



**INVESTIGATION OF THE RELATIONSHIP BETWEEN SCIENCE STUDENTS'  
PERFORMANCE IN THE CERTIFICATE OF SECONDARY EDUCATION AND  
PROGRESSION AT UNIVERSITY OF JUBA-SOUTH SUDAN**

**BY**

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**A THESIS SUBMITTED TO THE SCHOOL OF EDUCATION, DEPARTMENT  
OF EDUCATIONAL MANAGEMENT AND POLICY STUDIES IN PARTIAL  
FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE  
DEGREE OF MASTER OF EDUCATION IN RESEARCH**

**MOI UNIVERSITY**

**APRIL 2025**

## DECLARATION

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I declare that this thesis is my original work and has not been presented elsewhere for award of a degree or other academic purposes in any other learning institution. No part of this work may be reproduced manually, electronically or in any other form without prior permission from the author and/or Moi University.

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## **DEDICATION**

I am dedicating this thesis to my beloved mother Rachael Anok and father Michael Manyok for their encouragement, material supports, prayers and best wishes throughout my academic journey.

## ACKNOWLEDGEMENT

Thank you to God for giving me health and a chance to live until this time of the academic achievement. Also, many thanks go to the German Academic Exchange service (DAAD) for all their kind supports, including material provisions towards my education. equally, I sincerely acknowledge the East and South African-German Center of Excellence for Educational Research Methodologies and Management (CERM-ESA) at Moi university for helping me complete this Master's program. Special thank you goes to my supervisors, lecturers and all the "CERM-ESA's family" for their professional guidance and support. These include but not limit to the following: Prof. Zachary Kosgei, Dr. Ayanda Simayi, Prof. Susan Kurgat, Prof. David Serem, Prof. Sammy Chumba, Prof. Catherine Kiprop, Prof. Jonah Kindiki, Prof. Benjamin K. Wambua, Prof. Joyce W. Kanyiri, Prof. Joseph K. Lelan, Dr. Malve Von Mollendorff, Dr. Stella Keter, Dr. Too Charles, Dr. Emily Bomet, Dr. Kesio David, Dr. Felicity Githinji, Dr. Joyce Kurgat, Dr. Jane Michael, Dr. James Sang, Dr Njoroge. Appreciation goes as well to other staff members at the CERMESA-Moi university; Mr. Raymond, Stella Jepsang, Michael Kurgat and Chumba. Not forgetting a professional support from the University of Juba during my research data collection, I would like to acknowledge the following persons: Prof. Kiri Andrew, the Director of Research and Publications, Dr. Kenneth Lado, the dean of the school of Medicine and Glorie Simon, the data collector/research assistant. Lastly, thank you to my friend, the late Joh Dau Joh for supporting my application process for this Master's program.

## ABSTRACT

The correlation between secondary school performance and progression within higher education programs has been a subject of concern to researchers globally. In contrary, existing research on the relationship between Certificate of Secondary Education (CSE) and student progression in higher education is limited in the context of South Sudan. While students' results indicated strong performance in the CSE, the 2021 Report revealed that the cohort that advanced to the fourth year of medical science programs at the University of Juba mostly failed. The purpose of this study was to assess the relationship between the CSE performance in 2013/2014 and students' progression from year 1 to 4 in the School of Medicine at the University of Juba. The study objectives included the following: to determine correlations between students' performance in the CSE and progression in the school of Medicine at the University of Juba in academic years 2017, 2018, 2020 and 2021. Also, to determine whether students' performance in the CSE, and at the university of Juba in 2017, 2018, 2020 had impact on the fourth-year medical students' grades in 2021. Then, to assess students' perceptions on factors that affected performance in the school of Medicine at the university of Juba in 2021. The study used a mixed approach and a Concurrent embedded research design within a pragmatic paradigm. The study targeted a population of 1600 students' records and 15 respondents. From this population, a sample size of 310 observations was randomly selected and all the 15 respondents were chosen. Proportionate stratified random sampling was used for quantitative data, while purposive sampling was used for qualitative data. Data collection table was used to gather quantitative data, and open-ended questionnaires for qualitative data. Analysis was conducted using Multiple linear regression and Pearson correlation for quantitative data. Reflexive thematic analysis was used in qualitative data. The quantitative findings were as follows: **(a)** there is not statistically significant correlations between the CSE average scores in 2013/2014 and the average scores in the school of Medicine at the university of Juba in the following academic years **(i)** academic year 1 in 2017 [ $r(55) = .035, p = .802$ ]. **(ii)** academic year 2 in 2018 [ $r(55) = -.324, p = .016$ ]. **(iii)** academic year 3 in 2020 [ $r(55) = -.089, p = 0.520$ ]. **(iv)** academic year 4 in 2021 [ $r(55) = -.005, p = .972$ ]. **(b)** there is no statistically significant impact of the CSE and university years 1, 2 and 3 scores on the fourth-year medical students' performance at the university of Juba in 2021, [ $F(4, 50) = 0.194, P = .94, R^2 = .015$ ]. **(c)** The qualitative findings revealed that factors like insufficient learning and teaching resources, administrative and managerial issues, different academic pathways, lecturer-related factors, and heavy workloads significantly impacted the performance of fourth-year medical students at the University of Juba. The key stakeholders who can benefit from these findings include the University of Juba administration, the School of Medicine, the student body, the Ministries of Higher and General Education, as well as future researchers. The study recommends investing in updated educational materials and creating more supportive learning environments. Additionally, further research on psychological, social, and environmental factors influencing student performance is highly encouraged.

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**ACRONYMS AND ABBREVIATIONS**

<b>ACT</b>	American College Testing
<b>AEA</b>	Advanced Extension Award
<b>APM</b>	Advanced program in Mathematics
<b>ASEE</b>	American Society for Engineering Education
<b>ATAR</b>	Australian Tertiary Admissions Ranking
<b>BMC</b>	BioMed Central or Biomedical Science Central
<b>CASP</b>	Critical Appraisals Skills Programme
<b>CERMESA</b>	East and South African-German Center of Excellence for Educational Research Methodologies and Management
<b>CGPA</b>	Cumulative Grade Point Average
<b>CINAHL</b>	Cumulative Index to Nursing and Allied Health Literature
<b>CSE</b>	Certificate of Secondary Education
<b>CUE</b>	Commission for University Education
<b>DM</b>	Developmental Mathematics
<b>EFL</b>	English as a Foreign Language
<b>ERIC</b>	Education Resources Information Center
<b>ESUT</b>	Enugu State University of Science and Technology
<b>EVT</b>	The expectancy-value theory
<b>EWS</b>	Early Warning System
<b>GAT</b>	General Ability Test
<b>GCE</b>	Education Advanced Level
<b>GCSE</b>	General Certificate of Secondary Education

<b>GPA</b>	Grade point average
<b>H0</b>	Null hypothesis
<b>H1</b>	Alternative hypothesis
<b>HEI</b>	Higher Education Institution
<b>HETI</b>	Health Education and Training Institution
<b>ICCCT</b>	International Conference on Communication and Computational Technologies
<b>IEB</b>	Independent Examination Board
<b>IMA</b>	International Journal of Imaging Systems and Technology
<b>IPBL</b>	Integrated Project-based Learning
<b>JPO</b>	Journal of professionals and Organization
<b>KCPE</b>	Kenya Certificate of Primary Education
<b>KCSE</b>	Kenya Certificate of Secondary Education
<b>KUCCS</b>	Kenya Universities and Colleges Central Placement Service
<b>MAT</b>	Management Aptitude Test
<b>MOE</b>	Ministry of Education
<b>NBT</b>	National Benchmark Tests
<b>NCHE</b>	National Council of Higher Education
<b>NSC</b>	National Senior Certificate
<b>OECD</b>	Organization for Economic Cooperation and Development
<b>PLS-SEM</b>	Partial Least Squares Structural Equation Modeling (PLS-SEM)
<b>PRISMA</b>	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
<b>RUFORUM</b>	Regional Universities Forum for Capacity Building in Agriculture

<b>SAT</b>	Scholastic Aptitude Test
<b>SDG</b>	Sustainable Development Goals
<b>SID</b>	Society for Information Display
<b>SPSS</b>	Statistical Package for the Social Sciences
<b>SSCSE</b>	South Sudan Certificate of Secondary Education
<b>STEM</b>	Science Technology Engineering and Mathematics
<b>STEP</b>	Student Training in Engineering Program
<b>STI</b>	Science Technology and Innovation
<b>TOL</b>	Tolerance
<b>TVET</b>	Technical and Vocational Education and Training
<b>UME</b>	University Matriculation Examinations
<b>UNESCO</b>	United Nations Educational Scientific and Cultural Organization
<b>VIF</b>	Variance Inflation Factor

## CHAPTER ONE

### INTRODUCTION TO THE STUDY

#### 1.1 Introduction

This chapter raises the problem statement, purpose, research questions with objectives, significance with the rationale, scope with limitations, assumptions, theoretical framework, conceptual framework, and operational definitions of terms.

#### 1.2 Background of the Study

In First World countries such as Germany, university entrance examinations in different parts of the country varied until the 18th Century. Prior to German reunification in 1990, there were primarily decentralized examinations (for example, in mathematics) in West Germany (the Federal Republic of Germany), which were taken after 13 school years, and a centralized examination that students took after 12 years of school in East Germany (the German Democratic Republic), according to (Bruder, 2021). However, the *Abitur* certificate is currently granted after twelve or thirteen years of secondary school study and is regarded as a formal graduation certificate equal to a college or university entry qualification (Edeling & Pilz, 2017). An *Abitur* acquired in any German federal state serves as a universal qualification for university admission across the entire country. Furthermore, no supplementary entrance exams are required for fields like Science, Technology, Engineering, and Mathematics (STEM) programs (Deeken et al., 2020).

The *Abitur* grade is still regarded as the best predictor of a student's success in a specific course of study (Schneider & Preckel, 2017 cited in Bruder, 2021). In the case of medicine, only students with an *Abitur* score of 1.6 out of 6 (1 being the highest) are admitted to

medical faculties. Others must wait for placement in a university for up to six years (Nerad, 1986).

In contrast, the equivalent forms of Abitur in other countries are as follows (Farnham, 1982): the British General Certificate of Education Advanced Level (GCE-A Level), the French Baccalaureate, the United States Advanced Placement Test (APT), Achievement Test, and the International Baccalaureate which is accepted by universities in all countries

For example, in England and Wales, pupils must study mathematics until the age of 16 when they take the GCSE (Lyakhova & Neate, 2019). Furthermore, for the Advanced Level (A-level), there are two mathematics: Mathematics and more advanced "Further mathematics." According to (Darlington & Bowyer, 2018), an increasing number of British universities now require/encourage mathematics applicants to take 'extension exams' such as the Mathematics Admissions Test (MAT), Advanced Extension Award (AEA), and Sixth Term Examination Paper (STEP).

In the African context, such as in South Africa, there are two main assessments of school leavers (Prince, 2018). To begin with, the National Senior Certificate (NSC) is a school leaving certificate that is a legal requirement for admission to higher education. The National Benchmark Tests (NBTs) are the second type of evaluation. The NBTs are referenced using criteria. That is, the NBTs generate a statement about the expected conduct of a person with a certain score. It assesses students in three areas: Academic literacy, quantitative literacy, and mathematics are all important. The education system in South Africa covers 12 years of public schooling starting from Grade 1 to Grade 12, with secondary school covering 5 years starting from Grade 8 to Grade 12, exiting at Grade 12 with a nationally controlled examination (Department of Basic Education, 2011).

The South Africa National Senior Certificate (NSC) is a three-tiered system that qualifies students to get admission at tertiary institutions based on their Grade 12 average external examination percentage (DBE, 2011). The average pass percentage determines whether a student is qualified to study a Bachelor's degree, a diploma or a higher certificate. The Independent Examination Board (IEB) caters strictly to private schools with students coming from affluent families. Private schools falling under IEB have their own standardized examinations which are separate from the national examinations. Under the IEB, a student who is interested in pursuing a career in Mathematics might opt to take another qualification named as Advanced program in Mathematics (APM). A research study aimed at evaluating the effectiveness of the APM in preparing students for a successful academic career in mathematics at university as compared to the NSC revealed that the cognitive demands of the NSC mathematics curricula are similar to that of the APM (Makhoba et al., 2022). However, the evidence has shown that students who take APM performed better than those ones who were admitted using an NSC qualification only. This means that the APM syllabus provides extra topics similar to the ones taught at the university as compared to the NSC syllabus, for example, the foundation of Calculus.

Moreover, the East African education systems differ from country to country. For example, Kenyan schools follow a centralized national curriculum developed by the Ministry of Education (Wanjiru, 2020). Admission to higher education is based on a mandatory Kenya Certificate of Secondary Education (KCSE) which is written after four years of secondary school. The KCSE in Kenya was first held in 1989 and had ten subjects that were reviewed twice to seven (Luketero & Kangangi, 2019).

According to Oando (2020), Candidates in Kenya (KCSE) are required to do a minimum of seven subjects. A candidate who passes with a minimum grade of C+ qualifies for university admission. However, any student who scores below this mark joins non-degree programs in other tertiary institutions. Admission to universities in Kenya follows criteria set by the Commission for University Education (CUE) however, private admissions are taken care of by individual universities. The process of admission is based on the following criteria and requirements developed by CUE. First, the Kenya Universities and Colleges Central Placement Service (KUCCS) determines the eligibility of students to be admitted to both public and private universities. Secondly, the KUCCS set the pass grade required of each student to be admitted to a particular university (either a reputable university or others).

In South Sudan, the SSCSE is a standardized exit secondary school certificate awarded to students after passing the National Examinations (Ministry of General Education and Instruction, 2014). Access to universities in South Sudan requires a mandatory minimum average pass of 50% in the SSCSE that students should meet (Wilfrid Laurier University, 2023). In the South Sudan Curriculum, Mathematics is among the three compulsory subjects that students must pass in order to be considered successful in the SSCSE (Ministry of General Education and Instruction, 2017). Generally, the four major science subjects in the SSCSE are Mathematics, Biology, Chemistry, and Physics. In relation to this, admission to a Diploma program or Bachelor of Science (B.Sc.) in fields such as Medicine requires an SSCSE passing score of 65% in each of the above-mentioned four subjects plus English (Ministry of Health Republic of South Sudan, 2016).

