DECLARATION

I, Felix Kobina, hereby declare that this thesis is my own work produced from research undertaken under supervision and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references. It has not been submitted before for any degree or examination in any other university. I accept full responsibility for any error in the work and the bearing in which it has taken.

FELIX KOBINA

Signature:……

Date:……

CERTIFICATION

We, the undersigned, certify that we have read through this research work and recommend it to the Academic Board of the Graduate School of University of Ghana (UG) for the acceptance of this dissertation entitled 'Academic performance in a university with Senior High School entry grades: a study of Methodist University College Ghana', written and submitted by Felix Kobina (1011000336) in partial fulfillment of the requirements for the award of Master of Philosophy degree in Statistics.

Supervisor: .....

Signature.....

Date: .....

Co-Supervisor: .....

Signature: .....

Date: .....

Head of Department: .....

Signature: .....

Date: .....

DEDICATION

This research work is dedicated to the Almighty God for the guidance throughout my studies. It is also dedicated to my family who have been very supportive to me through their constant prayers and finance. To Prof. O. A. Y. Jackson and Prof. J. B. Ofosu, I say God bless you for all the support given me.

ACKNOWLEDGEMENT

This study would not have been possible without the great support accorded me by various individuals.

First and foremost, I want to thank the Almighty God for His guidance, strength and provision of peace of mind throughout my studies.

The emotional and financial support accorded to me by my parents cannot be overlooked. I also thank my family for the moral support during my study period.

Great appreciation is hereby given to my supervisor, Prof. O. A. Y. Jackson, Dean of Students Affairs, MUCG, who diligently and readily provided me with the needed technical and academic support and direction, encouraging me to strive for excellence in the study.

Another great appreciation to Prof. J. B. Ofosu, Dean of Faculty of Social Studies, MUCG, for his untiring support and guidance throughout this research. The work would not have been possible without his commitment.

This study would not have been possible without the authorization of the external examiner. I thank Methodist University College Ghana staff for releasing the data to me.

Finally, my appreciation goes to Mr. Frank Osei-Gyimah, lecturer, MUCG, Mr. Edward Acheampong, lecturer, MUCG, Mr. Dominic Buer Boryetey, lecturer, MUCG, Mr. Isaac Yaw Larbi and Becky for the various assistance given me throughout my studies.

ABSTRACT

The objectives of this study are to determine if Senior High School entry grades used for university admission could predict final performance in Methodist University College Ghana (MUCG) and to establish the relationship that exist between entry grades E, D7 or E8 and final performance of students who entered MUCG with these grades. The study population comprises of students who entered MUCG with Senior Secondary School Certificate Examination (SSSCE)/West African Senior School Certificate Examination (WASSCE) results. Out of this population, 888 students were selected from the academic years 2000/2001 to 2007/2008 for the study. Multiple regression, chi-square test of independence and correlation were used to analyze the data. The findings revealed that there is a weak correlation between entry grades E, D7 or E8 and final cumulative grade point average in MUCG. Based on the findings, it is recommended that a standardized entrance examination should be conducted for Senior High School students who are not able to meet the initial admission requirement, especially those with at most two subjects being grades E/D7/E8.

Contents

Lists of Figures

Lists of Tables

CHAPTER ONE

1.0 Introduction

This chapter introduces the background of the study, statement of the problem, objective of the study, significance of the study, hypothesis to be tested, limitation and scope of the study and definition of terms.

1.1 Background of the study

University education is more than the next level in the learning process; it is a critical component of human development worldwide. It provides not only the high-level skills necessary for every labour market but also the training, essential for teachers, doctors, engineers and so on. It is these trained individuals who develop the capacity and analytical skills that drive local economies and make important decisions which affect entire societies. However, it is not everyone who applies for admission to a university who is given the opportunity, due to various factors including the qualifications of the applicants (e.g. grades obtained from Senior High Schools). Nobel and Sawyer (1997) have shown that, academic ability, as measured by High School grades, has a predictive validity sufficient to set admissions criteria for selection into a university.

The practice of using Senior High School entry grades as the main determinant of university entrance is very common in some countries such as Ghana, Nigeria and Togo, to mention a few. In Ghana, students are selected into universities based on the grades obtained from their previous schooling sessions such as Senior Secondary School Certificate Examination (SSSCE), West African Senior School Certificate Examination (WASSCE), Ordinary and Advanced Level

Certificate Examination, Diploma in Business Studies (DBS), Higher National Diploma (HND) and other qualifications. However, few studies have validated such selection processes (McManus 1998).

In order to assess the performance of students in every institution, one needs to conduct periodic examinations to determine how every student is doing in his or her field of study. Examination here is an academic exercise designed to solicit information about those who are being examined. Some scholars have defined examinations their own way, for instance, Fagbamiye (1998) has described examination as a tool for measuring and judging the standard of education in a country. Tyler (1971) and Nunnally (1972) have defined examination as a standardized situation designed to elicit a sample of an individual's behaviour.

In universities, examinations serve as the basis for measuring students' performance in a subject and it is also a means of measuring academic success. However, academic success is not only predicted by examinations but other factors play important roles. Ali (1983), found some factors that predict academic performance. These are attitudes, individual differences, physical health and readiness, and expectation. Strauss (1951), Llyod and Pidgeon (1961), Pidgeon (1970) and Ali (1983) also found other factors in their research, such as home, cultural and parental factors.

A lot of tertiary institutions adopt different approaches to admit students into academic programmes. These admission criteria are most often used as a basis for measuring academic performance of students. University entrance exams or any form of entry scores or grades play a strong influence in the selection process of students. It is believed that students with a certain range of entry grades can successfully complete degree programmes as is the case of Royal

Melbourne Institute of Technology (RMIT) University (Murphy et al. (2001)). This is in view of the widely held view that only those students with high scores have the potential to succeed in higher education and that the quality of a course is reflected in the proportion of students selected with high entry scores as Murphy et al. (2001) argued. However, Burstall (1970) also found in his study that there was no significant relationship between entry grades and final performance of students who enter universities.

In the early part of 2011, the board members of the National Council for Tertiary Education (NCTE)/National Accreditation Board decided that students with grade E in Senior Secondary School Certificate Examination (SSSCE) and grades D7/E8 in the West African Senior School Certificate Examination (WASSCE) should not be given admission to universities in Ghana. No specific reason has been given to this decision.

1.2 Statement of the problem

This study examines whether Senior High School entry grades of students predict their final performance at the Methodist University College Ghana (MUCG). The prediction of academic performance in universities has become a very challenging and complicated piece of research to undertake. Several studies have been made and different views have been shared on predicting academic performance. A study by Abdullah (2010), using ordinary least squares multiple regression model and a sample of 566 students, found that academic performance in a university can be determined by entry grades of students from Senior High Schools. Win and Miller (2009) also found that Senior High School entry grades have an impact on the academic performance on university grades. Again, Niu and Tienda (2009) found in their study that Senior High school grades are a better predictor of college performance than standardized test scores. They used a

sample of 28 schools out of 1644 Senior High Schools and ordinary least squares multiple regression model to analyze their data. Other studies have shown that entry grades are poor predictors of academic performance at a university. A research by Momoh-elle (1998), established that entry grades has a poor predictive validity on academic performance. Ihiegbulem (1998) also using Pearson product moment correlation and t test in analyzing his data, found that there is a very low and insignificant degree of relationship between entry grades and final performance. Obioma and Salau (2007) also found in their research that even though grades of students from Senior High schools were statistically significant, they were not of much practical importance in predicting the achievements of university students.

It is in view of these divergent findings that this research seeks to investigate and analyze the relationship between entry grades and final performance of Methodist University College Ghana (MUCG) undergraduates, especially those who entered with grades "E", "D7" or "E8".

1.3 Objectives of the study

In order to follow the performance of students with entry grades E, D7 or E8, the purpose of this research is:

1. To check if Senior High School entry grades used for university admission predict final performance in MUCG.
2. To find out the extent to which Senior High School entry grades predict final performance in MUCG.
3. To compare the final performance of students who entered MUCG with grades E/D7/E8 and those who entered without these grades.

4. To establish the relationship between final cumulative grade point average (FCGPA) of students who were admitted into the university with grades E/D7/E8.

1.4 Significance of the study

The National Council for Tertiary Education (NCTE) and National Accreditation Board (NAB) decided that students with grades E, D7 or E8 in their best six subjects do not qualify for admission to a university. No research has been made to determine how these grades affect the final performance of students in a university. It is important to research into this decision by the NCTE and NAB so that universities can consider other factors in admitting students. This research also intends to help universities to take informed decisions in admitting tertiary students.

1.5 Hypothesis to be tested

The hypotheses to be tested are:

1. H_o: There is no significant relationship between entry grades E/D7/E8 and the final performance of students who entered MUCG between the academic years 2000/2001 and 2007/2008 with these grades.

   H_1: There is a significant relationship between entry grades E/D7/E8 and the final performance of students who entered MUCG between the academic years 2000/2001 and 2007/2008 with these grades.

2. H_o: There is no association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades.

   H_1: There is an association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades.

1.6 Methodology

Data on entry grades and final performance were recorded from academic files kept at MUCG's Admissions Office and Students' Records Unit and grouped in SSSCE/WASSCE holders, HND, Mature and A-Level Students etc. The main focus of this research is on SSSCE/WASSCE holders. The data has been regrouped from the year of admission, that is, beginning from the academic years 2000/2001 to 2007/2008.

The Final Cumulative Grade Point Averages (FCGPAs) of the students from the Senior High School were obtained from the records containing the SSSCE/WASSCE grades and the final degree. For each student the entry grades and the final results were compared.

Variables that are not necessary to this research, like students' name, ID number, date of birth and school attended were omitted. Inconsistencies and errors were detected by checking every student's detailed information row by row on the broadsheet.

Multiple regression, chi-square test of independence, correlation and tests concerning two population proportions were employed to investigate the relationship that exists between the final performances at MUCG and entry grades.

1.7 Limitations and scope of the study

This research covers MUCG graduates who entered the university with SSSCE/WASSCE results only. Some of the challenges encountered in acquiring the data from the Admissions Unit of the Academic Affairs Section were the bureaucracy and inadequate record keeping. Efforts were also made to obtain data from other private universities but were not successful. Only a few

independent variables were used in the prediction of the final performance even though there are more variables that determine it. Some of these variables include perceived stress, test competence, academic competence, time management, socio-economic factors and so on.

1.8 Definition of terms

a. **Grade Point (GP):** Every letter grade has a point assigned to it. The number of (grades) points earned by a student, for each course completed, is computed as the product of the number of credits for the course and the grade point equivalent of the letter grade obtained in that course.

b. **Cumulative Grade Point Average (CGPA**): The student's cumulative grade point average is calculated by dividing the total number of Grade Points obtained, up to any specified time, by the total number of credits hours of all the courses for which the student has registered up to that time.

c. **Final Cumulative Grade Point Average (FCGPA):** This is the CGPA for all courses as weighted under the grade points calculated up to the end of the student's academic programme. Academic success or performance in the context of this study is defined as the FCGPA achieved by a student.

d. **Senior Secondary School Certificate Examination (SSSCE)**: This is a standardized examination conducted by the West African Examinations Council (WAEC) for all Senior High School leavers. It is one of the entry qualifications needed for admission into Universities. This gave way to WASSCE in the year 2006.

e. **West African Senior School Certificate Examination (WASSCE):** This is a standardized examination conducted by the West African Examinations Council (WAEC)

for all West African Senior High School leavers. It is one of the entry qualifications needed for admission into universities.

f. **Correlation:** This is concerned with measuring the strength of the linear relationship between variables.

g. **National Council for Tertiary Education (NCTE):** It is a coordinating body for the re-defined tertiary sector in Ghana.

h. **National Accreditation Board:** It facilitates the establishment of both public and private tertiary institutions and ensuring that standards are set and maintained.

i. **Good grades:** These are SSSCE grades without "E" and "F" and WASSCE grades without "D7", "E8" or "F".

j. **Bad grades:** These are SSSCE grades with "E" and "F" and WASSCE grades with "D7", "E8" and "F".

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

In this section, we consider university selection process, criteria for admission in some countries, factors influencing academic performance in a university and some empirical evidence about the relationship between entry grades and final performance of students in a university.

2.1 University Selection

The entry requirements are based on the final year High School results and it remains the commonest criterion for selecting undergraduates for admission. University admissions among countries have largely evolved around grades obtained during final year of Senior High School. Historically, these grades have been the principal requirement for entry into tertiary education, and it is fair to say that for some time now performance in Senior High School has been the best available means of selecting students for entry into universities. In a research by Palmer et al. (2011), they found that, a strong performance in the Senior High School examination is a good predictor of success in the university and this reflected in the first year grade point averages and final performance of the students. They also found that, a middle class of performance is a less reliable predictor of final performance in a university, and as many students with average or comparatively low Senior High School results also did well in the university.

Universities in some parts of the world are increasingly being put under pressure by their central governments to admit people from a wider range of social backgrounds. These countries assess

these social backgrounds by the type of school attended by the student. This information is obtained from the admissions forms completed by the students.

