

**ADDIS ABABA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**INSTITUTE OF PSYCHOLOGY**

PREDICTIVE VALIDITY OF THE SELECTION CRITERIA FOR  
TEACHER EDUCATION COLLEGE (10+3) REGULAR PROGRAM  
STUDENTS: THE CASE OF HAWASSA COLLEGE OF TEACHER  
EDUCATION

A Thesis Submitted to the School of Graduate Studies of Addis Ababa  
University in Partial Fulfillment of the Requirements for the Degree of  
Master of Arts in Measurement and Evaluation

By

Tamire Laelago



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## **Acronyms and Abbreviations**

**AAU-** Addis Ababa University

**APA-** American Psychological Association

**EGSECE-** Ethiopian General Secondary Education Certificate Examination

**EHEECE-** Ethiopian Higher Education Entrance Certificate Examination

**EMPDA-** Educational Materials Production and Distribution Agency

**ESLCE-** Ethiopian School Leaving Certificate Examination

**GPA-**Grade Point Average

**HCTE-** Hawassa College of Teacher Education

**IER-** Institute of Educational Research

**MEFA-**Ministry of Education and Fine Arts

**MOE-** Ministry of Education

**SNNPREB-** South Nations, Nationalities and People Regional Education Bureau

**TEI-** Teacher Education Institutes

**TESO-** Teacher Education System Overhaul

**TGE-**Transitional Government of Ethiopia

**USA-** United States of America

## ABSTRACT

*The purpose of this study was to assess the predictive validity of the selection criteria used for (10+3) Teacher Education Colleges. 167 boys and 126 girls were randomly selected (from 453 boys and 345 girls) to participate in the study. EGSECE GPA, Transcript average, result of Entrance exam, Sex, and cumulative GPA of third year students were collected from the participants' personal file. Descriptive statistics, Pearson Product correlation coefficient, multiple and stepwise regression analyses were employed to analyze the data. The results indicated statistically significant relations (at .05 level) between the predictor variables and the criterion variable. A statistically significant intercorrelation was found among the components of the selection criteria for all groups other than Aesthetics. EGSECE GPA was found to be the best predictor of College GPA, while sex failed to be a predictor of College GPA. It was concluded that the selection criteria had different predictive power for males, females, and various fields of study. Practical implications of the findings are discussed. For example, the greatest weight/ proportion should be assigned to EGSECE GPA given the findings of this study.*

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the Problem

The quality of education is highly dependent on the quality of teacher education. That is, educational policies are likely to be more successful when much effort is done to improve teacher's preparation. One aspect of the effort is designing relevant selection criteria to select students when they join higher institutions. Although it may be difficult to obtain highly valid evidences in all tests and admission criteria, attempts should be made to devise instruments that are very helpful for the purpose at hand. For instance, according to Anastasi (1988), selecting students for admitting to colleges, universities and assigning individuals to vocational training programs require knowledge of the predictive validity of tests.

The issues of further education, quality of trainees, and quality of teacher education have been the major sources of debates among educators and researchers. For instance, according to Adane and Dawit (2001), even though quality of trainees is assumed as one of the decisive factors for quality teacher education, research indicates that candidates for teacher education institutions in many countries are not academically gifted, particularly in primary teacher education. Thus, Freeman cited in Adane and Dawit (2001) suggested that raising the admission standard of teacher education institutions is a means of increasing quality of teacher education.

Friedman, Brinlee and Hayes (1980) noted that the selection criteria for a teacher education program should be directly linked to success in the program and casually associated with desired student outcomes in the classroom. Supporting this view, Astin cited in Adane and Dawit (2001) suggested that, institutions producing high retention and high achievement by incorporating selected students is a "zero sum". This means that if an institution holds great number of trainees beyond the intended training time, it may not provide trained human resources to other sectors. In this case, retaining may cause high attrition rate if it is due to academic failure. Hence, predictive validity of the selection criteria may be established not only with respect to success in teaching but also success in the training program.

There are numerous situations in which some decisions could be made and consequently decisions about people are needed. In education, for example hiring of school teachers, selecting students for admission to college or professional school, decisions to promote or fail students and the like illustrate the varied need for prediction (Anastasi, 1976; Ogunniyi, 1984).

Some institutions suffer when inaccurate selection decisions are made either from losing a potentially productive individual or devoting precious resources to a person who does not fit in the institutions (Hogrebe, Ervin, Dwinell & Newman cited in Kasim, 1999). To alleviate the problem, the selection of students who demonstrate higher probability of successful academic performance in training program is the goal of most selection and admission criteria.

Hence, applicants should be typically selected on several variables which are used as predictors of their potential to perform successfully in training programs (Anastasi, 1976). This is to mean that when specific variables are used as predictors in the selection process, a significant relationship should be made between those predictor variables and the criterion which measures the training performance. Most of the predictor variables in the selection of students are based on intellectual evidences such as high school ranks, high school academic scores, test scores, and patterns of courses (Bressel, 1977; Petery & Craft, 1976).

In Ethiopia, some studies were conducted regarding the predictive validity of admission criteria of some training institutions in the country (Kasim, 1999; Mohammed, 2004; Belay, 1990; Meresa, 1994; Shenkute, 1991). Evaluating the admission criteria of one of these institutions is not an end by itself, but rather requires a continuous assessment from time to time. Regarding this, some researchers (Leners, Beardstetel, and Peters cited in Kasim, 1999) have suggested that the screening instruments should be re-evaluated yearly for their validity and usefulness.

Teacher education in Ethiopia has a long history. Teacher training program was started in 1944 in a single room at Menelik II school in Addis Ababa (MOE, 1999). The admission criterion was attending a minimum of grade six (MOE, 1999). Tilahun (1990) has indicated that, although pre-service teacher training goes back to 1944, there were no established criteria for teaching up to 1952/53 when the then Ministry of Education and

## **1.2 Statement of the Problem**

For better prediction of success and screening of the candidates who are academically competent, establishing empirically valid and reliable selection devices is of utmost importance. Taking such steps may help in decision making concerning the admission of candidates to the training institutes (Lindeman & Merenda cited in Meresa, 1994)

The present study aimed at evaluating the predictive power of the selection criteria used to select students for (10+3) Teacher Education Colleges. It also attempts to assess the relationship between the selection criteria and College GPA. More specifically, the study intended to answer the following basic questions.

1. Is there significant relationships between the selection criteria and cumulative GPA of students, separately and collectively?
2. Do the selection criteria predict College performance differently in various fields of study?
3. Do the selection criteria have different predictive power for males and females?
4. Do the weights assigned to the components of the selection criteria in SNNPREB match with the beta weights of this study?

## **1.3 Significance of the Study**

Many training programs are suffering from lack of reliable and valid selection criteria in higher institutions in Ethiopia.

Particularly, Teacher Education Institutions (TEIs) are part of the victims of the problem. Valid selection criteria are required not only to reduce the number of students who fail to graduate but also are desirable in order to choose students who will become professional in the field (Gottheli and Michael cited in Kasim, 1999).

In Ethiopia, as long as the knowledge of the researcher is concerned, only a single research work has been conducted so far in an attempt to establish the predictive validity of the selection criteria used for Teacher Education College (10+3) Regular Program Students. Thus, this research appears to be the second and important to evaluate the selection criteria used in the teacher education colleges and to find the predictive validity

of the components of the selection criteria separately and collectively. Moreover, the findings of the study are expected to have practical application for education authority to design and implement appropriate selection criteria which can promote the effective implementation of the new education and training policy.

#### **1.4 Delimitation of the Study**

This study is confined to the case at Hawassa College of Teacher Education (HCTE) for administrative convenience. That is, as the researcher has background knowledge about the college, the required information for the study is likely to be gathered easily. Although the study considers the case at HCTE, the findings are believed to represent the cases of other colleges of education in the region for the following reasons.

1. The same selection criteria are used in all the colleges which are under the mandate of SNNPREB.
2. The students were assigned randomly to all colleges from different Woredas in the region by officials of SNNPREB. Thus the students assigned to HCTE are believed to represent the students of the region.

#### **1.5 Definition of Important Terms**

- **Criterion measure:** refers to the dependent variable used as a standard against which performances are compared to give judgment about the extent of forecasting subsequent performances. In this case, cumulative GPA of students in the College is the criterion measure.
- **Predictive validity:** refers to the degree to which a procedure is more likely to indicate future trends.
- **Predictor variables:** refer to the independent variables used to forecast the future performance of students.
- **Selection criteria:** the procedure used to identify/select students who will join Teacher Education College.
- **High School/Transcript Average:** refers to the average of the sum total of scores earned by a student in grades nine and ten.

- **College GPA:** the cumulative GPA of a student at the end of a second year.
- **College Entrance Exam:** the written and oral exam prepared by college to identify/ select students who will join Teacher Education College.

# CHAPTER TWO

## REVIEW OF RELATED LITERATURE

Concepts pertaining to validity and findings of previous research relevant to the present study are reviewed in this chapter. These are presented under several headings: nature of validity, types of validity, criterion - related validity, studies on predictor variables , validating the criterion measure, methods of expressing criterion-related validity, educational selection and prediction, and combining predictor variables.