Literacy level In South Sudan is among the lowest in relation to the Global rate (Zua, 2021; Sudan, 2018). According to World Bank (2020), literacy rates in South Sudan for those aged 15 and up were 35% in 2018, over three times lower than the global average (87%) and nearly two times lower than the Sub-Saharan African average (67%). This is owing, among other things, to a teacher shortage (World Bank, 2021 referenced in Moser, 2023). In primary schools, for example, the teacher-pupil ratio averages 90 kids per instructor, whereas in senior schools, it is 40 students per teacher.

It is within this background that the study investigates whether there is consistency between students' academic performance at SSCSE and at the university level.

### **1.3 Statement of the Problem**

Existing literature provides limited insights into the relationship between university entrance examinations and student performance at the tertiary level, in the context of South Sudan. In relation to this, a concerning trend emerged at the University of Juba in 2021, where a significant majority of students, including fourth-year medical students in key disciplines, reportedly failed their examinations (Akec, 2021). The failing cohort had previously performed well in previous years, achieving a 64.7% rating in the 2013/2014 South Sudan Certificate of Education, and subsequently gained admission to public universities like the University of Juba (Eye Radio, 2013). The high failure rates observed in 2021 raise critical questions and may contribute to South Sudan's alarmingly low literacy rate of approximately 35% (UNESCO, 2020). This compelling situation has prompted the researcher's interest in delving deeper into this topic within the South Sudanese context, despite the conflicting findings reported in the existing literature.

#### **1.4 Purpose of the Study**

The purpose of this study is to assess the relationship between students' performance in the SSCSE in 2013/2014 and their progression from year 1 to 4 in the school of Medicine at the University of Juba.

#### **1.5 Objectives of the Study**

Given below are the objectives of this research study:

- i. To determine correlations between students' performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in academic years 2017, 2018, 2020 and 2021.
- ii. To determine whether students' performance in the SSCSE in 2013/2014, and at the university of Juba in 2017, 2018, 2020 had impact on the fourth-year medical students' grades in 2021.
- iii. To assess students' perceptions on factors that affected performance in the school of Medicine at the university of Juba in 2021.

#### **1.6 Research Hypotheses**

- i. **H0<sub>1</sub>:** There is no statistically significant correlation between students' average scores in the SSCSE in 2013/2014 and year 1, 2, 3 and 4 of the school of Medicine at the university of Juba in the academic years 2017, 2018, 2020 and 2021 respectively.
- ii. **H0<sub>2</sub>:** There is no statistically significant impact of average scores in the SSCSE in 2013/2014; year 1, 2 and 3 of the school of Medicine in the academic years 2017, 2018 and 2020 respectively on year 4 medical students' performance in 2021.

#### **1.7 Research Questions**

- i. What secondary school and university factors had impact on students' performance in the school of Medicine at the university of Juba in 2021

### **1.8 Justification of the Study**

The primary reason justifying the choice of this study is the inconsistency of science students' performance, from secondary school to university. For example, in 2021, the University of Juba (the top national university in South Sudan) reported that hundreds of students from different departments and specializations failed (Sudan's Post, 2021). This failed group included a majority of students who previously performed very well in the South Sudan Certificate of Secondary Education in the academic years 2013/2014.

Moreover, literature has shown that there is a little knowledge known about relationship between university entrance examinations (SSCSE) and students' progression at university. So, there was need to conduct this research in order to contribute to the literature.

### **1.9 Significance of the Study**

- i. The finding from this research study is expected to play a crucial role in South Sudan education sector, including but not limited to the following: inform teachers' current pedagogy and practices at the secondary school level.
- ii. Also, to shed light on how quality assurance guidelines are being observed in the South Sudan Certificate of Secondary Education (SSCSE).
- iii. Finally, the research report shall provide information helpful to the National Council of Higher Education (NCHE) and universities in South Sudan regarding students' recruitment, screening, and admission. The targeted beneficiaries of this

research study are schools, universities, future researchers, teachers, and policymakers in the Ministries of Education in South Sudan.

### **1.10 Assumptions of the Study**

The study will be guided by the following assumptions:

- i. It was assumed that all students' data, and other information that were collected from the targeted sample would correspond to the students who sat for the SSCSE in 2013/2014 and later studied in the school of medicine at the university of Juba in 2017, 2018, 2020 and 2021.
- ii. It was assumed that the targeted students' data would contain outliers such as the students who previously sat for other university entrance examinations in other countries like Uganda, Kenya, Sudan, etc.

### **1.11 Scope of the Study**

The research study covered only information concerning the school of Medicine at the University of Juba. In particular, the study targeted the students in the School of Medicine from year 1 to 4.

Generally, the content scope of this study was set to cover data pertaining science-students of the cohorts 2013/2014 of the South Sudan Certificate of Secondary Education (SSCSE) and year 1 to 4 of the school of Medicine. The scores for both secondary school and school of Medicine at the university of Juba that were targeted are given below:

- i. Average scores in the SSCSE in 2013/2014: Mathematics, Physics, Chemistry and Biology.
- ii. Average scores for year 1 in 2017: Mathematics, Physics, Chemistry, Botany and Zoology.

- iii. Average scores for year 2 in 2018: Anatomy, Physiology and Biochemistry.
- iv. Average scores for year 3 in 2020: Anatomy, Physiology and Biochemistry.
- v. Average scores for year 4 in 2021: Pathology, Microbiology and Pharmacology.

### **1.12 Limitations of the Study**

- i. Limitation in the research design: as the study employed an embedded mixed method design, the amount of information generated on the research topic through qualitative mean was too little to compliment the quantitative data in details.
- ii. The data collection table: the table that was used to collect the students' scores accommodated only estimated unit of measurement (percentages). That is, the conversion of quantitative data from words to percentage form was performed based on estimation. This was due the fact that the students' scores at the school of medicine at the university of Juba were available in form of Distinction, very good, good, pass and fail. In this case, the researcher had to estimate the equivalent of each grade using the university of Juba's grading system. For instance, the "very good" ranges from 70%-79%. This means that the average percentage (mid-mark) equals the sum of 70 and 79, then divide by 2. Therefore, the estimated value for very good was 74.5%, and so forth.
- iii. Challenge in detecting exact number of students who previously sat for Secondary School Leaving Certificate different from the SSCSE: it was discovered that some students previously sat for the Uganda certificate of education (UCE), other than the SSCSE.

### **1.13 Theoretical Framework**

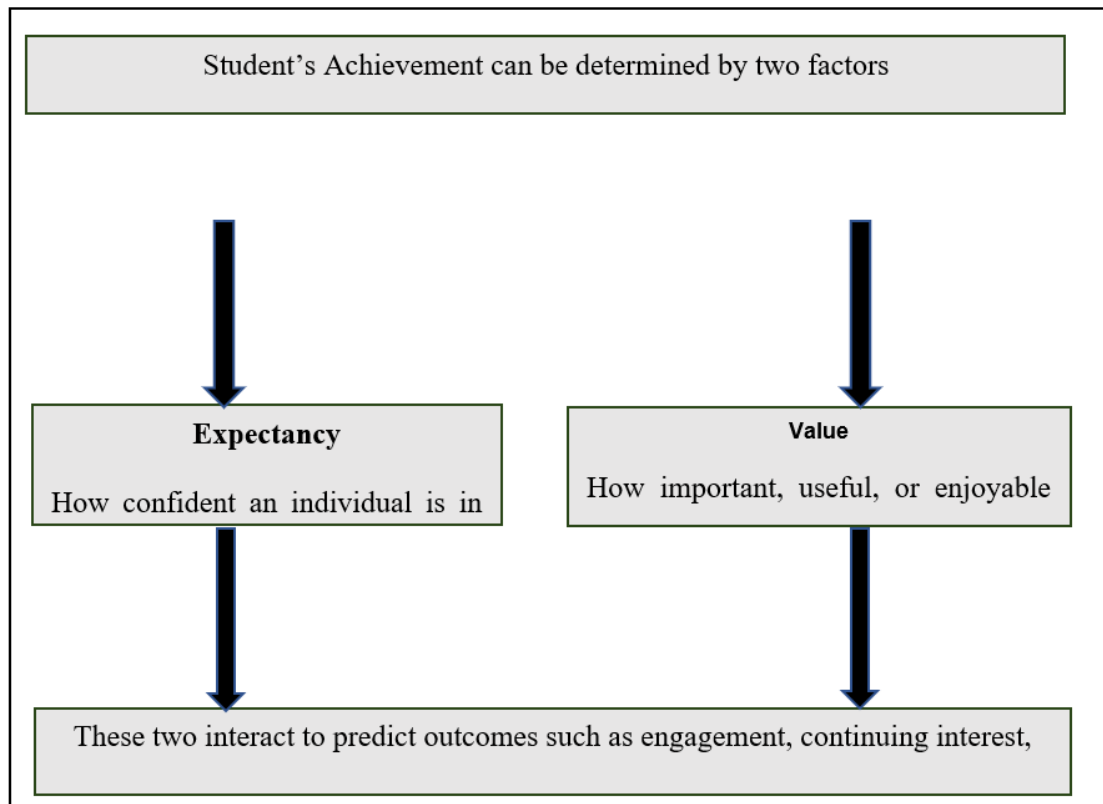
This research project was guided by the Expectancy value theory (Atkinson, 1957; Eccles et al., 1983; Wigfield, 1994; Wigfield & Eccles, 1992). The expectancy-value theory (EVT) is one of the key methods which has been widely used to predict and explain students' task choices, learning perseverance, and academic achievement (Wigfield & Eccles, 2000, quoted in Loh, 2019). Researchers have shown the connection between this theory, performance and underperformance.

Nagle (2021) conducted a survey-based study to investigate the relationships between motivation, persistence, and achievement in a fourth-semester Spanish course, a significant transition point in the language curriculum. It was found that the Expectancy Value Theory sub-components had varying associations with communication willingness, enrollment decisions, and final course grades. Based on this information, recommendations for enhancing university students' language learning interests and achievements are made.

Not only that but also, under-achievement in mathematics among high school students was explained by the Expectance-Value theory (Fong & Kremer, 2019). The researchers examined data from the High School Longitudinal Study to identify pupils who had a gap between their math aptitude and achievement. Low math motivation, as measured by value and expectation attitudes, was found to be substantially related to math underachievement. Furthermore, the study discovered that underachievement in math had an effect on future math performance, college attendance, and interest in STEM disciplines. The findings also revealed that high math aptitude influenced the relationship between math underachievement and these consequences.

According to Cooper et al. (2017) efficacy of active learning by student learning has been studied, but there is concern about student resistance to learning. They used the expectancy-value theory to understand such resistance. Students' opinions of active learning after a 40-hour exposure were investigated. The following Expectancy-value theory components were investigated: student-perceived self-efficacy in active learning, the value of active learning, and the potential cost of participating in active learning. The results show positive shifts in these components, as well as high active learning engagement, validating the expectancy-value theory for improving student engagement and perceptions.

Generally, the expectance-value theory identifies two essential factors that influence learners' motivation, academic performance, and choice of activities (Rosenzweig et al., 2019). These factors include students' expectations for success and task values shown in the figure 1.1 below.



**Figure 1.1: The Expectancy Value Theory Model**

*Source: [The expectancy-value model of achievement (Atkinson, 1957; Eccles et al., 1983; Wigfield; Wigfield & Eccles, 1992)]*

### 1.14 Conceptual Framework

The variables of interest in this research study are divided into two groups, namely:

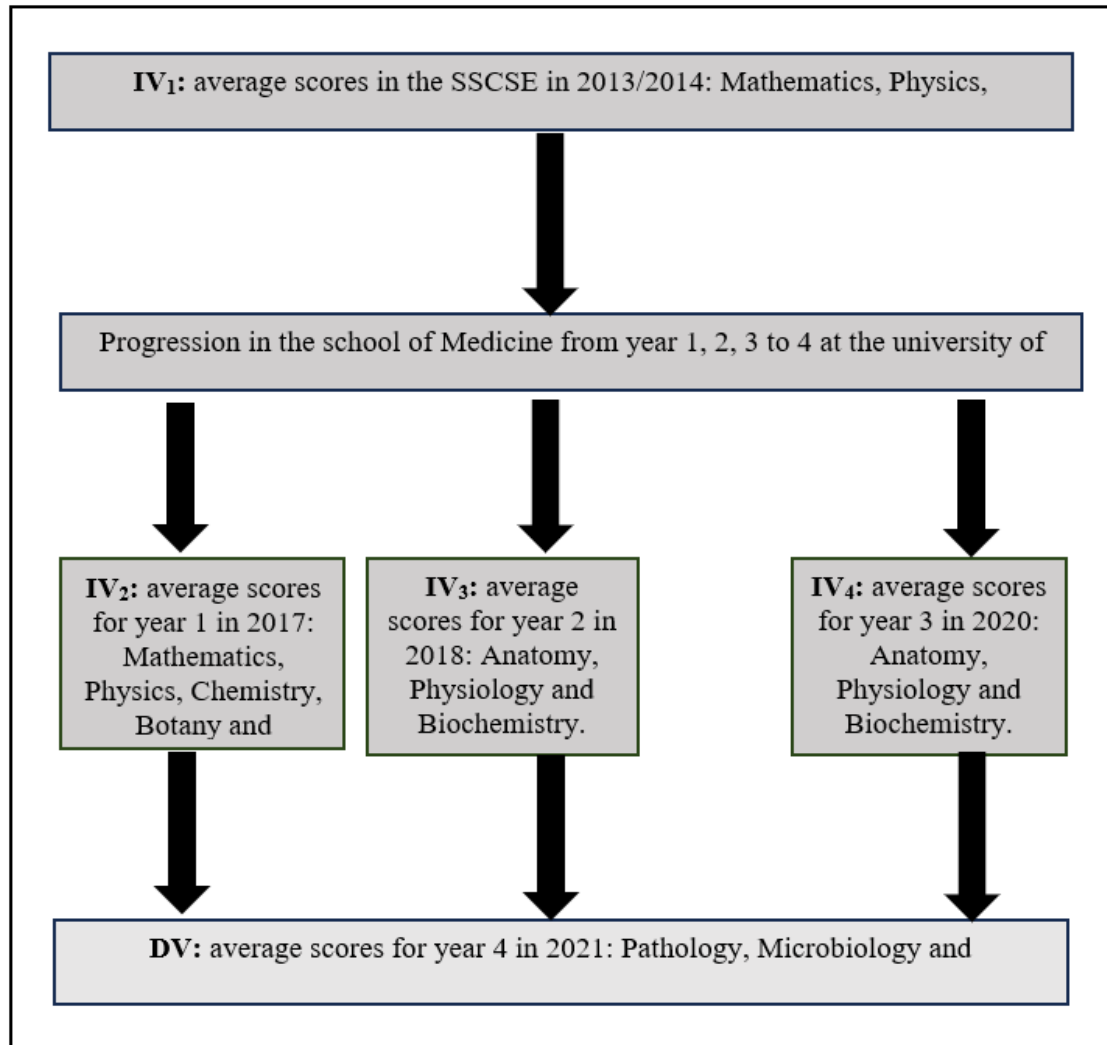
**Group 1:** These are predictors/independent variables (IVs), and they include the following:

- i) average scores in the SSCSE in 2013/2014: Mathematics, Physics, Chemistry and Biology (IV<sub>1</sub>).
- ii) average scores for year 1 in 2017: Mathematics, Physics, Chemistry, Botany and Zoology (IV<sub>2</sub>).
- iii) average scores for year 2 in 2018: Anatomy, Physiology and Biochemistry (IV<sub>3</sub>).
- i) average scores for year 3 in 2020: Anatomy, Physiology and Biochemistry (IV<sub>4</sub>).