2.2 Admission in Australia

Australian universities are supported in their selection of students by centralized admissions agencies across Australian States and Territories. In all these States and Territories, there has been a common ranking system for admitting undergraduates as of 2009-2010 in Australia; known as Australia Tertiary Admission Rank (ATAR) and this was derived from students' performance in Senior High School examinations. The ATAR allows the comparison of students who have completed different combinations of Senior High School courses. It is calculated solely for use by institutions to rank and select school leavers for admission to tertiary courses. Students who applied directly from Senior High School were assigned an ATAR while non-school leaving applicants are assigned an equivalent rank. Palmer et al. (2011) stated in their study that the ATAR are calculated by special tertiary agencies based on the type of examination taken in the state where it was written. For example, in New South Wales and the Australian Capital Territory, the ATAR are calculated by the Universities Admissions Centre (UAC) from students' Higher School Certificate marks (HSC), and in Western Australia the ATAR is derived by the Tertiary Institutions Service Centre (TISC) from students' Tertiary Entrance Aggregate, TEA (which was replaced by the Tertiary Entrance Score (TES) in 2008).

University admission in Australia has largely evolved around a matriculation examination in the final year of Senior High School. The matriculation examination is an examination taken by Senior High School students to qualify them for enrolment at a university. Historically, the principal prerequisite or criterion for entry to tertiary education has been Senior High School

matriculation examination. It is the most widespread criterion used in selecting school leavers, especially those who are Australians.

2.3 Admission in the United States of America

Admissions to universities in the United States are mainly based on High School grade points average (HSGPA) plus one or more college entrance exams, of which the most common ones are the Scholastic Aptitude Test (SAT) and American College Test (ACT). The High School grades have been considered as a 'soft' measure, that is, the grading standards in the United States (US) vary widely from school to school and from state to state, and that there has been the need for a standardized admissions exams. The SAT was taken by High School students to provide certain information for colleges alongside their High School grade point average and its results were used by universities to help compare students from different parts of the US.

In a review of studies to examine the ability of the SAT to predict a number of measures of college success (including final performance), Burton and Ramist (2001) found in their study that the combination of Senior High School grades and SAT scores were consistently the best pre-admission predictors. Although Senior High School grades are often seen as the slightly better predictor of performance at universities, Kobrin et al. (2002) reported that the SAT adds to their predictive power to a significant degree and may be a more accurate predictor for some groups of students with discrepancies between Senior High School grades and SAT scores.

2.4 Admission in Sweden

Both Senior High School grades and Sweden scholastic aptitude test (SweSAT) scores are used to select students for admission to universities. Kirkup et al. (2007) in a study, found that

admission was done in a way that, for every third or two-thirds of places given on the basis of the High School grades, the rest are given on the basis of the SweSAT. Those who were admitted with only High School grades were those who did very well in the High School examination. The other students who were admitted on the basis of SweSAT are those who did not do very well. The SweSAT is a voluntary examination and can be taken any number of times, with the highest acquired score being used. In a research to check if Senior High Schools grades by themselves have an effect on final performance in a university, Gustafsson (2003) reported that Senior High School grades by themselves have a better predictive validity than other entrance examinations but that the entrance examinations could contribute to the prediction when there are differences in the quality of education or when grades suffer from lack of comparability.

2.5 Admission in Ghana

The selection process to universities in Ghana for Senior High School (SHS) students requires specific entry qualification as the criterion for admission. The pattern of grading candidates' scores in the examinations is such that grade "A" is "Excellent", grade "B" is "Very Good", grade "C" is "Good", grade "D" is "Credit", grade "E" is "Pass" and grade "F" is "Fail" for Senior Secondary School Certificate Examination (SSSCE) holders. The grading for the West African Senior School Certificate Examination (WASSCE) holders are such that grade "A1" is "Excellent", grade "B2" is "Very Good", grade "B3" is "Good", grades "C4/C5/C6" are "Credit", grades "D7/E8" are "Pass" and "F9" is "Fail" (WAEC, 2002). The requisite qualification for admission into universities in Ghana is to attain grades between A and E in SSSCE or grades between A1 to D7/E8 in WASSCE. Candidates must have at least aggregate 24 or aggregate 36 (with E/D7/E8 inclusive) in six subjects including Mathematics, English Language and Social Studies in SSSCE or WASSCE. Integrated Science is used in place of

Social Studies if the candidate is a Science student. This has been the standardized test used by the West African Examinations Council (WAEC) since 1952, to conduct examinations and also award certificates to students.

Currently, these admission criteria have been adjusted in such a way that students who obtained passes (such as E/D7/E8) in any subject, do not qualify for admission to a university no matter the aggregate the student obtains in the examination. This is a decision taken by the National Council of Tertiary Education (Ghana) and the National Accreditation Board (NAB) in the early part of 2011.

In a study to determine if Senior High School entry grades have a relationship with final performance in a university, Jackson et. al (2010) found that there is a weak correlation between Senior High School entry grades and final performance. They also recommended that students with low entry grades when given the needed support and training could perform very well in public universities.

In the university setting, performance of a student is being assessed through the grade point average (GPA) obtained by the student in each subject registered by the student. However, a student is considered to have performed well if his or her grade point average is high (that is, above 2.50). At MUCG, the grade point average is on a cumulative basis from 200 level to the final year level. Hence, the cumulative grade point average (CGPA) would determine the performance level of a university student from one semester to another. The nomenclature of the cumulative grade point average of bachelors degree holders is such that 3.60 to 4.00 is first class, 3.25 to 3.59 is second class upper division, 2.50 to 3.24 is second class lower division, 2.00 to

2.49 is third class division, 1.50 to 1.99 is ordinary pass degree while between 0 and 1.49 is fail (see MUCG Transcript).

2.6 Factors that determine students' academic achievement in a university

The factors influencing academic achievement in a university have been researched by many scholars and divergent factors have been made. Some of these are said to be cognitive (ability or traditional measures) and others are non-cognitive (non academic factors). The cognitive factors mostly refer to measures such as High School grades and standardized test scores (for example SAT and ACT) and non-cognitive measures are related to psychological factors like social support. Some researchers like Noble (1991) and Reason et al. (2006) have shown the importance of these traditional predictors (such as High School grades and standardized test scores) for predicting academic achievement. In a study by Larson and Scrontrino (1978), they found that High School Grade Point Average (HSGPA) and Scholastic Amplitude test (SAT) consistently had high correlation with academic success. Other studies by Tracey and Sedlacek (1984) and White and Sedlacek (1986) have emphasized the use of non-cognitive factors to also predict students' success. Some scholars like Wolfe and Johnson (1995), Ting (1998) and Le et al. (2005) also suggested the use of both combinations to predict academic success in a university.

Another factor researched by Rubin (1977) focused on socioeconomic variables. He included other independent variables like the education of the parents, hours per week studied (excluding time spent in class), students' earnings, family size and the number of times families moved. His estimated regression model did not produce a good fit. Some of the assumptions he stated did not hold, for example, the assumption that the education of parents is positively correlated with their

child's academic success did not hold for either parent. The assumption that students who worked outside the school they attend make lower grades, perhaps because their study time was more limited, did not also hold.

Attitude and motivation towards learning have frequently been reported by many researchers like Brandl (2002), Desmarais (2002), Doherty (2002), Gilbert (2001), Murday and Ushida (2002) and Warschauer (1996a, 1996b) to be another critical factor for success within computer-assisted language learning (CALL) environments. According to Winne and Marx (1989), motivation is both a condition for, and a result of, effective instruction. Cronbach (1969) and Atkinson (1978) confirmed this factor in their research and found that, environment and motivation exert very strong influence on academic achievement.

Another factor that influences academic performance of students is gender. A significant component of the literature on this subject has been done by many researchers. One school of thought, best captured in the work of Miller (1986, 1991 and 1994) has found as a fact that the underachievement of males in the school system has been linked to a historical process of male marginalization. Evans (1999) found in his research that, gendered home and school socialization were a key element in explaining the underachievement of boys in the Jamaican Secondary School system but Bailey and Brown (1999) were not convinced about the role played by socialization and suggested, from the findings of their pilot study, that the critical factors accounting for males underperformance were financial constraints and home and community violence. Ullah and Wilson (2007) found that male students' relationship with their peers had a negative influence in their academic achievement.

Pidgeon (1970) and Ali (1983) suggested institutional factors such as the type of school, population, control, discipline, personnel interactions, admission and examination or evaluation policies, to have been influencing academic achievement or performance. They also found these factors to strongly affect academic achievement of students.

Strauss (1951), Llyod and Pidgeon (1961), Pidgeon (1970) and Ali (1983) also suggested that home, cultural and parental factors in which the motivational factors of the home background had been found to influence the learner's academic achievement more importantly than the fixed material and economic conditions of the home.

Pidgeon (1970) and Ali (1983) again suggested that teacher, instructional and curriculum factors such as teacher attitude towards students, types of classroom control, curriculum content, teacher adequacy in professional qualification and preparation, instructional contents and presentation, use of relevant teaching aids and so on, tend to influence students' achievement.

2.7 Prediction of academic performance with entry grades

The term academic performance has been described by Daniel and Schouten (1970) and Asaolu (2003) as the grades obtained in a course or group of courses taken by a student at any given time. It also describes how a person is able to show his or her intellectual abilities. Thus, in predicting academic performance, Daniels and Schouten (1970) emphasized the use of grades in examinations and reported that grades could serve as prediction and criterion measures. They continued to argue that the prediction of a future examination result could be made with reasonable success on the basis of the results of a previous examination. Researches by Ubokobong (1993), Al-shorayye (1995) and Adeyemi (1998) supported this point. Their study

supported the findings of other researchers that General Certificate Examination and Secondary School Certificate Examination results provided the best predictor of university performance. Findings made by Peers and Johnston (1994) confirm the validity of the number and grades of passes in the Scottish Certificate of Education in predicting first year and final year university performance of students. Al-Khader (1996) in his research, reported that there was a significant relationship between the grades obtained from High School and final GPA. These findings were contrary to Huda et al. (2001) which states that, Senior High School grades do not predict academic achievement of medical students in professional examinations at a university.

In the United States, it has been shown by Camara and Echternacht (2000) that, other examinations used in admitting Senior High School students help to predict academic success in universities. One of such examinations, is Scholastic Aptitude Test (SAT). Wilson (1983) also supported these examinations and found in his study, to determine (predicting) cumulative GPAs admission variables like SAT, that the combination of SAT scores and Senior High School grades provided better predictions than either Senior High School grades or SAT scores alone, and SAT scores made a substantial contribution to predicting cumulative GPAs. These findings were contrary to O'Rourke et al. (1989) findings which state that, the Scholastic Aptitude Test (SAT) is unable to predict examination performance as effectively as the Leaving Certificate Examination (LCE) point scores.

As a measure of prediction, several researchers have found Senior High School entry grades to best predict academic performance in a university. Birch and Miller (2006) gave an overview of studies from 1975 to 2001, providing an estimated coefficient for the predictive validity of final performance based on final year Senior High School results for various measures of success at

university. They found that Senior High School grades had a strong predictive power of prior academic achievement. Also, in a similar research by Baig (2001) over the students of the first four batches of Karachi Medical and Dental College (KMDC), who graduated between 1997 and 2000, after using correlation and step-wise linear regression analysis for his results, concluded that the Institution of Business Administration admission scores (an entry scores) combined with Higher Secondary Certificate (HSC) marks could predict academic achievement of medical students for the first three to four years.

An investigation by Dockery (1986) on the effects of intelligence quotient on academic achievement, found that achievement scores increased as the intelligence quotient increased. Eysenck (1995) agreed with this finding and remarked that intelligence quotient testing has been extremely successful on the practical level predicting academic success from early childhood to university degree. Other researches by Ting and Sedlacek (1998) suggest the use of psychological variables along with traditional college predictors of admission criterion which according to them better explains academic performance.

Wright and Palmer (1994) found that, at the masters level, particularly Master of Business Administration (MBA), students who were admitted with varied academic backgrounds, have their final performance in MBA being predicted by their undergraduate course. The findings of Alias and Zain (2006) confirmed these findings. Using a multiple regression model, they found that there was a significant relationship between undergraduate cumulative point average (UCPA) and cumulative grade point average (CGPA). A study by Lane et al. (2003) did not support these findings. In their study on hospitality of students, they found that there was a weak correlation between class of undergraduate and graduate performance.

Other studies by Kershaw (1989), Houltram (1996) and Wilson (1999) found no relationship between entry grades and final performance. Majasan and Bakare (1979) also confirmed that there was a negative predictive validity between entry qualification and final performance. Kershaw (1989), in a study involving 124 students from Melbourne nursing programme, found no significant correlation between a student's year 12 aggregate score (Anderson score, which is similar to Senior High School grades) and his/her grade point average (GPA). Wilson's (1999) study drew similar conclusions but Houltram (1996) deduced that entry scores were not as predictive of success as might have been expected.

In some parts of West Africa, particularly Nigeria, researchers like Alonge (1998), Gbore (2006) and Adeyemo (2001) have had divergent findings on the predictive validity of some examinations. In other developing countries, the index of academic performance varied from one country to another. A study by Othuon and Kishor (1994), found that the Kenya Certificate of Primary Education scores had a moderate positive linear relationship with the Certificate of Secondary Education grades. In some other States, performance in Junior Secondary Certificate (JSC) examinations has been found by Adeyemo (2001) and Adebayo (2002) to be significantly related to the performance in Secondary School Certificate (SSC) examinations.

