

UNIVERSITY OF CAPE COAST

PREDICTIVE VALIDITY OF SENIOR HIGH SCHOOL (SHS)  
AGGREGATE OF STUDENTS' GRADE-POINT AVERAGE (GPA)  
AT THE UNIVERSITY OF CAPE COAST, GHANA.

BY

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A thesis submitted to the Department of Educational Foundations of the Faculty of Education, University of Cape Coast in partial fulfillment of the requirements for award of Master of Philosophy Degree in Educational Measurement and Evaluation.

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2009

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## DECLARATION

### Candidate's Declaration

*I hereby declare that this thesis is the result of my own original work and no part of it has been presented for another degree in this University or elsewhere.*

Candidate's Signature: ..... Date:.....

Candidate's Name: Simon Alhassan Iddrisu

### Supervisors' Declaration

*We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidance on supervision of the thesis laid down by the University of Cape Coast.*

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Co-Supervisor's Signature..... Date.....

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## ABSTRACT

The study was conducted to investigate the predictive validity of students' senior high school certificate examination (SHSCE) entry aggregate on their final year cumulative grade-point average (GPA) at the University of Cape Coast. The study covered the year groups from 1999 to 2001 involving five departments under the Faculty of Education at the University of Cape Coast. A total of 1,216 subjects consisting of 403 females and 813 males formed the study population. The research design used final year cumulative GPA as the criterion, and SSCE aggregate, gender and end of first year GPA (FYGPA) as predictor variables.

Bivariate and regression analyses were carried out to investigate the relationships between variables. The correlation coefficient,  $r$  was also used to describe the extent of relationships and the regression equation used to estimate the predicted variable.

There were significant differences in the relationships between SHSCE grades and end of first year GPA as well as the final year cumulative GPAs. The key finding was that SHS students' entry grades did not determine their final year GPA with certainty. Rather, the end first year cumulative GPA was found to be the best predictor of the final year cumulative GPA with the other predictor variables having relatively little predictive effect on the criterion variable.

The study concludes that it is best to predict students' grade point average with their first year cumulative GPA and recommends that the departments in the Faculty set aside 5% of admission vacancies for students with low aggregates.

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## **DEDICATION**

I dedicate this work to my dear children; Collins, Prosper, Neena, and my wife, Faustina. This work is also dedicated to the memory of my Beloved Mother, Fati.

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## **CHAPTER 1**

### **INTRODUCTION**

#### **Background to the study**

Various groups and institutions have over the years used and continue to use test and examination results for varied purposes in different situations. Allen and Yen (1979) identified the following uses of tests as being among the cardinal reasons for developing and designing tests in general. Tests are used for selection, as in when new employees are selected from a group of job applicants or clients for psychological counselling from a pool of potential clients. Tests are used for classification- for example, classifying a person as neurotic, brain-damaged, or weak in verbal skills and strong in mechanical skills. This classification occurs in placement settings, as when a student is classified into a class division when grading or placed in an advanced French class or when a soldier is assigned to the motor pool. Tests are used for evaluation, as when students are assigned grades in a class, individuals are certified to teach, practise law, or medicine, or the effectiveness of teaching programmes is evaluated. Tests are useful in counselling, as when an interest inventory is used to suggest potential careers or use a personality test to aid in marriage counselling. In research, test scores are also an invaluable source of data, for example, when classifying subjects in an experimental design or measuring different behaviours and examining their

interrelationships.

The Chinese who are credited with being the pioneers in the use of test results are said to have formally selected their government officials through tests and examinations (Hopkins & Antes, 1978). According to Hopkins and Antes, the Chinese believed that there was a close relationship between a person's performance at tests/examinations and his/her output at the job place. For this reason, applicants for job vacancies were taken through rigorous testing conditions and scrutinized closely so as to select only those who were capable of executing the jobs. In this wise they used the applicant's performance at the selection examinations to predict or forecast his/her output in the real job environment.

Allen and Yen (1979) cited Du Bois as attributing the increase in the use of test results to three major areas of development: civil-service examinations, school examinations, and the study of individual differences. Civil-service testing began in China about 3000 years ago when an emperor decided to assess the competency of his officials. Later, government positions were filled by persons who scored well on examinations that covered topics such as music, horsemanship, civil law, writing, Confucian principles, and knowledge of public and private ceremonies. Such examinations were eliminated in 1905 and were replaced by formal educational requirements probably because ones'. Paradoxically, as the Chinese were phasing out their examinations, civil-service examinations were being developed in Britain and in the United States as a fair way of selecting among job applicants for government jobs.

Allen and Yen (1979) further indicated that students in European schools were given oral examinations until well after the 12<sup>th</sup> century, when paper began replacing parchment and papyrus. In the 16<sup>th</sup> century the Jesuits started using tests for the evaluation and placement of their students. Present-day students owe their examinations to the later developments of printing presses and ditto machines.

With the passage of time, this philosophy and practice of the Chinese pervaded the western countries including the United States of America where testing and assessment have assumed centre stage of efforts to reform America's educational system. Based on the fact that college admissions and scholarships should reflect merit, rather than privilege, standardized entrance examinations have taken on roles undreamed of by their creators (Kessel & Linn, 1996).

Kessel and Linn (1996) maintain that the use of tests has become so widespread in American schools, clinics, industry, and government that it is difficult to imagine anyone who has not taken hundreds of tests. Most early tests were designed for administration to only one individual at a time. Although work had begun on tests that could be given to many examinees at once, group-administered tests did not become widely used or accepted until after their introduction by the United States Army in World War I. The success of military testing led to the widespread development and use of group tests in schools and industry.

Yerkes (as cited in Kaplan & Succuzzo, 1989) is said to have headed a committee of psychologists who developed group tests of human ability; namely the Army Alpha and the Army Beta tests. These two tests were extensively used

during the First World War I used to evaluate draftees. The Army Alpha test was developed for literate groups while the Army Beta was designed for illiterates, low literates or non-English speaking adults to measure their intelligence. The Army Alpha was a structured ability test that required the reading ability. Both tests were based on the theoretical position that intelligence was an inherited trait, and the assumption was made that native intelligence was being assessed. Each test was made- up of a number of subtests, the contents of which differed depending on whether the test was for literates or illiterates, low literates or non-English speakers.

The colleges and universities saw that a test of this type could be very helpful to them. In 1920, the College Board in the United States of America appointed a committee to investigate the possible value of an objective test to the Board's members. This group recommended that such an examination be developed. In 1924, a second committee was appointed to review this question and it also urged that the Board develop an aptitude test. In April, 1925, the College Entrance Examinations Board in America moved to develop an aptitude test and to offer this examination to the public in June, 1926 (Fuess, 1950). Two types of aptitude tests emerged from the effort of the College Entrance Examinations Board namely: the scholastic aptitude test (SAT) and the American college test (ACT).

The strength of the SAT is its ability to provide a standard measure by which students can be compared. The test is uniform in its administration, application and scoring and provides students and educators a common set of

measures to differentiate students with similar academic credentials. For colleges and universities that receive several thousand applications each year it provides a quick and efficient way to classify students. Research on the predictive validity of the SAT indicates that traditional predictors of academic outcomes are enhanced with its use (Burton & Ramist, 2001; Camara & Echternacht, 2000). An analysis of the tests however, showed that the verbal test scores did not correlate highly with the mathematics test scores. This discovery convinced the Board that the results of this test should be presented in two scores: Verbal and Mathematics

In a large scale study of the predictive power of SAT scores and high school grade point average for predicting first year grade point average the predictive increment for the top tier schools was .09, .06 for the middle group and .04 for schools in the lowest category (Bridgeman, Jenkins & Ervin, 2000). Obviously, these coefficients reported by the study for the groups above were generally very low and could not be used for predictive purposes. Bowen and Bok (1998) reported similar findings in their research of highly selective institutions admissions. The College Board has also conducted numerous studies of the predictability and validity of the SAT for predicting first year GPA (Burton & Ramist, 2001; Bridgeman, Jenkins & Ervin 2000; Camara & Schmidt, 1999). Their findings have supported the use of the SAT as a measure to enhance the predictive power of admissions models that use High School GPA, rank in class and other quantitative variables to predict a first year GPA.

The major weakness of the SAT is the limitations of its use across different populations of students. Students have very different social, cultural, and

educational experiences. To attempt to predict the academic potential for all students using a single measure such as a standardized test score is unfair and unreliable. Researchers have cited test structure (multiple choice) as possibly biased against women (Childs, 1990).

The American College Testing Program (ACT) was founded in 1959 as an inviolate public trust with the original purpose of providing student assessment services to the nation's institutes of higher education for the counselling, placement, and admission of students to college (ACT, 1973). The ACT was designed to measure critical reasoning and higher order thinking skills in four curriculum areas: English, Mathematics, Reading and Science. The score is a composite of each of the components on a scale of 1 to 36, with a mean of 18 for the sample of students who take the test nationally. Both the SAT and ACT are commonly used to predict future academic performance as measured by predicted first year grades. The measures are generally validated against the criterion of the first year grade point average. Admissions officers in most American universities generally use SAT or ACT tests as an important part of the assessment process. It is assumed that the standardized test scores provide some objective measure for evaluating and comparing applicant's records that are from high schools with very different academic standards and grading practices. It is the weight given the test for admissions decision that presents major problems (Bowen & Bok, 1998). Many schools and critics contend that the SAT and ACT are over weighted in the admissions process (Cross & Slater, 1997; Zwick 1999).



Researchers have presented conflicting views and arguments to support the use or elimination of standardized tests in the admissions process (Tracey & Sedlack, 1987). The predictive validity of the SAT and the ACT as preadmission measures have been scrutinized in response to the continuing debate on the use of race neutral admissions policies in American universities. Opponents of the test argue that the tests have a significant and disparate impact on African Americans and Hispanics, are biased, and are inappropriate as criteria for admissions (Powell, 2003). Crouse and Trushiem, Sacks, Tracey and Sedlacek (as cited in Powell, 2003) indicate that prior research has generated evidence that the tests have limited predictive potential across racial, ethnic and gender characteristics.

Theorists, researchers, politicians, educators and community leaders have offered many reasons for the score differences in ethnic group performances on the SAT. These critics contend that score differences reflect socioeconomic conditions, cultural bias, and linguistic issues (Rigol, 1997; Camara & Schmidt, Zwick, 2000). Supporters of the SAT contend that group performance differences are reflections of the flaws and inequities in the educational system and group performance differences on standardized tests can arise for many reasons that are not a function of the tests (The College Board, 1999). Possible explanations for this performance gap are sample size variations, self-selection, different interests, aspirations, expectations and unequal educational opportunities (Camara & Schmidt, 1999) that are beyond the control of the test. Group differences in performances on the SAT and ACT tests are fairly consistent with the biggest gap

generally between Caucasian and African American test takers (The College Board, 2000).

There is a philosophical difference between Scholastic Aptitude Test and American College Testing Programme.

The specific job for which the SAT was designed was to provide an indication of a student's ability to do college work (It was not, and is not expected to take over the whole job of assessing scholastic potential). More precisely, the test is a measure of the level of development of the verbal and mathematical skills which are necessary to perform the academic tasks required in college (Chauncey, 1962: p 11).

On the other hand, the ACT tests are oriented toward major areas of college and high school instructional programmes. Test scores tend to have a direct and obvious relation with the student's educational progress, and carry a meaning readily grasped by both the instructional staff and the student (ACT, 1973; p 30).

Consequently, SAT was designed to test aptitudes as its name indicates, while the ACT was designed to measure student's educational progress in a number of academic fields. Both tests have demonstrated that they can assist colleges in predicting how students will perform in their college courses.

Universities and colleges in America usually admit and reject applicants primarily on the basis of predictions about their probable future scholastic

performance made from scholastic aptitude tests (SAT) and academic performance in senior high schools. Graduate Record Examination (GRE) scores are often considered during admissions process in some American universities for prospective graduate students and there have been several assessments of the predictive validity of the GRE for graduate students in Psychology (House & Johnson, 1993). These studies however report inconsistent results on the predictive value of students' GRE score on their scores in Psychology.

The use of previous academic records of students for selection into higher levels or institutions of higher learning is a common practice in many countries including Ghana (Anamuah-Mensah, 1988). In Ghana, movement or progression from the elementary school into the secondary level prior to the reforms in 1987 in the old educational system required the passing of the Common Entrance Examination (CEE). Admissions into the universities from secondary schools required passes in various subjects at the General Certificate of Education (GCE) Advanced ('A') Level examination of the West African Examination Council (WAEC). With the inception of the new educational reforms in 1987 in Ghana, the use of the CEE and 'A' Level examination results for educational progression into pre- and tertiary institutions have been replaced by the Basic Education Certificate Examination (BECE) and West African Senior High School Certificate Examination (WASHSCE) results respectively.

The demand for tertiary education increases by the day and so the need to closely scrutinize applicants using a common or standard yardstick for all is indispensable. Further, it must be ensured that those applicants who are selected

are capable of pursuing and succeeding in their chosen programmes. The growth of student populations with varied pre-university educational training, and the importance of all student groups participating in the economic benefits of a quality education cannot be ignored. To assume that SHSCE grades, and test scores are the only factors to consider in admissions decisions is unfair to students who come from diverse educational, especially those from deprived secondary schools, cultural, and socioeconomic backgrounds. The importance of developing models that are sensitive to the many forms of intelligence and aptitude demonstrated by students from various backgrounds is critical to developing admissions policies that are fair.

Addae-Mensah, Djangmah and Agbenyegah (1973) examined the predictive validity of CEE with respect to the General Certificate of Education (GCE) Ordinary (O) level examinations. They concluded that the CEE as a selective device seemed to be making it difficult for pupils from poor homes to get the necessary good education for which many of them are capable of attaining. Their findings revealed that among the public schools, a student who obtained a high score at CEE stood a good chance of doing well at Ordinary 'O' level but a candidate who obtained a low score stood an equal chance of doing well or doing poorly at the 'O' level. They also reported that in the private schools, some students with good marks in the CEE performed badly after first years in secondary school and got poor grades at the Ordinary 'O' level. Torjagbo (1996) also came out with inconsistent findings in her dissertation report on predicting students' potential in chemistry using BECE results. She reported that a number

of students' BECE results in science predicted their performance in chemistry fairly well at the SHS. At the same time, there were quite a number of others who obtained good grades in science at the BECE and yet performed poorly in chemistry at the SHS. In a similar study of the Professional Selection Test at University College of Education, Winneba, Amankwah (2000) reported indefinite findings. Conclusions emanating from the study cast a cloud of doubt on the predictive potential of Professional Selection Test. The entrance examination results did have only little predictive effect over students' grade-point averages across the faculties. From the issues discussed above, it seems to suggest that entry requirement or selection test results may not necessarily predict candidates' actual performance on job.

### **Statement of the Problem**

Administrators and heads of institutions alike always admit new prospective students into their institutions on the premise or assumption that such students would do well based on their present performances or results. Insurance companies or brokers, according to Glass and Hopkins (1996), rely heavily on statistical or actuarial predictions. In the same way, institutions of higher learning including University of Cape Coast (UCC) usually select their students with the assumption that the students' current SHSCE results would predict their future performance or final cumulative GPAs in their chosen programmes in the university.