**Group 2:** it is made up one dependent variable (DV), namely:

- i) average scores for year 4 in 2021: Pathology, Microbiology and Pharmacology (DV).

The relationship between the predictors and dependent variable is shown in figure 1.2 below.



**Figure 1.2: The relationship between the predictors/Independent variables (IVs) and dependent variable (DV)**

*Source: (Researcher, 2024)*

### **1.15 Operational Definition of Terms**

**Relationship** is a logical connection between two or more variables that explain any existence or occurrence of changes.

**Students' Perceptions:** Students' perceptions are attitudes, values, practices and believes that students have concerning teaching and learning.

**Students' progression:** Progression is a successful transition of a student from one level of study to another as evidenced by the grades a candidate has scored in a particular Exam.

**The South Sudan Certificate of Secondary Education (SSCSE or CSE):** The SSCSE is a formal university entrance qualification in South Sudan that is awarded to a candidate who has scored a minimum average grade of 50% and above.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

The chapter presents a literature review on the relationship between university entrance qualifications and students' progression at university. It explores pieces of literature related to this research topic in nine different sub-sections, namely: a general understanding of university entrance examinations and university progression, teachers' factors and students' performance, students' motivation and performance, students' admission and transition to university, performances in university entrance examinations as a predictor of students' progress at university, students' progression at university, dropout and class repetition by students, knowledge gap discovered in the reviewed literature and Summary.

#### **2.2 General Understanding of University Entrance Examinations and University Progression**

##### **2.2.1 Definitions of the University Entrance Examinations and Students' Progression**

According to the Collins English Dictionary, a university entrance examinations is an examination to determine a candidate's suitability to undertake a course of study at a university. Also, student progression is defined as a procedure that guarantees all students pass required units to proceed to graduation (HETI Part F, 2020).

There are two categories of standardized tests: achievement test and aptitude test. Standardized Achievement Test (SAT) is developed to measure the extent of learning which has occurred as a result of exposure to a relatively defined learning experience (Nugba & Quansah, 2021). This test is normally standardized. It means that, scoring and interpretation of the results are consistently according to individual competencies

regardless of gender, race, social economic background, etc. This form of test is usually administered at the end of the course/program, and they are deliberately based on the content covered in the course/program. But the aptitude tests as defined the type of standardized examination that attempts to determine and measure a person's ability to acquire, through future training (Encyclopedia Britannica, 2011).

In the OECD countries, admission to Higher Education (HE) is through examinations/tests of four types (Atherton, 2021): Matura/Abitur/Bac; National University Entrance Examination; university entrance examination; or individual subject-based examination. In other countries like Kenya, the Kenya Certificate of Secondary Education (KCSE) is accepted as a university entrance qualification. On the other hand, South Sudan recognizes the South Sudan Certificate of Secondary Education (SSCSE) as a legal university entrance qualification.

### **2.2.2 Teachers' Factors and Students' Performance**

Wanjiru (2020) examined school-based factors which influence students' performance in Kenya Certificate of Secondary Education in public day secondary schools in Nyeri County. Teaching experience and academic qualifications are some of the factors which influence academic performance. It means that a teacher can use applicable tactics to change pupils' understanding and get desirable results. Moreover, Imonje and Wandera (2019) investigated the impact of teacher experience on pupil performance in the Kenya Certificate of Primary Education (KCPE) in English. The finding revealed an increase in student performance from a mean score of 46% as a result of teachers' 4 years of teaching experience to a mean score of 53% related to 15 - 19 years of experience. In general, the

study found that teaching experience had a considerable influence on students' KCPE results.

### **2.2.3 Motivation and Students' Performance**

Research has shown students' motivation as an influencing factor on academic performance as per a study on the KCSE's students in Kirinyaga Central Sub-County (Luketero & Kangangi, 2019). That is, the more a student is interested in a subject, the harder he or she works on it. In addition, Maamin et al. (2022) carried out a survey to investigate the impact of student participation on mathematical achievement. A substantial link was found between affective involvement, behavioral engagement, and student achievement.

A study was conducted to investigate the effects of word formation as a component of the contextual guessing method, and also the efficacy of contextual guessing with online vocabulary application in exam preparation (Olha et al., 2022). A large number of bachelor test-takers who failed the unified admission examination test in 2021 exhibited a lack of proper reading strategies for boosting exam success, such as contextual guessing.

Foong et al. (2022) looked at how engineering students' motivation changed over the course of six months and the relationships between motivation and academic achievement. This study included forty-six ( $n = 46$ ) first-year chemical engineering students from a Malaysian public institution. A motivation, extrinsic motivation, and intrinsic motivation of students were investigated over a six-month period using the Academic Motivation Scale. After 6 months of study, the students' motivation remained almost same, with the exception of extrinsic incentive - external regulation dramatically increasing. Students showed the least a motivation, yet they were the most driven "to have a good life later on." Students' first-semester academic success was highly connected with extrinsic motivation. In contrast, the

students' second-semester academic performance was significantly correlated with intrinsic motivation - to experience stimulation.

Wang and Rao (2022) conducted a study on Chinese 11th-grade students from urban, rural, and suburban locations. Individual interviews were conducted in which they were asked open-ended questions such as "Why do you engage in academic tasks?" Inductive content analyses revealed that these children desired to perform well academically or participate in academic assignments for a number of reasons. Among these, the most important were: obtaining college admission and raising social status, performance-oriented reasons, mastering knowledge and developing competence, family-oriented reasons, and personal interest.

#### **2.2.4 Students' Admission and Transition to University**

According to Hafner et al., (2022), unlike other upper-secondary level certificates, the baccalaureate certificate (Gymnasiale Maturität) allows students to enter most areas of study at traditional universities (Universitäten). At this stage no further admission procedure except an internship at the University of Applied Sciences. Today, nearly all baccalaureate school graduates pursue a university education, with more than two-thirds enrolling in regular universities. As a result, baccalaureate schools are regarded as gateways to regular colleges.

Zamanzadeh et al. (2020) conducted a scoping analysis to evaluate and synthesize the existing information about admission criteria and selection procedures of nursing students. According to existing research, nursing students are mostly chosen based on two criteria: "cognitive-academic abilities" and "non-cognitive abilities." The findings also reveal that a wide range of noncognitive traits, such as morality, interpersonal communication skills,

and psychological strength, are considered in nursing applications. Interviews were the most widely utilized selection method to assess qualities. References, personal declarations, and personality evaluation instruments were among the other approaches used.

Crawford et al. (2021) aims at identifying existing selection strategies utilized for pre-registration nursing programs and examining the predictive efficacy of these methods on student achievement. Prior academic success, admissions tests, interviews, emotional intelligence testing, personal statements, and past healthcare experience were all recognized as selecting methods. Prior academic accomplishment and admissions tests appear to be the most indicative of student success in terms of selection strategies. Other selection procedures, such as interviews and personal statements, have less conclusive proof.

Gregory (2019) investigated reasons why senior secondary school students choose not to enroll in a higher mathematics course. All Year 11 and Year 12 mathematics students in Western Australian schools (aged 17-18 years) were invited to take part in a single, anonymous online survey with a focus on qualitative topics. According to additional testimony, there are minimal incentives available to students pursuing a higher mathematics course, and such courses are not required for university admission or later in life.

Kiden, et al. (2021) explored the implementation of internal quality assurance policies to student recruiting and admission processes in South Sudan's public universities. According to findings, the Ministry of Education, together with the public universities are passive participants in the process of students' recruitment. A recruitment policy was in place, with

a small number of competent employees and transparency to ensure excellent admissions. In that, there was a discrepancy between students' results and their performance in university after admission.

### **2.2.5 Students' Progression at University**

Student progression is defined as a procedure that guarantees all students pass required units to proceed to graduation (Part, 2020), according to the Health Education and Training Institute (HETI). Guo et al. (2022) studied the relationships between academic self-concept, learning environment perceptions, engagement, and learning outcomes among university students. The study used cross-sectional and longitudinal designs with sample sizes of 1502 and 2069 students. The finding shows that students' engagement/motivation has moderating effects on how students' self-concept and learning environments affect performance.

Alam and Islam (2022) used data from two public universities in Bangladesh in a study to determine characteristics that influence the academic achievement of university students in Bangladesh. Contingency and logistic regression were used as analysis approaches. The sample included 56.8% male students and 43.2% female pupils. Furthermore, 15% of the students in the survey hailed from educated families, while 65% came from middle-class families. The logistic regression model found that the following characteristics had a substantial impact on academic performance: student admission to a course of his/her choosing, family education history, college type, and student's family income.

Bibi, et al. (2019) studied factors responsible for low student performance in undergraduate programs in universities in Pakistan. With a sample of 300 students in the University of Gujrat, data was collected from the stratified sample population using a questionnaire. The

data was analyzed using descriptive statistics and logistic regression. The results showed a significant relationship between students' performance and previous academic scores, competency in the English language, teachers' roles, and family support.

Counterman and Zientek (2021) examined variations in mathematics achievement and persistence by course modality for students enrolled in developmental mathematics at a suburban community college in the Northeast United States. There were statistically significant disparities in final exam scores and course grades based on course level. For the middle- and upper-level courses, an emporium model that provides a semi-structured timetable, rapid feedback, and frequent encounters with tutors and instructors is a realistic choice. Students placed in the lowest level course (i.e., pre-algebra) did not appear to benefit from the emporium format, since grades and perseverance rates were lower when compared to face-to-face classes. Across all course levels, the online course mode was not the best option.

### **2.2.6 Dropout and Class Repetition by Students**

In light of students' drop out, four major causes of university dropout have been identified as follows (Castao et al., 2006, as cited in Alejandro et al., 2023): The first is individual determinants of success. These components are influenced by students' interests, beliefs, personalities, and motives. Second, socioeconomic status, which includes family, friends, culture, and location, predicts students' future. Finally, institutional issues such as education policy implementation, pedagogy, and so on must be addressed.

Cornelius (2020) explored a problem targeted at identifying risk factors influencing first-year students' desire to drop out of a South African university. The following factors were discovered to be associated with students' intent to drop out using partial least squares

structural equation modeling (PLS-SEM) data analysis: Firstly, dedication, the amount of effort a student puts into his or her studies determines academic advancement. Secondly, intellectual competence decides whether or not a student advance. That is, more driven students are more committed to their studies and hence more successful than less motivated students. Ultimately, motivation was discovered to have an indirect effect on advancement. Behr et al. (2020) discovered, through a thorough examination of the phenomenon which contributes to students dropping out at the tertiary education level, the following factors were identified: the country's financing policy for the national education system, the teaching quality at higher education institutions, and the students as determinants of their own dropout. Students' reasons for dropping out include previous secondary education and working while studying. Segura et al. (2022) recognizes that while academic achievement is always an important indicator that can be used to predict students' future performance, other variables such as students' preferences for which course to follow also play a role. Over the course of one semester, Scheunemann et al. (2022) conducted a longitudinal study to investigate the reciprocal links between academic procrastination, study satisfaction, and dropout intentions. The cross-lagged panel model revealed a substantial connection between study study satisfaction and subsequent dropout intentions.

Spain, like other countries throughout the world, has a problem with student dropouts. According to De la Cruz-Campos (2023) research study, this problem is caused by poor academic performance, a lack of social support in the new academic environment, a low socioeconomic level, a lack of enthusiasm, and previous academic performance.

Suzanne et al. (2022) study was aimed to answer the following questions: What are the cohort features of students who repeat first-year mathematics and how do they differ from

students who do not. It was discovered that pass rates for students taking their second attempt were much lower than pass rates for students taking their first attempt. In this case, age, degree enrollment, and road into university were indicators of who was more likely to repeat. Students who attempted a second time were less likely to finish all assessment items and were more than twice as likely to miss the final test.

Marta, et al. (2022) research combines a theoretically based model with a data-driven approach to study an Early Warning System that identifies students who are at risk of dropping out. It was identified that a variety of factors and variables linked with the chance of dropping out include personal background and previous academic achievement.

Cannistrà et al. (2020) research study has reported 30% of students to exit postsecondary education programs without receiving a degree in OECD countries. It was found that the major chosen has a significant impact on the likelihood of dropping out. The research also has revealed how valuable and powerful data analysis can be used in estimating the likelihood of a student dropping out during their first year of university attendance, or even afterwards. In relation to this, academic outcomes at the end of the first semester significantly increases the quality of dropout (Von Hippel & Hofflinger, 2020). Interestingly, these variables are far more predictive and relevant than demographic traits and prior high school achievement.

According to Oqaidi et al. (2022) there are three main factors in a machine learning-based approach to detecting students at risk of dropping out: the selection of features likely to influence a partial or total stop of the student, the selection of the algorithm to implement a prediction model, and the selection of the evaluation metrics to monitor and assess the credibility of the results.