Considering the divergent views and findings of previous researchers on the predictive validity of the Senior High School entry grades and final performance in a university, this study intends to examine the relationship that exists between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades and also determine whether Senior High School students entry grades used for admission could effectively predict final performance in a

university. This research looks to add to the body of evidence and provide literature in a Ghanaian context.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

In this chapter, we develop the mathematical tools used in the analysis of the data of this study. Issues concerning the appropriate sample to be used are addressed so as to achieve valid results which are in line with statistical data analysis.

3.1 Population and sample

The target population of this study consists of all MUCG alumni. A sample of 888 graduates was selected from the alumni database of MUCG. A stratified method of sampling was adopted in selecting sample units into the study since the study cuts across various year groups from the inception of the university. Each year represents a stratum. Records of admission grades of alumni selected into this study were obtained from the Admissions Office and Students' Records Unit of MUCG. Their yearly grade point averages (GPAs) and final cumulative grade point averages (FCGPAs) were obtained.

The data was first separated by year group, that is, year of admission. Students without SSSCE/WASSCE entry grades were excluded from the data. Students who had transfers from other universities with SSSCE/WASSCE grades were included in the data.

The students enrolled in the Masters programme were deleted from the analysis since the entry requirements and procedures for admission are relatively different from those of the undergraduate programmes. The analysis was strictly for undergraduates.

Every dataset contains some errors such as errors that occur in data entry, mistakes in recording and so on. Errors and inconsistencies were detected, identified and corrected where possible. Students with some details missing were omitted since there were no imputations for missing values in the dataset. In order to show anonymity, student' name and identity numbers were replaced with numbers.

If a student registered for more than six subjects at the SSSCE/WASSCE, only the best six grades were taken into consideration provided that Mathematics, English and Social Studies or Integrated Science were included in these six subjects. The variables that were used were the FCGPA, best six aggregate of SSSCE/WASSCE results, grades of students with or without entry grades E, D7 or E8 and the various years the students graduated.

Table 3.1, shows the year of admission, the number of students admitted, the year of completion and the number of alumni that were able to graduate.

Table 3.1: The number of students admitted and the corresponding number that were able to graduate.

Year of Admission	Number of students Admitted	Year of graduation	Number of students Graduated
2000/2001	**213**	**2004**	**54**
2001/2002	**198**	**2005**	**160**
2002/2003	**133**	**2006**	**142**
2003/2004	**228**	**2007**	**190**
2004/2005	**560**	**2008**	**423**
2005/2006	**958**	**2009**	**674**
2006/2007	**1137**	**2010**	**834**

Source: Principal's yearly report to congregation

Table 3.1 shows the number of students admitted and their corresponding number of students who were able to graduate. Note that the number of students who graduated in 2006 (142) is more than those admitted in 2002/2003 (133) because some of the students were not able to graduate in their estimated year, joined those graduating in the year 2006.

For purposes of this study, students who were admitted with SSSCE/WASSCE certificate or results were further sampled. The SSSCE/WASSCE grades were weighted with a grade "A" having the highest weight of six (6) and grade "F" scoring the lowest weight of one (1). Table 3.2 below shows the grades and their corresponding weights.

Table 3.2: SSSCE/WASSCE grades and weights

SSSCE Grades	WASSCE Grades	Interpretation	Weight
A	A1	Excellent	6
B	B2	Very Good	5
C	B3	Good	4
D	C4,C5,C6	Credit	3
E	D7,E8	Pass	2
F	F9	Fail	1

The compilation of the data was done in such a way that each sample unit's SSSCE/WASSCE grade was recorded against its corresponding GPAs and FCGPAs. The yearly GPAs and FCGPAs were obtained from the data containing the final classes of students. Table 3.3 shows the FCGPAs and their corresponding classes.

Table 3.3: FCGPA and their corresponding classes

FCGPA	3.6 and above	3.59-3.25	3.24-2.50	2.49-2.00	1.99-1.50
Class	1st	2nd Upper	2nd Lower	3rd	Pass

Source: MUCG Students hand book (2005)

3.2 Research tools

Multiple regression analysis, chi-square test of independence, correlation analysis and tests concerning two population proportions were employed to study the relationship between Senior High School entry grades and final performance. The multiple regression analysis was essentially used to look at how Senior High School entry grades can predict or account for the long-term university outcomes such as the FCGPA. The chi-square test of independence was used to check if there was an association between entry grades and final performance. The correlation analysis was used to determine in quantitative terms, the degree to which Senior High School entry grades and final cumulative grade point average (FCGPA) are related. The tests concerning two population proportions were used to show that, the proportions of students who entered MUCG with or without grades E/D7/E8 performed better than the other or not. The statistical software SPSS (version 17) was used for this analysis.

3.2.1 Multiple Regression

The general purpose of multiple regression (the term was first used by Pearson in 1908) is to learn more about the relationship between several independent or predictor variables and a dependent or criterion variable. This statistical technique was used to relate entry grades of students to their final performance. The prediction model for each or combination of entry

qualifications was determined by fitting the values of the best six grades and those who had grades E, D7 or E8 in the general multiple linear regression:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \qquad (3.1)$$

where

Y represents the final cumulative grade point average

β_0 represents the intercept

X_1 represents the best six (6) grades of the students

X_2 represents grades "E", "D7" or "E8"

X_3 represents the various years the students graduated

ε represents the error term

β_i where $i = 1, 2, 3$ represent the regression parameters.

The parameters of the model were estimated using the ordinary least squares method. The predictor variables in the regression analysis were the students' entry results, that is, the best six grades (X_1), grades "E", "D7" or "E8" (X_2) and the various years the students completed their studies. The possible value of the best six grades (X_1) ranges from aggregate 6 to aggregate 24 for SSSCE candidates and aggregate 6 to aggregate 36 for WASSCE candidates (without E/D7/E8 inclusive). The possible values for grades E/D7/E8 (X_2) is coded as zero when there is a presence of a "bad grade" in the best six grades and one when there is no "bad grade". The possible values of the various years the students graduated (X_3) ranges from the year 2004 to 2010 with the exception of 2008 due to loss of data. In this regard, the study considered only Senior High School students grades as the entry requirement(s) for admission into the university.

Based on this consideration, the best six grades were taken, including Mathematics, English Language and Integrated Science for every student. For this model to hold, a set of assumptions must be satisfied:

a. The variable ε is a real random variable.
b. The random variable ε has a zero mean value for each X_i.
c. The variance of each ε_i is the same for all the X_i values.
d. The values of each ε_i are normally distributed.
e. The values of ε_i (corresponding to X_i) are independent from the values of any other ε_j.
f. The explanatory variables are measured without error.
g. The term ε_i is independent of the explanatory variables.

3.2.2 Chi-square test of independence

The chi-square test of independence is a non-parametric procedure, in that no distributional assumptions of the data need to be made (Diepen & Franses, 2006). The test is used to decide whether two variables in a population are independent. If there is no association between two variables, we say that they are independent. If two variables are not associated (that is, if they are independent), then knowing the value of one variable for some subject will not help us predict the value of the other variable for the same subject. On the other hand, if two variables are associated, the knowledge of one is helpful in predicting the value of the other is likely to assume. Certain assumptions must be satisfied for this test to be used:

a. The data consist of a simple random sample of size n from the population of interest.
b. The observations in the sample may be cross-classified according to two variables of interest, so that each observation belongs to one and only one variable of interest.

c. The variables may be inherently categorical or may be quantitative variables whose measurements are capable of being classified into mutually exclusive numerical categories.

The data may be displayed in a contingency table as in Table 3.4, where the observed number n_{ij} of subjects characterized by one category of each criterion is placed in the cell formed by the intersection of the i^{th} row and the j^{th} column. The cell entries are known as the observed cell frequencies and usually denoted by O_{ij}, that is, $O_{ij} = n_{ij}$. The observed cell frequency n_{ij} represents the joint occurrence in the sample subjects of the i^{th} category of the first criterion of the classification with the j^{th} category of the second.

Table 3.4: Contingency table for the chi-square test of independence

		Dependent Variable					
	1	2	3	...	*i*	...	c
1	n_{11}	n_{12}	n_{13}	...	n_{1i}	...	n_{1c}
2	n_{21}	n_{22}	n_{23}	...	n_{2i}	...	n_{2c}
3	n_{31}	n_{32}	n_{33}	...	n_{3i}	...	n_{3c}
Predictor Variable .	.	.	.	...	.	...	.
j	n_{j1}	n_{j2}	n_{j3}	...	n_{ji}	...	n_{jc}
.	.	.	.	...	.	...	.
r	n_{r1}	n_{r2}	n_{r3}	...	n_{ri}	...	n_{rc}
Total	$n_{.1}$	$n_{.2}$	$n_{.3}$	...	$n_{.i}$	...	$n_{.c}$

a. Hypothesis

The researcher has to state a hypothesis in the form

H_0: The two criteria of classification are independent.

H_1: The two criteria of classification are not independent.

b. Test statistic

A test statistic under the assumption that H_0 (null hypothesis) is true is computed. The chi-square test of independence compares observed results with results that are expected when H_0 is true. This can be computed by multiplying together the appropriate row and column totals and dividing the product by the total sample size.

From the expected and observed frequencies obtained, we may compute the test statistic that reflects the magnitudes of the differences between these two quantities, that is, when H_0 is true. This test statistic has approximately a X^2 distribution with $(r-1)(c-1)$ degrees of freedom, where r is the number of rows and c is the number of columns in the contingency table. The test statistic is

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\left[\frac{(O_{ij}-E_{ij})^2}{E_{ij}}\right] \qquad (3.2)$$

When the difference between the observed and the expected frequencies is large, χ^2 (also known as Pearson's cumulative test statistic) is large and when there is a close agreement between them, χ^2 is small. The properties of this test statistic were first investigated by Pearson (1900). This is where he made the distinction between the test statistic (χ^2) and its distribution.

c. Decision rule

We may reject the null hypothesis of independence at the level of significance α if the computed value of the test statistic χ^2 exceeds the tabulated value $\chi^2_{1-\alpha}$ for $v = (r-1)(c-1)$ degrees of freedom, where $\chi^2_{1-\alpha}$ is the value of the chi-square with v degrees of freedom such that the area to the left is 1-α.

d. A case of a 2 x 5 contingency table

Let the reduced 2×5 table be as in Table 3.5, where the first and second rows of the predictor are possible compound rows corresponding to the five parts of the split. We find that there are 4 degrees of freedom associated with this 2×5 contingency table when we apply the $(r-1)(c-1)$ rule.

Table 3.5: 2 x 5 Contingency table for the data

		Degree/class					
		1st Class	**2nd Upper**	**2nd Lower**	**3rd Class**	**Pass**	**Total**
Entry Grades	**With grades E/D7/E8**	n_{11}	n_{12}	n_{13}	n_{14}	n_{15}	$n_{1.}$
	Without grades E/D7/E8	n_{21}	n_{22}	n_{23}	n_{24}	n_{25}	$n_{2.}$
	Total	$n._1$	$n._2$	$n._3$	$n._4$	$n._5$	n

where $n = n_{1.} + n_{2.}$ *or* $n = n_{.1} + n_{.2} + n_{.3} + n_{.4} + n_{.5}$

Table 3.5 shows the entry grades of students admitted and the various degrees they obtained after the four-year course in the university. The entry grades represent the predictor variable and the degree/class represents the dependent variables. The test statistic is

$$\chi^2 = \sum_{i=1}^{2}\sum_{i=1}^{5}\left(\frac{(O_{ij} - E_{ij})^2}{E_{ij}}\right) \qquad (3.3)$$

where χ^2 is a chi-square with 4 degrees of freedom when H_0 is true. $O_{ij} = n_{ij}$ (observed frequencies) and E_{ij} represents the expected frequencies.

3.2.3 Pearson correlation coefficient

The correlation between two or more variables reflects the degree to which the variables are related. A research by Anderson (1998) described correlational research as one way of describing in quantitative terms the degree to which variables are related. He argued that correlation studies investigate a number of variables believed to be related to an important variable such as academic performance. When the relationship is between two variables, it is known as simple correlation and when the relationship is between three or more, it is called multiple correlation. It is assumed that the two variables X and Y are random in nature, that is their outcome cannot be predicted. More importantly, it is also assumed that the independent variable (X) is measured with negligible error.

Let Y represent the final cumulative grade point average (FCGPA), X_1 be the best six grades the student was admitted with and X_2 be grades "E", "D7" or "E8". The strength of prediction from a multiple regression equation is measured by the square of the multiple correlation coefficient, R^2. In the case where there are only two independent variables, R^2 can be found by using the following formular

$$R^2_{Y.12} = \frac{r_{Y1}{}^2 + r_{Y2}{}^2 - 2(r_{Y1})(r_{Y2})(r_{12})}{1 - r_{12}^2} \qquad (3.4)$$

where r_{Y1} represents the correlation between Y and X_1,

r_{Y2} represents the correlation between Y and X_2, and

r_{12} represents the correlation between X_1 and X_2.

3.2.4 Tests concerning two population proportions

We wish to test the hypothesis concerning two population proportions. For instance, we may try to show evidence that the proportion of students who enter a university with grades E/D7/E8 is less than the proportion of students who enter the university without grades E/D7/E8.

Suppose that two independent random samples of sizes n_1 and n_2 are taken from two independent populations. Let p_1 represent the proportion of students who entered MUCG without grades E/D7/E8 and let p_2 represent the proportion of students who entered MUCG with grades E/D7/E8. Suppose x_1 and x_2 are the number of students who entered MUCG without and with E/D7/E8, respectively. Then, point estimates of p_1 and p_2 are given by $\hat{p}_1 = \frac{x_1}{n_1}$ and $\hat{p}_2 = \frac{x_2}{n_2}$.