The University of Cape Coast, like many other public universities in Ghana over the years, have set and continue to set cut-off aggregates for the purposes of

curtailing admissions into this institution given the multitude of applicants every year. These cut-off points continue to change year after year and even vary across the various programmes or faculties depending on the general performance in a given year. The question or problem is whether the admission model currently in use is fair or is encompassing enough not to preclude students with low SHSCE aggregates from admission but who might have adequate potential. In addition, admission to UCC is tied to the number of applicants to the University of Cape Coast in a given year as well as the number of applicants the university is capable and ready to admit. Candidates with higher aggregates have always been given preference to those with relatively lower/weaker aggregates even when they meet the national cut-off aggregates into the universities. Those candidates with higher aggregates are preferred probably because the administrators expect that all other things being equal, the selected candidates' results would predict higher cumulative grade-point averages in the final degree classification. But is this usually the case in all situations? In a study by Kessel and Linn (1996a), it was discovered that though some students with higher Graduate Record Examination (GRE) scores predicted high scores in a psychology test, it was not true in all cases. High scores did not always significantly correlate with scores in Psychology and for that matter did not predict high grades.

Kessel and Linn (1996b) in another study on how well mathematics score could predict students' score in statistics, discovered that though some students' mathematics scores predicted high scores in statistics, female students with generally low mathematics scores were found to obtain higher scores than their

male counterparts in statistics. The question then is should students' SHSCE grades be the sole criterion or determinant for admission into UCC? One school of thought has it that majority of students enter with low grades but complete with very high GPAs. On the other hand, some students also enter UCC with high grades but complete with lower class divisions (GPAs) than usually expected. Dare (1998) in a study on "Pointers to high achievement in first year university economics using students' Advanced(A) and Ordinary (O) level grades in English and Mathematics established that the grades were important predictors of performance in First University Examinations(FUE) grades in economics at UCC. He indicated however that, students' aggregates in three 'A' level subjects were not significant predictors of performance in FUE economics. Dare's study essentially tried establish a relationship (if any) between students' grades obtained in 'A' and 'O' level and that obtained in FUE economics. This particular study similarly is intended to investigate the relationship between students' SHSCE entry grade and the final year cumulative GPA at the Faculty of Education, UCC. The researcher chose to conduct the study in UCC using students' SHSCE entry aggregates and their GPAs because no specific study has yet been done on SHS students at the Faculty of Education, University of Cape Coast. The fact that data were readily available on SHS students was another good enough reason for restricting the study to them.

The study therefore set out to investigate the predictive validity of students' Senior High School Certificate Examination (SHSCE) results on their

final year GPAs in five departments in the Faculty of Education at the University of Cape Coast.

### **Purpose of the study**

The study was intended to evaluate the merits of using students' SHSCE results as a predictive device at the University of Cape Coast of student's final cumulative GPAs. Specifically, it sought to achieve the following objectives at the Faculty of Education:

1. To examine the SHS students' records to determine the relationship between their aggregates at the time of entry and their final grade point-average (GPA).
2. To investigate whether high entry aggregate (6 -15, division one) necessarily predicts high class (GPA, second upper and beyond) at UCC.
3. To investigate the relationship (if any) between a student's gender ( male or female) and the quality of GPA attained at the end of first year cumulative GPA and the final year cumulative GPA.
4. To investigate whether there is any relationship between a student's first year GPA and the final year cumulative GPA.
5. To investigate the best predictor of final year cumulative GPA in the Faculty of Education at UCC.

### **Research Questions**

1. What is the relationship between students' SHSCE entry aggregates and their final cumulative GPAs, in the Faculty of Education?



2. What is the relationship between students' SHSCE entry aggregates and their end of first year GPAs, in the Faculty of Education?
3. What is the relationship between a students' gender and the end of first year cumulative GPAs in the Faculty of Education?
4. What is the relationship between students' gender and the final (4<sup>th</sup>) year cumulative GPAs.
5. Which variable(s) or combinations from SHSCE, Gender and FYGPA is/are the best predictor(s) of a student's final year GPA?

### **Significance of the study**

This study is important for the reasons enumerated below:

1. The findings would push further the frontiers of our knowledge on the performances of University of Cape Coast students especially the SHS graduate students at the Faculty of Education.
2. The findings of the study are relevant and useful to the University of Cape Coast administrators. It would give a vivid picture of the pattern of performances of students over the years in the Faculty of Education and inform their admission policies/practices.
3. The study would serve as a reference material for future research purposes especially those related to student performances at the University of Cape Coast and possibly inform and guide future research works.
4. It would add to the research and discussion on the effects of differential prediction, and differential validity patterns in University of Cape Coast

admissions between different student groups with high and low entry SHSCE aggregates as well as between males and females.

### **Delimitation of the study**

The scope of the study is limited to only students who gained admission to the Faculty of Education, University of Cape Coast using the Senior High School Certificate Examination (SHSCE) results. Because of this reason, all students of different year groups who passed through this institution but did not complete SHS were excluded from the study. Despite the fact that there were SHS students admitted into other faculties other than Education, the researcher had to restrict the scope to the Faculty of Education to be able to manage the volume of data collected.

The five departments considered under the Faculty of Education are, Educational Foundations, Arts and Social Sciences Education (DASSE), Science and Mathematics Education, Basic Education and Vocational and Technical Education. Two other departments within Faculty of Education, namely the Institute of Education and the Institute for Educational Planning and Administration were not directly involved in the study since these two departments do not run separate undergraduate courses from the five departments above. The study also, focused on a cross-section of students across three academic year groups or batches covering the 1999/2000 to 2002/2003, 2000/2001 to 2003/2004 and 2001/2002 to 2004/2005. The study was restricted to these year groups for the purpose of managing the bulk of data expected from these departments and being conscious of the constraints of time, resources and

finances among other reasons. Another reason was that since the students had similar characteristics, any findings could be generalized to the rest and so there was no need to involve all. In addition, complete data covering the entire four academic years for SHS students could only be obtained from the 1999 group and beyond but not from groups who came before.

### **Definition of Terms**

The following terms used in the study have the meanings as defined below:

**Predictive Validity:** The ability or capability to make a statement of claim or forecast future performance based on present results.

**Aggregate:** The sum total of the best six grades obtained in the senior high school certificate examination. It is used synonymously with the word 'results'.

**High aggregate:** A high aggregate operationally refers to the aggregates between six (6) and fifteen (15).

**Low aggregate:** A low aggregate is an aggregate between sixteen (16) and twenty four (24).

**Grade:** The number or letter symbols representing marks or scores. SHSCE letter grades are interpreted as follows: A = 1, B = 2, C = 3, D = 4, E = 5, F =9.

**High GPA:** All GPAs that fall between 3.0 and 4.0, i.e. Second class upper and above. Any GPA below 3.0 is described as a low GPA.

**Predictor:** The variable that largely predicts or accounts for the change or effect realized. It is also called the independent/explanatory variable.

**Criterion:** The variable also called the dependent/outcome variable

### **Organization of the thesis**

Chapter one focused on the introduction and background to the study, statement of the problem, objectives and significance of the study, research questions and delimitation of the study. Chapter Two reviewed related literature under the following thematic areas; the concepts of reliability, validity, correlation, prediction, the correlation coefficient, factors affecting the correlation coefficient( $r$ ), the grade-point average, admission requirements in other countries and academic performance. Chapter Three delved into the methodology employed in the research covering subtopics such as research design, population, sample and sampling techniques, data collection procedure, research instrument and data analysis. Chapter Four presents the results of the study by discussing each research question and its correspondent results or findings. In Chapter Five, the summary of the findings and conclusions are presented alongside recommendations and avenues for future research.

## **CHAPTER 2**

### **REVIEW OF LITERATURE**

This chapter reviews theoretical issues and earlier works or studies done by other researchers that have relevance to this present study. The review of relevant literature has been grouped under the following sub-headings; concepts of reliability and validity, correlation and prediction, regression, assumptions, predictive validity of test scores, admission requirements, academic performance and a summary of the major findings of the literature review.

#### **Concept of Reliability**

A reliable measure is one that is stable or consistent across time. All other things being equal, a reliable measure is anticipated to give the same measurement of the same phenomenon each and every time it is used (Dunn, 1999). A reliability coefficient assumes a numerical index. Reliability coefficients are often based on correlation, a method of measuring the association between two or more variables. The degree of correlation between variables can be described by such terms as strong, low, positive, negative or moderate, but these terms are not very precise or definite. If a coefficient of correlation is computed between two sets of scores, the relationship is described more precisely. A coefficient of correlation is a statistical summary of the degree and direction of relationship or association between two variables (Glass & Hopkins, 1996).

Messick,(cited in Linn, 1997, p.4), intimates that “ a responsible use of test scores requires that the test user be able to justify the inferences drawn by having a cogent rationale for using the test score for the purpose at hand for selecting this test over other available assessment procedures”. The prerequisites for such a justification are reliability and validity. A high reliability coefficient indicates that there is consistency in examinee’s score but it does not ensure that the examiner’s inferences are defensible. Thus, evidence of a measurement’s reliability may not be sufficient to justify the desired inferences. It must be supported by evidence of its sound and appropriate use and interpretation. In other words the test results must be valid.

### **Concept of Validity**

Messick (1981) defines validity as the overall evaluative judgment of the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of interpretations and actions based on test scores and other modes of assessment ( Linn, 1997).

Nitko (2000, p.36) refers to the “soundness of the interpretation and uses of assessment results as validity”. An instrument that is a valid predictor of how well students might do in school may not be a valid measure of how well they will do once they complete school. Accordingly, the use of the West African Senior High School Certificate Examination (WASHSCE) results as entry requirements into universities in Ghana is a valid use of those results, but that of the basic school certificate examination (BECE) for the same purpose will not be a valid use of those results. So in general, an instrument’s results may not be said to be

valid or invalid but may rather be said to be valid for a specific purpose with a specific group of people. Validity is specific to the appropriateness of the interpretations an individual wishes to make with the scores.

Camara and Brown (1996) describe a number of validity evidences in use and tend to agree with the 1985 version of the standards for Educational and Psychological Testing (American Educational Research Association (AERA), American Psychological Association (APA), and National Council on Measurement in Education (NCME), 1985). These groups refer to the concepts of validity as trinitarian namely; the content, construct and criterion related validity evidences. This study however, is reviewing only an aspect of criterion-related validity evidence namely; predictive validity. The other aspect, which is concurrent validity, compares scores on an instrument with current performance on some other measure. Criterion-related evidence is collected by comparing the instrument with some future or current criteria. The purpose of an instrument dictates whether predictive or concurrent validity is desired.

Camara and Brown (1996), however, caution against rigid distinctions between predictive and concurrent, in defining validity as a unitary concept. They maintain that, the 1974 Revised Test Standards (AERA, APA, & NCME, 1974) assisted in reorientating the definition of validity from a property of a test or instrument to an evaluation of the interpretation and use of the test. The 1985 version of Test Standards (AERA, APA, & NCME, 1985; p.6) explains validity that “although evidence may be accumulated in many ways, validity refers to the degree to which that evidence supports the inferences that are made from the

scores. It follows that inferences made regarding specific uses of a test are validated, but not the test itself” (cited in Kessel & Linn, 1996.p.6).

Two important trends in scholarly debates according to Camara and Brown (1996) have evolved primarily from educational measurement and research, firstly; whether construct validity is central to test validity (Cronbach,1988; Guion,1980; Messick, 1988, 1989), and secondly, whether the social consequences resulting from test use can be used in evaluating test validity (Cronbach,1980: Estes,1993: Linn et al., 1991: Messick, 1988:1989, Moss,1992).

### **Concept of Correlation**

Measures of correlation are used to describe the relationship between two or more variables. Correlation analysis is the process of measuring the strength of the relationship between two variables using appropriate statistical techniques (Gordor & Howard, 2000). Two variables are correlated linearly if high scores on one variable tend to “go together” with high scores on the second variable (Glass & Hopkins, 1996). Likewise, if low scores on one variable tend to be accompanied by low scores on another, then the variables are said to be correlated.

A number of statistical measures have been derived to quantify the relationship among variables. Karl Pearson (1857-1936) derived a measure of relationship called the Product-Moment Coefficient of correlation, signified by  $r$  in a sample and by  $\rho$  (the Greek letter rho) for the population parameter. It is widely used in virtually all behavioural and social sciences. These tools are designed to analyse relationships between two variables, so the sample



data must be collected as paired data. Often, an intuitive understanding of the meaning of correlation coefficients and a qualitative conclusion about the paired data may be formed by constructing a scatter diagram (scatter plot). According to Glass and Hopkins (1996), a scatter plot consists of dots or tallies; each mark represents the intersection of two scores. The main purpose of the scatter plot is for the study of the nature of the relationship between two variables. It gives a pictorial view of the nature or shape of the relationship. The relationship between two variables is linear if a straight (a regression) line, more closely fits the dots of the scatterplot than does a smooth curve.

Interpretation of the size of a correlation coefficient depends on the way it is proposed to be used, the discipline in which the research is being done as well as on its statistical significance. What is a large or small correlation coefficient depends on the discipline within which the research question is being asked. However, for behavioural sciences, correlation coefficients of .10, .30, and .50, irrespective of its sign, are typically interpreted as small, medium, and large coefficients respectively (Green et. al, 1997).

A Pearson correlation coefficient,  $r$ , of .4 might be satisfactorily high for some purposes but too low for others. If it is to be used in the case of reliability, it may appear to be rather low, and a value of .60 would be more impressive. According to Cohen (1997), in the case of validity, a correlation coefficient of .40 would be quite satisfactory. For the purposes of prediction, a correlation coefficient,  $r$ , should be high, and of a value, .85 and above (Green et. al, 1997).

The higher the correlation, the better the predictions, the lower the correlation, the greater is the margin of error in the predictions.

If one variable is thought of as the predictor and another variable as the criterion, the correlation coefficient can be squared to interpret the strength of the relationship. The square obtained gives the coefficient of determination which is the proportion of criterion variance that is accounted for by its linear relationship with the predictor. No causal relation or association is assumed in prediction. Correlation does not, or cannot identify the causal relationships (if any) among groups of variables. Correlational research is suggestive, as it points to potential causal variables but makes no firm conclusions about them. According to Mangal (1987), the question regarding the significance of the size of the correlation coefficient cannot be fully answered without reference to the particular purposes and situations under which the coefficient has been computed. Consequently, the size has to be interpreted in the way it is intended to be used. He suggested three general purposes for the use of correlation:

1. In the form of a reliability coefficient for testing reliability of a test;
2. In the form of validity coefficient for studying the predictive validity of a test results and
3. In the form of a purely descriptive device for describing the nature of the relationship between two variables. In this particular study, the correlation coefficients computed were used for both predictive and descriptive purposes.