Segura et al. (2022) report analyzes data from dropout candidates after their first year at Europe's third largest face-to-face institution. It also aims at forecasting students who are likely to dropout either at the start of the course of study or at the end of the first semester. The findings indicate that dropout detection is not limited to enrolment characteristics, but that it improves following the first semester results. Academic success is usually a factor, but there are others, such as the student's level of preference for the course that he or she was finally able to study.

### **2.3 Performances in University Entrance Examinations as a Predictor of Students' Progress at University**

University admission tests are thought to be the best predictors of students' academic performance in higher education (Baron & Norman 1992, cited in Maria Ferro & Leandro Almeida, 2019). In practice the more a student pass in tests such as the Scholastic Aptitude Test (SAT) or American College Testing (ACT), high school Grade Point Average (GPA), etc.; the higher the student's performance in university specialization. Consequently, the more successful this student is likely to be. According to Suharno et al. (2020), a student's performance in secondary school is related to his or her professional route. In this situation, it means that whichever specialty, college, or degree of university program a student chooses is primarily determined by his or her secondary school results.

McMillan and Edwards (2019) look into the link between senior high school mathematics subject choice and first-year university pass rates in biology, chemistry, mathematics, and physics. In this case, twelve Australian institutions supplied detailed data for this program, which focused on the first semester of 2015, 2016, or 2017. The findings reveal that the majority of first-year students pass their first-year biology, chemistry, mathematics, and

physics subjects, regardless of their level of mathematics in senior high school. Also, it was found that students who took General Mathematics in high school had lower first-year subject pass rates than those who took more advanced mathematics subjects (Mathematical Methods or Specialist Mathematics).

Aciro et al. (2023) investigated the association between undergraduate students' admission grades and academic performance in Ugandan public universities during their first and final years of study. A retrospective cohort study of data for undergraduate students at Gulu and Makerere Universities was done from 2013 to 2016. In four university programs, the results demonstrated a substantial association between entry scores and students' academic achievement for those admitted on national merit, district quota, affirmative action schemes, and private sponsorship schemes. However, no significant relationship was found between admission scores and academic achievement in the Bachelor of Medicine and Bachelor of Surgery programs. Moreover, Nweze and Uzochukwu (2019) investigated university matriculation examination (UME) chemistry scores as predictors of students' first-year (freshman) university achievement. The study involved various chemistry-based faculties in Nigeria, namely: biological sciences, medical sciences, and physical sciences. A multi-stage sampling method was used. The study's findings on the association between UME-chemistry scores and first-year results in biochemistry, medicine, and surgery courses at Federal and State Universities show no significant relationships. However, there was no correlation between UME and first-year results of students in the medicine, surgery, and biochemistry departments.

Abdelfattah et al. (2022) investigated predictors of cumulative grade point average (GPA) from entrance scores and subsequent performance in university engineering programs.

According to the findings, there is a considerable association between the university entry score and the preparation year. Furthermore, there was a substantial association between the GPAs from year 1 to year 3. However, no significant association was found between the entry results and the CGPA. This agrees with Fu (2022) who examine 519 Taiwanese vocational school students' trajectory accomplishment in math and English. And, discovered that pre-enrollment academic performance predicted subsequent student performance.

Crowther and Briant (2021) conducted a regression analysis to determine whether cognitive characteristics such as university admission scores and subjects covered in school (arts and graphics) could predict future academic achievement. In Australia, 475 students were chosen from four disciplines: architecture, industrial design, landscape architecture, and interior design. It was observed that university entrance exams and first-year performance had a direct impact on students' long-term success. However, prior knowledge in art and graphics had little bearing on academic success.

Sakz et al. (2021) studied longitudinal correlations between higher education academic accomplishment, university entrance exam performance, campus psychosocial climate, instructional behavior, and socioeconomic status. Data from years 1–4 were taken from a sample of 2,361 bachelor's students (53% male and 47% female) from three universities. The findings revealed a link between entrance examination scores, students' assessments of their academic achievement, new campus experience, and GPA.

Maria and Leandro (2019) investigated the association between university entrance scores and first-year students' academic performance while controlling for characteristics such as socioeconomic position, motivation, and school trajectory. The study aimed for a sample

size of 2697 students admitted to 54 courses in the academic year 2015/2016 at public universities in Portugal. According to the findings, university entry grades strongly predicted first-year academic GPA.

Ariza et al. (2022) review of the production and publication of research articles connected to the study of academic variables explains how these variables affect academic performance in university entrance tests. Among the primary findings of this study, it was discovered that the United States had the largest scientific production registered in the names of writers affiliated with institutions in that nation, with 51 publications. With 68 published documents referring to the study of Academic, Variables that Affect Academic Performance in University Admission Exams.

#### **2.4 Knowledge Gap discovered in the Literature**

There are two main research gaps identified in the previous literature, namely: Contextual and conflicting research findings.

Firstly, the previous literature has shown some factors that affect students' performance. These include the following according to (Wanjiru, 2020; Foong et al., 2022; Luketero & Kangangi, 2019): Teaching experience, academic qualifications, and students' motivation among others. On the other hand, students dropping out of university are associated with factors such as: students' interests, beliefs, personalities, and motives, education policy implementation, pedagogy, and socioeconomic status (Castao et al., 2006, as cited in Alejandro et al., 2023). However, all of these studies were carried out in countries like United states, Malaysia, Colombia, Kenya, etc whose education systems are well-developed compared to the South Sudan's whose expenditure on education is only at 11.2%

(World Bank, 2021). It means that the research results do not necessarily reflect the realities in the context of South Sudan.

Lastly, there are conflicting research findings regarding the relationship between university entrance qualifications and students' progression at university, as revealed by the past literature. For instance, Abdelfattah et al., (2022) finding show a considerable association between the university entry score and the preparation year. Similarly, Fu (2022) discovered that pre-enrollment academic performance predicted subsequent student performance. Contrary to these positive correlations between the university entrance examinations and university progression, other authors found different results. For example, Nweze and Uzochukwu (2019) found no significant relationship between the UME-Chemistry scores and first-year results in biochemistry, Medicine, and surgery courses at Federal and State universities in Nigeria. In addition, (Aciro et al., 2023) research results showed no significant relationship between admission scores and academic achievement in the Bachelor of Medicine and Bachelor of Surgery programs in Uganda.

In conclusion, this current research study was meant to fill the existing knowledge gaps in two ways: choosing South Sudan as the study location and investigating the research topic using variables such as the SSCSE scores, students' performance in the school of Medicine at the university of Juba. This provided new insight into the topic in a special context.

## **2.5 Summary**

The chapter has presented a literature review on relationship between students' performance in university entrance examinations and progression at university. It has reviewed pieces of literature under the following sub-sections: a general understanding of university entrance examinations and university progression, teachers' factors and

students' performance, students' motivation and performance, students' admission and transition to university, performances in university entrance examinations as a predictor of students' progress at university, students' progression at university, dropout and class repetition by students. In addition to that, the literature has attributed factors that influence students' performance to the following: teachers' academic qualifications, teaching experience, student motivation, and personality. Not only that, the literature has indicated that that the determinants of students' failure or dropout are education policy implementation, students' beliefs, and socioeconomic background which include family, friends, culture, and location. However, the literature has revealed existence of knowledge gaps which include the contextual and conflicting findings from the previous researches.

## **CHAPTER THREE**

### **RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 Introduction**

Research Methodology is the science of investigating how research is conducted systematically (Mishra & Alok, 2022). In research methodology, the researcher describes the many processes that are commonly done to explore a research problem. That is, methodology refers to the scientific approach used to perform research. Burns and Grove (2001) define research technique as the entire process, from problem identification to final data collection and analysis plans.

This chapter is divided into sections, namely: the location of the study, research approach, which includes mixed methods research approach and research paradigm. Also covered in the chapter are research design, target population, sampling methodologies, and sample size. In addition, sampling strategies and sample procedures of various sizes have been described. Following that is a section on data collection instruments, then a section on the validity and reliability of research instruments. The third chapter also includes sections on data analysis, ethical considerations, and a summary of study methods.

#### **3.2 Research Paradigm**

A paradigm is a framework for viewing the world (Kuhn, 1962). Furthermore, paradigms encompass worldviews, the kind of knowledge sought, and the many methods for producing and assessing knowledge (Thomas, 2010). It comprises philosophical beliefs that shape the perspectives of academics.

Pragmatism is the paradigm used in this research project. Legg and Hookway (2008) describes pragmatism as a philosophical tradition that views comprehending the world as

inextricably linked to one's agency within it. One of the most distinguishing features of pragmatism that sets it apart from other philosophical works is that, while it is directed to the world and all mankind, it is a profoundly personal and living statement of doctrine that is defended throughout with the deepest and often tragic sincerity (James, 1975). Also, the advantage of employing pragmatism over other paradigms in this research study is that the combined strength of research participants' perspectives and quantitative facts in researching a phenomenon is always great.

Pragmatism, according to Biesta and Burbules (2003), views research as a human experience based on the attitudes and activities of actual researchers. This is not the same as categorizing social research in terms of ontology, epistemology, and methodology; but, it does not imply that the previous approach was wrong. Pragmatism, on the other hand, would see the previous paradigm as a collection of beliefs and acts that were particularly relevant under a certain set of circumstances.

### **3.3 Research Approach**

The approach that was used in this study is mixed methods research approach. According to Johnson et al. (2007), one of the three major "research designs" (quantitative research, qualitative research, and mixed methods research) is Mixed methods research. Mixed method research is defined as a study design that collects, analyses, and combines quantitative and qualitative data to better understand a research problem (Creswell & Clark, 2007, cited in Clark et al., 2008).

The modern field of mixed methods research originated in the mid to late 1980s. Campbell and Fisk used several approaches to explore psychological qualities in 1959, despite the fact that their methods were just quantitative assessments. Their work inspired others to

combine qualitative data (such as observations and interviews) with standard surveys (Sieber, 1973). Early ideas on the value of several approaches, known as mixed methods, were based on the idea that all methods had biases and shortcomings, and that collecting both quantitative and qualitative data balanced out the weaknesses of each type of data.

The decision to use a mixed method approach in this investigation is the best choice, because primary qualitative data was merged with secondary quantitative data to complement one another. Mixed methods research allows researchers to get a deeper grasp of complicated study issues than would otherwise be achievable using either quantitative or qualitative data alone (Halcomb et al, 2015).

### **3.4 Research Design**

Research design is a conceptual structure within which research is conducted and it involves data collection and analysis relevant to the research (Kothari, 2004). The research design is the strategy and approach selected to acquire valid and reliable data that can meet research objectives and answer research questions.

In this study, an embedded (nested) mixed methods research design was applied as shown in figure 3.2 below. In that, our design will incorporate some qualitative elements into a bigger set of quantitative data. This design was chosen for a complimentary purpose (Piccioli, 2019). That is, the goal was to supplement and improve mostly quantitative data with certain qualitative components. It should also be mentioned that the study was conducted concurrently, including data collecting and analysis for both quantitative and qualitative data.



**Figure 3.1: Embedded mixed methods research design**

*Source: Adopted from Creswell and Plano Clark's (2007).*

### 3.5 The Location of the Study

The study was conducted at the University of Juba, in South Sudan shown in Appendix VI. The University of Juba is a public university in Central Equatoria State of the country. It was established in 1975 in response to the need for higher education in the former Southern Sudan region. Juba is the capital city of South Sudan, located between latitudes 4.43° and 4.717°E and longitudes 31.30° and 31.50°N (Dhuol, 2018). The University of Juba is a world-class educational institution dedicated to national economic empowerment and social reform. The university is located in the city center on latitude 4°50'28" North and longitude 31°35'27" East (Open Street Map, 2023; Verini, 2014). The primary focus of this research is the University of Juba's undergraduate programs. Specifically, the investigation targeted the School of Medicine at the University of Juba.

### 3.6 Target Population

According to Polit and Beck (2004), population is defined as the aggregate or totality of people who meet a set of criteria.

The target population in this study was 1600 quantitative observations and 20 respondents.

The study population consisted of students who sat for the SSCSE in 2013/2014 and later studied in the school of Medicine at the university of Juba in 2017, 2018, 2020 and 2021.

This study population is characterized by the following:

- i. Science students who passed science subjects including Mathematics, Biology, Chemistry and Physics in the South Sudan Certificate of Secondary Education (SSCSE) in 2013/2014; then late joined the school of medicine at the University of Juba.
- ii. The qualification for admission to school of medicine at university was the SSCSE.
- iii. The students studied and sat for examinations including 4<sup>th</sup> year courses like pathology, pharmacology, and microbiology.

### **3.7 Sample Size Determination**

The sample size was determined using the table for determining sample size of a given population (Krejcie & Morgan, 1970). Out of the population of 1600 quantitative data, a sample size of 310 was drawn from it. This sample size of 310 was divided into four strata sample sizes (i.e., year 1, year 2, year 3 and year 4). According to Cochran (1977), the statistical formula used for determination of the stratum sample size is given as follows:

$$\text{Stratum sample size} = \frac{\text{grand sample size}}{\text{Population size}} * \text{Stratum size}$$

The sample sizes for each stratum are shown in the table 3.1 below.

**Table 3.1: Distribution of the sample size of 310 into strata using Proportionate Stratified Random Sampling**

Population size	1600
Grand sample size	310
<b>Stratum (academic years)</b>	<b>Sample size</b>
Year 1 (2017)	98
Year 2 (2018)	80
Year 3 (2020)	70
Year 4 (2021)	62

*Source: Researcher (2024)*

As shown in table 3.1 above, each stratum got the following share out of the total population sample: year 1 has 98, year 2 has 80, year 3 has 70, and year 4 has 62.

Regarding sample sizes for both the SSCSE and qualitative data, the sample sizes were chosen purposively. On one hand, sample size for the SSCSE was intentionally selected as 98 in order to match the sample size of the students' scores for the year 1 in 2017. On the other hand, 20 respondents were purposively selected for the qualitative data as shown in table 3.2 below.