Consider a test of H_o: $p_1 = p_2$ against H_1: $p_1 \neq p_2$. Then, point estimate of p_1 and p_2 are given by $\hat{p}_1 = \frac{x_1}{n_1}$ and $\hat{p}_2 = \frac{x_2}{n_2}$.

The test statistic for testing H_o: $p_1 = p_2$ is

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}} \qquad (3.5)$$

The quantity $\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}+\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$ is the estimated standard error of $\hat{p}_1 - \hat{p}_2$. It can be proved that for large samples, Z is approximately standard normal when H_o is true. Table 3.6 on the next page gives the critical regions for testing H_o: $p_1 = p_2$ against the various alternatives, where z is the computed value of Z.

Table 3.6: Critical regions for testing H_o: $p_1 = p_2$ against various alternatives

Alternative hypothesis	**Reject H_o if:**
$p_1 < p_2$	$z < z_{\alpha}$
$p_1 > p_2$	$z > z_{1-\alpha}$
$p_1 \neq p_2$	$z < z_{\frac{1}{2}\alpha}$ or $z > z_{1-\frac{1}{2}\alpha}$

3.3 P-value

This is the smallest value of α (significance level) that leads to the rejection of the null hypothesis. If the p-value is less or equal to α, we reject the null hypothesis, and if the p-value is greater than α, we fail to reject the null hypothesis.

3.4 Durbin-Watson (DW) statistic

This is a test statistic used to detect the presence of autocorrelation (a relationship between values separated from each other by a one time lag) in the residuals (prediction errors) from the

regression model. This is also part of the standard output of most regression programmes and the test statistic is given by:

$$d = \frac{\sum_{t=2}^{n} (e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2} \qquad (3.6)$$

where n is the number of observations, e_t is the residual value given at a time t. Since d is approximately equal to $2(1-r)$, where r is the sample autocorrelation of the residuals, $d = 2$ indicates no autocorrelation. The value of d always lies between 0 and 4. If the Durbin–Watson statistic is substantially less than 2, there is evidence of positive serial correlation. As a rough rule of thumb, if the Durbin–Watson statistic is less than 1.0, there may be cause for alarm. Small values of d indicate successive error terms are, on average, close in value to one another, or positively correlated. If $d > 2$, successive error terms are, on average, much different in value to one another, i.e., negatively correlated. In regressions, this can imply an underestimation of the level of statistical significance.

3.5 The F-test

The F-statistic is used to find out whether the independent variables (best six grades, grades E, D7 or E8 and the various years the students graduated) do actually have any significant fit on the dependent variable (final cumulative grade point average). We test the null hypothesis that the variations in the dependent variable comes as a result of chance or random fluctuations which are independent of the values of the independent variables. The F-statistic is computed as

$$F = \frac{R^2 / (k-1)}{1 - R^2 / (n-k)}. \qquad (3.7)$$

F has the F-distribution with $(k-1)$ and $(n-k)$ degrees of freedom, where k is the number of parameters in the model and n is the sample size. The computations of the F-statistic are usually summarized in an analysis of variance (ANOVA) table. When the computed F-statistic exceeds the critical value $f_{\alpha},(k-1,n-k)$, we reject the null hypothesis at the α level of significance and conclude that there is a significant amount of variation in the response accounted for by the estimated model.

3.6 Tolerance

This is a measure calculated for each variable. It is calculated as 1 – R-square for the regression of that variable against all the other independent variables, without the dependent variable. It is used to check the presence of multicollinearity (a statistical phenomenon in which two or more predictor variables in a multiple regression model are highly correlated) in the regression model. It represents the proportion of variability that is not explained by the other independent variables in the regression model. When tolerance is close to zero (0), it means that there is high multicollinearity of that variable with other independent variables and the estimated regression coefficients will be unstable (see Belsley et al. (1980)).

3.7 Variance Inflation Factor (VIF)

This is a measure calculated for each variable and it is simply the reciprocal of tolerance. It is also used to check the presence of multicollinearity in the model. Hence, the square root of the VIF is the degree to which the collinearity has increased the standard error for that variable. Therefore, a high VIF value indicates high multicollinearity of that variable with other independent variables and instability of the regression coefficient estimation process. VIF=1 is ideal and many authors use VIF=10 as a suggested upper limit for indicating a definite multicollinearity problem for an individual

variable (VIF=10 inflates the Standard Error by 3.16). Some would consider VIF=4 (doubling the Standard Error) as a minimum for indicating a possible multicollinearity problem (see Belsley et al. (1980)).

CHAPTER FOUR

ANALYSIS AND RESULTS

4.0 Introduction

This research used data from the Admissions Office and Students' Records Unit of MUCG. The statistical techniques such as the descriptive statistics, multiple regression, chi-square test of independence and correlation coefficient were used to analyze the data. This section presents the results of the various analyses.

4.1 Data required and source

The data covered Senior High School students from the academic years 2000/2001 to 2007/2008 with an omission of 2004/2005 academic year group due to loss of information. Even though some of the entry qualifications required by Methodist University College Ghana (MUCG) included better classes in Higher National Diploma (HND), "A" – Level grades (in addition to entrance examinations conducted by MUCG) mostly for mature students and other professional courses from recognized institutions, the focus on this study is on SSSCE/WASSCE students. Statistical and graphical tools in SPSS were used in the analysis and presentation of the study. Table 4.1 shows the various counts of students from the Senior Secondary School Certificate Examination (SSSCE)/West African Senior School Certificate Examination (WASSCE) grades from MUCG.

Table 4.1: Counts of SSSCE/WASSCE grades from MUCG

Year of Admission	No. of students Admitted	Count of SSSCE / WASSCE	Count of SSSCE/WASSCE selected into sample	Year of Graduation	No. of Graduates
2000/2001	213	64	62	2004	54
2001/2002	198	106	42	2005	160
2002/2003	133	71	62	2006	142
2003/2004	228	121	113	2007	190
2004/2005	560	NA	NA	2008	423
2005/2006	958	NA	NA	2009	674
2006/2007	1137	573	301	2010	834
2007/2008	1064	662	308	2011	NA
Total:	4,491	1013	888		2,477

Source: Admissions Office and Students' Records Unit, MUCG

Table 4.1 shows the number of students admitted into the university, the number of students with Senior High School results, the number of counts included in the sample, the year of completion and the number that graduated. The second column shows all the students admitted into MUCG in their respective years. The third and fourth columns show the number of SSSCE/WASSCE students that were obtained and included in the sample. The sixth column shows the number of students who graduated. The sample size of 888 represents the total number of students who had their records intact and also graduated. Figure 4.1 shows the number of students admitted and graduated over the various academic years in MUCG.

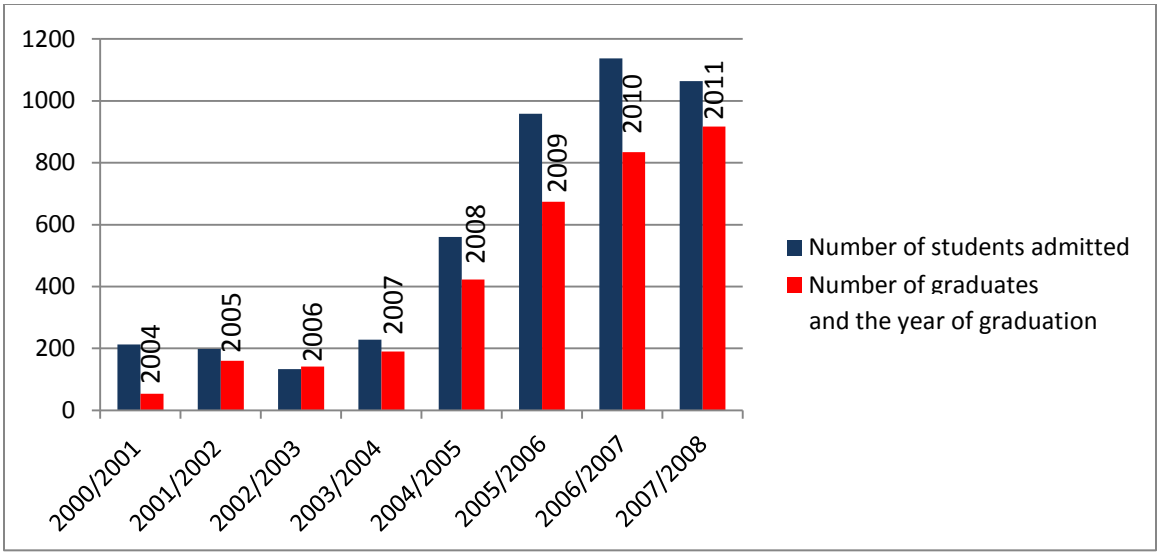

Figure 4.1: Admissions and graduates for the various academic years 2000/2001 to 2007/2008

Figure 4.1 shows the number of students admitted into MUCG and the year of graduation. The blue bars indicate the number of students who were admitted and the red bars indicate the number and years of those who graduated in the corresponding four years of study. It can be seen that from the academic years 2000/2001 to 2003/2004, admission of students were low, that was due to the challenges faced when beginning an institution. Between the academic years 2000/2001 and 2002/2003, admission of students fell by 40.4% and started increasing from 2003/2004 academic year by about 71.4%. For the following academic years, that is, 2004/2005 to 2007/2008, the number of students admitted increased except for the 2007/2008 academic year group which fell slightly by 6.6%. Also, from the bar chart, the first batch of students who graduated in 2004 were about 25.4% of the number admitted, which was low. The second batch of students who graduated in 2005 increased to 80.8% of the number of students admitted while the third batch (2006) of graduates exceeded 100% (that is, 106%) due to the fact that students who were unable to graduate in the previous years because they had some papers to write, also

graduated. It can also be seen that not all the students who are admitted into the university graduated in their respective years of graduation. The fourth, fifth, sixth and seventh batches of graduates in 2007, 2008, 2009 and 2010 were 83%, 75.5%, 70.4% and 73.4%, respectively of the various number of students admitted in their various academic years. Figure 4.2 below shows the number of SSSCE/WASSCE students who have graduated in MUCG between 2004 and 2010 and their classes.

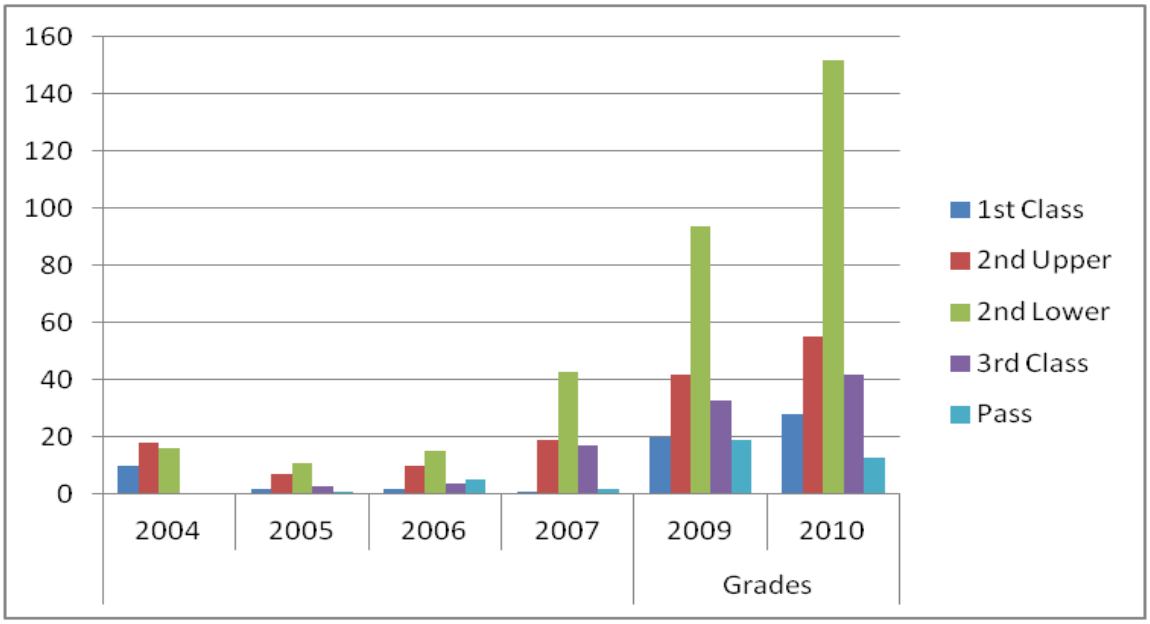

Figure 4.2: Number of students who graduated between 2004 and 2010 and their classes. Computational data, 2012

Figure 4.2 gives the pictorial view SSSCE/WASSCE students who entered MUCG with at least one "bad grade" in their best six subjects and their classes of degrees obtained after their three or four years of study. It can be seen from the graphs that SSSCE/WASSCE students who were admitted into MUCG with entry grades E/D7/E8 performed well, that is, from the graduation year 2004, 10 students with entry grades E/D7/E8 had first class, 18 students had second upper degree and 16 students had second class lower. The total number of students who graduated in

2004 became 44 students instead of the 54 students as indicated in Table 4.1 becomes 10 students who also graduated were not admitted with SSSCE/WASSCE grades.