### **Interpreting the Correlation Coefficient (r)**

The interpretation of the correlation coefficient as a measure of the strength of the linear relationship between any two variables is purely mathematical. In both simple linear and multiple regression analysis,  $r$  can assume any value from -1 to 1, both inclusive. Correlation coefficient,  $r$  is -1 or 1 if, and only if, all points of  $n$  pairs of measurements lie exactly on a straight line. A perfect positive correlation is achieved when  $r = 1$  and a perfect negative correlation attained when  $r = -1$ . The negative correlation coefficient implies that as one variable increases the other tends to decrease but the relationship may not be exactly linear. The closer the coefficient is to -1 or to +1, the stronger the degree of correlation and the nearer the relationship is to being truly linear. However, if  $r = 0$ , the relationship between the two variables is described as uncorrelated or a non-linear relationship.

In a multiple linear regression equation involving two independent variables,  $Y = a + b_1X_1 + b_2X_2$ ,  $a$  is the Y intercept,  $b_1$  and  $b_2$  are the partial slopes of the linear relationship between the first and second independent variables in the equation. These partial slopes of the regression line are determined using other formulae. In multiple regression analysis, there are corresponding multiple regression coefficients that increase with the number of independent variables.

The correlation coefficient cannot be interpreted directly as a percentage. However, it can be interpreted as a percent in one important sense-when standard deviation or standard (Z) score units are used. The correlation (regression) coefficient can be expressed as the ratio of the sums of squares for the covariance

to the sums of squares for X (independent variable) (Kaplan & Saccuzzo, 1989). A question often asked in this connection is “how large should the coefficient be for it to be meaningful”? The question may be approached in three ways: (1) by examining the strength of the relationship; (2) by examining the statistical significance of the relationship; and (3) by examining the square of the correlation coefficient (Cohen & Manion, 1997).

First, the size of Pearson’s correlation coefficient,  $r$  is an index of or measures the strength of the linear relationship between two variables. The sign indicates the direction of the relation, positive or negative. While an  $r$  value of .00 indicates no linear relationship, a value of -1 or +1 indicates a perfect relationship. Values of  $r$  between these two extremes may be described as weak, moderate or strong depending on how close these  $r$  values are to the extremes. This description of  $r$  values are somewhat subjective and relate to the proposed usage of the  $r$  values (Healey, 1996).

Secondly, a statistically significant correlation is indicative of an actual relationship rather than one due entirely to chance (Cohen & Manion, 1996). The level of statistical significance of a correlation is determined to a great extent by the number of cases upon which the correlation is based. Thus, the more the cases, the smaller the correlation need be to be significant at a given level of confidence.

The third approach to interpreting a coefficient is by examining the square of the coefficient of correlation,  $r^2$ . Aron and Aron (1994), refer to  $r^2$  as the proportionate reduction in error. This estimates the proportion of variance in one

variable that can be attributed to or accounted for in its linear relationship with the second variable. It simply indicates the amount the two variables have in common. An  $r$  of .4 should however not be interpreted as twice as strong as an  $r$  of .2. Cohen and Manion (1996), refer to the R square coefficient preferably as the coefficient of determination. This is most useful in prediction studies since interpretation of any relationship depends for their efficacy on the strength of the correlation coefficient. They indicate that caution must however be borne in mind in three areas when interpreting correlation coefficients:

1. That a coefficient is a simple number and must not be interpreted as a percentage.
2. That a correlation does not necessarily imply a cause-and-effect relationship between the factors.
3. That a correlation coefficient should not be interpreted in any absolute sense since many different factors may influence a given correlation coefficient.

Cohen and Manion (1996), further offer the following guidelines for interpreting correlation coefficients based on Borg's analysis and assume that the correlation relate to a hundred or more subjects. Correlations ranging from:

- i. .20 to .35 show slight relationship between variables although they may be statistically significant.
- ii. .36 to .65 indicate statistically significant relationship. With such correlations crude group prediction may be possible. According to Borg, correlations within this range are useful when combined with others in a multiple regression equation. Combining several correlations in this range,

can in some cases yield predictions that are correct within acceptable margins of error. Correlations at this level, however, are of little use for individual prediction because they yield only a few more correct predictions than could be accomplished by guessing.

iii. iii). .65 to .85 make possible group predictions that are accurate enough for most purposes. Close to the top of the range, group predictions can be made very accurately, usually predicting the proportion of successful candidates in selection problems within a very small margin of error. Near the top of this correlation range individual predictions can be made that are considerably more accurate than would occur if no such selection procedures were used.

iv. iv). Correlations above .85 indicate a close relationship between the two variables correlated. Prediction studies in education very rarely yield correlations as high as .85. If and when correlations obtained are that high, they are very useful for either individual or group prediction.

Pagano (1994), intimates that the margin of error in predictions is not so serious when correlation coefficients as high as .86 are used for prediction. However, in the behavioral sciences such high correlation coefficients are rare. Correlation coefficients of  $r = .50$  to  $.60$  are for instance considered fairly high and yet correlations of this magnitude account for only 25% to 36% of the variability in the criterion variables.

### **Factors affecting value of ( r )**

Glass and Hopkins (1996) caution researchers to be aware of both the implicit and explicit factors that may influence the value of the correlation,  $r$ , and thus to take the necessary precautions to offset these negative influences. They identify two influences that can have a substantial effect on the numerical value. These are the variability of the sample and the measurement error. The heterogeneity of the sample has an important influence on the value of  $r$ . All other things being equal, the greater the variability among the observations, the greater the value of  $r$ .

Another common problem that arises concerns restrictions on the range over which the dependent and independent variables vary. The effect of such range restrictions is to alter the correlation between the two variables from what it would have been if the range had not been so restricted. Depending on the nature of the data, the correlation may either rise or fall as a result of such restrictions, although most commonly leads to a spurious, low correlation between the two variables. The restriction of range reduces the value of the correlation coefficient. To minimize or overcome this diminishing effect on the correlation coefficient, it should be ensured that both variables have a fairly wide range of responses by examining their respective distributions prior to performing any correlational analyses (Howell, 1995).

Similarly, reliability of the instrument also has a serious effect on the value of  $r$ . Each item in a test is an independent sample of the trait or ability being measured. The larger the sample, the more likely it is that the test will be

representative of the true characteristic. The reliability of a test increases as the number of items increases. Therefore one way to increase the reliability of a test is to increase the number of items (Kaplan & Saccuzzo, 1989).

According to Glass and Hopkins (1996), though both correlations may be correct, much misinterpretation of research findings have resulted from ignoring this phenomenon. Dunn (2000) indicates that the presence of a restricted range for a variable often leads to what is called a spurious, low correlation between the variables. A spurious correlation according to Dunn (2000), is one that is either artificially high (inflated) or low (deflated) due to the particular characteristics of some data or the methodology used to collect it. The effects of lack of variability in the sample were overcome by the use of students across five different departments to include a heterogeneous group of students with varied academic potentials and abilities. Furthermore, all students were part of the study population and therefore the question of the negative effects of restricting the range was also taken care of in this study.

Another important influence on the value of  $r$  is the presence of measurement error. Measurement error refers to the difference between true score and the observed scores. The error is introduced into measurement when a small sample is used to represent a larger population. Measurement error in the observations of the predictor or criterion variables reduces the numerical value of  $r$ . The degree to which a set of scores is confounded by measurement error is represented in the reliability coefficient of that measure. If all other things remain constant, the measurement error has a diminishing effect on the value of  $r$ .



The effects of the measurement error can be minimized or be overcome if a more representative sample is used or in the case of a test instrument, by increasing the length of the test. Regarding this study, all students in the Faculty of Education were involved in the study and therefore the effect of any measurement error would have been taken care of.

Dunn (2000) also identifies outliers or extreme scores,( i.e scores with uniquely high or low values) as having a similar deleterious effect on correlations as they do in descriptive statistics like the mean. Outlying scores can artificially increase or decrease the apparent size of a correlation; just one or two “deviant” scores in a small or medium-sized sample can wield great influences. In particular, outliers can seriously bias the results by "pulling" or "pushing" the regression line in a particular direction, thereby leading to biased regression coefficients.

However, the problem of outliers may be solved by either increasing the sample size which can reduce the negative effect of outliers or excluding (removing) just a single extreme case can yield a completely different set of results from the data. Researchers should regardless of the alternative they choose give full account of how they dealt with the problem of outliers.

### **Concept of Prediction**

Regression is usually the statistical method of choice when predicting a variable, which is on an ordinal, interval or ratio scale (Glass and Hopkins, 1996). By using statistical methods, the accuracy of predictions of a dependent variable from one or more independent predictor variables can be maximized. No causal

association is required or assumed in forecasting. To predict is to make a statement of claim that a particular event or performance will occur in the future. The measure is based on the correlation or relationship between the results of the assessment method and results on a performance indicator. According to Kumar (1996, p.139), “predictive validity is judged by the degree to which an instrument can forecast an outcome”. For purposes of prediction studies, a validity coefficient typically is expressed as a correlation coefficient- the correlation between the predictor score and the criterion variable (Allen & Yen, 1979). The coefficient estimated is called a validity coefficient (Burns, 1994, p.220).

### **Concept of Regression**

Regression analysis is used to show how change in one set of scores is related to change in another set of scores. The concept of regression like correlation works on already existing relationships between variables. Kaplan and Saccuzzo (1989) indicate that regression is used to make predictions about scores on one variable from knowledge of scores on another. These predictions, they maintain are obtained from the regression line which is the best-fitting line through a set of points in a scatter diagram. The least squares method in regression is one of the methods used to find the straight line that comes as close to as many of points as possible. It is thus the line at which the squared deviations around the line are a minimum. Another way of estimating regression coefficient or locating the best line of fit is by the eyeball fitting technique. By this method, an individual estimates the location of the regression line using his eyes. This eyeball technique is however faulted by the fact that different individuals may

draw different lines for the same data. To be able to determine a predicted value of any variable, the regression equation is created from the data and this is used to estimate the predicted values.

### **The Regression Equation**

Kaplan and Succuzzo (1989) intimate that the regression equation shows the best available relationship between the variables involved. To derive an equation for predicting scores, on dependent variable Y from the independent variable X, according to Glass and Hopkins (1996), one must know the linear correlation between X and Y, in addition to the means and standard deviations for both variables.; The predicted criterion score for  $\hat{Y}$ , is the product of the regression coefficient b and the raw score on X plus a constant c, the intercept where  $\hat{Y} = bX + c$ ,  $b = r \frac{S_y}{S_x}$  and  $c = \bar{Y} - b\bar{X}$ . In the equation,  $\hat{Y}$  represents the predicted value of Y, “c” is the intercept, b is regression coefficient (slope) and X is the raw score or actual score in the data. It must be stated here that the most important term in the regression equation is the regression coefficient, b. It is the slope of the regression line and it describes how much change is expected in Y each time X increases by one unit. It may also be expressed as the ratio of the sums of squares for the covariance to the sums of squares for X (Kaplan & Succuzzo, 1989). The regression line expresses the best linear prediction of the dependent variable (Y), given the independent variable (X). However, nature is rarely (if ever) perfectly predictable, and usually there is substantial variation of the observed points around the fitted regression line. The

set of deviations between the obtained value and the predicted value of  $Y$  of a particular point from the regression line is called the residual value. Simply put, the residual is the difference between the observed and predicted scores ( $Y - Y^1$ ). It is also called the error of prediction (Howell, 1995).

The smaller the variability of the residual values around the regression line relative to the overall variability, the better the prediction. For example, if there is no linear relationship between the  $X$  and  $Y$  variables, then the ratio of the residual variability of the  $Y$  variable to the original variance is equal to 1. If  $X$  and  $Y$  are perfectly related then there is no residual variance and the ratio of variance would be .0. In most cases, the ratio would fall somewhere between these extremes, that is, between -1 and 1. This value is immediately interpretable in the following manner. If an R-square of .4 is obtained, then the variability of the  $Y$  values around the regression line is 1-.4 times the original variance. Ideally, it explains most if not all of the original variability. The R-square value is an indicator of how well the model fits the data. For example, an R-square close to 1 indicates that almost all of the variability has been accounted for with the variables specified in the model (Howitt & Cramer, 1999).

Triola (1980) suggests that to estimate the value of one variable given some other value, the equation of the regression line only must be used if  $r$  indicates that there is a significant linear correlation. However, in the absence of a significant linear correlation, the regression equation should not be used for projection or prediction. Instead, the best estimate of the second variable is simply

the sample mean of that variable, regardless of the value assigned to the first variable.

### **Assumptions Underlying Simple/Multiple Regression**

#### **Linearity Assumption**

It is assumed that the relationship between variables is linear. In practice this assumption can virtually never be confirmed; fortunately, multiple regression procedures are not greatly affected by minor deviations from this assumption. However, as a rule it is prudent to always look at bivariate scatterplot of the variables of interest. If curvature in the relationships is evident, one may consider either transforming the variables, or explicitly allowing for nonlinear components (Healey, 1996).

#### **Normality Assumption**

It is assumed in multiple regressions that the residuals (predicted minus observed values) are distributed normally (i.e., follow the normal distribution). Again, even though most tests (specifically the F-test) are quite robust with regard to violations of this assumption, it is always a good idea, before drawing final conclusions, to review the distributions of the major variables of interest. Histograms may be produced for the residuals as well as normal probability plots, in order to inspect the distribution of the residual values.

#### **Homoscedasticity Assumption**

Basically, a homoscedastic relationship is one where the variance of the Y scores is uniform for all values of X. That is, if the Y scores are evenly spread

above and below the regression line for the entire length of the line, the relationship is homoscedastic (Healey, 1996).

### **Limitations of Regression Techniques**

The major conceptual limitation of all regression techniques is that one can only ascertain relationships, but never be sure about underlying causal mechanism. For example, one would find a strong positive relationship (correlation) between the damage that a fire does and the number of firemen involved in fighting the blaze. The conclusion cannot be that the firemen caused the damage. Of course, the most likely explanation of this correlation is that the size of the fire (an external variable that might have been excluded in the study) caused the damage as well as the involvement of a certain number of firemen (i.e., the bigger the fire, the more firemen are called to fight the blaze). Even though this example is fairly obvious, in real correlation research, alternative causal explanations are often not considered (Powell, 2003).

### **Grade Point Averages**

A number of problems arise in using cumulative grade point averages to compare applicants. Students have different course taking patterns and different lecturers with different grading standards. Also, the difficulty of courses can fluctuate between instructors and schools. However, at the University of Cape Coast, a uniform grading system applies across all faculties and departments. One of the main concerns that admission counsellors are continually faced with is the problem of grade inflation and not knowing what criteria or level of

performance/competence a grade represents (Anderson, 1994). Powell's (2003) research confirms reports of widespread grade inflation in American schools as shown in the extract in Table 1 below.

**Table 1**

**Percentage of students reporting an "A" average**

High School GPA	1987	1996
A+	3.7%	6.1%
A	12.7%	35.6%
A+, A, A-	27.1%	35.6%

Source: Powell's Dissertation (2003).

This inflation has been gradual and has occurred in all subject areas.(The College Board,1997).