**Table 3.2: The Purposive sample size determination in the SSCSE records and qualitative data respondents**

	Sample size
The SSCSE (2013/2014)	98
Qualitative data respondents	20

*Source: Researcher (2024)*

### **3.8 Sampling Procedure**

A sample is a subset of a population that has been chosen to take part in a study (Polit & Beck 2004; Uys & Basson, 1991). This study used both Proportionate stratified random sampling and purposive sampling. An over-all (grand) sample size of 310 for the quantitative data was divided into four strata. The strata represented classes in the school of medicine at the university of Juba (i.e., year 1, 2, 3 and 4). Each stratum got the following sample size: year 1 (98), year 2 (80), year 3 (70) and year 4 (62). In contrast, the sample size for the SSCSE was purposively selected such that it matches the sample size for the stratum, year 1. In this case, the SSCSE was allocated a sample size of 98. In addition, all 15 respondents were taken as the sample size for the qualitative data.

### **3.9 Data Collection Instruments**

In this research study, the data collection tools that were used are data collection table and open-ended questionnaire.

#### **3.9.1 Data Collection Table**

The data collection table was adopted from the database containing students' data in the school of medicine at the university of Juba. The tool was developed by the researcher in Excel sheet according to this research variables. It was used for collecting secondary quantitative data, comprising of students' grades for the SSCSE and school of medicine at

the university of Juba. One of the key functions of data collection table is its ability to assure correctness and consistency in data entry. Moreover, the design of the table helped to lower the possibility of errors and inconsistencies caused by human data entering.

### **3.9.2 An Open-Ended Questionnaire**

The questionnaires were used to gather qualitative students' responses. This tool was very vital as it was designed in such a way that it gives enough space for students to voice their opinions.

### **3.10 Pilot Study**

Piloting involves a logical procedure where by a researcher can amend a research instrument depending on feedback from a considerable number of individuals who complete and evaluate a research instrument (Creswell, 2012). In the pilot study, the following steps were taken:

- i. Open-ended questionnaires: 10 students from second-year and third-year in the school of Medicine at the university of Juba were requested to pre-test the open-ended questionnaires. They were given the questionnaires to answer. Upon completion, the researcher checked and evaluated their answers. It was noticed that 8 students left one item (question) blank. On asking them about their comments regarding the questionnaires, their common feedback emphasized that the unanswered question was not relevant to the grading system in the school of medicine. In fact, the question was asking about each student's cumulative grade point average (CGPA). But the school does not grade the student using GPA. consequently, the researcher revised and considered deleting the item from the questionnaire based on the feedback from the students.

- ii. The data collection form: prior to the quantitative data collection, the data collector was given time to go through the table. This was done in order to help spot irrelevant and unclear information from the table and correct them. The data collector's comment showed the table was clear and understandable.

### **3.11 Validity and Reliability of The Research Instruments**

According to Mugenda and Mugenda (cited in Jeruto, 2022), validity is the accuracy and meaningfulness of inferences which are based on the research results. On the other hand, reliability is defined as the level of internal consistency or stability of the measuring instruments over time (Mugenda and Mugenda, 1999, as cited in Kokeloh, 2023).

#### **3.11.1 Quantitative Validity and Reliability of the data collection table**

The data collection table for this research study was an adopted version of the database containing the targeted data in the school of medicine at the university of Juba. Unlike primary data tools, assessing reliability and validity of secondary data instruments may not be easily executed with direct statistical methods (Weijun, 2008 as cited in Olabode, et al., 2019). So, the secondary data tool needs a step by step' method of analysis.

In this case, the researcher combined the use of face validity and content validity with the Flintermann's five criteria for assessing validity and reliability of secondary data (Flintermann, 2014 as cited in Olabode, et al., 2019).

- i. Criteria 1: Clear specification of data collection and data analysis. Before using this research tool, the researcher had to establish authenticity of the data bases/files containing the targeted data at the university of Juba. the researcher checked for the

following indicators: data source, date of the data collection, organization name, any contact details and how quality of the data was assured.

- ii. Criteria 2: Clear specification about potential changes in procedure. There was not any signs of changes or unethical interference noticed about the targeted data. So, the researcher accepted the data and the tool containing it as reliable and valid.
- iii. Criteria 3: Comparing data collected outside the research concepts with the actual research concepts data. In context of this research data, there was high similarity between the students' data that they researcher saw outside the university of Juba, and the data available in the school of medicine at the university of Juba. Therefore, there was evidence to of high validity and reliability of the targeted data set.
- iv. Criteria 4: Updates Due to error correction. There was no indication of errors, alteration or sign of new version of the students' dataset in the school of medicine at the university of Juba, hence the dataset was valid and reliable
- v. Criteria 5: Missing research variables report. The researcher confirmed that there was not any sign of missing students' data in the data bases at the university of Juba. So, the targeted data base was reliable and valid.
- vi. In addition to the Flintermann's criteria mentioned above, the validity of the data collection table was assessed further more using two forms of validity, namely:
- vii. Face validity: In order to make sure the data collection table was suitable for the data collection, a provisional tool was sent to my supervisors and fellow researchers for check and scrutiny, then their feedbacks were used to correct and inform final version of the data collection table.

- viii. Content validity: with the help of my supervisors, we made sure the contents included in the data collection table covered all constructs that it was intended to measure. For example, accuracy and correctness was observed by ensuring that the table column-headings bear variables/constructs indicated in the research objectives.

### **3.11.2 Qualitative validity and reliability of the open-ended-questionnaires**

In qualitative research, validity and reliability are ensured in line with the trustworthiness of the research findings (Creswell, 2014, as cited in Noel, 2022). In this case, the researcher observed trustworthiness by paying considerable attention to the following as in (Chirchir, 2023): Credibility, dependability, transferability and conformability.

- i. Credibility: the researcher ensured credibility of the research finding through various ways of triangulation namely: firstly, the used of more than one type of data (quantitative and qualitative) promises some credibility. In fact, this research data was supported by literature selected from various trusted sources. lastly, the weakness of one data collection tool was eliminated by using more than one methodology. For instance, the data collection table and open-ended questionnaires complimented one another in this research.
- ii. Dependability: the researcher ensured dependability through self-reflexive and bracketing. In that, the researcher was able to identify and avoid any potential biases like researcher's gender, background, personal interest, etc that would have interfered with this research finding. In addition, the researcher involved experts' judgement throughout this study. For instance, the supervisors, fellow researchers

and panel of investigators from the school of education at Moi university shaped this research interpretations and findings.

- iii. Transferability: actually, transferability of this study finding to other research context depends on trust in the finding. In order to honestly convince the consumers for this finding, the researcher made use of thick and detailed description of facts wherever applicable. Detail attention was paid in describing the research context, data collection and analysis procedures, time frame, research participants, ethical consideration and so on.
- iv. Confirmability: Check for legitimacy of this research study has been ongoing since the beginning until publication. The confirmation has been possible through the help of supervisors, fellow researchers, panel of academician at Moi university, self-reflection about biases and self-interest that might have been added in to research.

### **3.12 Data Collection Procedure**

The data collection took place from early February through the end of April 2024 in the school of Medicine at the University of Juba. The procedures were executed as follows:

- i. Introductory letter (research permit) was obtained from Moi University, Kenya. This letter was used to apply for research approvals at the university of Juba in South Sudan.
- ii. A research permit was offered by the office of the Director for Research and Publications at the University of Juba. Copies of this permit were also made available to the Dean of school of Medicine and the academic register of the university.

- iii. Using all the above approvals, the researcher wrote a letter to the Dean of the school of medicine requesting for assistance in data collection.
- iv. A data collector was assigned to support. This was a clerk in the school of medicine who was already familiar with files and locations of the students' data bases both in examinations office and admissions office.
- v. The researcher agreed with the data collector on terms and conditions of the assignment.
- vi. Then, the researcher trained the data collector on ethical considerations in data collection process, the features and contents of the data collection tools.
- vii. The major role of the data collector was to collect quantitative data in the examinations and admissions offices, while disseminating the open-ended questionnaires to the targeted students to answer.
- viii. After, both the quantitative data and qualitative data were collected, the data collector handed over the completed data tools to the researcher, witnessed by the Dean of the School of Medicine.

### **3.13 Data Analysis Procedures**

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS), (IBM SPSS Statistics, Version 25).

- i. Prior to exporting the data to SPSS for analysis, Micro soft excel was used to prepare for the data analysis. For instance, preliminary data cleaning and organization were done in the Excel sheet.
- ii. The data was analysed using both the Multiple linear regression for the quantitative data and Thematic analysis for the qualitative data.

- iii. Before carrying out the multiple regression analysis; seven relevant assumptions were tested for using statistics involving histogram, coefficients table, ANOVA table, scatter plot, box and whisker plot and others.
- iv. Under the data presentation and analysis section in chapter 4, the quantitative and qualitative data were analysed separately.
- v. The multiple linear regression was performed to answer both objectives 1 and 2 of this research study. This was possible since the researcher had to use the Multiple regression outputs to also determine correlation coefficients as required by the objective 1. In contrast, the qualitative data analysis was done in relation to the objective 3, which was meant to compliment the findings from objective 1 and 2.
- vi. Test for statistical significance of the results for both the Pearson correlation and linear regression were made. In this case, decisions on whether to reject or fail to reject the null hypothesis were executed based on 0.05 level of significance.
- vii. The findings for both quantitative and qualitative data analysis were then merged under the discussion and interpretation section of the chapter 4. This interpretation and discussion were done with reference to the research hypotheses, question and the literature review.
- viii. The research findings were summarized in the chapter 5. Then, conclusions and recommendations were drawn from the summary and discussion sections of this research report.

**Table 3.3: Summary of Objectives and Data Analysis Approach to be used**

S/n	Objectives	Variables		Data analysis method
		Dependent	Predictors/independent	
1	To determine correlations between students' performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in academic years 2017, 2018, 2020 and 2021.	Progression at University of Juba-School of Medicine, Year4	*Performance in the High school-SSCSE. *Progression at University of Juba-School of Medicine, Year1. *Progression at University of Juba-School of Medicine, Year2. *Progression at University of Juba-School of Medicine, Year3.	Pearson correlation
2	To determine whether students' performance in the SSCSE in 2013/2014, and at the university of Juba in 2017, 2018, 2020 had impact on the fourth-year medical students' grades in 2021	Progression at University of Juba-School of Medicine, Year4	Performance in the High school-SSCSE. Progression at University of Juba-School of Medicine, Year1. Progression at University of Juba-School of Medicine, Year2. Progression at University of Juba-School of Medicine, Year3.	Multiple linear regression
3	To find out from students' perceptions the secondary school and university factors that affected performance in the school of Medicine at the university of Juba in 2021.			Thematic analysis: Identifying patterns and themes.

Source: Researcher (2024)

### 3.14 Ethical considerations

According to Gajjar (2013), ethics can be defined as a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues.

In this study, the researcher tried by all means possible to avoid and minimize ethical issues throughout the research stages including proposal writing, data collection and report writing. The following principles of research ethics were adhered to with respect to the research context in South Sudan:

- i. Respect for intellectual property right: From the research proposal to report writing stage, the researcher has acknowledged with citations and other legal means any information and materials that belongs to other persons.
- ii. Informed-consent: the researcher was abided by rules of consent. It started by the time the researcher applied for the researcher approval from Moi university, the university of Juba and the research participants in the school of medicine. The consent forms were approved using signatures from different group of the study population.
- iii. Confidentiality and privacy: the researcher made sure to use the medical students' data, the official documents obtained from Moi university and the university of Juba for this research purpose.
- iv. Integrity and honesty: the researcher has shown scientific principle of honesty in the all the processes of the research; data interpretation, analysis and results. In addition to that, the research study was open to criticism from many different individuals like the researcher's supervisors, and other scientific individuals.

### **3.15 Summary of Research Methodology**

The chapter has presented different sections on the research design and methodology. It begun with the Mixed Methods as an approach that was used in this study. In particular, concurrent embedded (nested) mixed methods research design was used. In addition, pragmatism is the worldview that guided the research study. The target population in this study was 1600 quantitative observations and 15 respondents in the school of medicine at the university of Juba. The sample size is 310 which was determine using (Krejcie & Morgan, 1970). Proportionate stratified random sampling and purposive sampling techniques were used. The data collection was done using table and open-ended questionnaires. Analysis of the data was carried out with the help of the IBM SPSS Statistics, Version 25. The statistical analysis technique methods were multiple linear regression and Pearson correlation and reflexive thematic analysis. Ethical issues in this research study were managed by acknowledging intellectual property rights, confidentiality and privacy, informed consent, and integrity.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION

#### 4.1 Introduction

This chapter presents the analysis, presentation, Interpretation and discussion of the research findings. As a mixed methods research study, both quantitative and qualitative data were collected and processed differently. However, the two forms of data were merged together in the Interpretation and discussion section. Combination models of the Mixed Methods Research design put different qualitative and quantitative studies or parts of studies together. Different research approaches are complementary to each other, and can contribute to the same research question (cf. Mayring, 2000, cited in Mayring, P. 2007).

#### 4.2 Respond Rate

Kviz (1977) defines response rate as the proportion of all sample members who are eligible to participate in the survey from whom a complete and usable data is collected. This is expressed in formula below.

$$\text{Response rate} = C/E*100$$

Where C is the number of completed interviews or questionnaires, and E is the number of eligible sample members.

Regarding this research study, both quantitative and qualitative respondents were reached separately. Notably, both the quantitative secondary data collection table containing 310 observations and the 15 questionnaires have a response rate of 100%.

**Table 4.1: Response rate for the data collection in the SSCSE, School of Medicine, from year 1 to 4 at the University of Juba**

<b>Data type</b>	<b>Total number of data collection forms/questionnaires</b>	<b>Returned/completed data collection forms or questionnaires</b>	<b>Response rate</b>
Quantitative secondary data	1	1	100%
Qualitative primary data	15	15	100%

*Source: Researcher (2024)*

### **4.3 Respondents' Demographics**

As Statistical information like gender, age and others were not required in this study, the only demographics which characterized the study population were level of education and academic year. So, the background of the research respondents is as follows:

At the secondary level, 98 (100%) students' records represent students who sat for the South Sudan Certificate of Education (SSCSE) in 2013/2014. These records were obtained in the admissions office at the University of Juba.

On the other hand, 310 (100%) students' scores were gathered at university level. These are the records corresponding to students who had completed the SSCSE in 2013/2014, then sometimes later joined year 1, 2, 3 and 4 at University of Juba. This data was extracted from the students' data base in the Examinations Office in School of Medicine at the University.