Due to the size of the graduates between 2005 to 2006, very small number of classes were recorded in these years, that is, 4 students with entry grades E/D7/E8 obtained first class, 17 students had second (class upper division), 26 students graduated with a second class (lower division) and so on.

From 2009 to 2010, it can be seen that the number of students who entered MUCG with entry grades E/D7/E8 also did well. It can be noticed that when the students with entry grades E/D7/E8 are admitted, a number of them are able to acquire between a first class degree and a second class lower degree.

4.2 Descriptive statistics of SSSCE/WASSCE students by admission year groups

For the past years of admission in Methodist University College Ghana (MUCG), a high number of students admitted each year were Senior Secondary School Certificate Examination (SSSCE) or West African Senior School Certificate Examination (WASSCE) holders, apart from the academic year 2000/2001 while the others were shared among the other entry qualifications like the Higher National Diplomas (HND), A-Level and other professional courses. Table 4.2 gives some descriptive statistics of SSSCE/WASSCE students.

Table 4.2: Descriptive Statistics of SSSCE/WASSCE entry grades

Year Groups	Count of SSSCE/WASSCE	% of SSSCE/WASSCE	Mean Aggregate	S.E Mean	Std. Dev.	Best Agg.
2000/2001	64	30.00	20.1587	0.3726	2.9578	13
2001/2002	106	53.54	20.226	0.313	3.226	10
2002/2003	71	53.38	20.56	0.3473	2.926	11
2003/2004	121	53.07	20.430	0.288	3.167	10
2005/2006	320	51.09	16.352	0.136	2.201	07
2006/2007	573	50.40	18.012	0.139	2.212	09
2007/2008	662	62.22	17.443	0.142	2.223	11

Source: Admissions Office and Students' Records Unit, MUCG

Table 4.2 shows some descriptive statistics of SSSCE/WASSCE entry grades of students admitted in MUCG. From the table, it can be seen that in the academic year 2000/2001, 213 students were admitted with various entry qualifications including SSSCE, HND, A-Level and so on and about 30% of this group were SSSCE holders. An average aggregate of best six subjects was found to be 20.158 (20) with an error margin of 0.3726 which means that, the estimated mean aggregate of best six subjects was between the interval of 19.7861 and 20.5313. A standard deviation of 2.9578, indicates the spread of the aggregates around the mean. The best entry grade found from this academic year group was aggregate 13.

In the academic year 2001/2002, about 54% of SSSCE holders were admitted in MUCG. It can also be seen that aggregates 17 and 20 were the range of best six subjects for this year group. The best grade found within this category was aggregate 10. Also, the mean best six result is 20 with a standard deviation of about 3.226.

From 2002/2003 to 2007/2008 academic year groups with the exception of 2004/2005, the mean aggregate of the best six subjects are 20.56, 20.430, 16.352, 18.012 and 17.443, respectively. The corresponding standard deviations can also be seen in Table 4.2. Table 4.3 shows the percentages of students who entered MUCG with and without grades E/D7/E8.

Table 4.3: Percentages of students with and without grades E/D7/E8 and their various degrees/classes

			Degree/class					
			First class	2nd Upper	2nd Lower	3rd class	Pass	Total
Entry Grades	Without E/D7/E8	Observed frequency	28	55	95	18	8	204
		percentages	13.7%	27%	46.6%	8.8%	3.9%	100%
	With E/D7/E8	Observed frequency	63	151	331	99	40	684
		percentages	9.2%	22.1%	48.4	14.5%	5.8%	100%
		Total	91	206	426	117	48	888

Computational data, 2012

Table 4.3 above shows the percentages of students who entered MUCG with and without grades E/D7/E8 in their best six grades and the various degrees/classes obtained by these students. The columns show the various degrees/classes the students obtained and the rows show the entry

grades and percentages. Table 4.4, also shows the results from the tests of hypothesis concerning two population proportions.

Table 4.4: Results from the tests of hypothesis concerning two proportions

	Proportion of students without E/D7/E8 ($\hat{p}_1$)	**Proportion of students with E/D7/E8 ($\hat{p}_2$)**	**Test statistic**	**Critical values**
1st Class	**0.137254902**	**0.092105263**	**1.70**	**1.96**
2nd Upper	**0.269607843**	**0.220760233**	**1.40**	**1.96**
2nd Lower	**0.465686274**	**0.483918128**	**-0.46**	**-1.96**
3rd Class	**0.088235294**	**0.144736842**	**-1.51**	**-1.96**
Pass	**0.039215686**	**0.058479532**	**-0.44**	**-1.96**

Computational data, 2012

It can be observed from Table 4.3 that quite a high percentage of students who had first class were students who entered MUCG without grades E/D7/E8. This means that there is a high likelihood that students who are admitted without grades E/D7/E8 will earn a first class (probability of about 14%). However, a test of hypothesis conducted between the proportion of students who entered MUCG with grades E/D7/E8 and those who entered without grades E/D7/E8 show that there is no significant difference between the two proportions. This result can be seen in Table 4.4. This conclusion simply means that the proportion of students who entered

MUCG with or without grades E/D7/E8 do not really have an effect on the final performance (First class) at MUCG.

It can also be observed from Table 4.3 that quite a high percentage of students who entered MUCG without grades E/D7/E8 had a second class (upper division) compared to those who had grades E/D7/E8. This means that there is a likelihood that students who are admitted to MUCG without grades E/D7/E8 in their best six grades will have a second class (upper division) degree (a probability of about 27%). However, a test of hypothesis conducted between the proportion of students who entered MUCG with grades E/D7/E8 and had second class (upper division) against those who entered without grades E/D7/E8 also showed that there is no significant difference between the two proportions. This result can be seen from Table 4.4. This conclusion means that the proportion of students who entered MUCG with or without grades E/D7/E8 may not have an effect on the final performance (Second class upper division) at MUCG.

Also, it can be seen from Table 4.3 that there is a slightly high percentage of students who entered MUCG with grades E/D7/E8 compared to those who entered MUCG with these grades. This means that quiet a high percentage of students who entered MUCG with grades E/D7/E8 had a Third class degree (a probability of about 15%). However, a further test of hypothesis conducted between the proportion of students who entered without grades E/D7/E8 and had a third class against those who entered with these grades showed that there is no significant difference between the two proportions. This result can also be found in Table 4.4. This conclusion simply means that the proportion of students who entered MUCG with or without grades E/D7/E8 may not have an effect on the final performance (Third class degree) at MUCG.

4.3 Multiple regression results

The first hypothesis stated in this study sought to answer the extent to which entry grades E/D7/E8 and final performance in MUCG relate. The estimates of the ordinary least squares multiple regression model are summarized in Table 4.5.

Table 4.5: Estimates of the ordinary least squares multiple regression model

	Unstandardized Std. Error		Standardized coeff			Collinearity statistics	
Model	**B**	**Std. Error**	**Beta**	**t**	**P-value**	**tolerance**	**VIF**
Constant	**2.725**	**.114**		**23.911**	**.000**		
Best Six	**.026**	**.005**	**.174**	**5.251**	**.000**	**0.904**	**1.106**
Category of grades	**.101**	**.039**	**.087**	**2.598**	**.010**	**0.889**	**1.125**
Performance of students	**-.069**	**.010**	**-.230**	**-7.132**	**.000**	**0.958**	**1.044**

Computational data, 2012 $R^2 = 0.118$ $DW = 1.997$

The estimated model (4.1) below shows the estimates obtained from the ordinary least squares multiple regression model. This was derived from Table 4.5 and the summary of the estimated model is of the form:

$$\hat{G} = 2.725 + 0.026X_1 + 0.101X_2 - 0.069X_3 \qquad (4.1)$$

where X_1 represents best six grades, X_2 represents grades E, D7 or E8 and X_3 represents the various years the students completed their studies. From the estimated regression model (4.1), about 2.6% of the variation in final cumulative grade point average (FCGPA) was accounted for by the best six grades obtained from Senior High School, 10.1% of the FCGPA was also

accounted for by grades E, D7 or E8 and about 6.9% of FCGPA was accounted for by the various years the students completed their studies.

From Table 4.5, we can see that there is a positive relationship between final cumulative grade point average (FCGPA) and the best six grades and grades E/D7/E8 while a negative relationship between FCGPA and the years the students completed their studies. It was also found that all the independent variables were statistically significant since the significance level (0.05) was greater than 0.000 and 0.010 in all the independent variables. Hence, H_0, which states that, there is no significant relationship between entry grades E/D7/E8 and final performance of students who entered MUCG between the academic years 2000/2001 to 2007/2008 with these grades, will be rejected.

The R squared, R^2 (multiple correlation coefficient of determination), which measures the proportion of variation in the dependent variable (final cumulative grade point average) explained by the regression model was found to be very weak, that is, 0.118. From this output, about 11.8% of the variation in the final cumulative grade point average was accounted for by the independent variables (best six grades, grades E/D7/E8 and the various years the students completed their studies). Since the variance inflation factor (VIF) is not in excess of 20 and the tolerance region (1/VIF) is also greater than 0.05, it implies that there is no problem of multicollinearity.

The Durbin-Watson (DW) test statistic which is used to detect the presence of first order autocorrelation in the residuals is found to be 1.997 (which is approximately 2). This indicates that there is no autocorrelation.

Analyzing the quality of the estimated regression line is done by the analysis of variance (ANOVA) approach. This is a procedure where the total variation in the independent variable is subdivided into meaningful components that are then observed and treated in a systematic fashion. Table 4.6, on the next page shows the analysis of variance.

Table 4.6: Analysis of variance

Model	Sum of Squares	df	Mean Square	F	P-value
Regression	**26.030**	**3**	**8.677**	**39.564**	**0.000**
Residual	**193.868**	**884**	**0.219**		
Total	**219.898**	**887**			

Computational data, 2012

The analysis of variance aims at finding out whether the independent variables (best six grades, entry grades E/D7/E8 and the various years the students graduated) do actually have any significant influence on the dependent variable (final cumulative grade point average). From Table 4.6 above, the overall regression model is statistically significant at the 0.05 level since this level is greater than the p-value, 0.000 with an *F value* of 39.564. Hence, the null hypothesis that, there is no significant relationship between entry grades E/D7/E8 and the final performance of students who entered MUCG between the academic years 2000/2001 to 2007/2008 with these grades, is rejected. This means that, knowing the Senior High School grades of a student who enters MUCG with grades E/D7/E8, one can predict the student's final performance in MUCG at the end of the four-year course.

4.5 Tests of the linear model

In academic researches, normality of the data for a better result and generalizations to a large population is considered very important. In this section, tests of normality, autocorrelation and multicollinearity were checked.

4.5.1 Diagnostics test (Tests of normality)

A diagnostic test was made to check the distribution of the data. This is a graphical detection of the violation of assumptions of the regression model used for the analysis. The histogram below shows the diagnostic plots of residuals.

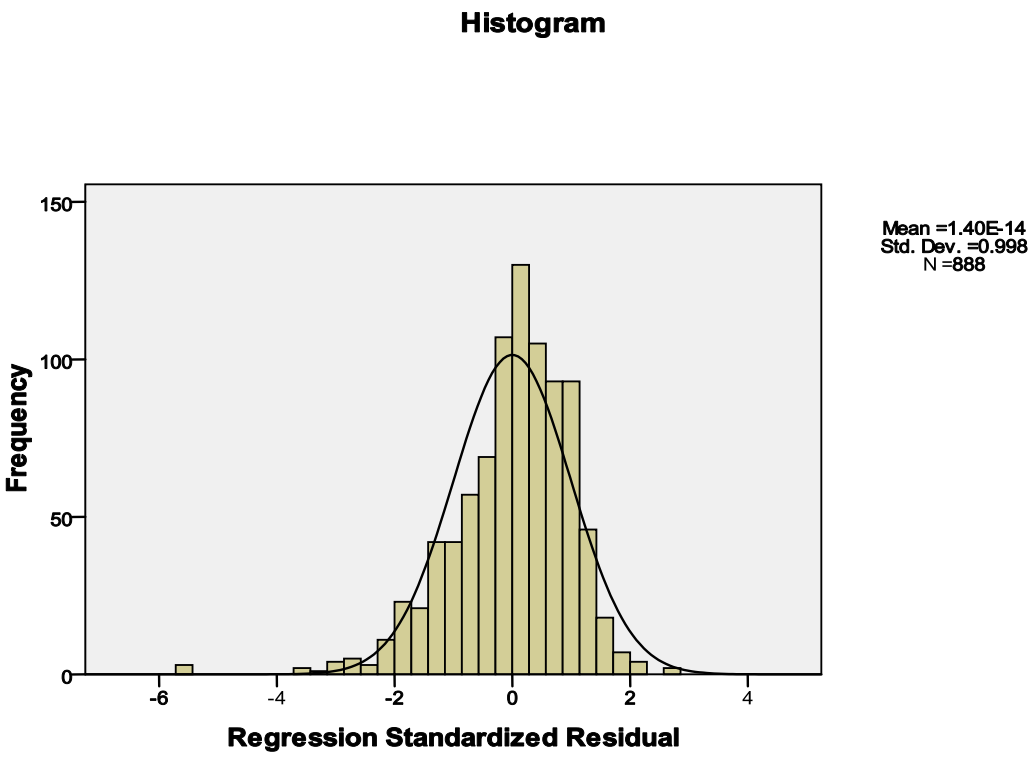

Figure 4.3: Diagnostic plots of residuals

Figure 4.3 is a histogram showing the standardized residual values and the predicted final cumulative grade point average which we expected to be close to normally distributed around a mean of zero. It was found that the pattern of the residuals plots are normally distributed around the mean of zero with some few deviations. It was found that the mean of the error term is 1.4×10^{-14} which is approximately zero (0) and a constant variance of 0.996 confirming the assumption of the regression model which states that, the error term is normally distributed with mean zero and a constant variance (see Wuensch (2007)).

