and validity of scores on predictor and criterion variables ([23]). However, there are some defects on the psychometric quality of the tests used by higher learning institutions. This study like other predictive validity studies, shares this problem. Therefore, to interpret validity data correctly, it is necessary to be aware of this problem.

## 5. Conclusions

Based on the results of this study, it may be possible to arrive at the following conclusions.

- High school result, entrance exam result and EGSECE GPA appear to be valid predictors of freshman CGPA. This means the predictor variables play important role in determining students' success in college learning.
- High school result is found out to be the most valid predictor of freshman CGPA than entrance exam result and EGSECE GPA.
- The combination of the three variables is found to be statistically significant to predict first year academic performance of college students.
- Gender difference was observed in this study. The predictor variables explained more of the variance in freshman CGPA for female than for male students. This implies that predictor variables are stronger for predicting freshman CGPA for females than for males.

The results of this study seem to have some practical implications to the selection criteria of pre-service diploma teacher education program of the country and future direction of research. High school result was found to be more influential in determining freshman CGPA than entrance exam result and EGSECE GPA. Thus, it would be better to consider the selection criteria on the basis of their importance during admission process. It would also be better to arrange special educational support programs for students with low high school result, entrance exam result and EGSECE GPA. Lastly, it would also be useful to conduct further study to identify the determinants of college academic performance in other colleges in Ethiopia along non cognitive variables such as achievement motivation and study habit. Additional research on this issue will help in explaining the variation in freshman CGPA.

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