Out of the 310 targeted respondents at university level, there were 31.6% (98) in year 1, 25.8% (80) in year 2, 22.6% (70) in year 3 and 20% (62) in year as shown in the table 4.2 below

**Table 4.2: The respondents' Demographics related to the SSCSE and the University of Juba**

<b>Level of Education</b>	<b>Academic year</b>	<b>Number of students' records/observations</b>	<b>Percentage</b>
<b>Secondary level/Form 4</b>	2013/2014	<b>98</b>	<b>100%</b>
<b>University level/School of Medicine</b>			
Year 1	2017	98	<b>31.6%</b>
Year 2	2018	80	<b>25.8%</b>
Year 3	2020	70	<b>22.6%</b>
Year 4	2021	62	<b>20%</b>
<b>Total</b>		<b>310</b>	<b>100%</b>

*Source: Researcher (2024)*

#### **4.4 The raw data as it appeared in the students' files at the University of Juba**

In the students' data bases at the University of Juba, the average marks obtained by students in the SSCSE were given as Percentages (%), while students' grades in the school of medicine were recorded in descriptive words. In other words, the students' grades in the university computer system were not indicated in terms of percentages, instead they appeared as Distinction, very good, Good, Pass and fail.

For illustration purpose, table 4.3 below shows a part of the full data collection table that was used to extract the quantitative data from students' files at the university of Juba. However, full details about the table are given in Appendix III

**Table 4.3: A section of the data collection table showing raw data as it appeared in the students' databases of at the University of Juba.**

Performance in the SSCSE		Performance at University/School of Medicine										
Cohort 2013/2014		Year 1: 2017 scores										
S/N	Mathematics, Physics, Biology, Average grade % obtained	Mathematics		Physics		Biology				Chemistry		Average
		Basic 1	Basic 2	Basic 1	Basic 2	Botany 1	Botany 2	Zoology 1	Zoology 2	Basic 1	Basic 2	
		grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	
1	81.7	Fail	Pass	Pass	Good	Fail	Fail	Fail	Fail	Fail	Pass	
2	81.7	Dist'tion	Good	Good	Pass	Pass	Good	Pass	Pass	Pass	Good	
3	81.6	Fail	Dist'tion	Pass	Good	Pass	Pass	Good	Fail	V. good	Fail	
4	81.6	Fail	Dist'tion	Pass	Good	V. good	Good	V. good	Pass	Pass	V. good	
5	81.5	Dist'tion	Dist'tion	Pass	Good	Pass	Fail	Pass	Good	Good	Good	

*Source: Adopted from students' data base, at the university of Juba (2024)*

#### **4.4.1 Preparation of the Quantitative data for analysis**

Before performing analysis for the quantitative data, there were three main steps taken in to consideration, this includes the following: Data conversion to percentages, data entry and cleaning in Excel sheet and the data export to the SPSS.

##### **a) Data/grades conversion from word forms to percentages (%)**

The raw students' data of performance in the school of medicine which was already available as remarks were converted to percentages using the given university grading system. So, the grades such as Distinction, very good, Good, Pass and Fail were change to percentage figures using the grading system of the University of Juba. For instance, the grade "Distinction" was given in a range of 80- 100 %. In this case, the researcher has converted it to a mean percentage (midpoint). So, by adding 80% to 100%, then divide by 2, it yields a mean percentage grade of 90%. Refer to table 4.4 is shown given below.

**Table 4.4: An adopted grading system from the university of Juba used in conversion of students' scores from (Distinction, very good, good, pass and fail) to mean percentage (%) marks**

SSCSE performance	University performance/School of Medicine		
Percentage (%) grades remain unchanged	Grades in words	Percentage (%) grades	Grades in words converted to mean percentage (%) marks
	Distinction	80-100%	90 %
	Very good	70-79%	75 %
	Good	60-69%	65 %
	Pass	50-59%	55 %
	Fail	0-49%	25 %

*Source: Adopted from school of Medicine at the University of Juba (2024)*

#### **b) Data entry into Excel**

Through the data conversion process, the students' data which was originally collected in hard copy as distinction, very good, good, Pass and fails was now entered into Excel in form of percentages. This was achieved by replacing all cells as follows: cells containing distinctions were replaced with 90%, cells with very good were replaced with 75%, good replaced with 65%, pass replaced with 55%, and fail replaced with 25%. For illustration purpose, a new converted data appeared in the research data collection tool as shown in table 4.5 below. But, full details about the data have been given in Appendix IV.

**Table 4.5: Raw data conversion from word forms (Distinction, very good, good, pass and fail) to percentages (%).**

Performance in the SSCSE		Performance at University/School of Medicine										
S/N	Cohort 2013/2014	Year 1: 2017 scores										
	Mathematics, Physics, Biology, Chemistry, and mandatory subjects	Mathematics		Physics		Botany		Zoology		Chemistry		Average grade
		Basic 1	Basic 2	Basic 1	Basic 2	Botany 1	Botany 2	Zoology 1	Zoology 2	Basic 1	Basic 2	
Average grade % obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	grade obtained	
1	81.7	25	55	55	65	25	25	25	25	25	55	38
2	81.7	90	65	65	55	55	65	55	55	55	65	62.5
3	81.6	25	90	55	55	55	55	65	25	75	25	52.5
4	81.6	25	90	55	65	75	65	75	55	55	75	63.5
5	81.5	90	90	55	65	55	25	55	65	65	65	63

*Source: Adopted from students' database at the University of Juba (2024)*

### c) Preliminary data cleaning and calculation in Excel

Before exporting the research data to SPSS, basic data cleaning and calculations were done in SPSS.

Firstly, the data collection tool which was in hard copy was checked whether its data matches with the one entered into excel.

Secondly, except student grades in the SSCSE, all other data representing university performance was grouped into different average percentages according to academic years (variables), that is Year 1, Year 2, Year 3 and Year 4). These averages were calculated variable by variable as follows:

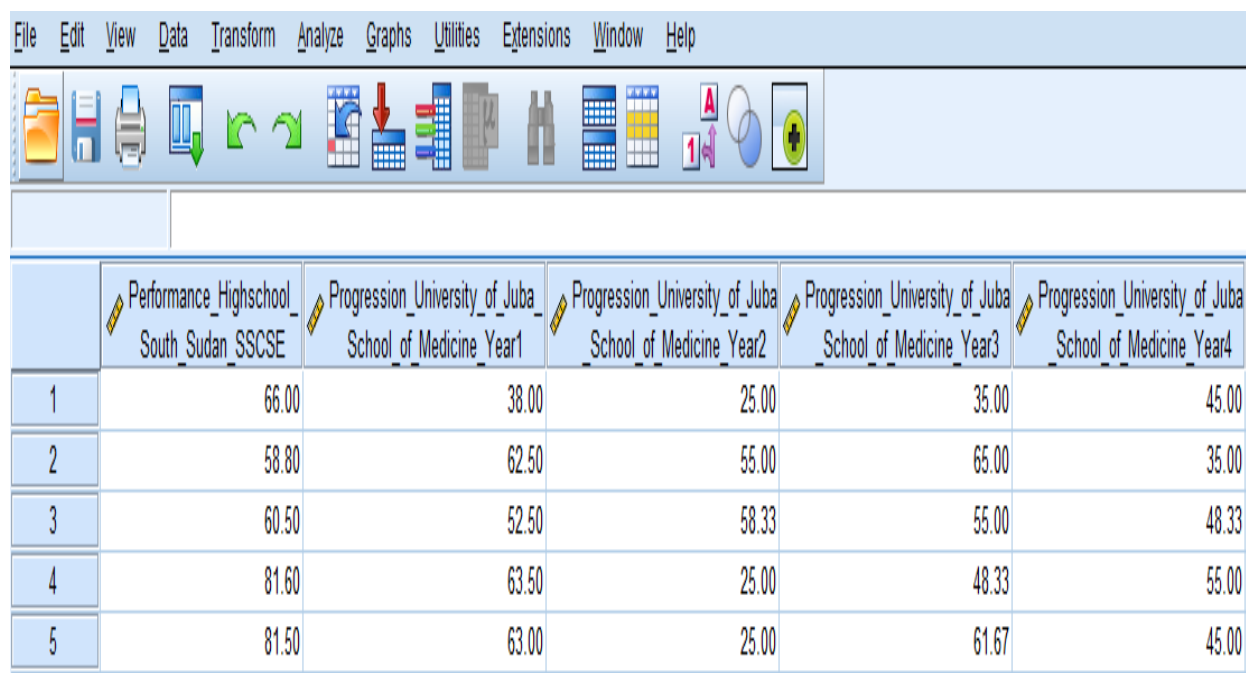
- i. Independent Variable 1: SSCSE average Percentages (this data was already available in average percentages)
- ii. Independent variable 2: Year 1 average Percentage  

$$= (\text{Mathematics 1 \& 2} + \text{Physics 1 \& 2} + \text{Botany 1 \& 2} + \text{Zoology 1 \& 2} + \text{Chemistry 1 \& 2}) / 10$$
- iii. Independent variable 3: Year 2 average Percentage =  $(\text{Anatomy} + \text{Physiology} + \text{Biochemistry}) / 3$
- iv. Independent variable 4: Year 3 average Percentage =  $(\text{Anatomy} + \text{Physiology} + \text{Biochemistry}) / 3$
- v. Dependent variable: Year 4 average Percentage =  $(\text{Pathology} + \text{Microbiology} + \text{Pharmacology}) / 3$

**d) Data Export to SPSS**

After all preparations were completed in the Excel sheet, the raw data was then imported to SPSS for analysis. The data that has been grouped into variables (year 1, 2, 3 and 4) looks in SPSS as shown in the table 4.6 below. Again, for illustration purpose, a portion of the data set has been given here, however full details have been given in Appendix V.

**Table 4.6: The data set in SPSS below shows average percentages for each variable; SSCSE, year 1, 2, 3 and 4.**



	Performance_Highschool_South Sudan SSCSE	Progression_University_of Juba_School of Medicine Year1	Progression_University_of Juba_School of Medicine Year2	Progression_University_of Juba_School of Medicine Year3	Progression_University_of Juba_School of Medicine Year4
1	66.00	38.00	25.00	35.00	45.00
2	58.80	62.50	55.00	65.00	35.00
3	60.50	52.50	58.33	55.00	48.33
4	81.60	63.50	25.00	48.33	55.00
5	81.50	63.00	25.00	61.67	45.00

*Source: Researcher (2024)*

#### **4.5 DATA PRESENTATION AND ANALYSIS**

In this section, presentation and analysis of the quantitative and qualitative data as part of the Mixed research Methods was carried out in subsequent. The first section will talk about the quantitative data presentation and analysis, then follows by qualitative data.

##### **4.5.1 Quantitative data presentation and analysis**

The data set for the quantitative section is made up of five main variables, namely:

- i) Performance in the High school-SSCSE in 2013/2014.
- ii) Progression at University of Juba-School of Medicine, Year1 in 2017.
- iii) Progression at University of Juba-School of Medicine, Year2 in 2018.
- iv) Progression at University of Juba-School of Medicine, Year3 in 2020.
- v) Progression at University of Juba-School of Medicine, Year4 in 2021

#### 4.5.1.1 Tests for statistical assumptions of the Multiple Linear Regression

Listed below are the main assumptions for the Multiple Linear Regression that should be satisfied before carrying out analysis (Osborne & Waters, 2019; Osborne & Waters, 2002),

- a) Scale of Measurement for both dependent and independent variables should be an interval or ratio.
- b) Absence of influential cases or outliers.
- c) Normality of residuals (Errors).
- d) Multicollinearity (Predictors should not be highly correlated).
- e) Homoscedasticity (the variance of the residuals is constant).
- f) Independence of values of the residuals from one another.
- g) Linear relationships between dependent and independent variables

Prior to running the Multiple linear regression, related statistical assumptions were tested.

These testing process went as follows:

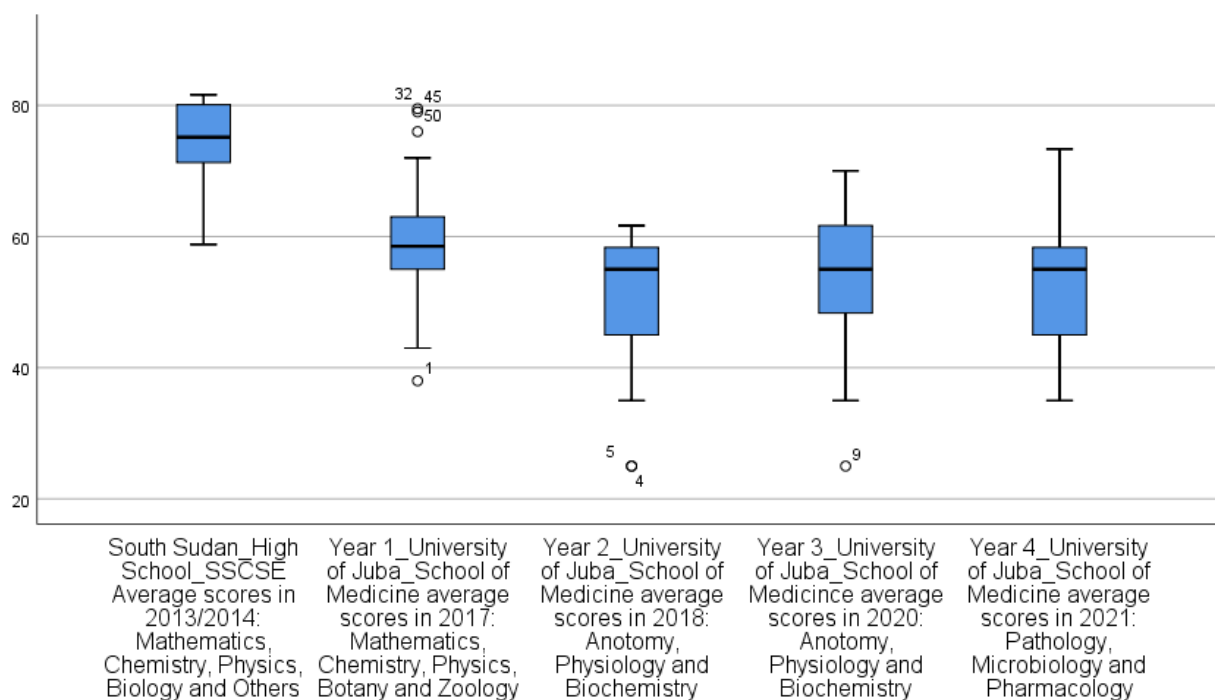
- a) **Assumption 1:** test of whether Scale of Measurement for both dependent and independent variables is interval or ratio. This assumption was met since the students grades in the SSCSE and at university were numerals.
- b) **Assumption 2:** Test for absence of influential cases or outliers.