### **2.1 Nature of Validity**

Validity has been defined in many ways by many authors in the past. Regardless of the type of instruments used or how the results are to be used, all measurements should possess certain characteristics. One of the most essential of these is validity. Several scholars (Anastasi, 1976; Mehrens & Lehmann, 1991; Nitko, 1983; Slavin, 1994) viewed validity of such instruments with reference to the soundness with which they can be interpreted in a particular way or the usefulness of test scores for a particular purpose.

According to Cronbach (1971), a test that helps in making one decision may not have value at all for another. Thus, it is wrong to ask general question such as “Is this valid test?” Instead, the question to be asked must be-“How valid is this test for the decision I wish to make” or “How valid is the interpretation I propose for the test?”

According to Thorndike and Hagen (1977), validity refers to the degree to which a test provides information that is relevant to the decision to be made. Thus, the judgment of validity is to be seen always in relation to a specific decision or use.

In general, since validity refers to the inferences made from the use of a procedure not to the procedure itself, the primary question to be answered in validation is the degree to which these inferences are appropriate (Anastasi & Urbina, 2003) It should be noted that, the use of a specific procedure might lead to valid inferences in one area and yet fail to lead to valid inferences in another area. Thus, it seems a must to the investigator to define in advance any validation effort, the inferences to be made and to plan the type of validation strategy.

## 2.2 Types of Validity

Earlier studies suggested that there are two broad groupings of validity. According to American Psychological Association's (APA) recommendation (cited in Ebel, 1979), these two groupings are primary or direct validity and secondary or derived validity. The distinction between the two categories is that those, which depend primarily on rational analysis and professional judgment, are identified as direct or primary validity, while those, which depend on empirical and statistical evidence, are designated as derived or secondary validity (Ebel, 1979). According to Ebel (1979), each category includes some validity types as indicated below.

<u>Direct</u>	<u>Derived</u>
Validity by definition	Empirical validity
Content validity	Concurrent validity
Curricular validity	Predictive validity
Intrinsic validity	Factorial validity
Face validity	Construct validity

But, the most important classification of types of validity is the one prepared by a joint committee of the American Psychological Association (APA), the American Educational Research Association (AERA) and the National Council on Measurement Used in Education (NCMUE), namely; content, criterion-related and construct validity (Kerlinger, 1992). For this study, the interest is on criterion-related validity since the issue under investigation is directly associated with prediction. Prediction problems are directly associated with predictive validity which is a type of criterion related validity.

## 2.3 Criterion- Related Validity

Criterion-related validity indicates the effectiveness of a test in predicting an individual's behavior (achievement) in specified situations. On the other hand, it pertains to the empirical techniques of studying the relationship between the test score or other measures (predictors) and some external measures (criteria). Criterion-related validity is further subdivided into concurrent validity and predictive validity and the time in which the criterion measure occurs is the point that differentiates the two divisions (Walsh, 1989; Mehrens & Lehmann, 1969; Fraenkel & Wallen, 1993).

According to Brown (1983), there are two types of distinctions between concurrent validity and predictive validity. The first distinction between them pertains to the time when the criterion data are gathered. The other is logical, which is based on the purpose of testing or the inference one wishes to predict in the future. In the case of predictive validity, for instance, the focus is on how accurately criterion scores can be predicted by test scores or other measures. In concurrent validity, the interest is whether one method can be substituted for another (Brown, 1983). In fact, time interval between administering the test and obtaining the criterion measure has also been emphasized since it might affect the observed degree of relation between the two measures (Fraenkel & Wallen, 1993).

Finally, before we conclude this section and discuss about the types of criterion-related validity, it is necessary to review its measure. Accordingly, the most commonly used measure of criterion – related validity is a validity coefficient, which is the relation between predictors and criterion scores. As was noted in Brown (1983) and Fraenkel and Wallen (1993), a validity coefficient is an index of how well criterion scores can be predicted from test scores or other measures. The squared validity coefficient indicates the proportion of shared variance or the proportion of variance in criterion scores predictable from test scores or other measures.

### **2.3.1 Concurrent Validity**

When criterion data are gathered at approximately the same time as the test data (predictor data), we refer to concurrent validity. Thus, it is relevant to tests used for diagnosis of existing behavior or current status. Since the study's concern is on predictive validity, there is no need to discuss more than this about concurrent validity.

### **2.3.2 Predictive Validity**

As the title of the study indicates, the study's concern is with this type of validity (predictive validity). It is concerned with predicting future outcome. The information that is gathered from this type of validity is very useful to know the extent to which the selection criteria were relevant in the process of selection of students.

The prediction of success in vocational and professional training is an important concern of psychometricians. Several professionals have defined the concept of predictive

validity. According to Anastasi (1976), for example, the term “prediction” can be used in the broader sense to refer to the test to any criterion situation. The information provided by predictive validity is the most relevant to tests used in the selection and classification of personnel. Hiring job applicants, selecting students for admission to college or professional schools and assigning students to occupational training programs represent examples of decisions that require knowledge of predictive validity. Hinkle, Wiersma, and Jurs (1982) define predictive validity as the process of estimating scores on one or more variables (the criterion variables) on the basis of knowledge of scores on the other variables (the predictor variables).

According to Aiken cited in Tsegazeab (2007), predictive validity is concerned with the accuracy, as expressed by the correlation between the test (predictor) and a measure of performance (criterion), with which test scores predict criterion scores.

Predictive validity, according to Baumgartner and Jackson (1995), represents the value of a measure for predicting performance on another measure (criterion). Predictive validity is a way of estimating the future performance of an individual, based on current scores. Skinner (1992) stated that if scores on a test predict well what pupils will do at some subsequent time, it is said to have predictive validity. Murphy and Davidshofer (2001), while discussing the advantage of predictive validity, indicated that predictive validity provides a simple and direct measure of the relationship between scores on the test and performance on the criterion for the population in general. Its prime focus is to indicate future performance by investigating the degree of correlation that exists between the predictor test score and the criterion score.

All professionals have raised one thing in common about the definition of predictive validity. That is, for any prediction study there should be the predictor variable and the criterion variable. According to Anastasi (1976), Aiken cited in Tsegazab (2007), Skinner (1992), and Murphy and Davidshofer (2001), a test score is considered as a predictor variable even though they have different criterion variables. However, Hinkle, Wiersma, and Jurs (1982), and Baumgartner and Jackson (1995) considered both predictor and criterion variables in a general way as the value of a measure. The definitions given by all

professionals about predictive validity in the above are directly related to the concept raised about predictive validity in this study.

## **2.4 Construct Validity**

Construct validity is categorized under derived validity type. It is evaluated by investigating what psychological qualities a test or an instrument measures; i.e by identifying the degree to which the test scores can be accounted for by certain explanatory constructs (Cronbach, 1971; Mehrens & Lehmann, 1969). As explained by Mehrens et al, (1969), “Constructs are unobservable phenomena (such as intelligence, motivation, interest, etc) that help to explain an individual’s behavior” (p. 43). Many writers believe that construct validity is difficult to explain with a single study, because it needs the integration of many studies (Ebel, 1979; Cronbach, 1971, Mehrens et al, 1969).

## **2.5 Studies on the Predictor Variables**

Many researchers have conducted studies with regard to predictor variables that have been designed and applied in various fields. For example, some of the local predictive studies include Desta (2002), Kasim (1999), Mohammed (2004), Tamiru (1992), Belay (1990) and Legese (2006).

For instance, the study conducted by Desta (2002) took TTI GPA, ESLCE GPA, academic rank in career structure, work performance evaluation score and entrance examination scores as predictor variables. College first semester grade point average (SGPA) was considered as the criterion variable. Using statistical devices such as Pearson correlation, simple and multiple regression analysis and analysis of variance (ANOVA), he concluded that TTI GPA, ESLCE GPA and entrance exam results were found to be the best predictor variables for the selection of trainees. Similarly, Kasim (1999) in his study on predictive validity of the selection criteria for nursing schools, included ESLCE GPA, entrance examination scores, trainees’ grade 12 class rank, high school average scores and high school biology average scores as predictor variables. The finding of the study has revealed that entrance exam results and the ESLCE GPA do not have statistically significant relationships with first, second, third and fourth semester’s academic scores, first year, and second year composite scores.

In the case of Mohammed (2004), ESLCE/TTI GPA, teaching experience and teaching performance were taken as predictor variables while graduation GPA was taken as the criterion variable. Results of the study indicated that the selection criteria have different predictive power in each subgroup. ESLCE/TTI GPA was found to be the best predictor of college GPA in the case of each subgroup and entire participants. Other researchers have also followed the same procedures to identify predictor variables in their respective studies (e.g., Belay, 1990; Merihatibeb, 1993; Shenkute, 1991).

Since this study is concerned with intellectual variables, which include high school achievement, test score (EGSECE), and admission test score as predictor variables, it is apt to review them as follows.