**Predictive validity of test scores**

The ability of a test to predict future success on some meaningful criterion is often the touchstone by which users evaluate the usefulness of the test. A number of predictive validity studies conducted involving the use of test scores have been reviewed in a multitude of past studies.

Dooley's (1999) study investigated the predictive validity of the International English Language Testing System (IELTS) at Curtin University of Technology in the United Kingdom and emerged with findings that did not offer any conclusive evidence about the validity of the IELTS as a predictor of academic success. These results found no evidence strong enough to suggest that students who did not meet Curtin's minimum English proficiency criteria, were

destined to fail. Conversely, most of the clear failures were among the native speakers who came with high IELTS scores. This would seem to indicate that, for this group at least, language was not a key factor contributing to their academic success.

Another large-scale study by Camara and Echternacht (2000), examining the predictive validity of high school grades and the SAT found that high school grades had higher validity coefficients than SAT scores, but the addition of SAT scores to the model increased the accuracy of the prediction substantially. Ramist, Lewis, and McCamley-Jenkins (1993) using data from 446,379 students from 38 colleges in the United States of America (U.S.A) reported that the corrected validity coefficient when using both the SAT and high school grades increased by about .7 which is highly significant. The SAT increases the prediction increment by almost .10 beyond high school grades to the total correlation. Overall high school GPA predicts better than SAT scores when used alone but the addition of the SAT to the formula improves the prediction. The findings for the subgroups (minorities, African Americans, Hispanics and women) in the study continued the trend of group differences and social stratification in the results. The validity coefficients for women were higher than males by about .05. For African Americans and Hispanics the validity coefficients were slightly lower than Whites and Asians but the addition of the SAT to the formula improves the predictions for all groups. Overall, the prediction is enhanced by the use of both predictors with the SAT making a substantial difference in the accuracy of the prediction as reported by the study and presented in Tables 2, 3, and 4 below.



**Table 2**

**Uncorrected validity coefficients with freshman GPA by sex and ethnic group (n= 446, 379).**

UNCORRECTED	All	M	F	A/A	A/I	AS/A	H	W
SAT Verbal + SAT Math	.36	.35	.41	.30	.34	.39	.27	.32
HSGPA	.39	.38	.40	.28	.42	.37	.35	.38
SAT + HSGPA	.48	.46	.50	.39	.55	.48	.48	.45
SAT Increment	.09	.08	.10	.11	.13	.11	.08	.07

Source: Ramist, Lewis & McCamley (1993).

Table 2 examined the predictive validity of high school grades and the SAT scores on the final performance of subgroups of students in 38 American colleges. The columns in Table 2 contain the validity coefficients of all groups involved in the study. Column 1 presents validity coefficients for the different individual groups identified in target group. The rest of columns present validity coefficients for males (M), females (F), African American (AA), American Indian (AI), Asian American (AS/A) Hispanic (H) and Whites (W). The rows also indicate the respective validity coefficients for SAT (Verbal & Math), high school GPA (HSGPA), SAT combined with HSGPA and then the increment recorded as a result of the combination. From the Table 2 above, the results indicate that combining the SAT and high school grades improve the prediction significantly for all groups in the study. Table 3 below presents the corrected validity coefficients for restriction in range and criterion unreliability for the same group of fresh students.

**Table 3****Corrected for restriction in range and criterion unreliability**

	All	M	F	AA	A/I	AS/A	H	W
SAT Verbal + SAT Math	.56	.57	.62	.49	.49	.58	.58	.43
HSGPA	.61	.58	.61	.46	.49	.60	.53	.61
SAT +HSGPA	.68	.65	.71	.56	.63	.69	.58	.68
SAT Increment	.07	.07	.10	.10	.14	.09	.05	.07

Source: Ramist, Lewis &amp; McCamley (1993).

In Table 3 above, after the correction for restriction of range and criterion unreliability, the accuracy of the prediction improved for all racial and ethnic groups when high school grades and SAT scores were combined as observed in row 3.

**Table 4****Corrected for restriction in range, criterion unreliability and course grading**

	All	M	F	A/A	A/I	AS/A	H	W
SAT verbal +SAT Math	.65	.63	.70	.62	.50	.63	.53	.64
HSGPA	.69	.65	.70	.57	.59	.65	.61	.69
SAT + HSGPA	.76	.73	.79	.68	.63	.75	.65	.75
SAT increment	.07	.08	.09	.11	.04	.10	.04	.06

Source: Ramist, Lewis &amp; McCamley (1993).

Table 4 reports results obtained from the corrections for restriction in range, criterion unreliability, and course grading. The SAT increased the accuracy of the prediction by 0.7 points for all groups in the study.

Several researchers (Sedlacek, 1997; Zwick, 1999) have challenged the statistical data supporting the claim that the SAT can increase the accuracy of prediction models. Crouse and Trusheim,( cited in Powell, 2003) examined the statistical data in support of the SAT claim that it can increase the accuracy of predictions above that of high school GPA. The data from the class of 1,972 was used for the calculations. The results indicated that the use of the SAT in combination with HSGPA enhances prediction by .01 and 2.7 additional correct forecasts per 100 applicants, which could hardly be called significant. Systematic errors in computing correlation coefficients for the SAT have been identified by researchers with the errors always in favour of the SAT (Slack & Porter, 1980). Slack and Porter identified systematic errors by the ETS (Educational Testing Service), which always favoured the SAT. In a large scale study based on the data, Slack and Porter found the accuracy of 16% for SAT-Verbal, 12% for SAT-Math, and 25% for high school record, but Slack and Porter subsequently discovered the actual values to be 14%, 10% and 27% respectively.

Bolt (1999), completed a study examining the predictive ability of non-traditional measures of academic success on a high-risk population of students admitted to the North Carolina State University (NCSU) Transition Program. The Transition Program was developed to provide an opportunity for students who

have demonstrated academic potential in their respective high schools but have fared poorly on standardized tests such as the SAT .

Students admitted into the Transition Program traditionally had lower standardized test scores than the general mean for the incoming class. All students in the program were required to enrol in a one-hour course during the fall and spring semesters of their first year of enrolment. The course was designed to assist students in developing the necessary academic, personal and social skills to succeed at the university level.

Bolt's (1999) study was designed on the earlier work of Tracey and Sedlacek (1984) that developed the Noncognitive Questionnaire (NCQ). The NCQ is an instrument developed to identify 8 levels of psychosocial development which research evidence indicates may correlate and serve as better predictors of academic success for minority/underachieving and non-traditional students than traditional measures which rely heavily on standardized test scores. Bolt compared the predictive power of the Noncognitive Questionnaire and the SAT in a sample of 220 freshmen admitted into the transition program. Results of Bolt's study suggest that the Noncognitive Questionnaire was not as valid a predictor as the SAT. The only two variables, which reached statistical significance in his study and were consistent across all groups (race/gender) were SAT/Math ( $r = .165, p < .05$ ) and Positive Self-Concept ( $r = -.139, p < .05$ ).

Kessel and Linn (1996), in a study to determine the predictability of standardized entrance examinations on success in mathematics revealed some inconsistencies. A sample of college-bound high school students taking the

Scholastic Aptitude Test- Mathematics (SAT-M) or American College Test-Mathematics (ACT-M) showed consistent gap between male and female performance and differences in course experience between the two groups was explained as accounting for the differences. Males generally obtained higher scores in SAT-M than females. In contrast, females earned higher grade-point averages than males, both in high school and in college. A synthesis of the studies of over 100,000 students at colleges and universities across the U.S.A shows that this trend continues in colleges (Kessel & Linn, 1996). Similarly, Bank (1995), in a study of 424 students at a major state university, found that not only did women receive significantly higher grades but they also made significantly faster progress completing undergraduate degrees. This finding is not consistent with general view that students with high grades perform/predict high grades.

From the study, it can be concluded that scores tend to underpredict the grades of females relative to those of males in mathematics courses. Benhow (1992), in a study also observed that girls with lower SAT-M scores received higher high school mathematics grades than their male counterparts.

Another study by Leonard and Jiang (cited in Kessel & Linn, 1996), found that scores tend to underpredict women's college/university grade-point averages relative to those of men. In an analysis of all 10,000 students that were admitted between 1986 and 1988, solely on the basis of high school grades and SAT-M scores, it was found that many males selected by this formula, had their undergraduate grades lower than those predicted by the study for the rejected females. This means that, had women with lower SAT scores been selected

instead of the men at the cut-off point, the women would have earned higher GPAs than the men who attended the university.

In Ghana, SHSCE are certificate examinations used as basic requirements into the universities and other tertiary institutions as well as post-secondary institutions. However, in most American universities, SAT and ACT scores serve as entry requirements. Connor and Vargyas ( cited in Kessel and Linn, 1996, p.13) maintain that the underprediction of female grades by such standardized examinations scores argues against their sole use for admission and awarding of scholarships . Bridgeman and Wendler (cited in Kessel and Linn, 1996, p.14), sums up the conclusions from the study of 3,499 first-year mathematics students' grades when they concluded that "the SAT-M score by itself is a relatively poor predictor of success in college mathematics courses when compared to tests specifically designed for placement purposes".

Further studies conducted by Hassett (cited in Kessel & Linn, 1996, p.13) at Arizona State University and Embry-Riddle University in the United States America revealed correlations between SAT-M and course grades ranged between .30 and .50 or lower. These correlation coefficients suggest small to moderate association between grades and final GPAs and for that matter other reasons could explain the differences in performances.

Similar assessment of the predictive validity of the Graduate Record Examination (GRE) scores for graduate students in Psychology has also been examined. Most of the studies examined the validity of the verbal (GRE-V) and Quantitative (GRE-Q) sections of the GRE for the prediction of subsequent

achievement outcomes. House, Gupta, and Xiao, (1997), in a study found GRE scores to be significant predictors of cumulative grade performance grades in specific graduate Psychology courses (House & Johnson,1998: Huitema & Stein, 1993), and graduate degree completion (House & Johnson, 1993). Dollinger (1989), also discovered in further studies that GRE scores were significantly correlated with a multifaceted rating that reflected student progress in a clinical psychology graduate programme. Dollinger evaluated academic records of 236 graduate students in professional psychology programs at a large Midwestern University. The sample was comprised of 101 students in clinical psychology, 76 students in counseling psychology, and 59 students in school psychology. Validity coefficients were computed for the relationship between GRE scores and course grades.

Given the number of correlations being tested, the Bonferroni approach to multiple significance tests was utilized and a significance level of .001 was used to assess the correlations (Myers, 1979). The number of students who enrolled in specific course and the validity coefficients for each predictor-criterion relationship are summarized in Table 5 below:

**Table 5****Advanced psychology test scores and grades in graduate courses GRE  
advance psychology test: r**

Course	N	M	Grade SD	Advanced Psychology Test	Exper. Score	Social Score
Theories of Learning	221	3.66	0.50	0.40*	0.34*	0.33*
Theories of Personality	219	3.69	0.48	0.32*	0.21	0.32*
Advanced Behaviour Modification	97	3.49	0.52	0.34*	0.29	0.32
Psychodiagnostics I	230	3.63	0.49	0.19	0.05	0.25*
Psychodiagnostics II	195	3.69	0.46	0.24*	0.18	0.22
Theories of Objective Psychological Assessments	71	3.54	0.50	0.44*	0.34	0.35
Statistics II	199	3.32	0.66	0.28*	0.31*	0.18
Theories and 226Techniques of Counselling		3.44	0.51	0.27*	0.21	0.23*
Vocational Counselling	79	3.53	0.53	0.58*	0.46*	0.52*
Seminar in Developmental Psychology	58	3.62	0.59	0.41	0.37	0.41

\*p < .001. Source: Daniel. J. House, James .J. Johnson.



The results in Table 5 indicate that GRE Advanced Psychology Test scores were significantly correlated (though low) with subsequent grade performance in a number of graduate psychology courses. These findings are consistent with earlier studies that have reported significant correlations between GRE scores and graduate student achievement (Dollinger, 1989; House, 1999). The correlations found in this study are similar to those reported in previous research (House & Johnson, 1998) and those reported in a meta-analysis of graduate student performance in psychology (Goldberg & Alliger, 1992). Previous research has shown that one factor that can affect test validity is restriction of range (Givner & Hynes, 1979). However, an earlier investigation of students in the same programme showed relatively slight effects from restriction of range (House, 1983). The findings thus indicate that in some instances, GRE Advanced Psychology test scores are significantly correlated (though low) with subsequent performance in selected graduate psychology courses.

Research examining the use of grade point average in the admission process has also demonstrated shortcomings with this quantitative indicator. Pryor and Gordan (1974) measured the importance of upper-division prerequisite courses and lower division courses for future academic success. Overall grade point average was found to be the variable most closely associated with level of performance, whereas prerequisites demonstrated little relationship.

Additional evidence is provided by Gough and Hall (1975) when they studied the relationship between standardized tests, premedical school GPA and clinical performance among medical students. They found that clinical

performance was not predicted from MCAT scores or premedical grade point averages. Friedman et al (1987) also supported the holistic argument as they maintained that no one variable should be used in the selection of students.

Liao and Adams (1977), conducted one of the first studies investigating the importance of qualitative and quantitative factors in predicting the first year grade point average. Results from the study indicated that the overall pre-pharmacy GPA is the best single predictor of academic performance. In a like effort, Jacoby, Plaxco, Kjerulffa, and Weinert (1978), also carried out a study that explained the importance of qualitative and quantitative factors in the predictions of first year grade point average. They discovered that;

1). Pharmacy College Admission Test(PCAT) lends little predictive power; and  
ii) pre-pharmacy grade point average and quality of feeder school best predicts students' first year grade point average. Subsequent research has presented conflicting data. However, it appears from the literature the following ideas are generally supported:

- i). pre-pharmacy grade point average, is a strong predictor of first year pharmacy grade point average.
- ii). PCAT scores to varying degrees predict first year pharmacy grade point average (Friedman et al, 1987).

Thornell and McCoy (1985) examined the predictive validity of the Graduate Record Examinations (GRE) and the graduate grade point average (GGPA) for subgroups of students in different disciplines found variations in the coefficients of correlation between GRE components and GGPA for different

disciplines. Studies by Nelson and Nelson (1995) and Nelson, Nelson and Malone (2000) found that the area of study was itself a predictor of success for at-risk students in graduate work. Their studies (Nelson and Nelson, et al) used both GGPA and degree completion as measures of success in graduate school.

Two criteria may be utilized for measuring success: 1) completion of the degree; and 2) GGPA. While these two measures are positively correlated, (a student must maintain a minimum grade point average to remain in a graduate program), a high grade point average does not insure that a student will complete the degree requirements. Thornell and McCoy (1985) and Madaus and Walsh (1965), in a study proposed that success in a graduate programme was measured by GGPA.

Thompson and Kobraak (1983) suggested that the primary variables that predict success in a graduate programme are perceived to be intelligence and commitment. Mitchelson and Hoy (1984) labeled these variables as intelligence and motivation. Madaus and Walsh (1965), in a study to predict GGPA from GRE scores, suggested that “other factors probably include differences in student motivation, in previous training and in personality factors” (p.24). Two such measures are undergraduate grade point average (UGPA) for motivation and GRE scores for intelligence.

