

# Assessing the Contribution of High School Achievements and College Entrance Examination on Pre-service Teachers' Performance

Desta Geneme Gebre <sup>1\*</sup>

<sup>1</sup> Bonga College of Teacher Education, Bonga, ETHIOPIA

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## ABSTRACT

The purpose of this study was to assess the contribution of high school achievements and college entrance examination score on college performance of pre-service teachers. To achieve this, the study utilized quantitative correlational research design. Data was collected from 205 pre-service teachers' secondary documents and was analyzed using both descriptive and inferential statistics. Thus; as a result, the study found that college entrance examination and high school transcript were the significant predictors of college level performance and the inclusion of college entrance examination to the admission criteria raised the predictive power of the selection criteria significantly. The study also found that college entrance examination and high school transcript were the most significant predictors for both program college pre-service teachers' performance. Thus; this study recommends further research to explore unexplained contributors to college level performance of pre-service teachers.

**Keywords:** college CGPA, college entrance examination, high school GPA and transcript

## INTRODUCTION

It is a common practice that different institutions depend on prior achievements to predict the success of students in their future performance (Zwick, 2013). However, the types of assessment or test vary from country to country in general and institution in particular. For example; according to Atkinson (2001), USA uses more standardized tests like SAT (Scholastic Aptitude Test), GRE (Graduate Record Examination), TOFEL (Test for English as Foreign Language) and other. Some others like Ethiopia administer institutionally prepared tests to select students for pursuing further education. Ethiopian higher institutions use such institutionally prepared examinations to select their future candidates (Melaku, 2014). The most commonly used test for identifying potential candidate for Ethiopian higher institution is tests prepared by the institution. In this regard, TGE (1994) encourages higher institutions to select candidates on the basis of their capabilities, diligence, physical and mental fitness. According to MOE (2002), a national examination is one of the assessments that Ethiopian education system uses to identify competent and academically fit students for higher education programs. It is assumed that competition through national examination can raise quality of education in the higher institution. Thus, prior to getting the chance for college entrance examination, student teachers are allowed to compete using their Ethiopian General Secondary Education Certificate Examination result and high school transcript record average score. The higher their score in such two assessment results, the higher the probability to sit for college entrance examination. Each criterion for selecting the candidate weighs 50%. Thus, the sum of the two assessment results decides whether the student can sit for entrance examination (SNNPRS College Admission Guideline, 2016: 6). The assumption is that the contribution of college entrance examination in determining the candidates' success in the college is higher than high school completion certificate examination and high school transcript record (MoE, 2002). High school completion certificate examination result and high school transcript record are weighed less compared to college

### Contribution of this paper to the literature

- It assessed the contribution of high school achievements and college entrance examination on college performance of pre-service teachers. Thus, it recognizes the contribution of high school achievements to pre-service teachers' success in the college.
- It identified the most dominant predictor variables of college pre-service teachers' performance. In this case, it opens ways for academic personnel to consider the most dominant factors of college performance.
- It identified the most significant predictors of college pre-service teachers' performance that should be included in the college admission criteria of pre service teachers.

entrance examination. However; it is a must for the student to score at least 2.00 in high school completion certificate examinations result and 50% average in high school transcript record to be a candidate in teacher training college.

Different researchers (for example Atkinson, 2001; Scott-Clayton, 2012; Geiser & Santelics, 2007; Melaku, 2014; Zwick, 2013) indicate that high school achievement and college entrance examination scores are among the indicators of candidates' success in higher institutions. However, there are inconsistent research findings on which type of achievement score to rely while selecting candidates for higher institution. Therefore; this study can bridge the gap in identifying the predictor of candidates' success in the higher institution in general, college of teacher education in particular.

### Statement of the Problem

The competency of higher institution student is the central concern of education system in Ethiopia. Education system documents in Ethiopia give highest concern for the improvement of quality of education through quality teacher education programs. For example; MoE (2011), underlines the importance of teacher quality for students' meaningful learning.