### **2.5.1 High School Academic Scores**

In practical terms, for educational selection one usually needs to have a high school transcript of the candidates to examine their academic potential. Several investigators (Meresa, 1994; Kebede, 1991; Wesely, 1994; Fraenkel & Wallen, 1993) have found the record of performance in high school to be reflected in college performance. In the case of Meresa (1994), high school average score has significant relationship with first semester average score earned in the Institute. However, the relationship of high school average with second, third, and fourth semesters is not statistically significant. The study conducted by Kebede (1991) also found that high school average significantly predicted students performance for the combined groups as well as with in separate fields of study. On the other hand, the relationship of high school average to College GPA holds up reasonably well for males and females. There are frequent cases in which high school achievement predicted freshman grades better than scholastic achievement or aptitude tests (Halpin, Halpin and Schaer, 1981). However, among studies concerned with grade prediction in specific subject areas, Passons (1967) concluded that although school achievement was the most predictive indicator of future overall college success, test scores were slightly more valid than was high school achievement for predicting grades in specific courses.

But Schwarz (1971) pointed out that the use of school grades as index of achievement has some problems which is compounded by variations in the grading system applied by

different schools and different teachers. Such difficulties have been widely recognized, and numerous adjustment techniques have been developed. One of these approaches is to scale the grades given by each school in accordance with the level of future performance they actually predict, as determined through empirical studies.

Bloom and Peters (cited in Thorndike, 1971) applied this approach to both the predictor (high school achievement) and the criterion (freshmen GPA) variables to correct for variation in the grading standards of High schools and Colleges. The authors reported substantial gains in the accuracy of prediction.

### **2.5.2 The Ethiopian General Secondary Education Certificate Examination (EGSECE)**

The purpose of EGSECE is to select those candidates who could be promoted to the preparatory classes or other regional technical and educational colleges. To join educational colleges in the country, the candidates should have at least a GPA of 2.00 in the EGSECE.

Many researchers have conducted various independent studies on the predictive validity of ESLCE results (Belay, 1990; Shenkute, 1991; Tibebe, 1992; Merihatibeb, 1993; Melaku, 1975; Desta, 2002; Tamiru, 1992). According to Belay (1990), ESLCE GPA was found to be a moderate predictor of success in TTI academic performance. Shenkute (1991) also found in his study conducted on predictive validity of the selection criteria of the Ethiopian Airlines Aviation Maintenance Technicians School that the ESLCE GPA was the most valid predictor of success at the training institute. Similarly, Tamiru (1992), in his study on the predictive validity of the selection criteria of the Catering and Tourism Training Institute, found that the ESLCE was the only best valid predictor in choosing candidates to the department of Front Office. According to study by Desta (2002), the ESLCE GPA together with TTI GPA and entrance exam scores was found to be the best predictor for selection purpose.

But, according to Tibebe (1992), Merihatibeb (1993), and Melaku (1975), the ESLCE GPA had weak correlation with college performance of students. Merihatibeb has concluded that ESLCE as a whole was not adequate to warrant validity as the sole instrument of selection and admission to higher education.

But, as long as the researcher's knowledge is concerned so far, only three studies have been conducted on the predictive validity of EGSECE after the termination of ESLCE (Samson, Tsegazeab, Wosen, 2007). According to Samson (2007), EGSECE was a better predictor of college GPA only for some fields of study in the Health Science College. He suggested that using only EGSECE as a selection criterion is not advisable. According to Tsegazeab (2007), the EGSECE GPA was found to be weak in its predictive ability. Wosen (2007), on his part, found that the EGSECE was the best predictor of college performance for mathematics department only. His findings also indicated that college entrance exam was the best predictor of college performance to students in language, natural science and social science departments, whereas high school average was a significant predictor for all departments as a whole.

In general, from the above findings, it seems fair to conclude that using only EGSECE to predict college performance is not advisable.

### **2.5.3 Admission Test Scores**

In addition to high school academic performance, data such as scores on admission tests have often been found to be useful for academic selection. It has been indicated by Hills (1971) that the most commonly used admission tests are achievement and aptitude tests which are often thought to have potential contribution to the prediction of college academic performance. It should also be noted that there is no very clear distinction between aptitude and achievement in educational testing. According to Hills, an achievement test is generally confined to a single subject matter more completely than is the aptitude test. However, verbal and mathematical aptitude tests are correlated with each corresponding achievement tests at the level of 0.60 or higher. When this is the case, it probably would be difficult even for a measurement or subject-matter expert to sort into separate groups accurately the items from aptitude and achievement tests.

Achievement and aptitude tests can also be distinguished according to the types of predictions for which each is most useful (Gronlund, 1985). Because past achievement is frequently the best predictor of future achievement, both types of achievement tests are then useful in predicting future learning. The content-oriented achievement tests can predict how well a pupil will learn new knowledge in the same content area, but it is less valid to predict future learning in other areas. On the other hand, tests measuring general

educational development are more effective predictors of future achievement than are content – oriented tests (Gronlund, 1985). This suggests that tests of educational development have been shown to be good predictors of general school achievement as aptitude tests.

However, some authors (Brown, 1983; Mehrens & Lehmann, 1972) argue that certain achievement tests may be better predictors than particular aptitude tests for some specified purpose. They also pointed out that there are many instances where achievement tests are used primarily to predict future performance. In that case, a training institute may select its entrants based on an achievement test if the test has been found to be a valid predictor.

In Ethiopia, some researchers (e.g., Kebede, 1991; Meresa, 1994; Tamiru, 1992) have attempted to assess the effectiveness of admission test scores (the incremental validity of the admission test scores) in selection of students for higher learning institutions. Some of these found admission test scores to be strongly predicting students' future performance in training institutions. For instance, Kebede (1991) found that Differential Ability Test (DAT) total and its sub scores significantly predicted students' academic performance in college. However, the predictive ability of the DAT test scores varied across different fields of study. The study by Meresa (1994) revealed that the scholastic aptitude test has statistically significant relationship with most of the criterion measures. For example, the mathematics and physics entrance examination has statistically significant relationship with the first year composite scores, but English entrance exam did not predict first year composite scores. Tamiru (1992) also found that score of entrance examination to be valid predictor only for Food and Beverages Services and Food and Beverage Control Department.

## **2.6 Validating the Criterion measure**

The issue of criterion score in predictive validity studies has been given great emphasis by many investigators. Cronbach (1971) has suggested that the whole weight of predictive validation is based on the criterion score. With respect to personnel selection, Chisselli (cited in Shenkute, 1991) has suggested that accumulating evidence to show a

relationship between decision based on assessments made by personnel selection procedure and criterion such as job performance, training performance, advancement or other relevant job behaviors is an essential principle in predictive validation studies.

In educational selection, the analogy to job performance is school or university achievement such as GPA (Cronbach, Hills, 1971). As stated by Hills (1971); ... “Though grades are criticized vigorously, they are usually attractive as a criterion because they are easily attainable, readily quantifiable, and of great importance in making other decisions such as whether students graduate or not, whether they are allowed to remain in college or not, whether they are given honors, whether they are allowed to take advanced or special courses, and so on.” (p.685). In relation to this, the validating criterion considered for this study is trainees’ cumulative GPA in the beginning of third year (i.e., the composite score of four semesters) in the regular training program in the college.

## **2.7. Methods of Expressing Criterion – Related Validity**

It is already mentioned that criterion-related validity can be classified as concurrent and predictive validity depending on the time of data collection and purpose of testing or other measure. In both cases we can use the same technique to express validity. However, according to Mehrens and Lehmann (1969), concurrent validity is greater than predictive validity when the outcome is unstable. This means that, when the present outcome doesn’t help to succeed in the future measure, the predictive validity becomes lower. On the other hand, validity in concurrent and predictive cases may differ due to external factors such as forgetting, learning, experience, or irrelevance of the present and future tasks as a result of the gap between data collection time (Ebel, 1979).

Evidence for criterion – related validity mainly consists of a demonstration of a statistically significant relationship between the predictor and the outcome measure (Cronbach, 1971). Predictors refer to any instruments used for decision making such as selection, admission, counseling, placement and promotion. Predictors may be standardized or non-standardized tests of achievement, aptitude, personality, etc. However, since most of the extraneous variables are better controlled in standardized

procedures, it is suitable to have a predictor which is standardized. As proposed by many measurement specialists, (e.g., Cronbach, 1971; Skinner, 1992; Anastasi, 1976; Murphy & Davidshofer, 2001) predictive study involves the following steps.

**First:** - obtaining appropriate sample. That is, the sample should represent the population under investigation.

**Second:** - Collecting data on the predictor instrument for the sample participants. In this case, all the procedures should be the same for all participants and care should be taken not to have recording error.

**Third:** - Assignment of participants to treatment and waiting for the necessary duration of time depending on the problem at hand.

**Fourth:** - Collecting criterion data for the same sample participants. In this case, the criterion measure should be relevant and reasonably reliable.

**Fifth:** - Computing the correlation between predictor scores and criterion scores. The Pearson product moment correlation coefficient is the most often used method for reporting validity coefficient.

**Sixth:** - The validity coefficient may lack statistical power to be significant. Thus, the last step should be checked for significance. There are factors determining statistical power, such as sample size, range restriction, criterion reliability and size of predictor-criterion relationship and combinations of these variables.