Kingston (1985), Nelson and Nelson (1995), Nelson, Nelson and Malone (2000), Rhodes (1994), Thompson and Kobraak (1983), and Vaseleck (1994) discovered no significant relationship in GGPA in a student’s first nine semester

hours or first year of graduate study and the student's GGPA at the completion of the graduate course of study.

### **Critique of predictive validity studies**

The strength of predictive validity studies is in their ability to predict academic performance in school/university. Though the results have been inconsistent between different populations of students and between men and women overall, the addition of the SAT to the high school record strengthens the prediction. The studies have proven to be a useful tool in differentiating students with similar academic records. For selective colleges and universities that have more applicants than spaces it is critical to have a system that can rank candidates potential for success. Studies have confirmed that predictions of cumulative GPAs, FYGPAs and graduation are enhanced when prediction studies combine with entry results such as SAT scores with the high school record. The factors used in the majority of predictive validity studies are quantifiable and uniform across all populations and schools. Standardized test scores, GPAs, and high school rank all have numerical values that provide researchers with a common benchmark to compare applicants. For this reason the use of prediction models has been advocated as the only fair and objective method to make admissions decisions. The benefits of using prediction models that rely exclusively on quantitative variables to select classes provides applicants and their parents a clear understanding of the factors considered in making admissions decisions. In addition it provides colleges and universities important data on factors that indicate college preparedness.

A major weakness of predictive validity studies utilizing standardized test scores or SSCE results (aggregates) is the restriction of range in the predictors. Students select universities and universities select students which means the range of scores used in the prediction model are much narrower than the larger pool of applicants. This is especially so with this particular study since all students came from the same Faculty of Education at UCC. This restriction of range directly impacts the correlation and causes an underestimation of the true validity of the predictors (SAT and High school grades). In order to address this issue, validity studies should report both the statistically corrected and uncorrected validity coefficients. The only other alternative would be to have all students take the same tests admit everyone, and then select a random sample from the pool. This however is highly unlikely to occur.

Another major concern is the variability in school grading practices. However, regarding SSCE results, uniform grading procedures were used to compute the best total across the whole country by the same examination council (WAEC). For admissions officers at University of Cape Coast, grading did not present a serious concern when comparing SSCE results among students and trying to determine some uniform standard for comparing applicants.

Critics argue that class rank is directly affected by the total graduating class size and that students from smaller schools have a distinct advantage as a result of their smaller size.

### **Requirements of admission in other countries**

Most countries in Africa, Europe, Asia and the United States of America administer special examinations to candidates for entry into higher education. Candidates are expected to reach a certain level in the educational system before they qualify to take the special examinations. According to Lijten (1991), in the USA after high school, students qualify to take the Scholastic Aptitude Test (SAT) while in Holland and Israel, students' achievement in secondary school is also taken into account in determining University entry (Luijten, 1991).

Papas and Psacharopoulos (1987) asserts that in Greece, entrance to higher education until 1987 was based on a weighted average of two sets of marks. First the student's marks in the last three years of secondary education (lyceum), with increasing weights over time of 1, 1.6 and 2.4 respectively (internal). And second, the marks achieved by the candidate in examinations specially administered by the Ministry of Education at the national level (external).

University entrance examinations in Japan have become a media event in the USA. American television has shown Japanese high-school students studying anywhere from 12 to 20 hours per day to prepare for these examinations. Japanese students are seen studying at bus stops and on the subway. American television has followed these students as they rush from their daytime high schools to attend special classes in the afternoons and evenings at "cram schools" to prepare for the entrance examinations. These examinations have become legendary for their difficulty.

Unlike the USA where university entrance is based upon a myriad of qualifications, be it high-school grades, SAT scores, letters of recommendation, community activities, athletic achievement, school service, or equal-opportunity considerations, in China and Japan, university entrance is based solely upon the university entrance examinations regardless of what the student has done during the previous 12 years of schooling. Students must perform on this “one-shot” approach to university acceptance. Pressure is therefore often high and all energies are put into passing the dreaded entrance examinations. In USA, high-school curriculum is influenced by University entrance requirements. In china and Japan, curriculum is driven by the entrance examinations. In Japan, two examinations are administered annually in March, and university admission is based on the results of these examinations ( Papas and Psacharopoulos, 1987).

Harry Manos (1990) reports that Japan is famous for its cram schools and mail-order schools. The cram schools are called *juku*, which means private class. He goes on to say that cram schools are privately operated and expensive to attend and parents do not send their children to cram schools out of any dissatisfaction with the education system, but adhere to the philosophy that “more is better”. Of all students who go to cram schools to study for university entrance examinations, 60% begin at age 13. Cram schools and mail-order schools provide special services such as pre-tests that indicate which entrance examinations a student is most likely to pass.

## China

China currently has four examinations, each providing a special service and serving a particular part of the student population. First is the National Entrance Examination, a seven-subject examination administered over a three-day period each July. The subject areas and maximum possible scores are: Chinese language 120, Politics 100, Mathematics 120, Biology 70, Physics 100, Chemistry 100, and English 100- (totaling 710 points). At one time there was a penalty for guessing, but not anymore.

Principally 10 people, usually eight or nine university professors and one or two middle-school instructors compile the National Entrance Examination questions in China. (Middle schools in China are equivalent to high schools in the USA in that they serve students of the same age group).

The second examination is a test for overseas students (including Taiwan and Hong Kong) who want to go to a University within China. This examination, though patterned after the National Entrance Examination and including identical questions, is noticeably easier because it is an abridged version. The chemistry and physics portions are reduced by half and count only 50 points for each test, compared with 100 points each on the National Entrance Examination.

Third, the cities of Guangzhou (Canton) and Shanghai administer their own examinations in an experiment to test new formats. In 1988 the Guangzhou experiment made one part National Entrance Examination in physics a two-part



format. This examination was not meant to qualify candidates into the university.

The fourth type of examination called, a Qualifying Test, is for adults over the age of 25. The test gives workers a chance for admission to a two-year or night school college. Students not passing the National Entrance Examination by age 25 are eligible only for the Qualifying Test for workers.

The current system has special circumstances that allow a small percentage of middle-school students to apply to universities without taking the entrance examinations. The Chinese government designates “key” middle schools based on equipment, level of instruction and general plant. The number of key schools varies by regions, but about 6% of the middle schools in China are so designated. These schools receive extra funding for various programs, and a small number of their students may be granted university admission based solely on teacher recommendation. Typically about four students from a graduating class of 200 could be recommended for this form of admission.

In China, students who compete for one of the science Olympiads\_ Physics, Mathematics, or Chemistry- and make the team can apply for university entrance without taking the National Entrance Examination because they have proven themselves academically by simply making a team. If a student is a medalist in any Olympiad event, that student can choose any University in China. Japan has been participating in the Olympiads.

## **Britain**

The general entry requirements for admission to a degree programme at Aston University in Britain are similar to most of the universities in that country. The general entry requirements are as follows:

- A (a) Three General Certificate of Education Advanced Level passes  
(G.C.E, A-L);
- (b) Two G.C.E A-Level passes plus two Advance subsidiaries A-Level passes; or
- (c) Passes in six subjects in the Irish Leaving Certificate; or
- (d) A qualification approved by the university as being at least equivalent to any of the above.
- B (a) Proficiency in the English language, demonstrated by a pass in English language at G.C.S.E grade A, B, or C, or Scottish Certificate of Education; or
- (b) An equivalent English qualification.

Those accepted include a pass in Communications taken as part of a fall access course. Usually the universities base their offers on A and AS-Level points, rather than grades, except a high grade in one specific subject (e.g. in mathematics for some engineering programmes). An offer of BCC grades at A-Level, for example, should be interpreted as an offer of 20 points, unless other conditions are imposed at the time of offer. In calculating the points achieved at A and AS-Level, best six units of a candidate is taken into account. Each A-Level is

worth two units and each AS-Level is worth one unit. Table 6 below shows how the calculation of the points is done.

**Table 6**

**A-level and AS-level point equivalencies**

Grade	A-Level Points	AS-Level Points
A	5 + 5	5
B	4 + 4	4
C	3 + 3	3
D	2 + 2	2
E	1 + 1	1

For example, a candidate achieving grades BBD at A-Level and a B at AS-Level scores 20 points [B (8pts), D (4 pts), B at AS- Level (4pts)].

Candidates over 21 years can enter the universities as mature students if they do not have traditional qualifications. All what they need is to provide evidence of successful recent study in relevant subjects or have relevant professional qualifications or experience. International students are also considered for admission into universities in Britain apart from the traditional qualification in terms of GCSE and A-Levels. In addition, there are many other qualifications that are acceptable, like those in the Aston University, Birmingham Undergraduate Prospectus (1998) stated below:

- i. English language GCSE grade C or above
- ii. Test of English as a Foreign Language (TOEFL) at least 550

- iii. IELTS minimum 6.0 over all, with at least 5 in each test.
- iv. Northern Examinations and Assessments Board (NEAB) (University Entrance Test in English for Speakers of Other Languages) C or above in each skill area.
- v. Associated Examining Board (now Assessment & Qualifications Alliance, AQA) Grade 3 in all relevant areas.
- vi. London O-Level syllabus B Grade C or above
- vii. Oxford English as a Foreign Language (EFL) Diploma
- viii. University of Cambridge Local Examinations Syndicate(UCLES) Certificate in Advanced English overall Grade A
- ix. University of Cambridge Local Examinations Syndicate (UCLES) certificate of Proficiency in English Grade C ( or above).

### **Ghana**

In Ghana candidates who qualified to enter universities before the inception of the SHS should have possessed General Certificate of Education Ordinary Level (G.C.E., O-L) credit passes (or approved equivalents) in English Language and Mathematics and in at least three (3) subjects in their areas of specialization. In addition to the above-mentioned requirements candidates must have had not less than 3 G.C.E. Advanced Level at grades not lower than ‘D’ and must also have passed the General Paper set by the West African Examinations Council (WAEC) for ‘A’ Level candidates.

However, with the phasing out of the Advanced Level Examination, the entry requirements to some universities in Ghana have since changed. The

minimum admission requirement into most of the public and private universities of Ghana for SHS applicants range from aggregate 24 to aggregate 20 ( Daily Graphic No: 149894, 11 June, 2006). Candidates must have passes in six (6) subjects with overall aggregate of twenty-four or better. Three of the six subjects must be core subjects (including English Language and Mathematics, Integrated Science or Social studies) and three must be in relevant electives. Candidates must in addition to the above, satisfy specific Faculty requirements. Other groups of candidates who enter the University of Cape Coast as mature students are Distance and Sandwich students. These two groups of students do not necessarily have to meet the above requirements of candidates who enter direct from the senior high schools. All such students should specify on their application forms the exact programme for which they are applying.

### **Selectivity**

One key component of this study that must be addressed is the issue of selectivity in university admissions with special reference to University of Cape Coast. Research has shown that institutional type has an influence on the predictive power of admissions criteria utilizing SAT/ACT scores and high school grade point averages (Powell, 2003). The more selective the school the higher the correlation between predictions and first year grade point averages.

Selectivity refers to the percentage of applicants accepted and rejected at a given institution and influences the parameters by which future students will be evaluated. Each institution has flexibility in how applicants are selected and the process used for selection; that is why admission practices are not generally

understood. The criteria used in the admissions process are of a quantifiable and qualitative nature subject to review and interpretation by the admissions officer.

### **Admission Requirements at University of Cape Coast**

The University of Cape Coast has basically four entry routes (University of Coast Academic Programmes, 2006):

- a). Entry by means of the Senior High School Certificate Examination ( Entry at Level 100)
- b). Entry by means of the G.C.E. “O” and “A” level (Entry at Level 100).
- c). Entry by means of the Mature Students’ Examination (Entry at Level 100).
- d). Entry by means of professional certificates and tertiary level diplomas (Entry at Levels 200 and 300) depending on the assessment of the diploma or certificate.

There are other groups of candidates who enter the University of Cape Coast through Distance or Sandwich. All such students that pursue programmes in the university should have attained at least one of the requirements specified above. All applicants to the university should specify on their application forms the exact programme for which they are applying.

### **Basic Entry Requirements for Post-Senior High School**

#### **Candidates (SHSCE)**

The minimum admission requirements into the University of Cape Coast for SSSCE/WASSCE applicants are aggregate 20 or better. Candidates must have passes (not be lower than C<sub>6</sub>) in six (6) subjects with overall aggregate of twenty (20). Three of the six subjects must be core subjects (including English language, Mathematics, and either Integrated Science or Social Studies) and

three must be in electives relevant to the candidate's proposed programme of study. In all admission cases, candidates must satisfy the specific requirements of the relevant faculty (2006/2007 University of Cape Coast Admission Brochure).

### **Mature Candidates**

Admission through Mature Students Examination is available in the Faculties of Arts, Education and Social Sciences only. The university offers admission to mature candidates to pursue Arts, Education and Social Sciences degree programmes. The general entry requirements for Mature Entrance Examinations include:

- i. Age: at least 30 years old by 31<sup>st</sup> December, the previous year. Mature candidates applying for B.Ed (Physical Education) should be twenty-five (25) years old by December as specified
- ii. Photocopy of original birth certificate.
- iii. Relevant professional/Academic qualifications
- iv. They must pass an Entrance Examination in:  
General Paper (including a section in English Language)
- v. Examination in Mathematics for those who do not have  
GCE 'O' Level credit pass in mathematics
- vi. Examination in English Language for those who do not have  
GCE 'O' Level credit pass in English Language
- vii. Interview. Candidates who pass the examination are ranked and those who fall within the approved quota are invited for interview.

## **DIPLOMA (Basic Education) Evening Classes Programmes.**

Candidates must possess one of the following categories of qualifications and experience:

- i. Cert 'A' 4- Year Post Middle with a minimum of 5 years post qualification teaching experience,
- ii. Cert 'A' 3-Year Post Sec. with a minimum of 3 years post qualification teaching experience,
- iii. 1-Year certificate from KATTC, Kumasi with a minimum of 2-years post qualification teaching experience.
- iv. Candidates will be required to pass a selection examination conducted by the university.

### **Professional and Post-Diploma Candidates**

The Level placement of professional certificate and tertiary diploma holders will depend on the assessment of their certificates or diploma in relation to the programme desired. The general guidelines are as follows:

- i. All professional and post-diploma candidates must have G.C.E. 'O' Level passes or SHSCE credit passes in English Language and Mathematics (Core for SHSCE).
- ii. Holders of UCC (and affiliated Institutions) diplomas: A minimum of second Class Lower/Upper is required for admission to Level 300; holders of all lower classes are advised to go through the Mature Students Examination.