#### 4.5.1.1 Detection and treatment of the outliers

There are two steps that were taken to deal with the outliers:

- i) The researcher re-visited the data collection table to find out whether there were errors in the data entered. In fact, there were errors related to data entry, as there was duplication of figures. In this case the researcher replaced wrong figures with the correct ones.

ii) After matching data in the data collection table with the one entered in SPSS, outliers continued to exist. With the help of the Box and Whisker plot, outliers were detected in the data. Since, maintaining the outliers was not statistically important, the researcher deleted them from the data set. All the steps that were taken are shown in 4.1.



**Figure 4.1: Outlier's detection in the research data set using a Box and Whisker plot.**

*Source: Researcher (2024)*

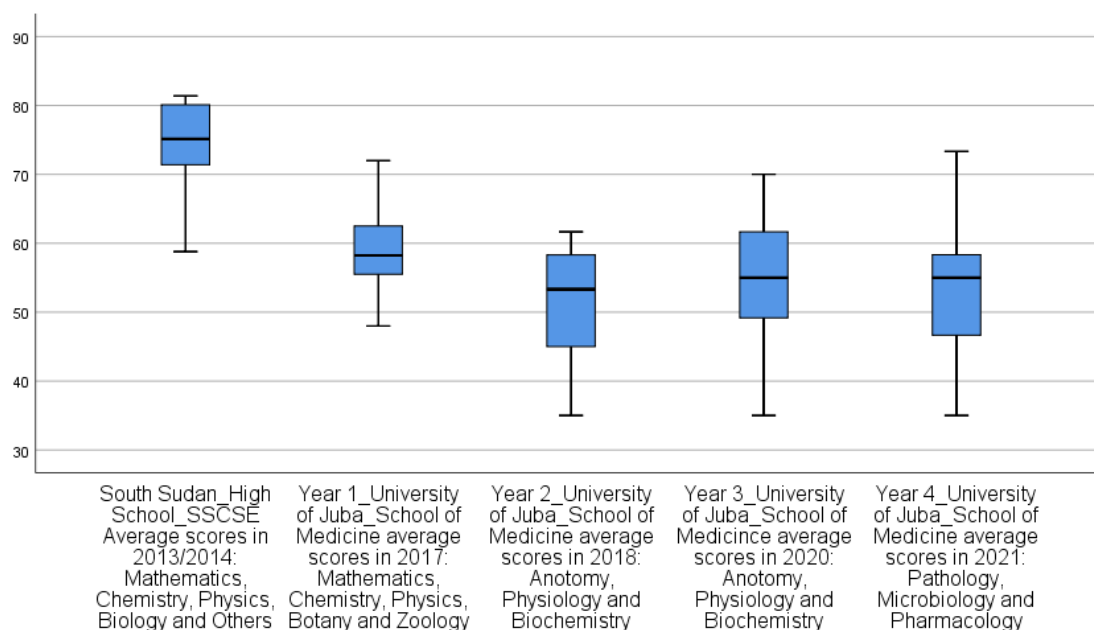
In addition, the researcher used a table to display and visualize the outliers and case numbers containing them. Given in table 4.7 below, are the outliers and their corresponding case numbers.

**Table 4.7: the table below shows the outliers that were deleted from the data set**

Variables	Case number	Outliers
SSCSE		
<b>Year 1</b>	1	38.00
	32	79.5
	45	79.00
	50	76.00
<b>Year 2</b>	4	25.00
	5	25.00
<b>Year 3</b>	9	25.00
<b>Year 4</b>		

Source: Researcher (2024)

Upon re-running the test using the Box and Whisker plot, the results showed no more existence of influential outliers. The figure 4.2 below shows the final outcome of the outliers' analysis.

**Figure 4.2: The Box and Whisker plot showing no outliers or influential cases**

Source: Researcher (2024)

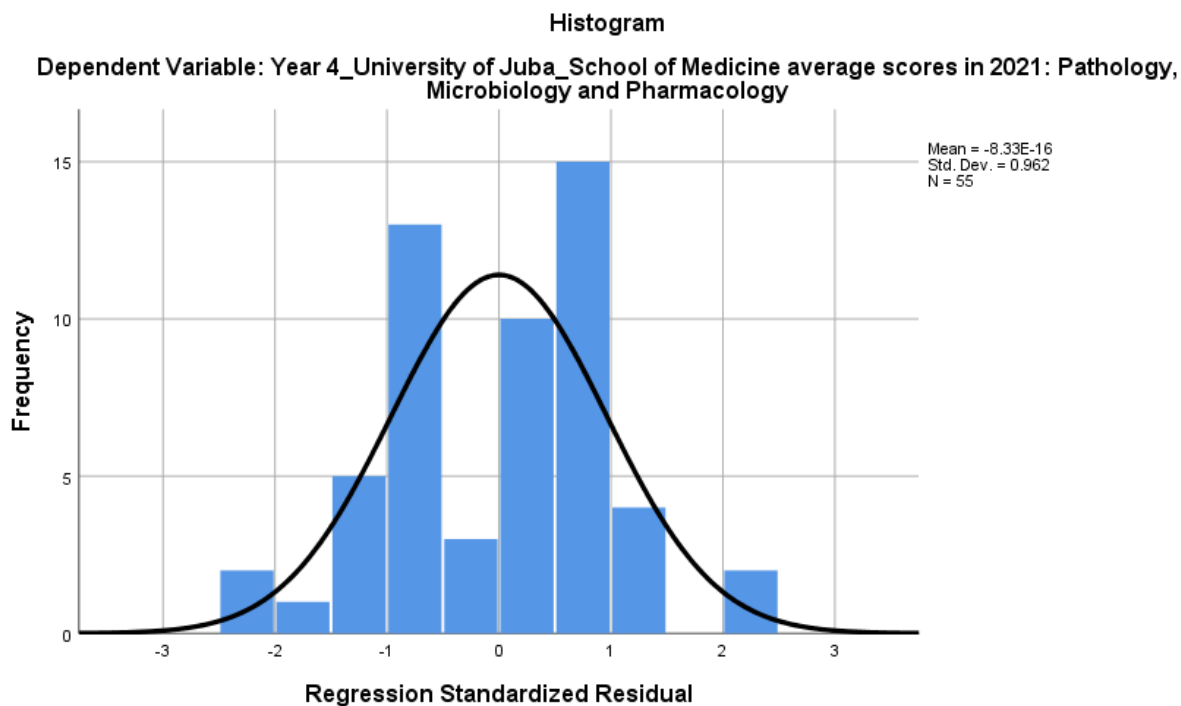
### **Results for the assumption 2 test**

The box and whisker plot shows no outliers or influential cases in the research data set

c) **Assumption 3:** Test for normality of the residuals.

Upon running the linear regression in the SPSS, the following output was generated.

Refer to figure 4.3 below which shows the normal distribution of the residuals.



**Figure 4.3: Histogram showing normal distribution of the standardized residuals**

*Source: Researcher (2024)*

### **Results for the assumption 3 test**

The histogram shows a bell-shaped curve, hence assuming a normal distribution of the residuals.

d) **Assumption 4:** Test for Multicollinearity

The Variance Inflation Factor (VIF) and tolerance are both widely used measures of the degree of multi-collinearity of independent variable with independent variables in a

regression model (O'brien, 2007). Literature indicates that if any of the VIF values exceeds 5 or 10, it implies that the associated regression coefficients are poorly estimated because of multicollinearity, and a tolerance value close to 0 suggests that multicollinearity may be a threat (Jamal, 2017; as cited in Oke et al., 2019). The multicollinearity was assessed as shown in table 4.8 below.

**Table 4.8: Test of multicollinearity using Tolerance and VIF**

Coefficients <sup>a</sup>		Collinearity Statistics	
Model		Tolerance	VIF
1	South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others	.888	1.126
	Year 1_University of Juba_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology	.968	1.033
	Year 2_University of Juba_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry	.887	1.127
	Year 3_University of Juba_School of Medicine average scores in 2020: Anatomy, Physiology and Biochemistry	.970	1.031

a. Dependent Variable: Year 4\_University of Juba\_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology

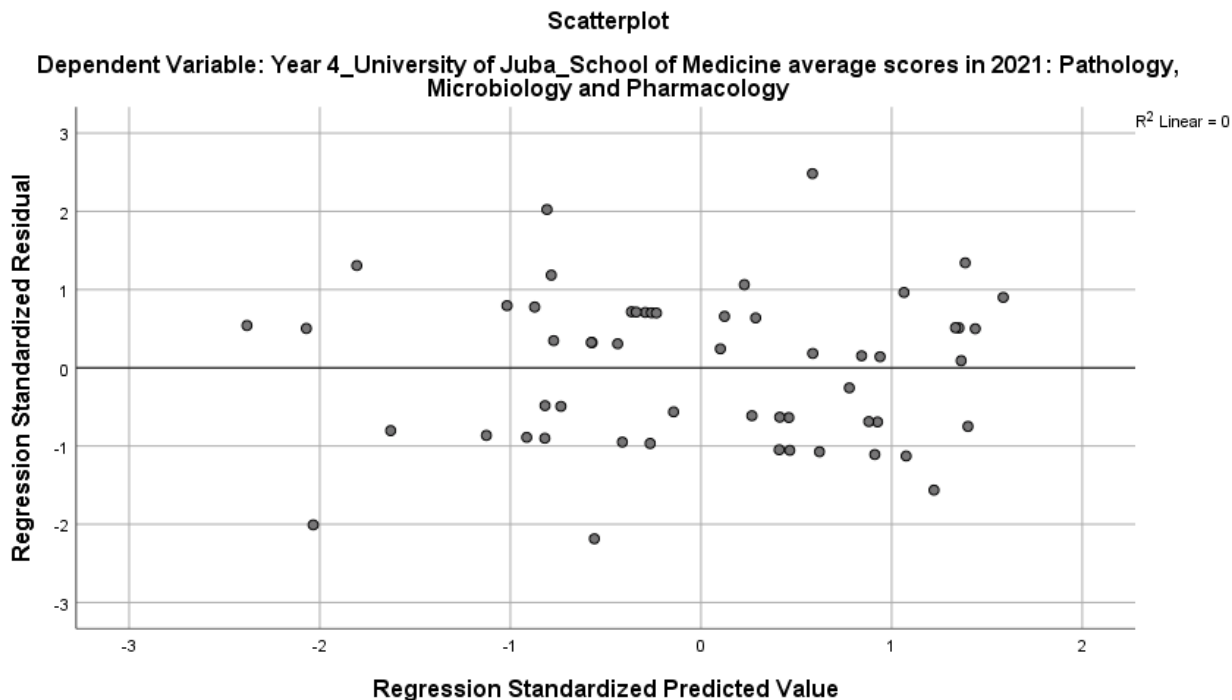
*Source: Researcher (2024)*

### **Results for the assumption 4 test**

As can be seen on the coefficient table above, the values for Tolerance are all close to 1 and none of the VIF values have exceed 5 or 10. Therefore, there is no any threat of multicollinearity in the data set.

#### e) **Assumption 5: Test for Homoscedasticity**

Homoscedasticity is a parametric assumption of equal variance in sample data. As uneven variances in sample data can lead to biased test results, the researcher used the scatter plot given below to test for homoscedasticity. Figure 4.4 given below shows the test for homoscedasticity.



**Figure 4.4: Scatter plot showing Homoscedasticity**

*Source: Researcher (2024)*

#### **Results for the assumption 5 test**

In the Scatter plot above, the standardized residuals were seen equally spread across the line representing standardized predicted values. Meaning that, the data points appear equally distributed below and above line zero (0) along X-axis. So, the variance of the residuals is constant (homoscedasticity).

- f) **Assumption 6:** Test for Independence of values of the residuals from one another.

In the Model summary table 4.9 given below, the Durbin-Watson column shows the value which can be used to test the independence of residuals. According to Uyanto (2020) the value of Durbin-Watson usually lies between 0 and 4. For a large sample size, the Durbin-

Watson tests statistics has about a mean of 2 (Harvey, 1990; as cited in Uyanto, 2020).

**Table 4.9: Test for independence of residuals using Durbin-Watson**

Model	Model Summary <sup>b</sup>				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.124 <sup>a</sup>	.015	-.063	7.97762	1.962

a. Predictors: (Constant), Year 3\_University of Juba\_School of Medicine average scores in 2020: Anatomy, Physiology and Biochemistry, Year 2\_University of Juba\_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry, Year 1\_University of Juba\_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology, South Sudan\_High School\_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others

b. Dependent Variable: Year 4\_University of Juba\_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology

*Source: Researcher (2024)*

### **Results for the assumption 6 test**

Since the value (1.962) of Durbin-Watson given in the table 7 above is close to 2, the assumption that our residuals are independent has been met.

- g) **Assumption 7:** Test for Linearity between dependent and independent variables.

According to Garson (2012), an ANOVA table can be used to test for a linearity between dependent and independent variables. If F significant value is greater than 0.05 (i.e., Sig. > 0.05), there is a significant linear relationship between the independent variable and the dependent variable. But if F significant value is less than 0.05 (i.e., sig < 0,05), there is no significant linear relationship between the independent variable and the dependent variable (Lestari et al., 2024). The highlighted significant values given in table 4.10 below show the degree of the Deviation from Linearity as compared to alpha value of 0.05. Note that the original appearance of this table as in the SPSS output was modified/transposed using Excel sheet.