In most modern prediction studies, regression analysis is used to gather further evidence other than correlation coefficients. Traditionally, the correlation coefficient is considered as predictive value of a predictor variable. However, this may hold true in the case of bivariate analysis (that is, when one dependent and one independent variables are used). In the case of multivariate analysis, the multiple correlation coefficients may not directly indicate the predictive power of each predictor variable because of overlapping effect (Hinkle, Wiersma, & Jurs, 1994). For instance, predictors that are actually the same measures under different names may cause overlapping effect. This is because almost all the variance in one predictor variable can be accounted for by a set of other predictor variables. Therefore, multiple regressions help to identify the true variable, which contributes significantly for the variability of the criterion variable. It also helps to know

validity for such decision making is shown by prediction study (Ebel, 1979). According to Drenth, Flier, and Omari (1983), the prediction study helps to identify whether or not the following two errors are committed. These two interrelated errors are positive misers and negative misers, where the former refers to candidates, who would perform satisfactorily but have not been accepted, while the latter refers to those who have been accepted but erroneously, i.e. the selection criteria are unsatisfactory to predict candidates' success accurately. Drenth et al (1983) finally suggested that there should be balance among the number of positive misers and negative misers to have fair selection system.

In general, the true value of decision in educational selection lies in the predictive validity of the instruments used for decision making. Moreover, the following issues should be considered in conducting decision oriented validation studies.

### **2.8.2 Issues in Decision-oriented validation**

According to Hills (1971), there are at least five factors to be considered in any decision oriented validation study. These are:

- A. Criterion Development
- B. Choice of Predictor variables
- C. Sampling of Participants
- D. Sample Size, and
- E. Data Analysis and Interpretation

#### **A. Criterion Development**

Validity researchers have stressed the issue of criterion variable in prediction study. For instance, Linn (1984) stated that "The degree to which a predictor variable predicts a criterion measure is of concern only to the degree that the criterion measure is itself a valid indicator of those idealized qualification." (P. 38). Idealized qualification according to Linn refers to the kind of benefit that is wished to be maximized. In this case, the criterion should be truly representative of the outcome that we want to maximize.

In educational selection, GPA has been used widely as a criterion measure (Cronbach, 1971). In spite of its wide use, many authors have criticized GPA. In relation to this issue,

Hills (1971) has stated "Grades have been chosen as the criterion of success in schools and colleges regardless of what the catalog of the institution said it was trying to accomplish with the students it admitted and regardless of whether grades represent level of competence or represent personality, discipline, effort or represent a combination of these and other characteristics." (P. 685)

Hence, the dissatisfaction with GPA as a criterion in educational selection has led to the occasional use of other measures such as ratings by faculty members, licensing tests or other standard evaluations, and persistence at the institution until graduation as out-puts or criterion measures (Cronbach, 1971)

### **B. Choice of Predictor variables**

In educational selection, intellectual and non-intellectual variables are commonly used as predictors (Petery & Craft, 1976). Intellectual variables refer to test of aptitude or achievement. Non-intellectual variables refer to professional or biographical data obtaining procedures. Intellectual variables include previous academic performance, aptitude, and scores in entrance examination. Non intellectual variables include biographical data and ratings. According to Hills (1971), in academic selection system, the first kind of predictor to look for is some readily available work sample from previous performance. The best work samples usually will be the ones closest to the criterion in time and form (Cronbach, 1971; Drenth, Flier, & Omari, 1983).

With respect to non-intellectual predictors, there is no empirical basis for expecting them to provide appreciable incremental validity in academic selection (Drenth et al., 1983). Moreover, Petery et al., (1976) stated that "There was no non-intellectual variable that was cited as a best predictor often enough to rank it first in a list of that type of variable." (P.21). This shows that all non-intellectual variables have more or less the same predictive validity implying no incremental validity when we select some among them.

However, additional data obtained from admission or entrance tests have been found to be potential contributors to prediction (Cronbach, 1971; Drenth et al. 1983). In general, other things being equal, predictors which are more objective, valid and relevant to the criterion in time and form are preferable.

### **C. Sampling of Participants**

There is always rejection of some applicants who do not fit the minimum requirements in educational selection (Cronbach, 1971). This is the major source of great discrepancy among validity researchers concerning the sample they treated in their studies.

According to Cronbach (1971), the participants in the study may be sample of

1. the entire population of applicants
2. the population of screened applicants, or
3. the population of persons who presently enter and remain in the treatment.

He further recognized that, though there are no hard and fast rules as to which population is studied; the findings may differ greatly from one to another. That is, in the case of (1), the correlation would be higher due to increased variability. Since population (3) is severely decreased by the elimination of poor performers in the course of treatment, the correlation would be the least of the other two cases. This happens due to lower variability. In general, any screening affecting the sample must be taken into account in interpreting the findings of prediction studies.

### **D. Sample Size**

Sample size affects the meaningfulness of the study. This is because as sample size decreases, correlation tends to be lower. Thus, it may not be significant or may not be stable from place to place and time to time. Of course, correlation may also be smaller from homogeneous samples even if we have large number of participants (Hinkle, Wiersma, & Jurs, 1994). Therefore, validation studies should be based on adequate and representative samples. Cronbach (1971) suggested that validation study requires a sample of 100 or more cases even if this requires combining of several years' data where the treatment can be assumed to remain much the same. Generally, representativeness and adequate size should be focused on deciding on the number of participants in a study.

### **F. Data Analysis and Interpretation**

Data analysis in most prediction studies is performed by using multiple correlation and regression, particularly in the prediction of student success in schools and colleges. The correlation of variable X with Y is traditionally used as the validity coefficient for test X (Mehrens and Lehmann, 1969). The squared correlation indicates what proportion of the

variation in the criterion is forecast by the prediction equation under the usual linear assumption (Cronbach, 1971). According to Schrader (1969), two considerations which complicate the interpretation of validity coefficient, but which are nevertheless essential are sampling error and the effect of selection. When validity coefficients of two highly correlated predictors are compared using the same criterion measure and the same group, the sampling error is appreciably smaller (Schrader, 1969).

Actually, the most valuable contribution of a conventional validity study lies not in the correlation coefficients which are produced, even though, they may be of some interest for comparing results from one group to another, but the regression equation which permits the translation of relatively unfamiliar predictor data in to the more readily understood form of predicted grades (Schrader, 1969). According to Grones (1969), if it is assumed that the regression line is not affected by selection on the predictors and further assumed that the standard error of estimate is not affected by selection on the predictors, it can be argued that regression rather than correlation should be the main tool in validity studies. Supporting this idea, Cronbach (1971) suggested that since the standard error and the regression coefficient are much less sensitive to restriction of range, regression analysis provides a more general description of the predictor-criterion relationship.

In general, from the above discussion, it seems appropriate to use both correlation and regression models in order to have detailed evidences for the problem raised in the study. Moreover, the five factors raised and reviewed in this section were considered during the design stage of this study.

## **2.9 Combining Predictor Variables**

Often times several variables rather than a single variable are investigated as possible predictors of a criterion. The aim then becomes that of selecting those predictor variables which in combination could give most reliable predictions and finding the most effective way of using the combined information. For example, admission officers of training institutes consider student's high school achievement, achievement tests, and other data (Brown, 1983). In such cases, the important question is how to combine scores on these

variables so as to obtain the most reliable prediction. In terms of validation, the question is then how to determine the validity of the composite scores.

The most frequently used approach to the combination of such measures for prediction of a continuous criterion is that of multiple linear regressions (Brown, 1983; Fraenkel & Wallen, 1993; Kerlinger, 1992). This method assumes that predictor measures of two or more unrelated factors underlie the criterion to be predicted, and that these factors are related to the criterion variable in a manner such that any deficiency in one variable can be compensated for by a sufficiently high level of performance in another variable. It was also indicated that the coefficient to be used for each predictor variable is determined so that the weighted sum of the predictor variable yields the maximum correlation with the criterion for the sample of individual under study (Brown, 1983; Fraenkel & Wallen, 1993; Kerlinger, 1992).

Even though many predictor variables may be found to be predictive of the criterion, it has been observed that combining these variables usually yield relatively little gain in prediction over that obtainable by using the best two or three (Aleamoni & Oboler, 1997 cited in Nitko, 1983; Brown, 1983). Thus, an additional measure has value only to the extent that it adds validity beyond that provided by the initial predictors, and each additional measure would be evaluated by its ability to improve upon the existing variable (Sechirst, 1963).

In this study, college entrance exam, EGSECE, high school average score and sex are selected as predictor variables in order to predict the college performance of students separately and in a combined way. When predictor variables are entered collectively in the linear regression model, significant predictor variables are identified by stepwise regression. Finally, the predictive power of each predictor variable is evaluated from the combined variables based on their contribution to the variability of college performance (the criterion).

# CHAPTER THREE

## RESEARCH METHODOLOGY

In this chapter, the research design, participants, variables included in the study, procedures of data collection, and methods of data analysis are presented.

### 3.1 Research Design

This study was designed to assess the predictive validity of the selection criteria used for Teacher Education College (10+3) students in HCTE. In the process of assessment, the correlation between the components of the selection criteria/independent variables and the cumulative GPA of third year students/dependent variable was computed separately and collectively (i.e., when all independent variables were considered as a single variable). To secure the required information, quantitative approach was used in the study.