- iii. Holders of Diplomas awarded by other universities: The relevant faculties and departments will assess the curriculum content of the diploma in relation to the programme on case-case basis.
- iv. HND candidates: The Level placement of candidates will depend on the match between the content of the diploma and the UCC programme. Where there is a good match, a minimum of Second Class Upper is required for admission to Level 300.
- v. Professional certificates: The placement level of candidates will depend on an assessment of the certificate by the relevant department or faculty. In addition to the general admission requirements, faculties and departments may have specific requirements.
- vi. Applicants with 'A' Level must have three (3) passes of which two (2) must be grades not lower than 'D'. Candidates must satisfy faculty requirements (University of Cape Coast Academic Programmes, Brochure, 2006) in addition.

### **Academic Performance**

This section reviews the relationship between the various selection tests and the academic performance of students after admissions. Several studies revealed a positive correlation between selection examinations and academic performance. One of such studies was undertaken by Fletcher et al (1989) to find the relationships between the Pre-professional Skills Test (PPST) and the American College Testing Program for teacher education and College GPA and National Teacher Examination (NTE) at Tennessee Technological University

(Cookevilla). All the students at the University are required to take PPST and ACT as entry requirement.

Results from the analysis of 270 graduates revealed that correlation between similar subtests of the PPST and NTE ranged from .58 to .71. The correlation between similar sub-tests of the PPST and NTE ranged from .05 to .32. Values for multiple correlations were slightly higher than were those for simple correlation.

Cloer and McNeely (1990), however, studied the relationship of independent variables to scores on the National Teacher Examinations, and Test of Professional Knowledge (TPK) to determine the best combination of predictor variables to account for variance on the TPK. Data were elicited from 202 undergraduate students at Furman University who had already taken the TPK and were currently enrolled in the teacher education curriculum. Twenty independent variables were selected from scores on the Scholastic Aptitude Test (SAT), high school class rank, grade point average, grades from college courses, scores on the Education Entrance Examination (a basic skills examination for future teachers), and results from the Assessment of Performance in Teaching (a state-mandated classroom observation instrument used with student teachers). Results revealed that the TPK measured the ability to take verbal tests more than anything else, and that professional knowledge as measured by this test was best predicted by another NTE test. Results also revealed the following:

- (1) SAT verbal scores alone accounted for approximately 35% of the variance on the TPK;

- (2) Grades in certain courses were significantly related to TPK performance, but all the best grade predictors, including overall cumulative grades, did not account for as much of the variance as the SAT verbal score; and
- (3) By adding courses that had a high relationship with performance on the TPK, only 5% more of the verbal variance was accounted for.

American Association of College for Teacher Education, Washington, D.C. in 1992 published a report on the study it undertook. The study examined how high school preparation, standardized test scores, and on programme entrance examinations were indicators of White, Black, and Hispanic students' academic performance and completion of teacher education programmes. Transcripts of student teachers (N=712) matriculating in traditional 4-year teacher education programmes were collected and analysed. Results indicated that: (1) students of all races and ethnic groups within the same institution were admitted using the same policy and standards; (2) a correlation existed between high school grade points average (HSGPA) and success in teacher education programmes; (3) GPA was a better predictor of success than SAT scores; (4) type of institution attended had a significant effect on mean grades earned; (5) no significant effect was found between race/ethnicity and grades earned; (6) performance in methods courses was better than in foundation courses; and (7) completion data indicated a higher attrition rate for Blacks than for Whites and Hispanics.

Riggs and Riggs (1990) examined the validity of several predictors against multiple criteria of student programme success. Subjects (N = 437) were selected

from about 800 students in the elementary teacher education programme of a small California State University. Predictor variables for each subject included: (1) undergraduate grade point average (GPA); (2) sub-scale scores from the California Basic Education Skills Test, (3) prerequisite education course grades; and (4) composite scores from the National Teacher Examination (not available for all subjects). Criterion variables included: (1) grade in the curriculum and methods course taken during the last student teaching block; (2) two student teaching performance ratings; (3) positive and negative comments written on student teacher rating forms; and (4) successful completion of two quarters of student teaching. Multiple regression analysis enabled the assessment of the relative importance of the factors.

The results indicated that the reading methods course grade and GPA functioned best as predictors of the performance criteria. Scores on the standardized tests were not significantly predictive. These results suggested that academic performance might be predictive of student teacher success, yet there was a need for further research. Graham (1999) reported the results of a study to correlate graduate school of business entrance criteria with success in a Master of Business Administration programme (as measured by graduate GPA). Two groups of graduate students ( $n = 50$  for each group) were randomly selected from a pool of 203 graduates. One group had taken the Graduate Management Admission Test (GMAT); the second group, the Miller Analogies Test (MAT). Ten predictor variables were used in bivariate and stepwise multiple regression analyses. The 10 variables were number of semesters in the programme,

undergraduate GPA; age, ethnic background, sex, marital status, GMAT score, MAT score, number of years since undergraduate degree completion, and the type of undergraduate degree earned (BS versus BA). Results presented a strong correlation between the GMAT score and graduate GPA, especially when combined with undergraduate GPA as shown in Table 7 below. The relationship between MAT score and graduate GPA was significant, but not as strong as that between GMAT and graduate GPA. There was a strong relationship between ethnic background and graduate GPA when using the MAT.

It is reported in Education Testing Service that the use of standardized testing is widespread among graduate schools as a selection criterion for admission. In particular, the vast majority of graduate schools of business use the Graduate Management Admission Test (GMAT) (Educational Testing Service, 1990). These test scores are weighted with other selection criteria to allow the American Graduate Management school to establish objective standards in screening applicants for admission. Wightman and Leary (as cited in Education Testing Service, 1990) recommended the use of undergraduate grade point average in combination with the GMAT score to the Graduate Management Admission Council for admission purposes. Paolillo, Wightman and Leary, Youngblood and Martin (as cited in Education Testing Service, 1990) indicate that the validity of such standardized tests and the relative merit of selection criteria has long been the focus of attention of professionals, academicians, and students alike.

Graham (1999) intimated that the purpose of his empirical study was to examine the selection criteria used at a typical graduate school of business. Specifically, the study evaluated the predictive validity of the most commonly used standardized tests, the GMAT and the MAT. In addition, other predictors contained in Table 7 , were evaluated in terms of their ability to predict the grade-point average of students in a Master of Business Admission (MBA) programme.

**Table 7**  
**Linear Regression Correlation Coefficients (r) Between 10 Predictor Variables And GGPA**

Predictor Variables	GMAT	MAT
SINP-Semester in programme	-.158	-.159
UGPA-Undergraduate GPA	.220	.400
AGE-Age of student at entrance	-.044	-.022
ETHNIC-Ethnic status (white= 1 other = 0)	.197	.426
SEX- Sexual gender (female= 1, male = 0)	.086	-.172
MARRIED- marital status (married = 1, single = 0	.074	.100
YSU- year since undergraduate	-.081	-.056
BA/BS- BA or BS degree (BS = 1, BA = 0)	.168	-.050
GMAT – GMAT test score	.410	N/A
MAT- MAT test score	N/A	-.28

Source: Graham (1999)

The results above showed that for the GMAT group, the GMAT test score had a much higher correlation coefficient with GGPA (  $r = .410$ ) than each of the

eight remaining variables. Contrary to the findings of Paolillo (1982), and in agreement with the findings of Deckro and Woundenberg (1977), Gayle and Jones (1973), the GMAT score was the first variable to enter the regression equation, accounting for half of the variance explained by the regression equation.

One key difference between this study and that of Paolillo (1982) according to Graham (1999) is that, one used undergraduate GPA for all levels (years) while the other used undergraduate GPA for only the junior and senior years. For the MAT group the Table 7 showed that three variables (MAT, ETHNIC and UGPA) yielded higher correlation coefficients with GGPA than each of the 6 remaining variables. Not one of the other variables was significant at the .05 level. Graham continued that this result is consistent with the majority of previously cited researches, which had generally reported the standardized test scores (especially GMAT) and undergraduate GPA to be the most important predictor variables.

Andoh (1986) worked on the correlation between Common Entrance Examinations (CEE) results and GCE 'O' level results in three schools in Cape Coast municipality from 1980-1984. He observed a very strong positive correlation between performance in CEE total score and performance in division and aggregate obtained at the GCE 'O' level. This is not in line with the findings of Addae-Mensah et al (1973), who found only a weak positive relationship between CEE and GCE 'O' level examination.

Puruse (1986), also studied the relationship between CEE and

GCE 'O' level examination results in schools in the Upper East Region of Ghana between the periods 1980 and 1984. He found that the correlation between CEE total scores and GCE 'O' level aggregate for the five years was close to zero and concluded that CEE performance does not predict performance at GCE 'O' level.

In a study by Yager et al (1988), performance in mathematics at the secondary school level was found to be a good predictor of successful achievement in science at the university level. This finding is consistent with the findings of Anamuah-Mensah (1988), Wheeler and Wheeler (1986), and Chadwick (1986). Anamuah-Mensah concluded from his study that performance in GCE 'O' level science and mathematics were indicators of overall achievement in science at the GCE 'A' level. Work done by Wheeler and Wheeler (1986), and Chadwick (1986), also support this conclusion even though their work dealt with transition from secondary school to university. Their findings are that students with good GCE 'A' level passes in science and mathematics usually obtained second-class upper division passes in science.

Not much research work has been done in Ghana at present relating performance at SHS with achievement at the UCC since examination started in the 1990s. However, Ziblim (as cited in Torjagbo,1996) studied the correlation between performance in achievement test in mathematics and grades obtained at BECE in mathematics. His study involved 37 form three students of OLA Presbyterian junior secondary school (JSS) in Cape Coast. He found out that 32 percent of the students performed above the group average in the BECE but in the achievement test only five percent performed above the same group average.



About 68 percent performed averagely in the BECE as against 76 percent in the achievement test. For the below average, none was found in this category in the BECE as against 19% in the achievement. He concluded that the BECE results may not be reflecting the actual proficiency of students in J.S.S. mathematics. This means that the J.S.S. candidates were not as much proficient in the J.S.S. mathematics as the BECE results portrayed them to be.

Work done by Baker (1985) in Ghana with Middle School students indicate that those who obtained marks equivalent to grades A and B in mathematics also had similar grades in science and those who had poor grades in mathematics also had poor grades in science.

#### **Summary (State of the art)**

The results of these prediction studies reviewed in this chapter have revealed relationships among groups in performance attributable to a myriad of factors such as sex or gender, class (high or low grade) and socioeconomic status. The review also disclosed the use of some particular methods in the conduct of the predictive studies. These methods include correlations, determining the coefficients of reliability and validity and subsequently using these coefficients to interpret the relationships. Both simple and multiple regression analyses were employed in studies in which they were appropriate. Correlation coefficients were used to describe the strength of relationships between variables while R-square was used as an explanatory variable or the coefficient of determination of the criterion.

Predictive validity of selection tests for admissions into higher institutions worldwide, researchers appear to agree that selection tests were not single best predictors of high final year GPAs of students. The studies reviewed in this chapter seem to also agree that the best predictors of high GPAs (academic success) are selection tests in combination with GPAs of students. The first year GPAs especially alone were better predictors than selection tests. No reason(s) was/ were given for the high correlation between first year and final year GPAs.

With reference to the objectives set for this study and considering the general findings regarding entry grades, one would expect different or variant relationships among the variables. Will SHSCE, gender or end of first year GPA have any strong predictive relationship with a students' final year GPA? Should admission officers at the Faculty of Education, UCC base their admission requirement solely on a student's SHSCE grade only or other factors should be considered alongside.

## **CHAPTER 3**

### **METHODOLOGY**

The purpose of the study was to investigate how well senior high school grade can predict students' final year grade point average at Faculty of Education, University of Cape Coast. To achieve this, the entry grades of senior high school graduates together with their first and final year GPAs were collected from the Data Processing Unit, University of Cape Coast. Bivariate correlations of the relevant pairs were then computed to determine the nature of the relationships.

This chapter discusses the methodology employed by the researcher for the collection and analysis of data. It is broken into the following subtopics; research design, population, sampling and sampling techniques, instruments, data collection procedure and analysis.

#### **Research Design**

A research design is an organized collection of procedures used by researchers to collect behavioural data (Dunn, 2000). The design employed was a correlational research. Correlational research refers to research that involves collecting data in order to determine the degree to which a relationship exists between two or more variables (Fraenkel & Wallen, 2003). A correlational design is used to discover predictive relationships, and the degree of association among variables (Dunn, 2000). The basic design of

correlational research is simple and involves collecting two or more scores on a group of subjects and computing correlation coefficients. Relationships disclosed may simply indicate what goes with what in a given context, or else they may provide a basis on which to make predictions about the variables being studied. The variables identified in the present study were students' first year GPA, final year cumulative GPAs, students' gender and SHSCE entry aggregate. SHSCE aggregates, students' gender (male or female) and end of first year GPA (FYGPA) were used as independent predictor variables, and students' final year cumulative GPAs in the undergraduate programmes were used as dependent or outcome variables.

Regarding the advantages of this design, correlational research is particularly useful in tackling the problems of education and the social sciences because it allows for the measurement of a number of variables and their relationships simultaneously (Cohen & Manion, 1996). It also yields information concerning the degree of relationship between the variables being studied. Other strengths of the method include being used as a basis for prediction studies and it enables researchers to make estimates of the probable accuracy of their predictions.

Regarding its limitations, correlational research only identifies what goes with what (Cohen & Manion, 1996). It only implies concomitance and therefore does not necessarily establish cause-effect relationships. It is less rigorous because it exercises less control over the independent variables. The correlation index is relatively imprecise.

## **Population**

The target population for the study was all students who entered the University of Cape Coast using SHSCE results in the period 1999, 2000, and 2001 in five departments of the Faculty of Education. The total population of SHS students admitted over the period specified under the study were 1,216 students. The breakdown for the period 1999, 2000 and 2001 respectively were 236, 396 and 584 students. All 1,216 students admitted over the period, through the use of the SHSCE results formed the accessible population and for that matter formed the participants of the study.

## **Sample and Sampling techniques**

Since there were data available on every student admitted and completed with the SHSCE result, all SHS students within the year groups chosen were used for the study. Five departments of the Faculty of Education involved in the study were Educational Foundations, Arts and Social Science Education, Science and Mathematics Education, Basic Education and Vocational and Technical Education. The three-year groups were however purposively selected to cover periods when the University of Cape Coast began direct admission of substantial numbers of the SHSCE holders. The study was a census type of research and so there was no need for sampling. The total of 1,216 SHS students formed the study population from the five departments in the Faculty of Education.

## **Instruments**

Data for this research were retrieved from documentary records. No special or existing instrument was used except that a data collection format was developed to collect the relevant data. The format is labeled Appendix B under the appendices.

Documents are the main source of information when studying past events and may be of high quality information. Documentary research is more economical than most other types of research. Besides, the act of measurement does not affect the results.

Despite the advantages enumerated above, documentary sources also demonstrate some limitations of which the researcher must be aware. Among them, documents are not necessarily representative of their kind and thus they may not allow generalizations. This limitation applies mainly to personal documents. In addition, some of these are not easily accessible especially private letters and diaries. Some documents may be classified, especially security information or may not be complete or up to date. Issues bordering on reliability may be questionable and biased since they represent the views of their authors and comparisons between some documents are not always possible.