Education quality can't be thought without quality teachers (Panigrapi, 2013). Moreover, MOE (2002) motivates the preparation of professionally competent and ethically minded teachers so as to assure quality of Ethiopian education system. Thus, selecting competent teacher candidates is the central concern of Ethiopian teacher education system in general. For example; MOE (2002) requests higher institutions to work on predominant activities that can improve teacher applicants' capacity and readiness. The necessary training and preparation starting from selection is the area of focus in teacher education system. To select such teacher candidates, Ethiopian teacher education system uses high school GPA, high school transcript and college entrance examination scores. This shows that an attempt to select competent candidates for higher institution is a major concern of all higher institutions in the country. However; the competency and the success of higher education students is questionable in the current Ethiopian education arena (Melaku, 2014; Telila, 2010). In this regard; most Ethiopian teacher training institutions rely on the college administered entrance examination results in order to select teacher candidates for their institutions. The contribution of high school achievements of student candidates is left aside. Thus; assessing the contribution of high school achievements of pre-service teachers and forwarding recommendation to stake holders is the major purpose of this study.

The variation on the use of higher education entry criteria among the institution bases itself on research findings done on college performance predictor variables (Zwick, 2013). However; there are inconsistencies among the research results of college performance predictor variables. According to Geiser and Santelics (2007), university students' performance is highly impacted by high school grade point average. They indicated that selection of high institution candidate should give much emphasis for high school records than standardized examinations. On the other hand; Melaku (2014) from a study conducted in Addis Ababa University revealed that among the criteria for admitting students for higher education, university entrance examination took the highest predictive position. Scott-Clayton (2012) from a study conducted in community colleges found that the predictive power of placement examinations was high for mathematics but less for English. This shows that the type of program determines the type of criteria for selecting the candidate.

There are different suggestions on what type of college entry criteria to use in the process of selecting higher education candidates. In this regard, Scott-Clayton (2012) recommends higher institutions to use program specific college entry criteria than holistic and general criteria. In general; this shows that situations, contexts and programs dictate the criteria for admitting the candidates in the college. Similarly, Melaku (2014) indicated that the predictive power of higher institution entrance examination on candidates success in the university vary from program to program.

Using multiple measures of admission criteria is one strategy that education personnel prefer to use in order to select competent candidates in the higher institution. Accordingly, this day institutions are focussing the inclusion of multiple measures of admission criteria than a single measure (Atkinson, 2001; Melaku, 2014; Zwick, 2013). For

example; Atkinson (2001) calls institutions to use multiple tests than one standardized test in deciding higher institution candidates. Thus, exploring the predictive power of high school GPA, high school transcript record and entrance examination score on college performance of mathematics and environmental science student teachers is imperative and this can have clear educational implication in teacher training programs in Ethiopia in general and college of teacher education in particular. Moreover, as to the knowledge of the researcher, there is no research conducted in Bonga College of Teacher Education that clearly indicates the predictor variables to college achievement of student teachers. Therefore, the aim of this study was to investigate the relationship between the variables: High school GPA (HGPA), High school transcript record (HTrans), College entrance examination score (CEES) and college performance measured in college cumulative grade point average (CCGPA) in Bonga College of teacher education. The specific objectives of the study were:

- To identify if there exist significant mean achievement difference between Mathematics and Environmental Science and Mathematics pre service program student teachers due to the program of study.
- To determine the extent of contribution of college entrance examination score on the predictive validity of college entry criteria.
- To determine the most dominant predictor of college performance in Bonga College.

Therefore, regarding the prediction of college student performance, the following four research questions were set to be answered. These were:

1. Is there significant mean difference on pre-service teachers' performance due to the program of study?
2. To what extent do high school GPA and high school transcript predict Mathematics and Mathematics and Environmental Science pre-service teachers performance in Bonga College?
3. To what extent does college entrance examination score raise the predictive power of college entry criteria in predicting college level performance of Mathematics and Mathematics and Environmental Science pre-service teachers in Bonga College?
4. What is the most powerful predictor in forecasting the college level performance of Mathematics and Mathematics and Environmental Science pre-service teachers in Bonga College?