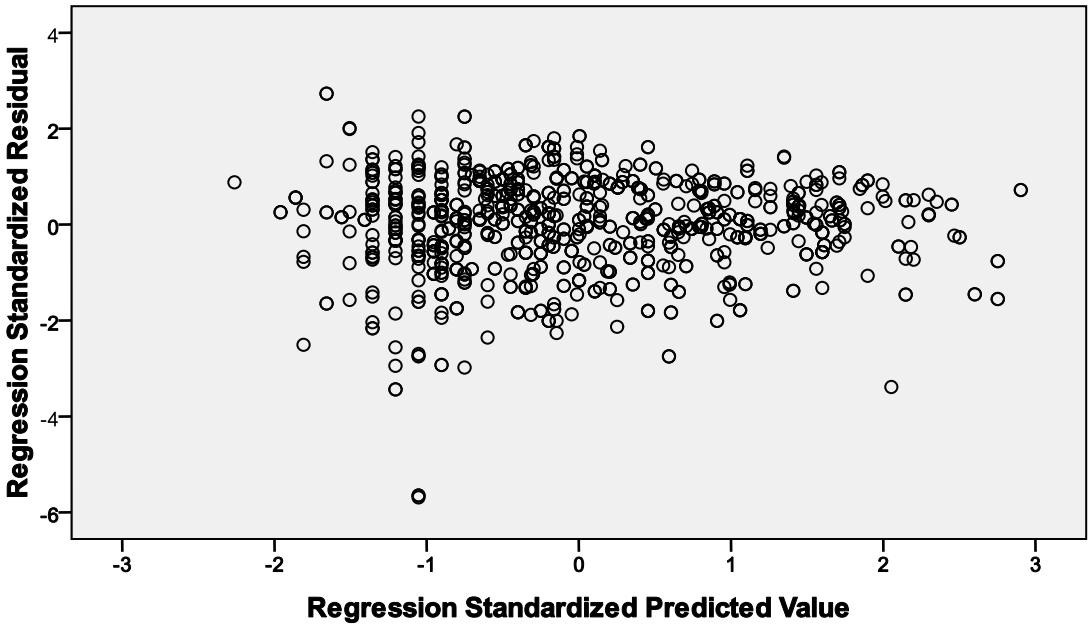

Figure 4.4: Plots of the residuals

Figure 4.4, above, shows the scatter diagram of the regression standardized predicted value and the regression standardized residual. This plot was used to check the assumption of constant

variance of the error terms. The random dispersion of the error terms within a constant distance shows clearly that there is homoscedasticity. The assumption of homoscedasticity is the variation of the each error term around its zero mean does not depend on the values of the independent variables. We can see some rectangular shape of the error terms in the scatter plot with some few deviations around the zero means and also a form of symmetry around the zero mean found in the scatter diagram confirms the linearity of the model (see Wuensch(2007)).

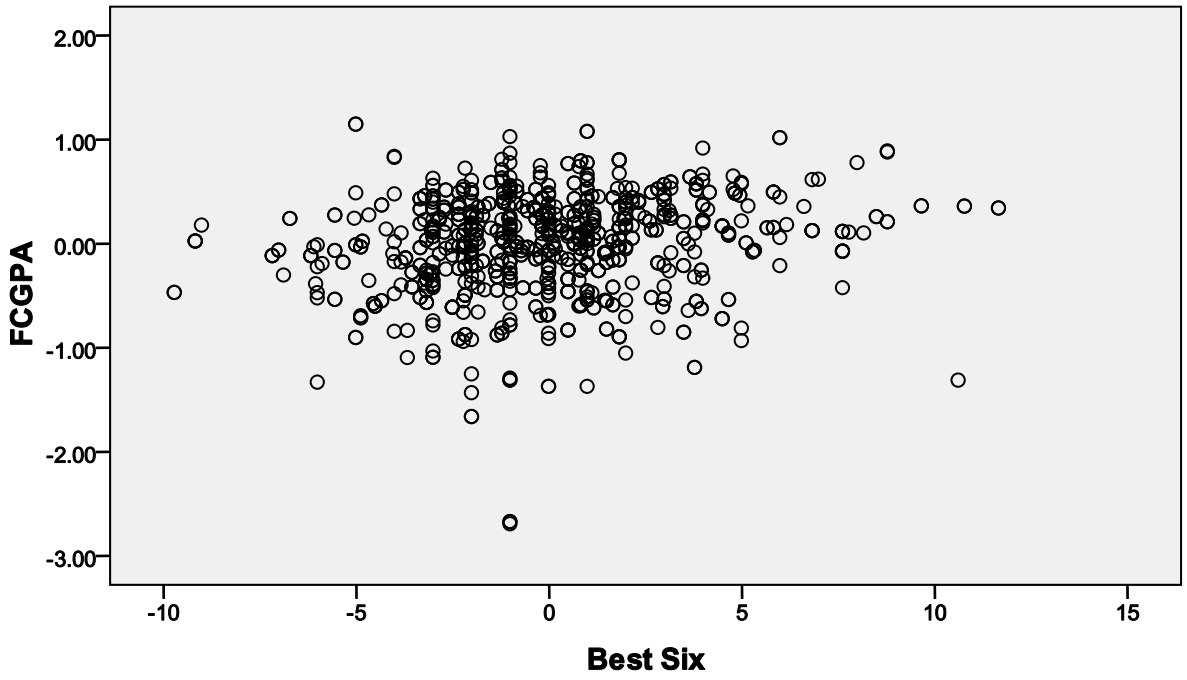

Figure 4.5: Partial regression plot of the final cumulative grade point average and best six grades of students obtained from Senior High School

Figure 4.5, above, shows the scatter diagram of the partial regression plot of residuals for final cumulative grade point average (FCGPA) and the best six grades of the students. The error terms are assumed to be independent and normal with a mean zero and a constant variance. It found that these plots show random fluctuations around the value of zero with some deviations. This depicts the independence of the best six grades and the error terms (Wuensch (2007)).

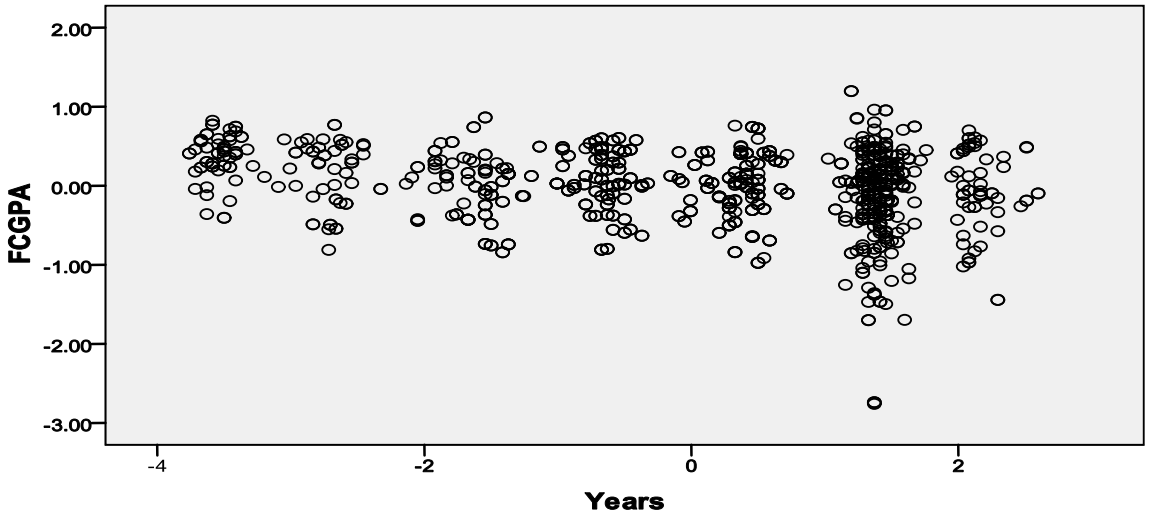

Figure 4.6: Partial regression plot of final cumulative grade point average and the years the students completed their studies

Figure 4.6, above, shows the scatter diagram of the partial regression plots for final cumulative grade point and the years the students completed their degree programmes. It can be seen that these plots show random fluctuations around the value of zero with some deviations. This depicts the independence of the various years the students graduated and the error terms (see Wuensch (2007)).

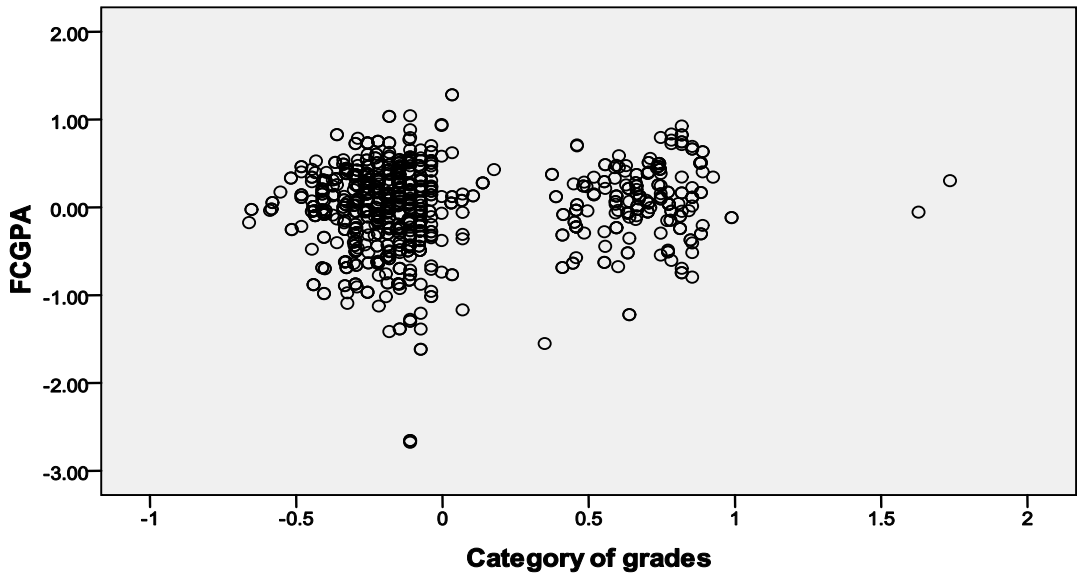

Figure 4.7: Partial regression plot of final cumulative grade point average and the categories of grades

Figure 4.7, above, shows the scatter diagram of the partial regression plots for final cumulative grade point and the category of grades of students. It can be seen that these plots show random fluctuations around the value of zero with some deviations. This depicts the independence of the category of grades and the error terms (see Wuensch (2007)).

4.5.2 Test for multicollinearity

Multicollinearity is used to denote the presence of linear relationships between the explanatory variables (best six grades, entry grades E/D7/E8 and the various years the students completed their studies). Table 4.7 shows the correlation coefficients of the variables in the model.

Table 4.7: Correlation coefficients of the independent variables in the model

Model			Years	Best Six	Category of grades
1	Correlations	Years	1.000	.085	.155
		Best Six	.085	1.000	-.281
		Category of grades	.155	-.281	1.000
	Covariances	Years	9.313E-5	4.024E-6	5.800E-5
		Best Six	4.024E-6	2.432E-5	-5.379E-5
		Category of grades	5.800E-5	-5.379E-5	.002

Computational data, 2012

From Table 4.7, the correlation coefficient between the best six grades of students and those who enter the university with grades E/D7/E8 is -0.281 while the relationship between the best six grades and the various years the students completed their studies is also 0.155, which shows clearly that there is no multicollinearity. This means that the predictor variables in the multiple regression model are not correlated.

Also, it was found that there was no autocorrelation between the error terms, that is, there was approximately zero covariances between the errors and the independent variables. This satisfies the assumption of independence of the error term of the regression model.

4.6 Results of the chi-square test of independence

The second hypothesis in the study is to check if there is an association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades. Data on Methodist University College Ghana (MUCG) alumni were obtained from the Admissions Office and Students' Records Unit. A sample of 888 students who had their records intact were classified as to whether they were in the first, second upper division, second lower division, third or pass class and whether or not they entered the university with grades E/D7/E8. The observed frequencies are presented in Table 4.8 which is also known as a contingency table.

Table 4.8: 2 x 5 contingency table showing entry grades of students and their final class/degree

		Degree/Class					
		1st	2nd upper	2nd lower	3rd Class	Pass	Total
Entry grades	Without E,D7,E8	28	55	95	18	8	204
	With E,D7,E8	63	151	331	99	40	684
	Total	91	206	426	117	48	888

Computational data, 2012

Table 4.8 above is a 2 x 5 contingency table because it has two (2) rows and five (5) columns. It shows the observed frequencies of the various classes and entry grades obtained by the students. The two rows show the entry grades of the students with and without grades E/D7/E8 in their Senior Secondary School Certificate Examination (SSSCE)/West African Senior School

Certificate Examination (WASSCE) results and the five columns also show the various classes or degrees obtained by the students in the university.