Notwithstanding the limitations above, documentary records especially student records are very useful tools of social research and an indispensable one, particularly when focused on events of the past to be used to forecast the future. In this particular study, documentary methods are the most appropriate source for

collecting data on students' performances in terms of GPAs and so the justification for its use.

### **Data Collection Procedure**

Documentary data on individual student's academic records involving their entry aggregates and GPAs were obtained from the University of Cape Coast admissions office and data processing unit (DPU) respectively. To access these records, an introductory letter was written by the Head of the Department of Educational Foundations to the Registrar requesting his permission for the release of the relevant records from both admissions office and the Data Processing Unit for the study since such records are confidential. A copy of the introductory letter is labelled as Appendix A.

With the permission of the authority in charge, students' SHSCE aggregates for the period specified (1999-2001) in the five departments of the Faculty of Education were extracted from the individual admission files for the study. The names/ index numbers and SHSCE entry aggregate of each student were recorded using the format labeled as Appendix 'B'. For ethical reasons and for the avoidance of the disclosure of confidential records of participating students in the study, the names and index numbers of students were dropped after scrupulously matching the relevant data for the analyses. Data were collected separately for the 1999, 2000 and 2001 year groups for the respective departments in the Faculty of Education in UCC and analysed.

## **Data Analysis**

The data obtained on each student were analysed with reference to the set research questions posed for the study. The variables entered included students' gender or sex, SHSCE entry aggregates (grades), year entered University of Cape Coast, first and final year cumulative grade-point averages (GPAs). Male students were coded as "1" and female students coded as "2" for data analysis. Students' SHSCE aggregates were also dichotomized to distinguish between the higher aggregate-student and the low-aggregate one. Aggregates ranging from 6 to 15 were described as "high" (Division one & above) for the purpose and convenience of the study and coded "1" while aggregates between 16 to 24 were also described as "low" (Division two & below) and coded "2". The categorization of the grades done by the researcher was also for comparative reasons.

Analysis of data for this study was evaluated through a bivariate correlation and a multiple linear regression analysis. The regression analysis yields an equation which is used with SHSCE entry aggregates, gender and end of first year GPA as predictor variables. In this analysis, correlation coefficients were used as indicators of predictive validity and R-square values used as determinants or explanatory variables in the regression analyses. All data analyses were done using Statistical Product for Service Solutions (SPSS, version 12). The Pearson product-moment correlation coefficient was used to determine the strength of the relationship between the independent and dependent variables.



To analyse each of the five research questions which essentially were all seeking to investigate if there were any relationships between the specified variables, the following statistical tools were employed.

Research Question 1; “What is the relationship between students’ SHSCE entry aggregates and their final year cumulative GPAs, in the Faculty of Education?” The variables in this question are the SHSCE grade and the final year cumulative GPA. To determine the relationship, a bivariate correlation analysis was carried out on these two variables.

Research Question 2; “What is the relationship between students’ SHSCE entry grades and their end of first year GPAs, in the Faculty of Education?” The variables again are SHSCE grades and end of first year GPAs. A bivariate correlation analysis was conducted to establish a relationship if any between the variables. The size of the Pearson correlation coefficient was used to describe the strength of the relationship, whether strong, moderate or weak.

Research Question 3; “What is the relationship between a student’s gender and the end of first year GPA in the Faculty of Education?” The variables are gender and end of first year GPA a student earned. To investigate the relationship, a bivariate correlation analysis was done on the two variables and the correlation coefficient used to explain the relationship.

Research Question 4; “What is the relationship between students’ gender and the final year cumulative GPA?” The student’s gender and final GPA were the variables identified. To investigate the relationship between these variables,

correlation analysis was done on these variables. The strength of the relationship if any was to establish using size of the correlation coefficient.

Research Question 5; “Which variables or combinations from SHSCE, Gender and end of first year GPA is/are the best predictor(s) of a student’s final year GPA? The variables in this question are SHSCE grade, gender, end of first (FYGPA) and final year GPAs. Regression analysis was the tool used to investigate the variable(s) or combinations of them which predicted the criterion variable best. A stepwise entry method for the variables was used to determine the individual contributions of each of the predictor variables combined and by so doing singled out the variable that contributed most to the criterion variable.

## **CHAPTER 4**

### **RESULTS AND DISCUSSIONS**

The University of Cape Coast has over the years admitted different categories of students to pursue various certificate and degree courses. These categories included holders of Advanced level results, Diploma, Higher National Diplomas, Post-secondary certificate 'A', Senior high school certificate and Mature applicants. The ages of students who apply for undergraduate courses range from seventeen to about thirty years. With the inception of the education reforms in 1987, the admissions office of the University of Cape Coast continue to receive increasing numbers of Senior High School graduates year after year. Many of the SHS graduates have completed degree courses at different Faculties at the University of Cape Coast. No study has been conducted to investigate the predictive validity of the SHSCE results over the students' final year GPAs at the Faculty of Education at the University of Cape Coast.

This study was therefore embarked upon to investigate the predictive validity of student's SHSCE entry aggregates over their final year cumulative GPAs at the Faculty of Education, University of Cape Coast. Bivariate correlations and regression analyses were done to investigate the relationships proposed in the research questions. For the purpose of this study a number of assumptions were made: that students admitted to the Faculty of Education

pursued programmes that are related to what they offered at the SHS level, it is also assumed that students irrespective of their gender are admitted to the Faculty of Education on merit. It is assumed that information obtained regarding relationships existing among variables in the study would be used to make predictions and to inform decisions of counsellors and policy makers at the Faculty of Education, UCC.

The correlation coefficients, regression coefficients and constants are reported in the Table 8 below.

## **Results**

### **Research Question 1**

What is the relationship between students' SHSCE entry aggregates and their final year cumulative GPAs, in the Faculty of Education?

The research question 1 sought to investigate and establish the nature of the relationship between students' senior high school certificate examination entry aggregate and their final year cumulative GPAs in the Faculty of Education. Bivariate correlation results carried out to investigate the relationship between the variables, SHSCE and final year GPAs (FGPA) are presented in Table 8 below.

**Table 8**  
**Results of bivariate correlation and multiple regression analyses**  
**with final year cumulative GPA(Y) as dependent variable**

Variable	Variables	Coefficient	p-value
	Paired		
SHSCE	X <sub>1</sub> x Y	.269**	.001
aggregate(X <sub>1</sub> )	X <sub>1</sub> x X <sub>3</sub>	-.267**	
Student's	X <sub>2</sub> x X <sub>3</sub>	.002	.956
gender(X <sub>2</sub> )	X <sub>2</sub> x Y	-.018	.526
FYGPA	X <sub>3</sub> x Y	.816**	.001
Constant		.486	
B-value		.834	
	R <sup>2</sup>	.666	
	N	1216	

\*\* Correlation is significant at the .05 level (2-tailed).

The results presented in Table 8 indicated a statistically significant relationship between students' SHSCE entry aggregate and their final year cumulative GPA reporting a Pearson's correlation coefficient,  $r = .269$ ,  $p < .001$ . The correlation coefficient indicates a positive relationship between the SHSCE entry aggregate and the final year cumulative GPA. The size of the correlation coefficient can be used to explain the strength of this relation. Considering the correlation coefficient of .269, the strength of the relationship between the two variables is not large enough to be used for any predictive purpose. The positive Pearson correlation reported suggests that students with "high" SHSCE entry grades tend to earn high final year cumulative GPAs. Those

with “low” SHSCE entry aggregates also earn low final year GPAs. The above represents the mere interpretation of the relationships of the correlation results but do not however reflect the reality in the Faculty of Education, University of Cape Coast. There is no causal relationship suggested. The r-square reported is .049 or 4.9%. The 4.9% reported implies that a student’s cumulative FGPA, only 4.9% of it is accounted for by the SHSCE entry aggregate leaving as much as 95.1% being accounted for by other factors. The logical conclusion is that there are other factors accounting for the huge shortfall. It follows from the results here presented that SHSCE entry grade plays a very negligible role in the final year GPA a student may obtain at the Faculty of Education, University of Cape Coast.

### **Research Question 2**

Research question 2 investigated the relationship between SHSCE entry aggregate and the students’ end of first year GPAs (FYGPA) in the Faculty of Education. Table 8 displays the result of the bivariate correlation between the end of first year GPA and SHSCE

From Table 8, the entry aggregate was found to be statistically significant with the end of first year GPA reporting a Pearson’s correlation coefficient,  $r = -.267$ ,  $p < 0.001$ . This correlation nonetheless describes a slightly weak inverse relationship between SHSCE entry aggregate and the end of first year GPA (FYGPA). This inverse or negative relationship suggests that the higher the entry aggregate of a student, the lower the first year GPA or the lower the entry aggregate, the higher the end of first year GPA. By extrapolation, it can be explained that at the Faculty of Education in University of Cape Coast, a student

that entered with a high SHSCE entry aggregate in the period specified had a low probability of obtaining a high end of first year GPA (FYGPA). Conversely, a student admitted with a low aggregate or grade had a high probability of making a high end of first year GPA. This interpretation is consistent with the conclusion by Kessel and Linn (1996) in their study of the predictability of standardized entrance examinations on success in mathematics where they established that females who obtained low mathematics grades rather earned higher GPAs upon completion in high school programmes. Banks' (1995) also found that female students who entered university with low mathematics grades did earn higher grades upon completion. This finding is not consistent with general view where students with high grades are expected to perform/ earn higher grades upon completion. It must be noted that the research question only sought to determine if there was a significant relationship between SHSCE grade and FYGPA and this has been established. The Pearson correlation coefficient,  $r = - .267$  indicated a statistically significant relationship. It is however too weak to be used for predictive purposes (Cohen & Manion, 1996). Based on the assumption that students may not necessarily pursue courses offered at the SHS, it is probable that other factors not considered in this study would explain the inverse relationship further than the evidence presented by this slight relationship established. The inverse relationship however implicitly suggests that a greater percentage of students with low SHSCE entry aggregates earned more high end of first year cumulative GPAs than those who originally came in with high SHSCE aggregates but this will require further investigation to establish. It may also be the case that

programmes students offered at the SHS were relatively more difficult than what they did at the Faculty of Education.

### **Research Question 3**

What is the relationship between a students' gender and the end of first year cumulative GPAs in the Faculty of Education?

The results of the bivariate correlations between a student's gender and the end of first year cumulative GPAs attained in the Faculty of Education did not report significant relationships between them. Table 8 reports Pearson correlation coefficient,  $r = .002$ ,  $p = .956$  between the two variables. As observed above, the relationship between the students' gender and end of first year GPA was positive but not statistically significant. The results suggest that a students' gender has practically little or nothing to do with the GPA the student obtained at the end of the first year in the Faculty of Education, University of Cape Coast. The relationship can further be described as a non-linear or curvilinear relationship. This result suggests that the grades attained by students across the departments in the Faculty of Education were completely independent of the person's gender. By implication or extension, other factors explain or account for the quality of grade a student obtained though it may not fall within the premise of this research question. Further investigation should unravel the underlying factors responsible for their final classification a student in the Faculty of Education, University of Cape Coast.



#### **Research Question 4**

What is the relationship between students' gender and the final (4<sup>th</sup>) year cumulative GPAs?

Research Question 4 essentially sought to investigate the relationship between a student's gender and the final year GPA earned at the Faculty of Education, University of Cape Coast. The results of bivariate correlations done and presented in Table 8 reports a Pearson's correlation coefficient,  $r = -.018$ , and  $p = .526$  between a student's gender and end of final year GPA. The negative Pearson's correlation,  $r = -.018$  between gender and final year cumulative GPA presents a very weak inverse relationship between the two variables. This result suggests that students of some unspecified gender had or obtained "low" GPAs in the Faculty of Education within the period specified in the study. The gender is unspecified because the research question did require a specific relationship between FGPA and boys or girls. This result seemed to confirm Kessel and Lin's (1997) finding that female students' university entry grades are underpredicted by standardized examinations scores. The case of suggested underprediction of student scores could either be for both boys and girls. Following this argument, then the results presented above may be suggesting that students admitted in the Faculty of Education with low (as defined operationally) grades might have completed their programmes with underpredicted high final year cumulative GPAs. This result is consistent with that of Banks (1995) who established in a study that students' gender had very little predictive validity of a student's final year grade-point average. Several other factors associated with life and studies in

university campus as well as the student's personality and study habit among others could account for the final grade a student attains at the end of the programme in the University of Cape Coast.

### **Research Question 5**

Which variables or combinations from SHSCE, Gender & FYGPA is/are the best predictor(s) of a student's final year GPA?

Multiple regression analysis was conducted on the variables SHSCE, gender, and end of first year GPA (FYGPA) to determine which variable(s) or combinations of variables were the best predictor (s) of the final year GPA of students in the Faculty of Education, University of Cape Coast. Table 8 contains the Pearson's correlation coefficient, the beta value or regression constant (b), R-square value respectively as reported by the regression analysis conducted between student's end of first year cumulative GPA (FYGPA) and final year cumulative GPA. From Table 8 a Pearson correlation reported was  $r = .816$  (0.82),  $p < .001$ .

This result presented a strong, positive and significant relationship between end of first year cumulative GPA and final year cumulative GPA. The justification for claiming the relationship to be strong is the magnitude of the correlation coefficient of .82. A perfect relationship according to Kaplan and Saccuzzo (1989) would produce a correlation coefficient of 1 and the conventional rule of thumb for educational data is to regard coefficient of .82 and above as very strong. Cohen and Manion's (1996) finding support the claim that any correlation coefficient above .80 suggests a strong relationship between the

variables involved. Following this argument, it can be said that the strong relationship between FYGPA and final year GPA suggests that a student who obtained a high cumulative GPA at the end of first year is most likely to also obtain a high GPA at the end of the final year. This finding is consistent with Powell's (2003) finding which established that first year cumulative GPA was a better predictor of final GPA compared with any of the standardized test scores. By extension, it can be deduced from this premise that, a student that obtains a low cumulative GPA at the end of the first year would probably make a low final year cumulative GPA, all other things being equal.

R-square value of .67 reported in Table 8 is another explanatory variable used to describe the relationship between FYGPA and FGPA. It represents the portion or percentage of the predicted value that is accounted for by the independent or predictor variable. An R-square value of .67 reported means that FYGPA alone accounted for 67% of the final year GPA a student obtained at the Faculty of Education within the study period specified. The difference of .33 or 33% can be explained by other factors including the excluded variables, gender and SHSCE grades. The other independent or predictor variables like gender and SHSCE were eliminated for their insignificant or minute contributions to the predicted variable, the cumulative final year GPA. From the above, it can be concluded that among the three predictor variables, the end of first year GPA is the best predictor of a student's final year GPA at the Faculty of Education, University of Cape Coast.