### **Significance of the Study**

Selecting professionally interested and academically fit student teachers is the responsibility of teacher education institution (TGE, 1994). Thus, designing appropriate admission criteria lies on the shoulders of admission personnel at education Bureau and academic decision makers at college of teacher education. Therefore, this research finding will help academic personnel in the development of future admission plans and admission criteria development process at Ethiopian colleges of teacher education in general and Bonga College in particular. Further, the results of this study might guide educational stakeholders in Ethiopian College of Teacher Education in general and SNNPRS education Bureau in particular to review the quality of high school assessments and college entrance tests. Furthermore, this study might bridge a research gap in the study of academic performance of students attending teacher education program in Ethiopia and thus serves as a motivation for future research to be conducted in this area.

### **Delimitation of the Study**

As it has been stated, the objective of this study was to explore the predictive power of high school GPA, high school transcript and college entrance examination score on College performance of Mathematics and Environmental Science prospective student teachers. Therefore, Bonga College graduating class Mathematics specialist and Mathematics and Environmental Science generalist program students were participant in the study. Though, many other factors may affect graduates' performance; high schools GPA, high school transcript, college entrance examination were the only independent variables selected for the investigation. The study focused on Mathematics specialist and Mathematics and Environmental Science generalist program graduates of Bonga College of Teacher Education because there was no any study which was conducted in Ethiopian teacher education in general and in Bonga College in particular regarding these programs.

## **RESEARCH DESIGN AND METHOD**

The research method used in this study was quantitative. Both descriptive statistics (Mean and standard deviation) and inferential statistics (Independent samples t test and multiple regression analysis) were used for the purpose of analysis. The researcher was motivated to see the effect of high school GPA, high school transcript and College Entrance Examination on College performance of Mathematics and Mathematics and Environmental Science pre-service teachers. As Creswell (2012) elaborates correlational designs provide an opportunity for

researchers to predict scores and explain the relationship among variables of the study. The current study assessed the contribution of high school achievements and college entrance examination on college performance using statistical tests to describe and measure the degree of association (or relationship) between such variables. This study did not undergo manipulation of variables but looked for relationships and predictions among the variables. Correlational study involves the collection of two or more sets of data with a view to determining the relationship between them (Cohen, Manion, & Morrison, 2013, p.265). Thus, this study was correlational in its design.

### Participants of the Study

The study site was Bonga College of teacher education (one of the Teacher Training College in Ethiopia which is located in South West of Ethiopia and 444 km from Addis Ababa) and there were 80 Mathematics specialist and 149 Mathematics and Environmental Science generalist pre-service teachers who graduated from Bonga College of teacher education in 2017 during the regular program. Census sampling was the technique of sampling used in order to select sample of the study. Of the graduates from the College, 205 (132 Mathematics and Environmental Science student teachers and 73 Mathematics specialist student teachers) were participant in the study. Though census sampling technique was utilized in the study, 24 participants were excluded from the participants' list due to incompleteness of the necessary information in their secondary data sources.

### Data Sources

The purpose of the research dictates the source of data for the study. This study was envisioned to assess the effect of high school achievements and college entrance examination on college achievement. In addition, the study was targeted to assess the predictive power of high school achievement and college entrance examination on college performance. For such type of study, secondary data source is an appropriate data source. Thus; the data source used in this study was secondary.

### Study Variables

The main independent variables that were utilized in this study were high school GPA, high school transcript, and College entrance examination scores (CEES). College Cumulative Grade point average (CCGPA) was the dependent variable that represented college level performance. Program of study (Specialist vs. generalist) was included as a group variable for investigation.

### Data Collection Procedure

Prior to starting data collection, the researcher got a written letter of permission for accessing secondary data from Bonga College of teacher education. Thus; secondary data on pre-service teachers' achievement were collected accordingly. In order to protect the risk on participants, the researcher coded the participants list so that it was the researcher who only knows what the codes mean. Thus; confidentiality and anonymity were kept according to the principles of research ethics. Then, the researcher collected the data: high school GPA (HGPA), high school transcript (HTrans), College Cumulative Grade point average (CCGPA) and College entrance examination scores (CEES) of pre-service teachers in line with the codes. Finally, the researcher organized the data for the purpose of analysis.