### 3.2 Participants

This study included all students who were admitted in 2007/2008 academic year in HCTE as a target population. Their total number was 798 ;( 453 males and 345 females.) The participants were selected by the researcher for they are the best source of information for the study at hand. The reason that this batch was selected as a target population is that they are the beginners of the new training program that substituted the old TESO program. Conducting the study on currently existing programs can have practical importance, and this is one of the reasons to select participants from the new training program. To select a sample from this population, a significant level ( $\alpha$ -level) of 0.05 was initially accepted for use. Depending on the level of significance and other factors such as time, the sample size of 293(37% of the population) students were selected. Their mean age is 17.21 with standard deviation equals to 0.99. From these participants, 167 were males and 126 were females. All participants were sampled from four streams of the training program in the College. The streams were formed according to their category from ten different departments, which were mentioned in the introduction part of the study. These streams are Language, Natural science, Social science, and Aesthetics.

To select participants from each stream, stratified random sampling was used. There is one main stratum (gender) and four-sub strata (Language, Natural science, Social science and Aesthetics). To decide on the number of participants from each stream, proportional allocation method of stratified random sampling (37% of the population from each stream) was used. Then, using the Lottery system of simple random sampling, members of the sample were selected from each stratum.

**Table 1 Demographic Characteristic of the Sample Participants**

Population			Sample			
Stream	M	F	Total	M	F	Total
Language	31	130	161	11	48	59
Natural Science	287	74	361	106	27	133
Social Science	125	110	235	46	40	86
Aesthetics	10	31	41	4	11	15
Total	453	345	798	167	126	293

### 3.3 Variables included in the study

#### 3.3.1 Independent variables

The following selection criteria used by the College were considered as predictor variables in the study:

- \_The Ethiopian General Secondary Education Certificate Examination GPA( $X_1$ )
- \_High School/Transcript Average Score( $X_2$ )
- \_Result of College Entrance Exam( $X_3$ )
- \_Sex (1=Male, 0=Female) of the trainees( $X_4$ )

When males and females were considered separately, the predictor variables used in each case were the first three of the variables listed above.

#### 3.3.2 Dependent variable

The only variable used as criterion/dependent variable was the cumulative GPA of third year students( $Y$ ).

### **3.4 Procedures of Data Collection**

The main source of data used in this study was participants' personal file in the respective departments in the College. This included EGSECE GPA, High School/Transcript Average Score, Result of College Entrance Exam, Sex and Cumulative GPA in College. All these data were obtained from the registrar office of the College.

To gather further information about the College Entrance Exam, the researcher at the end of the result conducted Interview. The Interviewees were selected from the selection committee of the College (HCTE).

Two professionals from HCTE assisted the researcher during data collection after they had been informed about the procedures of collecting data using formats prepared for this purpose.

### **3.5 Methods of Data Analysis**

To show the general picture of the data, descriptive statistics such as means and standard deviations were determined for all variables in each field of study, and in all groups. Then, analyses of relationships of variables were done.

Initially, Pearson product-moment correlation coefficients were computed between the predictor and criterion variables. To know the exact amount of variables' contribution to the total variance in the dependent variable, coefficients of determination was obtained through multiple regressions. Then after, to find the relative contribution of each independent variable to the total variance in the dependent variable, while controlling the effects of other independent variables, stepwise regression was also computed. Qualitative approach was used to analyze the result of the Interview. In the regression analysis, F test was used to check the statistical significance of variables in each model of regression. Moreover, beta weights (standardized coefficients) were identified in the regression analyses. Finally, comment was given on the weights assigned to the components of the selection criteria that have been using in SNNPREB, based on the results of the study.

# CHAPTER FOUR

## RESULTS

The results obtained through analysis of data using SPSS 15.0 (Statistical Package for the Social Sciences- Version 15.0) are presented in this chapter. The results are presented in the following sequence: relationship between predictor variables and the criterion variable, interrelationship of scores of the components of the selection criteria, and summary of multiple regression analysis predicting College GPA of each stream students other than Aesthetics students, the entire group, male and female students. The results of Aesthetics students were not analyzed independently because of its low sample size (N=15).

### **4.1 Relationship between Predictor Variables and the Criterion Variable**

In order to answer the first basic question of the study, Pearson Product-moment correlation coefficient was computed. The criterion/dependent variable was College GPA of third year students and the predictor/independent variables were EGSECE, Transcript average, Entrance exam, and Sex/Gender. Table 2 shows the mean and standard deviations for each predictor variable, and relationship between each predictor variable and the criterion variable for each field of study other than Aesthetics and participants considered together.

**Table 2 Mean and Standard deviation for predictor variables, and relationship between predictor variables and the criterion variable for each field of study other than Aesthetics and participants considered together**

Streams/Variables	Mean	Standard deviation	Correlation with College GPA
Language(N=59)			
EGSECE	2.15	.22	.33**
Trans.average	61.65	5.75	.48**
Entra.exam	37.62	5.26	.41**
Sex	.19	.39	.35**
Natural Science(N=133)			
EGSECE	2.37	.31	.51**
Trans.average	66.69	5.10	.22*
Entra.exam	43.34	4.66	.24**
Sex	.80	.40	.25**
Social Science(N=86)			
EGSECE	2.37	.34	.43**
Trans. average	64.40	5.94	.51**
Entra. exam	40.81	5.12	.62**
Sex	.53	.50	.66**
Participants considered together(N=293)			
EGSECE	2.32	.31	.43**
Trans. average	64.62	5.89	.35**
Entra. exam	41.28	5.55	.35**
Sex	.57	.50	.37**

\* p<.05    \*\* p<.01

Table 2 Shows that the correlations between each predictor variable and the criterion variable were significant at  $\alpha=0.01$  and  $\alpha =0.05$  for all fields of study. Furthermore, the highest mean scores of EGSECE, Transcript average and Entrance exam observed for

students of Social science (mean= 2.37), Natural science (mean= 66.60), and once again for Natural science students (mean= 43.34), respectively as given in Table 2.

Table 3 shows the relationship between the predictor variables and the criterion variable for females and males separately. The dependent variable was College GPA of third year students, and the independent variables were EGSECE, Transcript average, and Entrance exam.

**Table 3 Mean and standard deviation for predictor variables, and relationship between predictor variables and the criterion variable for female and male students separately**

Groups /variables	Mean	Stand. Dev.	Correlation with College GPA
Females (N=126)			
EGSECE	2.15	.20	-.002
Trans. Average	60.86	4.92	.28**
Entrance exam	36.94	4.99	.35**
College GPA	2.60	.42	1
Males (N=167)			
EGSECE	2.45	.32	.44**
Trans Average	67.46	4.89	.12
Entrance Exam	44.56	3.23	-.04
College GPA	2.98	.52	1

\*\* p<.01

As shown in Table 3, the mean scores of male students for all variables included in the study are greater than that of female students'. Furthermore, as indicated in the table, the correlation between Transcript average as well as entrance exam and College GPA was significant for female students (P<.01), while the correlation between EGSECE and College GPA was significant for male students (P<.01).

## **4.2. Interrelationship of Scores of the Components of the Selection Criteria**

In order to assess the interrelationship of scores among the components of the selection criteria, once again Pearson product-moment correlation coefficient was computed. The components of the selection criteria were EGSECE, Transcript average, Entrance exam, and Sex. The interrelationship was done between each predictor variable/components of the selection criteria. Table 4 shows the intercorrelation among predictor variables for each field of study other than Aesthetics and participants considered together.

**Table 4 Intercorrelation among predictor variables for each field of study other than Aesthetics and participants considered together**

Streams /Variables	EGSECE	Trans. ave	Entr. Exam	Sex(M=1,F=0)
<b>Language (N=59)</b>				
EGSECE	1	.47**	.45**	.40**
Trans.average	.47**	1	.55**	.42**
Entra.exam	.45**	.55**	1	.59**
Sex	.40**	.42**	.59**	1
<b>Natural Science (N=133)</b>				
EGSECE	1	.14	.33**	.37**
Trans.average	.14	1	.29**	.41**
Entra.exam	.33**	.29**	1	.66**
Sex	.37**	.41**	.66**	1
<b>Social Science(N=86)</b>				
EGSECE	1	.25*	.28*	.50**
Trans.average	.25*	1	.36**	.56**
Entra.exam	.28*	.36**	1	.61**
Sex	.50**	.56**	.61**	1
<b>Participants considered together (N=293)</b>				
EGSECE	1	.29**	.35**	.47**
Trans.average	.29**	1	.47**	.56**
Entra.exam	.35**	.47**	1	.68**
Sex	.47**	.56**	.68**	1

\* p<.05

\*\* p<.01

As can be seen in Table 4, the correlations between EGSECE and Transcript average were significant for Language students and the entire group ( $P<.01$ ), and for social science students ( $P<.05$ ). EGSECE has also significant correlations with Entrance exam for Language students, Natural science students, and the entire group ( $p<.01$ ), while for Social science students ( $p<.05$ ).

On the other hand, Transcript average had also significant correlations with Entrance exam for Language students, Natural science students, Social science students, and the entire group ( $P < 0.1$ ). Sex had significant correlations with each predictor variable for all fields of study, and the entire group ( $P < 0.1$ ) as given in Table 4.