The hypothesis tested is

H_0: There is no association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades.

H_1: There is an association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades.

We computed the expected frequencies for the various observed frequencies by multiplying each cell probability by the total number of observations, that is 888. The number of degrees of freedom associated with the chi-square test used here is equal to the number of cell frequencies that was filled in freely when we found the marginal totals and the grand total. Table 4.9 below shows the expected and observed frequencies of the contingency table.

Table 4.9: 2 x 5 contingency table showing the observed and expected frequencies of students with entry grades and their final class/degree

			Degree/class					
			First class	**2nd Upper**	**2nd Lower**	**3rd class**	**Pass**	**Total**
Entry Grades	**Without E/D7/E8**	**Observed frequency**	**28**	**55**	**95**	**18**	**8**	**204**
		Expected frequency	**20.9**	**47.3**	**97.9**	**26.9**	**11.0**	**204.0**
	With E/D7/E8	**Observed frequency**	**63**	**151**	**331**	**99**	**40**	**684**
		Expected frequency	**70.1**	**158.7**	**328.1**	**90.1**	**37.0**	**684.0**
		Total	**91**	**206**	**426**	**117**	**48**	**888**

Computational data, 2012

Table 4.9 on the previous page, shows the observed and expected frequencies of the various classes obtained by the students and their entry grades. The entry grades (with or without E/D7/E8) can be found on the rows and the corresponding degrees or classes on the columns.

To test the null hypothesis that, there is no association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades, we use the test statistic in equation (3.3) to compute the test. Table 4.10 below summarizes the value of the chi-square test of independence and the p-value of the test.

Table 4.10: Summary of the value of the chi-square test of independence

	Value	**df**	**P-value**
Pearson Chi-square	**9.737**	**4**	**0.045**
Number of Valid Cases	**888**		

Computational data, 2012

Table 4.10 shows the result of the computed chi-square value (X^2) of 9.737 and its p-value of 0.045. The results show that the chi-square test of independence is statistically significant with a p-value of 0.045 which is less than significance level 0.05. We therefore reject H_0 (the null hypothesis) that there is no association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades. We conclude that there is an association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades. This means that, final performance depends on entry grades.

Also, since the computed value, 9.737, is greater than the significance level, $\chi^2_{0.95,4} = 9.488$ (read from the chi-square table), we reject H_0 at the 0.05 level of significance and conclude that there is an association between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades. Table 4.11 below shows some symmetric measures of the test.

Table 4.11: Summary of some symmetric measures

	Value	**Asymp. Std Error[a]**	**Approx. T[b]**	**p-value**
Pearson's R	**.101**	**.033**	**3.022**	**.003[c]**
Spearman correlation	**.103**	**.033**	**3.077**	**.002[c]**
Number of valid cases	**888**			

Computational data, 2012

Table 4.11 shows some symmetric measures of the test. It was found that there was a significant relationship between entry grades E/D7/E8 and the final performance of students who entered MUCG with these grades based on the p-value of 0.003 being less than the significance level of 0.05. Also, the Pearson's correlation, *R* between the entry grades and final performance was 0.101, which shows a very weak relationship between the variables.

Again, Spearman correlation between entry grades and final performance was also found to be very weak (r = 0.103) but statistically significant at the 0.05 (p-value = 0.002).

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

In this chapter, we give the summary of the results of this study. We also present a brief overview of the study and answers to the hypotheses which drove the study and connects them to the relevant literatures and theories. Also, a comprehensive conclusion is made on the whole research, implications of the research and recommendations are suggested based on the findings.

5.1 Summary on Findings

The objectives of the study were:

1. to check if Senior High School grades used for university admission predict final performance in MUCG
2. to find the extent to which entry grades predict final performance
3. to compare the final performance of students who entered MUCG with and without grades E/D7/E8 and
4. to establish the relationship that exists between entry grades E/D7/E8 and the final performance of students who entered MUCG between the academic years 2000/2001 and 2007/2008 with these grades.

After conducting a detailed empirical analysis on the data, the following findings were made.

1. Senior Secondary School Certificate Examination (SSSCE)/West African Senior School Certificate Examination (WASSCE) is the most popular category of entry

requirements that are admitted to MUCG. This entry requirement forms about 50% of the total entry requirements of students who are admitted to MUCG over the period of study.

2. Aggregate 19 is the average SSSCE/WASSCE entry requirement to MUCG over the period under study and the best SSSCE/WASSCE aggregate admitted by MUCG is 7.
3. About 2481 students as of the 8th congregation of MUCG with various specializations in Accounting, Banking & Finance, Marketing Management, Human Resource Management, Economics, Economics & Mathematics-Statistics, Information Technology and Psychology graduated.
4. Entry grades used for university admission predict final performance in MUCG.
5. There is no significant difference between the proportion of students who entered MUCG with grades E/D7/E8 and those who entered without grades E/D7/E8.
6. Some of the students who entered MUCG with grades E/D7/E8 tend to do well by also obtaining first class, second class upper division and second lower division degrees.
7. 2.6% of the variation in FCGPA is accounted for by the best six grades obtained by the students from Senior High School, 10.1% of the FCGPA was also accounted for by grades E/D7/E8 and about 6.9% of FCGPA was accounted for by the various years the students' completed their studies.
8. There is a weak and positive relationship between all the independent variables (best six grades, entry grades E/D7/E8, and the various years the students completed their studies) and FCGPA (a multiple correlation coefficient of 0.118 was obtained). The independent variables were all found to be significant at the 0.05 level of significance.

9. There is an association between final cumulative grade point average and entry grades of students who entered MUCG between the academic years 2000/2001 and 2007/2008 with these grades.

5.2 Discussion on the results of the multiple regression analyses

As discussed in the methodology, multiple regression is used to relate entry grades of students to their final performance. It requires a large sample size in order to obtain a reliable and replicable result. These results and analyses demonstrate that multiple regression can be used effectively with educational data. In the multiple regression, the best six grades, entry grades E/D7/E8 and the various years the students completed their studies are all significant predictors of final cumulative grade point average (FCGPA). The regression model shows that, a student with a good best six grades in SSSCE/WASSCE is likely to do well after the four years of studies in the university. This result is consistent with previous studies undertaken by Abdullah (2010), Niu and Tienda (2009) and Al-Kader (1996). It can also be seen from the model that a student with entry grades E/D7/E8 in his or her best six SSSCE/WASSCE grades is also likely to do well in a university. This forms about 10% of the variation in FCGPA. This performance at the university may be attributed to either the students being taught very well by good lecturers, the facilities available to them being used efficiently and a conducive atmosphere for learning is being provided. This study has shown that there is some gap between reality and expectation as regards to the relationship between entry grades and final performance at a university with a weak correlation (R^2=0.118) between these two criteria. Generally, it is expected that there is a strong correlation between entry grades and final performance at a university. The reality is that this expectation has not been strongly supported by findings from Abdullahi (1983) and Ihiegbulem (1998).

5.3 Discussions on the results of the chi-square test of independence

As discussed earlier in the methodology, the chi-square test of independence is used to decide if two variables in a population are independent. The objective of this study is to compare the final performance of students with entry grades E/D7/E8 in their best six subjects and those who performed better. The null hypothesis (H_0) that there is no association between entry grades E/D7/E8 and the final performance of students who entered with these grades against its alternative was tested and it was found that there was an association between the two criteria. This means that final performance depends on entry grades.

5.4 General discussion on the results

The study has shown that the mean aggregate of SSSCE/WASSCE grades admitted by MUCG over the period of study is 17. Entry qualifications can be used to predict the final performance of a student but also other factors including facilities available to the students, how lecturers teach, conducive atmosphere for learning and so, must also be checked. Some of the findings from scholars like Rubin (1977), Murday and Ushida (2002), Bailey and Brown (1999), and so on, testify to these factors in chapter two.

The results from the multiple regression and chi-square test of independence analyses found SSSCE/WASSCE best six grades and entry grades E/D7/E8 to be necessary predictors of final performance in a university. The results also showed a statistically significant relationship between entry grades and final performance for the two variables. There is also a weak correlation between entry grades and final performance. These results are consistent with previous studies by Al-Shorayye (1995) and Adeyemi (1998) but for the case of MUCG, the strength of the correlation between entry grades and final performance is 0.118.

Also, the results of the tests of hypothesis concerning the two proportions showed that there were no significant difference between the students who entered MUCG with grades E/D7/E8 and those who entered without these grades. These results suggests that in the sampled population, the proportion of students who entered MUCG with grades E/D7/E8 and those without these grades may be equal.

5.5 Implications from the findings

The study has shown clearly that SSSCE/WASSCE entry grades can be used to predict final performance in MUCG and also other factors also influence a student's final performance. Some of these factors are discussed in the literature review. This can be testified by the low relationship between the best six grades, entry grades E/D7/E8 and the final performance captured in the multiple regression model.

The study suggests that the likelihood of a student who has grades E/D7/E8 in his or her entry requirement and those who do not have these grades may be equal. This means that when the proportions of students with and without grades E/D7/E8 who entered MUCG are compared, there may not be any difference between these two groups of students.

Also, as a result of the new policy requirements by the NCTE/NAB, there is the danger of making entry into a university in the country very difficult for some students. This is the case where a student with only one of his or her best six grades being E/D7/E8 and the others being grade "A" will not qualify for admission to a university in Ghana while another student who obtains all six grades being "C6" will qualify for admission to a university. I think this

comparison will not be fair to the student with the grades E/D7/E8 in his or her results since these grades are "passes" and not "fail".

5.6 Conclusion

Several studies have been done attempting to determine what factors affect final performance at a university. Based on the results of this study, the use of SSSCE/WASSCE entry grades in determining final performance is one of the factors. There is a weak correlation between the best entry grades and the final performance at MUCG given the period of study.

The results of the study indicate that the best entry qualification from Senior High School does not guarantee good final performance at a university. Also, low entry qualification from Senior High School does not guarantee failure. It is also important to note that grades E/D7/E8 are not "F" grades. They are passes. Therefore, a student who obtains an aggregate up to 24 for SSSCE or 36 for WASSCE with grades E/D7/E8 is not a bad candidate and should not be denied admission to a university. It is also important to note that some of the students who have been rejected by having grades E/D7/E8 in their best six grades gain admission to some European and American universities with the same grades which Ghanaian universities have rejected.

University education requires hard work and perseverance. Students who enter the university with low grades when given the necessary support and training may do very well. This was evident in MUCG, as at the 8th congregation, MUCG graduated about 834 students and about 9% of these graduates had first class honors in their respective programmes, 23% had second class (upper division) and about 56% graduated with a second class lower degree.

To date, few research studies relating to the prediction of academic performance in a university using Senior High School entry grades have been published. In view of the increasing costs in university education and the desire of the NCTE/NAB to raise the entry requirement to universities, additional research should be made to determine the best predictors of academic performance in a university. The results of such studies will be helpful in admitting the next generation of students into the universities.

5.7 Recommendations

Based on the findings of this research, the following recommendations are made:

1. A standardized entrance examination should be conducted and supervised by the NCTE/NAB officials for students who are not able to meet the initial admission requirement, that is, students with at most two papers to better should be given the opportunity to write this examination.
2. The admission requirement should be published for students to be encouraged to learn hard. Senior High School students should be educated on this new grading system.
3. Since this study shows that there is a weak correlation between entry grades and final performance in a university, other factors should be considered when admitting the students. Some of these factors include the socio-economic background of the students.
4. A good record keeping and archival system of data should be developed by institutions.

Attempts to acquire data from other universities were unsuccessful. Further research needs to be done using data from other universities and other years in graduating students.

References

1. Abdullah AL-Mutairi. (2010). Factors affecting Business Students' Performance in Arab Open University: Case Study of Kuwait, International Journal of Business and Management, Vol. 6, No. 5; May 2010, pp 146-150.
2. Abdullahi, A. (1983). A study of the predictive value of Joint Matriculation Examination in selected Secondary School Subjects. Journal of Nigerian Educational Research Association, 3(1); pp: 25-35.
3. Adebayo, A. (2002). Predictive validity of the junior secondary school certificate examinations (JSCE) for academic performance in senior secondary school certificate examinations (SSCE) in Ekiti State, Nigeria. Unpublished M.Ed Thesis, University of Ado-Ekiti, Nigeria, 60-62.
4. Adeyemi, T.O., (1998). School and teachers variables associated with the performance of students in the senior secondary certificate examinations in Ondo- State, Nigeria. Unpublished Ph.D. Thesis, University of Hull, UK, pp: 203-208.
5. Adeyemo, G.A., (2001). Teacher and student variables as correlates of achievement in Integrated Science in Ibadan North Local Government Area of Oyo-State Unpublished M.Ed. Thesis, Faculty of Education, University of Ado-Ekiti, Nigeria, pp: 40-45.
6. Ali, A. (1983). Attitudes of Nigerian Secondary School Students towards School and their Academic Achievement in Science. Journal of Nigerian Educational. Research Association, 3(2); 11-17.
7. Alias, M and Zain, A.F.M (2006). Relationship between entry qualifications and performance in graduate education, International Education Journal, 2006, 7(3), 371-378.
8. Al-Khader, O. (1996). Factors affecting the academic performance of psychology students at Kuwait University. The Educational Journal, 10(40): 141 -169.