### Data Analysis Technique

The data analysis for this study included both descriptive and inferential statistics. Descriptive statistics was computed for the variables of the study (high school GPA (HGPA), high school transcript (HTrans), College Cumulative Grade point average (CCGPA) and College entrance examination scores (CEES)) with respect to the program of study.

In order to answer the research questions, both descriptive statistics (*Mean and standard deviation*) and inferential statistics (*independent samples t test and multiple regression analysis*) were used. The analysis evaluated the effect of high school GPA (HGPA), high school transcript (HTrans), and College entrance examination scores (CEES) on college performance of student teachers measured in College Cumulative Grade point average (CCGPA).

## RESULTS AND DISCUSSIONS

The presentation of the finding of this study used both descriptive and inferential statistics. The descriptive statistics of the data is indicated in **Table 1**.

**Table 1.** Descriptive statistics and Independent Samples t test of CCGPA, HGPA, HTrans and CEEs difference due to program of the study

Variables of the study	Program	N	M	SD	MD	t	df	p
CGPA	Specialist	73	2.49	0.392	0.166	3.44	203	0.001
	Generalist	132	2.33	0.294				
HGPA	Specialist	73	2.28	0.293	0.113	3.25	203	0.001
	Generalist	132	2.16	0.202				
HTrans	Specialist	73	66.82	8.492	5.153	5.03	203	0.000
	Generalist	132	61.67	6.07				
CEES	Specialist	73	55.31	5.158	1.505	2.23	203	0.027
	Generalist	132	53.8	4.321				

### Differences in Achievements due to the Program of the Study

In order to visualize the achievement differences in pre-service teachers in two programs of the study, descriptive statistics (mean and mean deviation) and independent samples t test were utilized. Thus; inspection of the two groups' mean indicate that the average CGPA achievement score for specialist students ( $M=2.49, SD=0.39$ ) is significantly higher than the average score ( $M=2.33, SD=0.29$ ) for generalist program student teachers ( $t_{(203)} = 3.44, p < .05$ ); High school GPA of specialist program student teachers ( $M=2.28, SD=0.29$ ) is significantly different from High school GPA of generalist program student teachers ( $M=2.16, SD=0.20$ ) ( $t_{(203)}=3.25, p<0.05$ ); High school transcript achievement for specialist students ( $M=66.82, SD=8.49$ ) is significantly higher than the average score ( $M=61.67, SD=6.07$ ) for generalist program student teachers ( $t_{(203)} = 5.03, p < .05$ ); and the average college entrance examination achievement score for specialist program student teachers ( $M=55.31, SD = 5.16$ ) is significantly higher than the average score ( $M=53.80, SD=4.32$ ) for generalist program student teachers ( $t_{(203)} = 2.23, p < .05$ ). In general; the mean achievement of mathematics student teachers was significantly higher than the mean achievement scores of mathematics and Environmental science student teachers.

### Predicting College Cumulative Grade Point Average from High school GPA, High school Transcript and College Entrance Examination Score

In this study, linear multiple regression analyses was utilized to examine the predictive power of High School GPA, High School Transcript and College Entrance Examination Score on student teachers' performance measured by College Cumulative Grade Point Average (CCGPA). As high school GPA and high school transcript records were the primary conditions to get the pathway to college entry competition, the analysis was started with the predictive power of these variables on college performance. Thus; to answer the first research question, the regression analysis was done for each program of study.

The change in  $R^2$  (coefficient of determination) was analyzed to visualize if the high school GPA and high school transcript provided significant prediction on pre-service students teachers' college performance. As **Table 2** presents; high school transcript predicted the college performance of Mathematics and Environmental Science generalist program pre-service teachers significantly ( $F_{(1, 130)}=16.62, p<0.05$ ) and the coefficient of determination on college performance due to high school transcript was  $R^2 = 0.113$ . This shows that high school transcript explained 11.3% of variance in college performance. However; as indicated in **Table 2** model 2, the multiple correlations (R) between college performance and two of the independent variables: high school GPA and high school transcript was 0.374 and the coefficient of determination was 0.14. This shows inclusion of high school GPA as a criterion for selection raised the predictive power of the selection criteria. Thus; both variables together explained 14% of the variance in college performance of Mathematics and Environmental Science generalist program pre-service teachers. The significance of F-value for both variables ( $F_{(1, 129)}=3.95, p=0.049$ ) implies that the variables: high school GPA and high school transcript predicted college performance at least for this group of pre-service teachers in the college. The result of this study on the other hand shows that the remaining 86% of variance in college performance was contributed by variables other than high school GPA and high school transcript.