Table 5 shows the intercorrelation among predictor variables for female and male students.

**Table 5. Inercorrelation among predictor variables for females and male students separately**

Groups/Variables	EGSECE	Trans. Average	Entra. Exam
Females (N=126)			
EGSECE	1	.098	.059
Trans.average	.098	1	.244**
Entra.exam	.059	.244**	1
Males (N=167)			
EGSECE	1	.014	.047
Trans.average	.014	1	.037
Entra.exam	.047	.037	1

As can be seen in Table 5, the correlation between Transcript and Entrance exam was significant only for female students ( $P < .01$ ). The remaining predictor variables were not found to be significant for both female and male students.

### 4.3. Multiple Regression Analysis Predicting College GPA

In order to find the predictive validity of the components of the selection criteria, multiple and stepwise regression analyses were employed with respect to each field of study other than Aesthetics, the entire group, male and female students. The data were presented in Table 6, Table 7, Table 8, Table 9, Table 10, and Table 11 for the results related to this subtopic.

As shown in the table, model 2 was identified as the best model of regression. In model 1, EGSECE alone explained about 26% of the variance in College GPA. Model 2 shows that both EGSECE and Transcript average explained about 29% of the variance in College GPA. The Change in  $R^2$  (3%) was significant ( $P < .05$ ). Mathematically, it is expressed as, College GPA (pred.in standard score) = .49(EGSECE) + .16(Trans.average). The rest predictor variables were removed by stepwise regression.

Table 8 presents the results of the regression analysis to predict College GPA of Social science students

**Table 8 Summary of multiple regression analysis predicting College GPA of Social science students (N=86)**

Model	Variables	Multiple correlation and its related values			Values in the stepwise regression	
		R	$R^2$	Change in $R^2$	Standardized Coeff.Beta)	F
1	Sex	.66	.43	.43	.66	64.43*
2	Sex Entra.exam	.71	.51	.08	.45 .34	42.76*
3	Sex Entra.exam Trans.average	.73	.53	.02 <sup>a</sup>	.34 .34 .19	31.15*

a indicates that the increase in the explained variance is statistically significant ( $p < .05$ )

\*  $p < .01$

As can be seen in the table, model 1 shows that Sex alone explained about 43% of the variance in College GPA. In model 2, sex and Entrance exam explained about 51% of the variance in College GPA. The change in  $R^2$  (8%) was the proportion of variance accounted for by Entrance exam alone and was significant ( $P < .01$ ). In model 3 of the same table, Transcript average raised the proportion of variance from 51% to 53%. The change in  $R^2$  (2%) was also significant ( $P < .05$ ). Thus, model 3 was identified as the best model of regression. Mathematically, it is expressed as, College GPA (pred.in stand. score) = .34(Sex) + .34 (Entra. exam) + .19 (Trans.average). The rest predictor variable (EGSECE) was excluded by stepwise regression.

Table 9 presents the results of the regression analysis to predict College GPA of the entire group

**Table 9 Summary of multiple regression analysis predicting College GPA of Participants considered together (N=293)**

Model	Variables	Multiple correlation and its related values			Values in the stepwise regression	
		R	R <sup>2</sup>	Change in R <sup>2</sup>	Standardized coeff.(Beta)	F
1	EGSECE	.43	.19	.19	.43	66.97*
2	EGSECE Trans.average	.49	.24	.05	.36 .24	45.78*
3	EGSECE Trans.average Entra.exam	.51	.26	.02 <sup>a</sup>	.33 .18 .15	33.27*

a indicates that the increase in the explained variance is statistically significant(p<.05)

\* p<.01

As shown in the table, there are three models for stepwise regression. Model 1 shows that EGSECE alone explained about 19% of the variance in College GPA. Model 2 shows that EGSECE and Transcript average together explained about 24%. This means that Transcript average alone explained about 5 % of the variance in College GPA and was significant (P<.05). Model 3 of the same table shows that due to the inclusion of Entrance exam, the proportion of variance in College GPA was raised from 24% to 26%. The change in R<sup>2</sup> (2%) was significant (P<.05) and the model was identified as the best model of regression. Mathematically, it is expressed as, College GPA (predi.in standard score) =.33(EGSECE) + .18(Trans.avrage) +.15(Entra.exam).Only Sex was excluded by stepwise regression.

Table 10 presents the results of the regression analysis to predict College GPA of male students.

**Table 10 Summary of multiple regression analysis predicting College GPA of Male students (N=167)**

Model	Variables	Multiple correlation and its related values			Values in the stepwise regression	
		R	R <sup>2</sup>	Change in R <sup>2</sup>	Standardized coeff.(Beta)	F
1	EGSECE	.44	.19	.19 <sup>a</sup>	.44	38.98*

a indicates that the increase in the explained variance is statistically significant(p<.01)

\* p<.01

As can be seen in the table, the stepwise regression consists only one model, which includes EGSECE as the best predictor variable of College GPA for male students. It explained about 19% of the variance in College GPA. Mathematically, it is expressed as, College GPA (predi.in standard score) =.44(EGSECE). The remaining predictor variables were excluded by stepwise regression.

Table 11 presents the results of the regression analysis to predict College GPA of female students.

**Table 11 Summary of multiple regression analysis predicting College GPA of Female students (N=126)**

Model	Variables	Multiple correlation and its related values			Values in the stepwise regression	
		R	R <sup>2</sup>	Change in R <sup>2</sup>	Standardized coeff.(Beta)	F
1	Entra,exam	.35	.12	.12	.35	16.93*
2	Entra.exam Trans.average	.40	.16	.04 <sup>a</sup>	.20	11.64*

a indicates that the increase in the explained variance is statistically significant(p<.05)

\* p<.01

As shown in the table, the stepwise regression consists two models. Model 1 shows that Entrance exam alone explained about 12% of the variance in College GPA. In model 2, Transcript average raised the proportion of variance in College GPA from 12% to 16%. The change in  $R^2$  (4%) was significant ( $P < .05$ ) and the model was identified as the best model of regression. Mathematically, it is expressed as, College GPA (predi.in standard score) = .30(Entra.exam) + .20(Trans.average)

Finally, the beta weights (standardized coefficients) entered in the best models was different for all sub groups (each field of study, male and female students), and the entire group.

### **Information obtained through Interview about College Entrance Exam**

The interview was conducted at the end of the data analysis of the study. According to the result of this finding, Entrance Exam was found not to be a good predictor of College GPA. This result is not expected by the researcher and other concerned bodies. That is why interview was conducted with three professionals selected from the Selection Committee of HCTE.

For questions number 1, 2, 3, & 4 (See Appendix D), the interviewees forwarded their suggestions as follows.

For question number 1, from the three interviewees, two of them suggested, "College Entrance Exam is the best predictor of College performance (GPA) of students". But, one of them suggested, "EGSECE is the best predictor of College performance of students". In addition, he justified, "EGSECE is prepared in a national level, more or less in a uniform manner unlike College Entrance Exam which is prepared in different Colleges in SNNPREB". More specifically, he suggested that College Entrance Exam might not be a good predictor of College GPA as it was prepared in a non uniform manner in different Colleges.

For question number 2, one of the interviewees explained, "It is difficult to talk about the quality of College Entrance Exam this time since it is prepared in different Colleges turn by turn". The remaining interviewees explained, "If College Entrance Exam is prepared carefully and in a uniform manner assigning representatives from the four Colleges in

SNNPREB, its quality may not be questionable. But, this time there is no uniformity in its preparation. Further investigation should be conducted on the quality of items of the exam prepared in different Colleges". Furthermore, they suggested, "Item banking system should be designed for the future".

For question number 3, all of the interviewees in their sides suggested, "There is no uniformity in administration of the Entrance Exam in different centers of the Exam". In other words, they also suggested, "Even though the guide lines prepared for all centers are the same, the assigned supervisors and invigilators may not apply the rules in a uniform manner due to internal and external factors". More specifically, when they say internal factors they mean that the rules were not applied as required due to the fact that supervisors assigned to different centers used to follow different styles during administration of the exam. By external factors, they mean that different challenges, which were beyond the capacity of the supervisors, were observed in different centers during the exam was going on.

For question number 4, all of the interviewees suggested, "If the College Entrance Exam failed to be a good predictor of College GPA, the problem might be result from the administration of the exam in one hand, and from the quality of items in the exam on the other hand". More specifically, they suggested that to gain more from the College Entrance Exam, corrective measures should be taken to minimize the problems that might arise during administration of the exam and preparation of the exam in different centers and Colleges, respectively.

## CHAPTER FIVE

### DISCUSSION

In this chapter, the results are discussed in relation to the basic questions. To make the main issues of the discussion clear, this chapter is divided into three sections. These are relationship between cumulative College GPA and predictor variables, interrelationship of scores among the predictor variables, and predictive validity of components of the selection criteria.