9. Alonge, M.F. (1998). Implications of probabilistic models of item analysis to educational evaluation. J. Edu. Res., 2: 50-56.
10. Al-Shorayye, S.R., (1995). The effect of admissions policy, socio-economic factors, and demographic and personal considerations on students' performance at Kuwait University. Unpublished Ph.D Thesis, University of Hull UK, pp: 142-145.
11. Anderson, G. (1998). With Nancy Arsenaut Fundamentals of educational research, London: Falmer Press Taylor and Francis Inc, 12-13,110-152.
12. Asaolu, A.G., (2003). Predictive validity of JSC mathematics examinations on the performance of students in science subjects in Ekiti State secondary schools, unpublished M.Ed. Thesis, Faculty of Education, University of Ado-Ekiti; Nigeria, pp: 50-76.
13. Atkinson, J.W. (1978). The Mainsprings of Achievement Oriented Activity. In Atkinson, J.W. & Raynor, J.O. (Eds), Personality Motivation and Achievement, pp: 11-39. New York: John Wiley & Sons.
14. Baig, L. A (2001). Predictive validity of the medical college admission criteria for academic performance: results from the four MBBS batches of Karachi Medical and Dental College., Journal of Pakistan Medical Association.51 (9): 3126.
15. Bailey, B. and Brown, M. (1999). "Schooling and Masculinity: Boys' Perceptions of the School Experience," Caribbean Journal of Education, Vol. 21, No.1, 1999.
16. Belsley, D.W., Kuh, E. & Welch, R.E. (1980), Regression Diagnostics: Identifying Influential Data and Sources of Collinearity.
17. Birch, E. R., & Miller, P. W. (2006). Student outcomes at university in Australia: a quantile regression approach. Australian Economic Papers, 45 (1), 1-17.

18. Brandl, K. (2002). Students' attitudes and perceptions of learning: A comparative study of a classroom-based and web-based language course. Taking language instruction online: Progress or demise? Paper presented at CALICO 2002, Davis, CA.
19. Burstall, C. (1970). French in the Primary School: Some Early Findings. Journal of Curriculum, Studies 5, 2(1).
20. Burton, N. W. and Ramist, L. (2001). Predicting success in college: SAT studies of classes graduating since 1980, College Board Research Report No. 2001-02, College Entrance Examination Board, New York.
21. Camara, W. J., & Echternacht, G. (2000). The SAT and High School Grades: Utility in Predicting Success in College. The College Board Research, Research Notes, the College Board Office of Research and Development.
22. Cronbach, L. J. (1969). Heredity, Environment and Educational Policy. Havard Educational Review, 39; 338-347.
23. Daniels, M. and J. Schouten, (1970). Education in Europe: The Screening of Students, Problems of Assessment and Prediction of Academic Performance Council for Cultural Cooperation of the Council of Europe. George Harrap Co. Ltd., London, p: 65.
24. Desmarais, L. (2002, March). Monitoring distance training. Paper presented at CALICO 2002, Davis, CA.
25. Diepen, M. V. & Franses, P. H. (2006). Evaluating Chi-squared automatic interaction detection, Information Systems. 31, 814-831.
26. Dockery, K.A. (1986). The effects of IQ, sex and school entrance age on the achievement and self esteem of ten-to-eleven year old students. Unpublished Ph.D Thesis, Temple University USA. Dissertation Abstracts on CD Rom. Order No. AAC 8611836.
27. Doherty, K. M. (2002). Students speak out. Education Week, 11 (35), 19 23.

28. Evans, H. (1999). "The Construction of Gender and Achievement in Secondary Schools in Jamaica," Caribbean Journal of Education, Vol. 21, No. 1, April, 1999.
29. Eysenck, H. (1995). Clever Measures. The Times Higher Education Supplement 1160. January 27.
30. Fagbamiye (1998). Examination Malpractices in Nigeria Education Institutions: Is there any hope? in Adegboye, A; Olutoye, O and Adetunberu, J. O (Ed) issues on examination malpractices in Nigeria, Ado – Ekiti: PETOA Educational Publishers.
31. Gbore, L. O. (2006). Cognitive entry characteristics, study habits and self concept as predictors of academic performance of university undergraduates in South- West of Nigeria, Doctoral dissertation, University of Ado-Ekiti, Ado-Ekiti
32. Gilbert, S. D. (2001). How to be a successful online student. New York: McGraw-Hill.
33. Gustafsson, J-E. (2003). 'The predictive validity of grades and aptitude tests in higher education.' Paper presented at The Annual Conference of the Association for Education Assessment Europe, Lyon, France, 6-7 November.
34. Houltram, B., (1996). Entry age, Entry mode and Academic performance on a Project 2000 Common Foundation Programme. Journal of Advanced Nursing 23, 1089–1097.

http://professionals.collegeboard.com/profdownload/pdf/RN-15%20v4.pdf

http://williamsedlacek.info/publications/articles/validity100.html-99k

http://www.dcsf.gov.uk/research/data/uploadfiles/RR846.pdf [28 June, 2010].
35. Huda N, Dosa TI, Alam E, Agha S. (2001). Selection procedure as predictor of performance in a university examination. Journal of Pakistan Medical Association. 51(11): 381-411.

36. Ihiegbulem (1998). The relationship between NCE (Technical) Students' Scores in Pre-requisite Theoretical Education Courses and Practical Courses. Students in technical teacher education.2 (1 and 2): 63-69.

37. Jackson, O. A. Y., Hesse, C., Boyetey, D. (2010). Correlation between entry qualification of MUCG students and their final results.(Unpublished).

38. Kershaw, D., (1989). Student selection for tertiary nursing courses: efficacy of the Anderson score as a performance predictor. The Australian Journal of Advanced Nursing 6 (3), 34–39.

39. Kirkup, C., Schagen, I., Wheater, R., Morrison, J. and Whetton, C. (2007). Use of an Aptitude Test in University Entrance – a Validity Study: Relationships between SAT®Scores, Attainment Measures and Background Variables (DfES Research Report 846). London: DfES [online].

40. Kobrin, J.L., Camara, W.J. and Milewski, G.B. (2002). Students with Discrepant HighSchool GPA and SAT I Scores (Research Notes 15). New York, NY: The CollegeBoard [online].

41. Lane, J., Lane, A and Cockerton, T. (2003). Prediction of postgraduate performance from selfefficacy, class of first degree and cognitive ability test scores. Journal of Hospitality, Leisure, Sport and Tourism Education, 2(1), 113-118

42. Larson, J.R. and Scontrino, P. (1978). The consistency of high school grade point average point and the verbal and mathematical portions of the Scholastic Aptitude test of the College Entrance Examination Board, as predictors of college performance: An eight year study. Educational and Psychological Measurement. 36: 439-450.

43. Le, H., Casillas, A., Robbin, S.B. and Langley, R. (2005). Motivational and skills, social and self-management predictors of college outcomes: Constructing the student readiness inventory, educational and psychological measurement, 62: 1-28.

44. Llyod, F. & Pidgeon, D.A. (1961). An Investigation into the Effect of Coaching on non Verbal Test Materials with European, Indian and African Children. Britain Journal of Educational Psychology, 31: 145-151.

45. Majasan, J.A. and Bakare, G.S.M. (1979). Entry qualifications. Journal of Africa education research, 2, 61-71.

46. McManus, I.C. (1998). Factors affecting likelihood of applicants being offered a place in medical schools in retrospective study. BMJ 1998; 317: 1111-6

47. Miller E., (1991). Men at Risk (Kingston, Jamaica Publishing House).

48. Miller E., (1994). Marginalization of the Black Male: Insights from the Development of the Teaching Profession, 2nd Edition (Mona, Jamaica: Canoe Press).

49. Miller, E., (1986). Marginalization of the Black Male: Insights from the Development of the Teaching Profession (Mona, Jamaica: Institute of Social and Economic Research, UWI).

50. Momoh-Olle, J.Y. (1998). Types of students entry certificates and academic performance at the Kwara State College of Education, Iloria. Gusau Journal of Education, 2(1), 169-179.

51. Murday, K, and Ushida, E. (2002). Student experiences in the language online project. Paper presented at CALICO 2002, Davis, CA.

52. Murphy, M., Papanicolaou, K and Mcdowell, R. (2001). Entrance score and performance: A three year study of success. Journal of institutional research. 10 (2), 32-49.

53. Niu, S. X. and Tienda, M (2009). Testing, ranking and college performance: Does High School matter? 1-44.

54. Nobel, J. & Sawyer, R., (1997). Alternative methods for validating admissions and course placement criteria. The Association for Institutional Research for Management Research, Policy Analysis and Planning. 63: 1-12.

55. Noble J.P. (1991). Predicting college grade from ACT assessment score and high school course work and grade information (Rep. No. ACT RR-91-3). Iowa City, IA: American College Testing Program. (Eric Document Reproduction Service No. ED344943)

56. Nunnally, J.C. (1972). Education Measurement and Evaluation in education (2nd Edition), New York, McGraw Hill.

57. O'Rourke, B., M.O. Martin and J.F. Hurley, (1989). The scholastic aptitude Test as a Predictor of third-level academic performance. Irish J. Edu., XXIII (1): 22-35.

58. Obioma, G and Salau, M (2007). The predictive validity of public examinations: a case study of Nigeria. Journal of Nigerian Educational. Research Association, 10.

59. Othuon, L. and Kishor, N. (1994). Hierarchical linear modeling of predictive validity: The case of Kenya certificate of primary education examination. Stud. Edu. Evaluate. 20: 5-190.

60. Palmer, N., Bexley, E., James, R., (2011). Selection and participation in higher education, University selection in support of student success and diversity of participation.

61. Pearson, K (1900). On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. Philosophy magazine, Series 5 50(302): 157-175.

62. Peers, I. S. and Johnston, M. (1994). Influence of learning context on the relationship between A-level attainment and final degree performance: A Meta analytical review. Br. J. Edu. Psychol., 64: 1-15.

63. Pidgeon, D.A. (1970). Expectation and Pupil Performance NFER in England and Wales, London: pp. 21-34.

64. Reason, R.D., Terenzini, P.T., Domingo, R.J. (2006). Developing academic competence in the first year of college. Research in Higher Education, 47(2): 149-158.

65. Rubin, L. S. (1977) 'Socioeconomic and Academic Factors Influencing College Achievement of Economics and Business Majors', Journal of Economic Education, Vol. 8, No. 2, Spring, 124–125.

66. Strauss, M.A. (1951). Mental Ability and Cultural Needs - A Psycho-Cultural Interpretation of Intelligence Test Performance of Ceylon University Entrants. American Sociological Review 16; 371-375. Studies 5.

67. Ting, S.R and Sedlacek, W.E. (1998). Validity of the Noncognitive Questionnaire-Revised 2 in Predicting the Academic Success of University Freshmen: Research Report Retrieved on December, 26. 2007.

68. Ting, S.R. (1998). Predicting First-Year Grades and Academic Progress of College Students of First-generation and Low-income Families. Journal of college Admission, 158: 14-23.

69. Tracey, T. J., & Sedlacek, W. E. (1984). Noncognitive variables in predicting academic success by race. Measurement and Evaluation in Guidance, 16: 172-178.

70. Tyler, R. (1971). Basic Principles of Curriculum Instructions, Chicago. The University of Chicago, Press.

71. Ubokobong, H.E., (1993). Predicting educational performance at tertiary level on the basis of Ado-Ekiti, Nigeria.

72. Ullah, H., and Wilson, M. A. (2007). 'Students' Academic Success and its Association to Student Involvement with Learning and Relationships with Faculty and Peers', College Student Journal, Part B, Vol. 41, #4, 1192–1202.

73. WAEC (2002). Standards in subjects: West African School Certificate. Lagos: West African Examinations Council, Yaba, Nigeria. December, pp: 2-10.

74. Warschauer, M., (1996a). Comparing face-to-face and electronic discussion in the second language classroom. CALICO Journal, 13 (2/3): 7-26.

75. Warschauer, M., (1996b). Motivational aspects of using computers for writing and communication. In M. Warschauer (Ed.), Telecollaboration in foreign language learning: Proceedings of the Hawaii symposium (Technical Report No. 12 pp. 29-46). Honolulu: University of Hawaii Second Language Teaching and Curriculum Center.

76. White, T.J. and Sedlacek, W.E., (1986). Noncognitive Predictors of Grades and Retention for Specially Admitted Students. Journal of College Admissions. 3: 20.

77. Wilson, K., (1983). A review of research on the prediction of academic performance after the freshman year. College Board Report No. 83-2. New York: College Board.

78. Wilson, T., (1999). A Student Selection Method and Predictors of Success in a Graduate Nursing Program. Journal of Nursing Education 38(4): 183–193.

79. Win, R. and Miller, P.W. (2009). The effects of individual and school factors on university students' academic performance. Center for labour market research.1-24.

80. Winne, P. H., and Marx, R. W. (1989). A cognitive-processing analysis of motivation within classroom tasks. In C. Ames & R. Ames (Eds.), Research on motivation in education: Vol. 3. Goals and cognitions (pp. 223-257). San Diego: Academic Press, Inc.

81. Wolfe, R.N. and Johnson, S.D. (1995). Personality as a Predictor of College Performance. Educational and Psychological Measurement. 55: 85-177.

82. Wright, R.E. & Palmer, J.C. (1994) "GMAT scores and undergraduate GPA as predictors of performance in graduate business programs." Journal of Education for Business, 69(6), pp. 344-349.

83. Wuensch, K. L., (2007). Producing and interpreting residuals plots in SPSS.