**Table 2.** Contribution of high school GPA and high school transcript record on college performance as measured by College Cumulative Grade Point Average (CCGPA) for generalist program student teachers

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.337 <sup>a</sup>	0.113	0.107	0.278	0.113	16.62	1	130	0.000
2	0.374 <sup>b</sup>	0.140	0.126	0.275	0.026	3.95	1	129	0.049

a. Predictors: (Constant), HTrans

b. Predictors: (Constant), HTrans, HGPA

**Table 3.** Contribution of high school GPA and high school transcript record on college performance as measured by College Cumulative Grade Point Average (CCGPA) for Mathematics student teachers

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.518 <sup>a</sup>	0.268	0.258	0.338	0.268	26.05	1	71	0.000
2	0.575 <sup>b</sup>	0.330	0.311	0.325	0.062	6.49	1	70	0.013

a. Predictors: (Constant), HTrans

b. Predictors: (Constant), HTrans, HGPA

**Table 4.** Contribution of College Entrance Examination (CEES) on College performance (CCGPA) of student teachers

Program	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics			
						F Change	df1	df2	Sig. F Change
Math and Environmental Science	1	0.520 <sup>a</sup>	0.270	0.253	0.254	15.78	3	128	0.000
Mathematics	1	0.636 <sup>a</sup>	0.405	0.379	0.309	15.65	3	69	0.000

a. Predictors: (Constant), CEES, HGPA, HTrans

As **Table 3** indicates; of two variables used as predictors of college mathematics specialist program pre-service teachers' performance through admission criteria, high school transcript record alone predicted 26.8% of the variation in college performance ( $R^2=0.27$ ) ( $F_{(1, 71)}=26.05$ ,  $p<0.05$ ). Inclusion of high school GPA as a criteria raised the variance by 6.2% which was significant ( $F_{(1, 70)}=6.49$ ,  $p<0.05$ ).

This shows that both high school GPA and high school transcript together explained 33% of the variation in college performance of mathematics student teachers. The significance of F-value for both variables ( $F_{(1, 70)}=6.49$ ,  $p < 0.05$ ) implies that the variables: high school GPA and high school transcript predicted college performance at least for mathematics student teachers of the college. The result of this study on the other hand shows that the remaining 67% of variance in college performance of mathematics student teachers was contributed by variables other than high school GPA and high school transcript record.

College entrance examination is one of the instruments that teacher education programs use in order to select pre-service teachers for their specific programs. Thus; determining the predictive validity of college entrance examination on college performance has educational significance. In this study, it was planned to check if addition of college entrance examination to high school GPA and high school transcript brought significant change in predicting student teachers' college performance.

As **Table 4** indicates, addition of college entrance examination in to the selection criteria raised the predictive power of the selection criteria from 14% to 27% ( $F_{(3, 128)}=15.74$ ,  $p < 0.05$ ) for Mathematics and Environmental Science student teachers' performance and from 33% to 40.5% ( $F_{(3, 69)}=15.65$ ,  $p < 0.05$ ) for mathematics student teachers' performance.

The above analysis was related with the gross and shared contribution of the variables of the study on college performance. The next section presents the dominant predictor variables with respect to the program of the study.

To determine the extent of contribution to the variation on pre-service teachers' college performance, the researcher used multiple regression analysis. **Table 5** presents the contribution of the variables under this study to the variation in college performance. As indicated in the table, the multiple correlations ( $R$ ) between college performance of Mathematics and Environmental Science pre-service teachers and all variables under study was 0.52 and the coefficient of determination was 0.27. This shows that 27% of the variance in college performance was contributed by all variables in this study. However, all these variables did not contribute equal variation to college performance.