#### **5.1 Is there significant relationship between predictor variables and**

#### **Cumulative College GPA of students, separately and collectively?**

To assess whether there are significant relationship between College GPA and the selection criteria/predictor variables separately (i.e. to match EGSECE, Transcript average, Entrance exam, and Sex with College GPA one by one), Pearson product-moment correlation coefficient was computed. Accordingly, correlations obtained between College GPA and EGSECE were significant for students of Language, Natural science, Social science, and for the entire group. They had also positive correlations for all groups. However, EGSECE had no significant correlation with College GPA for female students. These results support Samson's (2007) finding in that EGSECE was a better predictor of College GPA for students in some fields of study in Health Science College.

Before its termination, ESLCE was used as EGSECE even if the level of class is different. If we take ESLCE as a predictor variable, the results of this study supports Mohammed's (2004) finding, in that ESLCE GPA was found to be the best predictor of College GPA for each subgroup as well as for the entire participants. Desta's (2002) finding indicates the same result in that ESLCE was found to be the best predictor of College performance. Moreover, the findings of Shenkute (1991) and Tamiru (1992) are also in accordance with this finding, in that ESLCE was the most valid predictor of success at the training institutes. But, the results of this finding are inconsistent with the findings of Tibebe (1992), Merihatibeb (1993), and Melaku (1975) in that ESLCE GPA had got weak correlation with College performance of students. And also, the results of

this finding contradict with the finding of Tsegazeab (2007) in that the EGSECE GPA was found to be low in its predictive ability. But, according to Wosen's (2007) finding, EGSECE was found to be the best predictor of College performance only for Mathematics department.

When Transcript average is considered as a predictor variable, the correlation between College GPA and Transcript average was significant and positive for all fields of study and for all participants considered together. But the College GPA had no correlation with Transcript average for male students, while it had significant correlation with Transcript average for female student. The results of this finding, particularly the one for the entire group (i.e., all participants considered together), are in line with the finding of Kebede (1991) in that high school average significantly predicted students' performance for the combined groups, separate fields of study as well as for males and females. The results of the finding are also in line with Meresa's (1994) finding in that high school average score has statistically significant relationship with the first semester average score earned in the Institute (Ethiopian Electric Light and Power Authority Training Institute). However, the relationship of the high school average score with second, third, and fourth semesters' average scores earned in the Institute was not statistically significant.

If we compare the results of this finding with International study, the results are in line with the finding of Halpin, Halpin and Schaer (1981) in that high school achievement predicted freshman grades better than scholastic achievement or aptitude tests. Moreover, the results of this finding are also consistent in most cases with the finding of Wosen (2007) in that high school average was a significant predictor for all departments as a whole.

When College Entrance exam is considered as a predictor variable, College GPA correlates positively with Entrance exam in all fields of study. College GPA had no significant correlation with Entrance exam for male students even though it had significant correlation for female students. If we consider all participants together, the result of this finding is in line with the findings of Meresa (1994) and Kebede (1991) in that both have found positive relation between College GPA and Admission test scores.

On the other hand, this finding contradicts the finding of Wosen (2007) in that College entrance exam was the best predictor of College performance to Language, Natural science, and Social science departments.

When Sex is considered as a predictor variable, the correlation between Sex and College GPA was positive and significant for all cases. However, a significant correlation may not necessarily imply significant predictor in the case of multivariate analysis because of an overlapping effect (Hinkle, Wiersma, & Jurs, 1994). To identify the true variable, which contributes significantly for the variability of the criterion variable, we use multiple regression analyses. Therefore, even though the correlation between Sex and College GPA was significant, it failed to be a significant contributor to predict College GPA for the entire group (which will be discussed in detail in section 5.3).

To assess whether there is significant relationship between College GPA and the selection criteria collectively (i.e. when all the components of the selection criteria are combined), multiple regression analysis was computed to identify the true variable, which contributes significantly for the variability of the criterion variable. The correlation coefficient may not hold true in the case of multivariate analysis. That is why multiple regression analysis was used. To get better understanding to this question, more information is given in section 5.3.

## **5.2 What is the interrelationship of scores among the components of the selection criteria/predictor variables?**

To find answer to this question, Pearson product-moment correlation coefficients were computed, and the relation between each component of the selection criteria is given based on the values of correlation coefficient.

As mentioned early, EGSECE, Transcript average, Entrance exam and Sex are predictor variables (components of the selection criteria) in each field of study and in the entire group. When male and female students were considered separately, Sex was removed from the other predictor variables and the correlation coefficient was computed among EGSECE, Transcript average, and Entrance exam. When we see the interrelationship

among these variables, all had significant relations with each other for the entire group. But, for students of Natural science the relationship between EGSECE and Transcript average was not significant. Transcript average and Entrance exam had significant relationship only for female students. But, the remaining predictor variables had weak relationships among them for male and female students. This result implies that Transcript average and Entrance exam as the components of the selection criteria correlate differently for male and female students.

When Sex was considered as a predictor variable for the entire group and other subgroups, it was observed that Sex is correlated positively with other predictor variables and the correlations are in line with the code numbers given initially for Sex (dummy variable with 1=Male, 0=Female). This means that higher performances go with 1=Male, while lower performances go with 0=Female. Moreover, this result supports the finding reported by Mohammed (2004) that females' achievement is less than males' achievement in College courses.

The researcher faced with shortage of related studies conducted so far pertaining to this question in order to compare the results of this finding. As long as the researcher's knowledge is concerned so far, only a single study has been conducted on the interrelationship of scores among predictor variables (Mohammed, 2004).

### **5.3 What is the predictive validity of each component of the selection criteria?**

In order to identify the predictive power of each predictor variable and the best regression model, regression analysis was conducted and the results are presented in Tables 6,7,8,9,10 & 11 for Language students, Natural science students, Social science students, participants considered together, male students, and female students respectively. EGSECE explained about 26%, 19% and 19% of the variance of College GPA for Natural science students, the entire group and the male students, respectively. But, EGSECE was not a significant predictor of College GPA for Language, Social science and female students. Each of these proportions is the highest when compared with proportions of variance explained by other predictor variables in each respective group. If

we take the entire group as a reference group, EGSECE was identified to be the best predictor of College GPA among the variables considered in this study. This result supports the study of Samson (2007) that EGSECE was a better predictor of College GPA for some fields of study in Health Science College. Many researchers had conducted various studies on predictive validity of ESLCE result before the implementation of the new educational policy. If we consider the ESLCE result as a predictor variable, the result of this finding is in line with the findings of different researchers (e.g., Shenkute, 1991; Tamiru, 1992; Desta, 2002; Mohammed, 2004) in that ESLCE was found to be the best predictor of College performance of students.

But, the finding of this study contradicts with the findings of Tibebe (1992), Merihatibeb (1993), and Melaku (1975) in that the ESLCE GPA had weak correlation with College performance of students. Moreover, the finding of this study contradicts with the finding of Tsegazeab (2007) that the EGSECE together with other predictor variables used in the study was found to be weak in its predictive ability.

Transcript average contributed 23%, 3%, 2%, 5% and 4% of the variance in College GPA for Language, Natural science, Social science, entire group and female students respectively. All the proportions were significant at  $\alpha=0.05$ . For male students, the Transcript average was failed to be a significant predictor of College GPA. For the entire group, the Transcript average was identified as the second best predictor of College GPA among the predictor variables involved in the study. This result is in line with the findings reported by different investigators (such as Fraenkel and Wallen (1993), Wesley (1994), and Kebede (1991)) who have found that the record of performance in high school to be reflected in the criterion of College performance. The result of this finding is also consistent with the finding of Meresa (1994) in that the high school average has statistically significant relationship with the first semester average score earned in the Ethiopian Electric Light and Power Authority Training Institute.

However, for male students this result is not in line with Wosen's (2007) in that high school average was a significant predictor of College GPA for all departments as a whole. On the other hand, the finding of this study is not in accordance with the finding of Passons (1967) in that he reported that, although school achievement was the most

predictive indicator of future overall College success, test scores were slightly more valid than high school achievement for predicting grades in specific courses. But in this study, Transcript average was observed to be more valid predictor of college performance of students than the result of Entrance exam.

The third predictor variable is the result of Entrance exam. It explained about 8%, 2% and 12% of the variance in College GPA for Social science students, the entire group, and female students respectively. It failed to be a significant predictor of College GPA for Language, Natural science, and male students. Even for the entire group, it was found to be the last predictor variable from the predictor variables identified to predict College performance of students (e.g. EGSECE, and Transcript average). This result was not expected by the researcher and other concerned bodies (e.g. Educational Selection Committee) since College Entrance exam is recently used as a better selection criterion to select students in different institutions.

To gather further information about the College Entrance Exam, three professionals were selected from the College (HCTE) for they are believed to be the best source of information. Then, Interview was conducted with these professionals about this unexpected result of Entrance Exam. The professionals have been serving in the selection committee of the College since 2000 E.C. According to the suggestion forwarded by the professionals, this unexpected result might result from the quality of the exam and/or the problem of administration of the exam during the selection period. On their suggestion, they gave stress on the problem of administration of the exam, and recommended to conduct further investigation on this issue. Thus, this result calls for further investigation on the quality of College Entrance exam particularly prepared for South region Teacher Education Colleges and on the problem of administration of the exam. Moreover, this result contradicts with the finding of Wosen (2007) in that, College Entrance exam was the best predictor of College performance to Language, Natural science and Social science departments.