The B value of .834 in Table 8 represents the slope of the regression line called the unstandardised regression coefficient or constant between the variables; end of first year GPA and cumulative final year GPA. What this value means is that for every increase of 1.00 unit in the end of first year GPA, the final year cumulative GPA changes by .83. Putting together the regression co-efficient and the constant term, the equation of the line of regression may be written as – Final cumulative GPA (Y) = .486 + 0 .834\* FYGPA. This regression equation allows prediction or forecasting of the end of final year cumulative GPA of students under the Faculty of Education, subject to a margin of error. The end of first year GPA is the independent or predictor variable in the equation above. The results also presented a 95% confidence interval for the coefficient ranging between .80 and .87. This interval gives the range within which one can be 95% sure that the population slope will lie. It estimates the confidence level of one in using the regression equation above to predict a student's end of final year GPA if given the end of first year GPA.

From the foregoing discussion, a number of conclusions regarding the results of the analysis can be made. First, the end of first year GPA (FYGPA) was established as the best predictor of final year GPA relative to gender, and SHSCE entry grade from the results of the regression analyses. FYGPA was the only single variable with a very high predictive effect on students' final cumulative GPA while both gender and SHSCE grades were excluded for their non-significant contributions to the final year cumulative GPAs.

Secondly, gender had a zero or a non-linear relationship with the SHSCE entry grade. The results also showed non-significant correlations between gender and both FYGPA and final cumulative GPA. These results suggest that a student's gender has nothing to do with the GPA obtained either at the end of first or final year at the Faculty of Education, University of Cape Coast. The weak relationship between SHSCE and final year Cumulative GPA indicates the little predictive effect SHSCE has over the end of final year GPAs. This result confirms or supports the stands of Connor and Vargyas (cited in Kessel & Linn, 1996) who argue against the sole use of standardized examinations scores for admission and award of scholarships. The weak relationship could be explained by the fact some students could be admitted to programmes which may be unrelated to the courses they offered at the SHS. It is also probable that the education courses being pursued at the Faculty relatively are easier to understand given the background of most students being professional teachers and so could account for the difference in performance specially for those that came in with low grades.

### **Summary**

In this chapter, the results of the analyses were discussed by considering each research question, one at a time. The relationships between pairs of variables studied were interpreted and discussed. These relationships ranged from significant to non-significant ones. Among the predictor variables, only the end of first year cumulative GPAs was found to have a very strong relationship with the criterion variable, end of final year cumulative GPA. These results led to the

discovery of a number of key findings which are summarized and presented in the next chapter.

## **CHAPTER 5**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **Summary**

The research questions focused on whether there were significant relationships among the variables; SHSCE entry grades, end of first year GPA, gender of student and the final year cumulative GPA. The study further sought to investigate which of the variable(s) or combinations of which was the best predictor of final year cumulative GPA of students that entered the Faculty of Education at the University of Cape Coast within the period 1999 to 2001. The broad question this research sought to answer was whether the Senior High School grade could predict the final year cumulative GPA with certainty.

Research methodology used for the analysis was bivariate correlations and multiple regression analysis. The bivariate correlations paired the variables to investigate the strength of relationship between them using the Pearson's correlation coefficient. The regression analysis on the other hand used a combination of R-square, the coefficient of determination and the correlation coefficient to investigate the predictive strength of the variables involved. A summary of the main findings drawn from the results of the analyses are presented below.

Findings of this study are summarised below:

1. The study established that in the Faculty of Education, SHSCE entry aggregate had a statistically significant relationship with both end of first year and final year cumulative GPAs between 1999 and 2001. SHSCE had very little predictive effect over the students' final year cumulative GPA in the Faculty of Education at University of Cape Coast in the period specified for the study.
2. The results indicated that SHSCE entry grade showed a statistically significant relationship with the end of first year cumulative GPA. This relationship could be described as negative and weak given the low correlation coefficient reported.
3. The study also found out that the relationship between gender and the first year GPA was zero or non-linear in the Faculty of Education at UCC. A student's gender had nothing to do with the quality of GPA obtained at end of the first year.
4. The study established a zero or non-linear relationship between the student's gender and the final year GPA. The relationship was not statistically significant. It was a negative and very weak relationship.
5. The results established that the end of first year grade-point average (FYGPA) was the best predictor of final year grade-point average. The results presented a strong relationship between the end of first year GPA and the final year cumulative GPA. An end of first year GPA had a very strong predictive effect (67%) over students' final year GPA in the Faculty of Education.

### **Implications**

It always seems difficult to select one set of ideas or assumptions that will accommodate all groups. That is also the case in trying to develop an admissions



policy or formula that will be truly objective and consistent across all populations. For enrolment management professionals, the art of crafting and selecting a class requires multiple measures of assessment and a clear idea of the goals and objectives of the institution.

For many enrolment professionals, the simple process of transforming the student's application into a numerical rating is the most effective and objective method to differentiate applicants and select a class. The admissions office of the University of Cape Coast clearly states that every application is reviewed individually considering each applicant's academic strengths, background experiences and other factors (as outlined in Entry Requirements in 2006/2007 Admissions Brochure). For most large universities like UCC, the admissions office serves as a clearing house transforming data into a numerical rating to be decided upon by administrators within the various faculties and departments. The relationship between high grades and acceptance is very high at most universities. Unfortunately, as the results indicate at the Faculty of Education, UCC, that there is no clear relationship between SHSCE entry aggregate and future academic performance in terms of the former predicting the latter. This position or finding is consistent or confirms both previous and current predictive research findings by Addae-Mensah, (1973), House and Johnson (1993), who both did not arrive at very conclusive findings on the predictive validity of Common Entrance Examinations and GRE graduate courses respectively.

This study investigated the predictive validity of the SHSCE aggregate or grade of students admitted to the Faculty of Education in UCC. Research results

however, presented evidence that indicated that SHSCE grades have little predictive value with respect to the final cumulative GPA, but rather established that end of first year GPA was a better predictor of final year cumulative GPA. This finding is consistent with conclusions established by Powell (2003) in the literature review, who established in a study that students' end of first year GPA was a better predictor of their final year GPAs. This is attributable to the fact that students are admitted to pursue programmes very unrelated to what they would do at the SHS and probably easier to learn and this may account for this relationship.

In Ghana, the senior high school certificate examinations are uniform throughout the country. However, other variables such as school location; facilities available in the school and quality of teachers among others continue to vary from school to school. Uniformity in grading students at the University of Cape Coast addresses the need for objective measures to compare and predict examinees or students from different backgrounds. Nonetheless, the University of Cape Coast will still continue to base admissions decisions on the SHSCE and other results such as Mature entrance examinations and prospective post-diploma students until a more reliable admission model is evolved for admission purposes.

It is assumed that all students who are admitted to the University of Cape Coast with SHSCE grades have had the same level of preparation in their senior high school curriculum, but this may not be the case. However, comparisons of public and private schools SHSCE grades or results across the country indicate that there is a wide disparity in student performance (Chief Examiner's Report,

1995). Student profiles and funding levels besides their own cognitive capabilities play important roles in their academic outcomes. Furthermore, the reliance on entry grades and the arguments of their merit must take into account the inequities that exist in the public school system. The challenge for student affairs practitioners is this: How they would use this information to enhance opportunity for the disproportionate number of poor students trapped in poor and low performing deprived senior high schools that have the ability and potential to succeed in the university education.

### **Limitations of the Study**

The results of this study should be interpreted with consideration for several limitations. One limitation relates to the five departments in the Faculty of Education that were used or chosen to participate in this study. Since only SHS students in the five departments in the faculty were involved in the study, the results obtained may only be relevant to SHS undergraduates in the faculty. This factor may limit the generalizability of the findings, especially for students in the Faculty of Education who did use SHSCE results. Another limitation relates to the kind of course a student would have offered at the SHS and whether his/her present programme has any relation with it. The study could not establish such prerequisites and as such was limited in explaining very weak relationships established. The design only sought to establish if there was any relationship without attempting to find out the underlying causal factors responsible and thus limited the extent of interpreting the results.

Predictive validity research is limited in several ways. The primary limitation of predictive validity studies is the restriction of range in the predictors. Universities select students based primarily on their pre-university test grades or aggregates and prior academic records. In selective institutions, such as University of Cape Coast, there are more applicants than spaces available annually. Because of this, many students are turned down for admissions and this narrows the range of SSCE aggregates available for comparison purposes. The range of grades or scores used in the prediction studies is representative of a much smaller applicant pool than the original pool applying to the university. The use of an applicant pool with a narrower range of grades or scores under-estimates the true validity of the predictors (Camara, & Echternacht, 2000).

The course taking patterns of students also affects the correlation coefficient in prediction studies. At the Faculty of Education in UCC, the range of education related courses offered by students vary in content and probably in difficulty levels across the departments in the faculty even though there is no standard for determining the difficulty level of courses mounted in the Faculty .

There are a number of qualitative factors that could also affect the outcomes of this predictive study. These include the comfort level of a student, his/her pre-university educational experiences, peer group association, socio-economic background, student's study habit and family support are all factors that can influence academic outcomes (Pascarella & Terenzini, 1991). The predictors used in this validity study covered only a limited set of variables. Some non-academic skills also contribute to academic outcomes and these are not included.

Any of these factors can affect the student's final cumulative GPA in the Faculty of Education at UCC. This assertion is supported by a relatively high regression constant report in Table 8.

### **Conclusions**

The results of this study suggest that the senior high school grade had very little value in predicting both end of first year and final year cumulative GPAs across the five departments over the three year period (1999-2001) specified for the study. The results present far reaching implications for admission officers and heads of departments at the Faculty of Education in UCC based upon which the following conclusions were made.

The competition for spaces or vacancies in the University of Cape Coast will probably intensify in the future with increasing populations. The process the institution uses to select students will continue to be scrutinized. Diversity will continue to be an accepted goal of higher education but the methods used to achieve that goal will have to be creative and flexible to accommodate a changing population. Failure to develop and evolve alternative admission models for the Faculty of Education, University of Cape Coast may result in a continuous denial of admission to students who have the potential to excel but who may also have low SHSCE results. This situation may have long term dire consequences both economically and on the manpower need of our country, Ghana.

The results of this study were also consistent with the over/under-prediction trends that have been analyzed extensively in other prediction studies reviewed. The actual entry grades tend to relate poorly with final grades

predicted. Researchers investigating the fairness of the SAT and its impact in admissions formulas focus on how well the models predict group performance and whether there is a variation in the prediction accuracy across different groups. The under-predictions and over-predictions found for various groups of students are a recurrent finding in prediction studies reviewed.

This recurrent findings suggest that admission officers should not only base their selection criteria solely on the quality of the SHSCE aggregate since in most cases, it is not the best predictor of the final year cumulative GPA of students who graduate from the Faculty of Education, University of Cape Coast. There may be many other factors accounting for the final cumulative GPA that a student attains at the University of Cape Coast which future research should investigate.

### **Recommendations**

Entry requirements into any institution of higher learning especially the universities are indispensable tools in the admission process. Administrators naturally would expect to predict students' potential or future performance in their programmes of study using their senior high school results into the institutions that absorb them. Results of this study conducted on the predictive validity of SHSCE grades or results on students' final cumulative GPA in the Faculty of Education at the University of Cape Coast failed or showed very little predictive effect on the criterion. Currently, SHSCE grades by no means are the most convenient criteria by which admission officers in Ghanaian universities can

screen applicants even though the reliability of some of the SHSCE grades may be in doubt for obvious reasons.

The following recommendations are made with the expectation that they could help improve upon the predictive validity of SHSCE grades accepted as entry requirements for admission purposes in the Faculty of Education at the University Cape Coast.

1. It is recommended for the purposes of this study that, it is best to predict students' performance based on the first year grade point average (FYGPA) and to allow the "folder review" process conducted by the office of undergraduate admissions to remain the appropriate method for selecting applicants into the Faculty of Education.
2. Owing to the little predictive effect the SHSCE grades have over students' final cumulative GPA, it is recommended that the various departments in the Faculty be permitted to set aside between 5% to 10% of admission vacancies for a start and to conduct "justify your inclusion" rigorous screening interviews solely for students with low grades (students whose aggregate fall below cut-off point) and who would excel to be offered admission into the Faculty instead of the current practice where no other window of opportunity is available to them.
3. At the Faculty of Education the final grade obtained by students has no relation with the gender of the student. It is therefore recommended that admission officers make provision for a 50-50 admission spaces instead of the targeted 40% provision for women and scrupulously enforce it to the latter. Such enforcement

will actualise or bring to reality the age-old lip-service being paid to providing equal access and educational opportunities for the girl-child in Ghana.

4. There is a very strong relationship between end of first year cumulative GPA and final year Cumulative GPA in the Faculty of Education. It is recommended that academic counsellors in the Faculty schedule regular meetings with freshmen and women as they come in afresh to assist such students develop healthy study habits so as to be able to excel in their academic work. In addition, the Counselling department should institute more comprehensive orientation programmes spanning a period more than a week for fresh undergraduates to enable them adjust quickly to their new academic environment so that the students may earn high cumulative first year GPAs and probably complete with high final GPAs , all other things being equal.

5. The results expressly indicate that low SHSCE entry grades do not always predict low (below second upper) final cumulative GPA in the Faculty of Education at University of Cape Coast. It is recommended that students who enter the Faculty with low SHSCE grades but with adequate promise or potentials be given more concessions in terms of the number of admission allocations advanced to them so as to offer as many an opportunity to pursue university education. To identify students with adequate potential, it is suggested that the faculty roll out pre-university programmes spanning between six to ten weeks at all the Regional Study Centres of UCC Distance Education Unit for those with low aggregates at the end of which such students would be examined and those



who excel given the admissions. The students will commit some funds to be able to participate in the programmes.

### **Future Research**

The process of understanding and measuring meaningful admission criteria is a dynamic process. A changing curriculum and programmes, a more diverse applicant base, and an ever increasing applicant pool present a number of demands on admission officers in UCC year after year. Further research should therefore include:

1. A predictive validity study to sample from all Faculties and departments in UCC in at least five year groups to make it possible to investigate the trend of student performance over the years.
2. An investigation of students' performance in individual academic courses in the various departments.
3. Further study is needed to determine if scores would be significantly related to other types of criterion measures, such as grades earned in specific courses.
4. Future studies analyzing the demographic profile of SHS students entering University of Cape Coast and the relationship with the final cumulative GPA is needed.
5. Further study would be required to investigate and determine what factors contribute most to predicting the final year cumulative GPA and for that matter, the attainment of the bachelor's degree.
6. It is further suggested that a more extensive study be conducted across all faculties in UCC to develop an admissions model that integrates non-academic

factors into the prediction model. It will be essential to have clear guidelines on how these factors will be considered in admissions decisions to make them more balanced and fairer to all identifiable student groups.

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## **APPENDICES**

### **APPENDIX A**

## APPENDIX B

### Data Collection Format

Students' SHSCE entry aggregate (grade) and GPAs for the year groups in the Faculty of Education required. The year groups are 1999/2000, 2000/2001 and 2001/2002. Student records for the respective year groups were recorded in the format below for only students admitted through SHSCE results.

Serial No.	Index No	Sex	Year of Entry	Department	Aggregate (Grade)	CGPA 1	CGPA 4

Department of Educational Foundations

Department of Arts and Social Science Education

Department of Science & Mathematics Education

Department of Basic Education

Department of Vocational & Technical Education and