**Table 5.** Percent of Variance in College performance explained by High school GPA, High school transcript record and College Entrance Examination in specific programs

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation Coefficient	% of contribution	R	R <sup>2</sup> Change
		B	Std. Error	Beta						
Generalist	HTrans	0.012	0.004	0.245	3.16	0.002	0.337	8.25	0.52	0.27
	HGPA	0.168	0.112	0.115	1.51	0.134	0.199	2.30		
	CEES	0.025	0.005	0.373	4.78	0.000	0.442	16.45		
Specialist	HTrans	0.015	0.005	0.336	3.24	0.002	0.518	17.40	0.636	0.405
	HGPA	0.250	0.138	0.187	1.81	0.074	0.417	7.78		
	CEES	0.023	0.008	0.306	2.94	0.004	0.501	15.32		

As presented in the table, college entrance examinations score (CEES) was the dominant predictor among the variables included in this study for generalist program student teachers' college performance. It explained 16.45% of the variance in the college performance. High school transcript was the second and significant predictor for generalist program student teachers' performance. It explained 8.25% of the variance in the performance ( $t_{(130)}=3.16$ ,  $p<0.05$ ). However, high school GPA was the least predictor and its contribution (2.3%) was insignificant ( $t_{(130)}=1.51$ ,  $p > 0.05$ ).

Similarly, multiple regression analysis result indicated that high school transcript was the most significant predictor of mathematics student teachers' performance in the college ( $t_{(71)}=3.24$ ,  $p<0.05$ ). It explained 17.4% of the variation in the college performance. In the same way, college entrance examination score contributed a significant and almost as equal contribution as high school transcript in college performance of mathematics specialist student teachers ( $t_{(71)}=2.94$ ,  $p<0.05$ ). It contributed 15.32% of variation in college performance. High school GPA was not a significant contributor of the variation in college performance of mathematics student teachers ( $t_{(71)}=1.82$ ,  $p>0.05$ ). Thus; from this result, it is concluded that high school transcript is the highest predictor of college performance of pre-service teachers in both programs compared to the contribution of high school GPA.

## DISCUSSION

This section discusses the major findings of the study and delivers the position of the finding on a relation to the former studies.

### Differences in Achievement due to the Program of Study

Exploring achievement difference in college performance due to the program of study was one of the central issues in this study. With this regard; this study found that Mathematics specialist program student teachers over achieve Mathematics and Environmental Science student teachers in their achievement during their study in the college. Similarly, it was found that the high school GPA, the high school transcript and college entrance examination score of mathematics student teachers was significantly higher than the corresponding achievements scores of Mathematics and Environmental Science generalist program student teachers. Thus, it was concluded that the predictors of college performance depend on the program of study. This agrees with the former research findings by Scott-Clayton (2012) and Melaku (2014). According to Scott-Clayton (2012), the predictors of future success of students vary from program to program. Similarly; Melaku (2014) from a study conducted on different programs of study conducted in Addis Ababa University indicated that the predictive power of variables for the success of university first year achievement depend on the type of program of study.

### Predictive validity of High School GPA and High School Transcript

In Ethiopian teacher training admission criteria, high school GPA and high school transcripts are among the criteria that are commonly used to select teacher candidates. To explore if these variables were significant predictors of college performance, this study utilized multiple regression analysis for specific program of study. For Mathematics and Environmental Science generalist program; both high school GPA and high school transcript contributed a significant 14% of the variance in college performance ( $F_{(1,129)}=3.95$ ,  $p=0.049$ ). Similarly; for Mathematics specialist program, both high school GPA and high school transcript explained 33% variance in college performance ( $F_{(1,70)}=6.49$ ,  $p<0.05$ ). This finding is supported by former research findings like Scott-Clayton (2012) and Belfield and Crosta (2012). According to Belfield and Crosta (2012), high school GPA and high school transcript record have a positive significant association with college students' performance. Similarly; Scott-Clayton (2012) indicated that in both math and English, high school background measures are more useful predictors of success in a wide range of settings because they capture a wider range of cognitive skills.