However, the result of this finding is in line with the finding of Tamiru (1992) in that the score of entrance examination was valid predictor only for Food and Beverages Services, and Food and Beverage Control Department. The finding of this study is also in line with

the finding of Kasim (1999) in that, Entrance exam did not have statistically significant relationships with first, second, third and fourth semester's academic scores and first year and second year composite scores. This means that its significance relationship is only with fifth and sixth semesters academic scores and third year composite score.

Sex as a predictor variable failed to be a significant predictor of College GPA for the entire group and other subgroups other than Social science even if it had significant positive correlations with College GPA in all groups. Sex contributed 43% of the variance of the College GPA for Social science students. In the opinion of the researcher, this high proportion of variance may come from the strong correlation( $r=.66$ ) between Sex and College GPA as compared to that of other groups.

On the other hand, the reason that Sex as a predictor variable failed to be significant as mentioned above is due to the fact that EGSECE, the best predictor in this study, was moderately correlated with Sex. However, the goal in regression analysis is to select predictor variables that are highly correlated with the criterion variable but have low correlation among themselves (Hinkle, Wersma and Jurs, 1994). This means that, if two predictors correlate highly/moderately to each other, only one can have a significant contribution to the prediction of the criterion measure. Thus, due to the overlapping effect of high/moderate correlation with other predictor variables (e.g. EGSECE, Transcript average, and Entrance exam), Sex failed to be a significant predictor of College performance of students except for social science students.

#### **Q. Do the selection criteria predict College performance differently in various fields of study?**

If we observe the results obtained in each field of study as shown in Tables 6, 7, & 8 in chapter four, they clearly show that different predictor variables were identified as the best predictors in various fields of study. For instance, Transcript average was identified to be the best predictor for Language students; EGSECE was identified to be the best predictor for Natural science students; and Sex was identified to be the best predictor for Social science students. But the results for Aesthetics students were not analyzed independently for its low sample size. Only 15 participants were sampled using

proportional allocation procedure of stratified random sampling because of access of its population. Many investigators reported that sample size affects the meaningfulness of the study. For example, Cronbach (1971) suggested that validation study requires a sample of 100 or more cases. Generally, representativeness and adequate size should be focused on deciding on the number of participants in a study (Hinkle, Wiersma & Jurs, 1994; Cronbach, 1971). The result of this finding for Language and Social science students is not in line with the finding of Mohammed (2004) in that ESLCE GPA was identified to be the best predictor of College GPA for all subgroups and the entire group.

**Q. Do the selection criteria have different predictive powers for males and females?**

As shown in Tables 10 & 11 in chapter four, the findings of the study clearly show that the selection criteria have different predictive powers for males and females. For instance, Entrance exam had found to be the best predictor of College GPA for female students, while EGSECE was found to be the best predictor of College GPA for male students among other predictor variables. This has also implication to modify recently used selection criteria in order to have predictor variables that have nearly equal predictive powers for males and females. The result of this finding supports the study reported by Mohammed (2004) in that the ESLCE GPA predicts better for males' than females' performance in College.

In general, the proportions of variance accounted for by all components of the selection criteria (EGSECE, Transcript average, Entrance exam, and Sex) were 23%, 29%, 53%, and 26% for students of Language, Natural science, Social science, and the entire group, respectively. Sex had no contribution for other groups other than Social science. EGSECE and Entrance exam had no significant contribution for Language students. Entrance exam had no significant contribution for Natural science students. EGSECE had no significant contribution for Social science students. If we consider the entire group,  $R^2=26\%$ . This means that, the total proportion of the variance accounted for by the selection criteria was only 26% for the entire group. The remaining proportion (74%) of variance was accounted for by other unknown factors. The factors might be motivational, personal or environmental factors.

The proportions of variance accounted for by the selection criteria for male and female students were 19% and 16% respectively. For the female students', the remaining proportion (84%) of the variance accounted for by other variables is greater than that of the male students' (81%). Such a result might come from the special quota system given for female students in each Woreda of the region in order to avoid the existing gender gap. Even though this is the case, the performance of female students in the College was not so much less than that of male students' performance in most streams.

**Q. Do the weights assigned to the components of the selection criteria in SNNPREB match with the beta weight of this study?**

Finally, in order to answer the last basic question of this study, it seems fair to assess the beta weights (standardized coefficients) identified by stepwise regression for each significant predictor variable for the entire group. SNNPREB has been using the selection criteria as follows: EGSECE(10%), Transcript average(20%) and Entrance exam(70%). However, the beta weights (standardized coefficients) identified for statistically significant predictor variables are listed as follows: EGSECE(.33), Transcript average(.18) and Entrance exam(.15). According to the result of this study, it is clear to see that the weights assigned to the components of the selection criteria do not match with the beta weights of this study. This comment was given based on simply observing the beta weights and comparing them with the proportion (weight) assigned to each component of the selection criteria that have been using in SNNPREB.

## CHAPTER SIX

### SUMMARY AND CONCLUSIONS

The main purpose of the present study was to assess the predictive validity of the selection criteria used to select students for (10+3) Teacher Education Colleges. More specifically, the study sought to answer the following basic questions:

1. Is there a significant relationship between the selection criteria and cumulative GPA of third year students?
2. Do the selection criteria predict College performance differently in various fields of study?
3. Do the selection criteria have different predictive power for male and female students?
4. Do the weights assigned to the components of the selection criteria in SNNPREB match with the beta weights of this data?

There were four Teacher Education Colleges in SNNPR. Of these, Hawassa College of Teacher Education (HCTE) was selected using convenience sampling technique. From this College, 293 participants (Males=167 & Females=126) were randomly selected from 798 students (Males= 453 & Females = 345).

Participants' personal files from registrar's office of the College were used as the main source of data. The data included EGSECE GPA, Transcript average, result of College Entrance exam, Sex, and cumulative GPA of third year students in the College.

Descriptive statistics (means and standard deviations), Pearson product-moment correlation coefficient, multiple and stepwise regression analyses were employed to analyze the data. The results showed that there were statistically significant relationships between the predictor variables and the criterion variable. The intercorrelation of scores of the components of the selection criteria was also found to be statistically significant for the entire group and for students in all streams except Aesthetics.

In the multiple regression analyses, it was found that EGSECE GPA explained the highest proportion of variance in College GPA for the entire group even though it was

not expected by the researcher. For the same group (the entire group), Transcript average and College Entrance exam were found to be the second and the third best predictors of College GPA, respectively. The total proportion of variance accounted for by the selection criteria was found to be 26%, 19% and 16% for the entire group, male and female students, respectively.

Moreover, the selection criteria were found to have different predictive powers for different fields of study/streams, female and male students. Furthermore, the results showed that the weights/proportions assigned to the components of the selection criteria in SNNPREB do not match with the beta weights of this study.

From the findings of the study, one may arrive at the following conclusions.

1. It seems that there is significant association between the predictor variables(EGSECE, Transcript average, Entrance Exam, and Sex) and the criterion variable(College GPA)
2. It seems that EGSECE GPA is the best predictor of College GPA of students among the components of the selection criteria.
3. It seems that the selection criteria work better when used to predict College GPA of male students than that of females.
4. It seems that the selection criteria have different predictive powers for students who pursued different fields of study.
5. It seems that there is interrelationship among the components of the selection criteria.
6. It seems that the weights assigned to the components of the selection criteria (e.g. EGSECE, College Entrance exam) in SNNPREB do not match with the beta weights of the present study.

Finally, the findings seem to have practical implications to concerned bodies (e.g. SNNPREB, Teacher Education Colleges) and further research. These implications include the need to (a) improve the present selection criteria used for (10+3) Teacher Education Colleges in SNNPR considering the following points.

- In order to increase the total proportion of variance accounted for by the selection criteria, additional pertinent components should be included in the original criteria.
- The weights given to the different components of the selection criteria should be re-examined to reflect the relative importance of the components as shown in the results of the present study.
- The greatest weight, according to the results of this study, should be assigned to EGSECE GPA.

(b) encourage the special quota system for females in order to avoid gender gap during the selection period.

(c) consider the interest of trainees/students when students are assigned to different streams/departments.

(d) conduct further research to examine the quality of College Entrance exam, particularly in SNNPR.

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## Appendix D

### SEMI—STRUCTURED INTERVIEW

(Interview conducted with Professionals from the Selection Committee, HCTE)

**Qualification** \_\_\_\_\_

**Work Experience** \_\_\_\_\_

1. From your experience, what do you think is the best predictor (variable) of College GPA of students out of the components of the selection criteria?
2. What is your view on the quality of College Entrance Exam? Please explain.
3. Do you have any suggestion about the administration of College Entrance Exam in different centers?
4. Should the Entrance Exam be not a good predictor of College GPA, what would you suggest?

## DECLARATION

I hereby declare that this thesis is my original work done under the guidance of Dr. Seleshi Zeleke. All relevant sources used for the thesis have been duly acknowledged.

Name Tamire Laelago

Signature 

Date 18 June 2010

The thesis has been submitted for examination with my approval as a University advisor.

Name Dr. Seleshi Zeleke

Signature 

Date 18 June 2010

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