Identifying the unique and specific contribution of the variables of the study assists higher institutions to focus on such significantly dominant variables so as to upraise pre-service teachers' performance in the college. In this regard; this study result showed that high school transcript alone explained 11.3% for Mathematics and Environmental Science generalist program student teachers' college performance ( $F_{(1,130)}=16.62, p<0.05$ ) and 26.8% variance for Mathematics specialist program student teachers' college performance ( $F_{(1,71)}=26.05, p<0.05$ ). Thus; the finding indicated that high school transcript predicted better than high school GPA for both generalist and specialist program pre-service teachers' college performance. This finding contradicts with former research results of Belfield and Crosta (2012). According to Belfield and Crosta (2012), high school GPA is useful for predicting many aspects of students' college performance than high school transcript. This former study found that high school GPA has a strong association with college GPA and it is the strongest predictor of college performance but high school transcript was modestly correlated with college performance. Similarly; contradictory to the current finding, a review by Zwick (2013) indicated that high school grade point average is the best predictor of college grade point average.

### **Contribution of College Entrance Examination in raising the Predictive Validity of College Admission Criteria**

In this study, it was planned to check if addition of college entrance examination to high school GPA and high school transcript brought significant change in predicting student teachers' college performance. In this regard, different research findings indicate a positive and significant contribution of entrance examination on college performance (Scott-Clayton, 2012; Melaku, 2014; Wang, 2013). For example; Melaku (2014) from a study conducted at Addis Ababa University found that university entrance examination is the most dominant predictor of students' achievement in the university. Melaku's finding based on standardised regression coefficients revealed that university entrance examination scores have higher predictive power for all programs including mathematics except for Geology, in which High school GPA predicted more. Scott-Clayton (2012) from a study conducted in community college in Columbia indicated the relevance of including placement examination to admission criteria. According to the study, adding placement examinations to high school GPA improves the overall variance contributed to college performance but the improvement was found to be low. Concurrent with these findings, the current study found that college entrance examination was the most significant predictor of pre-service teachers' college level performance. The study also found that addition of college entrance examination in to the selection criteria raised the predictive power of the selection criteria from 14% to 27% ( $F_{(3,128)}=15.74, p < 0.05$ ) for Mathematics and Environmental Science student teachers' performance and from 33% to 40.5% ( $F_{(3,69)}=15.65, p < 0.05$ ) for mathematics student teachers' performance. Moreover, the analysis indicated that the effect of college entrance examination was higher for Mathematics and Environmental Science generalist program than Mathematics specialist program. In general, the study indicated that inclusion of college entrance examination into college admission criteria raised the predictive power of selection criteria from 14% to 27% and from 33% to 40.5% for general and for specialist program pre-service teachers' college achievements respectively.

### **Dominant Predictors of College Performance**

Determining the dominant predictor variable on college performance was one of the objectives of this study. To identify dominant predictors for both pre-service program of student teachers, this study utilized multiple regression analysis. Multiple Correlation ( $R$ ), Coefficient of Determination and Regression Coefficients were among the strategies used in the study to determine the most significant predictors among the study variables.

With regard to Mathematics and Environmental Science generalist program student teachers' college performance, this study found that all the three independent variables: high school GPA, high school transcript and college entrance examination explained 27% variation to college performance. However, all these variables did not contribute equal variation to college performance. College entrance examinations score (CEES) was the dominant predictor which alone explained 16.45% of the variation to college performance among the variables included in this study for generalist program student teachers' college performance. This shows that college entrance examination was the dominant predictor of Mathematics and Environmental Science generalist program student teachers' college performance. However, this study, on the other hand, reported 8.25% significant contribution of high school transcript to the variation in college performance of Mathematics and Environmental Science student teachers. The least and insignificant contributor was high school GPA. It explained 2.3% variance to college performance of generalist program student teachers. Similarly, the result of the current study found out that out of 40.5% variation contributed by all variables under the study, 17.4% variation to college performance was explained by high school transcript and 15.32% variation to college performance of mathematics student teachers was explained by college entrance examination score. Similar to the current finding, Melaku's (2014) study concluded that higher institution entrance examination is the dominant predictor of higher education students'

achievements. Similar to the current finding, it also found that high school GPA was not a significant contributor of the variation in college performance of mathematics student teachers.

However; other study findings report (Belfield & Crosta, 2012; Gentsch & Truelsch, 2016; Pugh & Lowther, 2004) inconsistent research results. According to Belfield and Crosta's (2012) study result, high school GPA predicts college GPA of students significantly. The research further indicated that adding the placement test to high school GPA did not increase the achievement variation on the college performance of students. According to a study by Gentsch and Truelsch (2016); of various cognitive variables studied on a relation to college mathematics achievements, overall high school GPA and mathematics grades are significant predictors of passing college mathematics above and beyond placement criteria. Pugh and Lowther's (2004) study also reported high school mathematics GPA as the dominant predictor of college mathematics grade than placement examination score.

## CONCLUSION AND RECOMMENDATION

### Conclusion

Research evidences indicate that student teachers' college performance is a function of multifaceted variables related to the learner (Dunn, 2010; Whitehead, 2016; Zwick & Sklar, 2005). To this end, four research objectives were set to be achieved throughout the current research endeavor.

Exploring achievement difference in student teachers' performance due to the program of study was one of the central issues in this study. Regarding this objective; it was found that mathematics specialist program student teachers over achieve Mathematics and Environmental Science pre-service teachers in all achievement variables: high school GPA, high school transcript, college entrance examination score and college cumulative grade point average. This shows that in all cognitive measures included in this study, generalist program pre-service teachers achieve lower than specialist program pre-service teachers.

With regard to the contribution of high school GPA and high school transcript in predicting college performance, it was found that high school transcript was the dominant contributor for both program pre-service teachers' college level performance. This shows that high school transcript should be given higher emphasis while setting college admission criteria than high school GPA.

Regarding the effect of entrance examination on the college performance of pre-service teachers, it was found that addition of college entrance examination in to the selection criteria raised the predictive power of the selection criteria from 14% to 27% for Mathematics and Environmental Science pre-service teachers' performance and from 33% to 40.5% for mathematics student teachers' performance. Thus; as a result of the finding, the study concluded that college entrance examination should be continued to serve as a criterion to select pre-service teachers.

To determine the dominant predictor variable, this study utilized step wise regression analysis and it found that both high school transcript and college entrance examination were dominant predictors of college achievement of mathematics specialist program pre-service teachers. On the other hand, it was found that the only dominant predictor of college achievement of generalist program pre-service teachers was college entrance examination. However, high school GPA was the least contributor on the college achievement of pre-service teachers in both programs.

### Recommendations

This section presents the recommendations forwarded as a result of the finding of the study. Thus, in the next section, the findings of the study are precisely addressed in order to pin point the recommendation.

To determine the contribution of high school achievements and college entrance examination, a series of data analysis was applied, Thus; as result, it was found that all variables: high school GPA, high transcript and college entrance examination explained a variance of 27% for Mathematics and Environmental Science pre-service teachers' performance and a variance of 40.5% for mathematics student teachers' performance. These shows 73% of the variance in Mathematics and Environmental Science pre-service teachers' college performance and 59.5% of the variance in Mathematics pre-service teachers' college performance were unexplained by the predictor variables in this study. Thus; college admission criteria may include other cognitive and non cognitive variables like learner motivation, attitude and high school mathematics achievements to fill the unexplained portion of student teachers' college performance. Therefore; this study recommends further research that may explore the remaining contributors to the variations on college performance of pre-service teachers.

With respect to achievement differences due to the program of study, this study found that Mathematics and Environmental Science student teachers were significantly lower achievers in all cognitive variables included in this study. Thus, this cognitive issue needs further research and intervention, particularly for this program of study.

In this study, it was found that college entrance examination was the dominant predictor for Mathematics and Environmental Science pre-service teachers' performance and high school transcript and college entrance examination were also dominant predictors of mathematics student teachers' college performance. This shows that if time and resource limitations restrict using multiple measures of admission criteria, institutions can use entrance examination alone for Mathematics and Environmental Science pre-service teachers' selection and two measures: high school transcript score plus college entrance examination score for mathematics student teachers' selection.

Finally; this study calls further research to be done on the predictive validity of college entrance examination in other programs of study like physics, chemistry and biology. In addition, a study evaluating the content of entrance examination is also necessary.

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APPENDIX

Letter of Permission from Bonga College of Teacher Education