**Table 4.10: Linearity test using ANOVA Table**

ANOVA Table						
		Between Groups			Within Groups	Total
		(Combined)	Linearity	Deviation from Linearity		
Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology * South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others	Sum of Squares	3031.153	1.223	3029.930	688.426	3719.579
	Df	43	1	42	18	61
	Mean Square	70.492	1.223	72.141	38.246	
	F	1.843	0.032	1.886		
	Sig.	0.080	0.860	<b>0.073</b>		
Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology * Year 1_University of Juba_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology	Sum of Squares	1601.564	5.958	1595.606	1757.870	3359.435
	Df	29	1	28	28	57
	Mean Square	55.226	5.958	56.986	62.781	
	F	0.880	0.095	0.908		
	Sig.	0.634	0.760	<b>0.600</b>		
Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology * Year 2_University of Juba_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry	Sum of Squares	679.874	140.268	539.606	2970.636	3650.509
	Df	10	1	9	49	59
	Mean Square	67.987	140.268	59.956	60.625	
	F	1.121	2.314	0.989		
	Sig.	0.366	0.135	<b>0.461</b>		
Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology * Year 3_University of Juba_School of Medicine average scores in 2020: Anotomy, Physiology and Biochemistry	Sum of Squares	741.262	2.436	738.825	2912.654	3653.916
	Df	14	1	13	46	60
	Mean Square	52.947	2.436	56.833	63.319	
	F	0.836	0.038	0.898		
	Sig.	0.628	0.845	<b>0.562</b>		

Source: Researcher (2024)

### **Results for the assumption 7 test**

The ANOVA table 5 given above has indicated that F significant value for each variable was greater than 0.05 (i.e sig. > 0.05). Since the given values for deviation from linearity were greater than 0.05, there was existence of linearity between the dependent and independent variables.

#### **4.5.1.2 Analysis of the study objectives/hypothesis**

As all the essential statistical assumptions for the Multiple Linear Regression were met, the next step was about testing the research hypothesis. In this research study there are 4 hypotheses for the objective 1 and 4 hypothesis for the objective 2.

The descriptive statistics in table 4.11 below, shows a brief overview of the data set. Note that the original appearance of this table as in the SPSS output was modified/transposed using Excel sheet

**Table 4.11: Descriptive statistics of the dependent variable and predictors/independent variables.**

Descriptives											
		South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others		Year 1_University of Juba_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology		Year 2_University of Juba_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry		Year 3_University of Juba_School of Medicine average scores in 2020: Anatomy, Physiology and Biochemistry		Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology	
		Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error	Statistic	Std. Error
Mean		74.516	0.75348	58.518	0.69328	51.648	0.98778	55.909	1.10674	52.97	1.04311
95% Confidence Interval for Mean	Lower Bound	73.006		57.128		49.668		53.69		50.878	
	Upper Bound	76.027		59.908		53.628		58.128		55.061	
Median		75.1		58		55		55		55	
Variance		31.225		26.435		53.664		67.368		59.845	
Std. Deviation		5.5879		5.1415		7.3256		8.2078		7.7359	
Minimum		58.8		48		35		35		35	
Maximum		81.4		72		61.67		70		73.33	
Range		22.6		24		26.67		35		38.33	
Interquartile Range		10		7.5		13.33		13.33		13.33	
Skewness		-0.792	0.322	0.226	0.322	-0.501	0.322	-0.347	0.322	-0.02	0.322
Kurtosis		0.261	0.634	-0.239	0.634	-0.435	0.634	-0.118	0.634	0.066	0.634

Source: Researcher (2024)

#### **4.5.1.2.1 Analysis using Pearson correlation**

**Objective 1:** To determine correlations between students' performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in academic years 2017, 2018, 2020 and 2021.

The Hypothesis that was tested for is as follows:

**H<sub>0</sub>1:** There is no statistically significant correlation between students' average scores in the SSCSE in 2013/2014 and year 1, 2, 3 and 4 of the school of Medicine at the university of Juba in the academic years 2017, 2018, 2020 and 2021 respectively.

#### **The variables that were analyzed are as follows:**

Performance in the High school-SSCSE in 2013/2014; Progression at University of Juba-School of Medicine, Year1 in 2017; Progression at University of Juba-School of Medicine, Year2 in 2018; Progression at University of Juba-School of Medicine, Year3 in 2020 and Progression at University of Juba-School of Medicine, Year 4 in 2021.

By running a multiple regression analysis, Pearson correlation values were generated from the correlation table as shown in from in table 4.12. Note that sig. (1-tailed) was multiplied by 2 in order to obtained the sig. (2-tailed).

**Table 4.12: The correlation between students' performance in the SSCSE and Progression in year 1, 2, 3 and 4 of the school of Medicine at the University of Juba**

Correlations						
		South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others	Year 1_University of Juba_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology	Year 2_University of Juba_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry	Year 3_University of Juba_School of medicine average scores in 2020: Anatomy, Physiology and Biochemistry	Year 4_University of Juba_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology
Pearson Correlation	South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others	1.000	0.035	-0.324	-0.089	-0.005
	Sig. (1-tailed)		0.401	0.008	0.260	0.486
	Sig. (2-tailed)		0.802	0.016	0.520	0.972
	N	55	55	55	55	55

\*. Correlation is significant at the 0.05 level (2-tailed).

*Source: Researcher (2024)*

### **Results from the correlation table**

The table given above has shown the following correlation coefficients and corresponding significant values:

- i) The results showed that there is no statistically significant correlation between the SSCSE Average scores in 2013/2014 and average scores in year 1 of the school of Medicine at the university of Juba in 2017,  $r(55) = .035$ ,  $p = .802$ . Therefore, we fail to reject the null hypothesis.
- ii) The results showed there is statistically significant weak, negative correlation between the SSCSE Average scores in 2013/2014 and average scores in year 2 of the school of Medicine at the University of Juba in 2018,  $r(55) = -.324$ ,  $p = .016$ . Therefore, we fail to reject the null hypothesis.
- iii) The results showed there is no statistically significant correlation between the SSCSE Average scores in 2013/2014 and average scores in year 3 of the school of Medicine at the University of Juba in 2020,  $r(55) = -.089$ ,  $p = 0.520$ . Therefore, we fail to reject the null hypothesis.
- iv) The results showed there is no statistically significant correlation between the SSCSE Average scores in 2013/2014 and average scores in year 4 of the school of Medicine at the University of Juba in 2021,  $r(55) = -.005$ ,  $p = .972$ . Therefore, we reject the null hypothesis.

#### **4.5.1.2.2 Analysis using Multiple Linear Regression.**

**Objective 2:** To determine whether students' performance in the SSCSE in 2013/2014, and at the university of Juba in 2017, 2018, 2020 had impact on the fourth-year medical students' grades in 2021.

#### **The hypotheses testing**

The Hypothesis that was tested for is as follows:

**H0<sub>2</sub>:** There is no statistically significant impact of average scores in the SSCSE in 2013/2014; year 1, 2 and 3 of the school of Medicine in the academic years 2017, 2018 and 2020 respectively on year 4 medical students' performance in 2021.

**The variables that were analyzed are as follows:**

**Dependent variable:** Progression at University of Juba-School of Medicine, Year 4 in 2021 (students' performance in Pathology, Microbiology and Pharmacology in the academic year 2021).

**Predictors/independent variables:** Performance in the High school-SSCSE in 2013/2014; Progression at University of Juba-School of Medicine, Year1 in 2017; Progression at University of Juba-School of Medicine, Year2 in 2018 and Progression at University of Juba-School of Medicine, Year3 in 2020

**The Model Summary table**

The model summary table was used to read out the values for R, R square and Adjusted R square as shown in table 4.13 below

**Table 4.13: The Model Summary table**

Model Summary <sup>b</sup>				
Model	R	R Square	Adjusted Square	R
			Std. Error of the Estimate	
1	.124 <sup>a</sup>	.015	-.063	7.97762

a. Predictors: (Constant), Year 3\_University of Juba\_School of medicine average scores in 2020: Anatomy, Physiology and Biochemistry, Year 2\_University of Juba\_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry, Year 1\_University of Juba\_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology, South Sudan High School\_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others

b. Dependent Variable: Year 4\_University of Juba\_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology

*Source: Researcher (2024)*

### **Results from the Model summary**

The fit statistics from the Model summary table above shows the following data:

- i) Adjusted  $R^2 = -.063$
- ii) R Square = 0.015

### **The Coefficients table**

The next table shows the regression coefficients, the intercept and the significance of the coefficients. Refer to the table 4.14 below. (Note that the original appearance of this table as in the SPSS output was modified/transposed using Excel sheet).

Table 4.14: The SPSS output showing the coefficient table with the Dependent variable and the predictors

Coefficients <sup>a</sup>										
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	44.079	25.885		1.703	0.095	-7.912	96.070		
	South Sudan_High School_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others	0.046	0.206	0.034	0.225	0.823	-0.368	0.460	0.888	1.126
	Year 1_University of Juba_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology	0.003	0.215	0.002	0.012	0.991	-0.429	0.434	0.968	1.033
	Year 2_University of Juba_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry	0.134	0.157	0.127	0.851	0.399	-0.182	0.450	0.887	1.127
	Year 3_University of Juba_School of Medicine average scores in 2020: Anatomy, Physiology and Biochemistry	-0.029	0.134	-0.031	-0.217	0.829	-0.299	0.241	0.970	1.031

a. Dependent Variable: Year 4\_University of Juba\_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology

Source: Researcher (2024)

### **Results from the coefficients table**

Given in the table above, the constant ( $\beta_0$ ), unstandardized coefficients ( $\beta_1$  to  $\beta_4$ ), t-statistics and P values for the predictors are as follows:

- i) Constant ( $\beta_0$ ) = 44.079
- ii) Performance in the High school-SSCSE in 2013/2014  
Unstandardized coefficient ( $\beta_1$ ) = 0.046, t-statistics = 0.225, and P value = 0.823
- iii) Progression at University of Juba-School of Medicine, Year1 in 2017  
Unstandardized coefficient ( $\beta_2$ ) = 0.003, t-statistics = 0.012 and P value = 0.991
- iv) Progression at University of Juba-School of Medicine, Year2 in 2018  
Unstandardized coefficient ( $\beta_3$ ) = 0.134, t-statistics = 0.852 and P value = 0.399
- v) Progression at University of Juba-School of Medicine, Year3 in 2020
- vi) Unstandardized coefficient( $\beta_4$ ) = 0.029, t-statistics = -0.217, and P value = 0.829

Therefore, the general equation for the regression model was expressed as follows:

$$\text{Year 4 average scores in 2021} = 44.079 + 0.046 (\text{SSCSE scores in 2013/2014}) + 0.003 (\text{Year 1 scores in 2017}) + 0.134 (\text{Year 2 scores in 2018}) - 0.029 (\text{Year 3 scores in 2020})$$

### **The ANOVA Table**

Finally, the F-ratio was read out from the ANOVA table 4.15 given below. The F-ratio tests whether the regression model is a good fit for the data or not. Note that the F-test has the null hypothesis that R square is zero.

**Table 4.15: The ANOVA table showing the F-statistical significance of the regression model**

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	49.495	4	12.374	.194	.940 <sup>b</sup>
	Residual	3182.121	50	63.642		
	Total	3231.616	54			

a. Dependent Variable: Year 4\_University of Juba\_School of Medicine average scores in 2021: Pathology, Microbiology and Pharmacology

b. Predictors: (Constant), Year 3\_University of Juba\_School of medicine average scores in 2020: Anatomy, Physiology and Biochemistry, Year 2\_University of Juba\_School of Medicine average scores in 2018: Anatomy, Physiology and Biochemistry, Year 1\_University of Juba\_School of Medicine average scores in 2017: Mathematics, Chemistry, Physics, Botany and Zoology, South Sudan\_High School\_SSCSE Average scores in 2013/2014: Mathematics, Chemistry, Physics, Biology and Others

*Source: Researcher (2024)*

### **Results from the ANOVA table**

As can be seen from the ANOVA table above, there was no statistically significant impact of the predictors on dependent variable,  $F(4, 50) = 0.194$ ,  $P = .94$

### **4.5.2 Qualitative data presentation and analysis**

The Reflexive thematic was used to analyze the qualitative data. This analysis approach follows from the six-phase analytical steps of the Braun and Clarke (2012, 2013, 2014, 2020), the six-phase analytical processes include the following:

- a) Phase 1: Familiarization with the research data.
- b) Phase 2: Generating initial codes.
- c) Phase 3: Search for themes.
- d) Phase 4: Review themes.
- e) Phase 5: Defining and naming theme.

f) Phase 6: Producing the report.

a) **Phase 1: Familiarization with the research data**

The research qualitative data was already available in hard copies. So, the researcher had to extract and enter each student's responses with corresponding questions in to excel sheet.

This data entered to excel was then carefully checked and compared with the original one in the hard copies. This action helped avoid any possible errors in data in data entry process.

In addition, the researcher attentively read and re-read the data. By so doing the researcher became familiar with the word tones, breaks and pauses in the sentences.

b) **Phase 2: Generating initial codes**

Initially, there were a lot of responses given by the targeted research students. This information was filtered under the phase 2 according to the research questions. That is, long sentences were summarized, segmented and given codes (from C<sub>0</sub> to C<sub>33</sub>) by the researcher for clear understanding.

According to Braun et al. (2016) Codes should be brief, but offer sufficient detail which can independently inform the underlying commonality among data items in relation to research questions. Given in table 4.16 below were initial codes generated from the targeted students' responses at the university of Juba.

**Table 4.16: Codes (C<sub>0</sub> to C<sub>33</sub>) for the students' responses to the Open-ended questionnaires**

S/N	Open-ended questions	Mixed responses of 15 students
1	When (year) did you sit for the South Sudan Certificate of Secondary Education (SSCSE)?	<b>C<sub>0</sub></b> : 2013/2014
2	What was your dream-career (specialization) before becoming a university student?	<b>C<sub>1</sub></b> : 14 students answered Medicine, and 1 student mentioned Mechanical engineer
3	As a university-student now, what would your choice be, if you were given a chance to specialize again?	<b>C<sub>2</sub></b> : 15 students responded as follows: Medicine (6), Nephrologist (1), Public health (1), oncologist (1), ophthalmologist (1), gynecology (1), Mechanical engineering (1), obstetrician (1), orthopedic surgeon (1).
4	Mention exactly or approximate the average mark/grade that you scored in the SSCSE	<b>C<sub>3</sub></b> : 12 scored from 77.9% to 86.1% in the SSCSE, while 2 scored 78.7% in the UCE and 87% UACE respectively.
5	Why do you think there is a variation in your performances indicated in questions (4) and (5) above?	<b>C<sub>4</sub></b> : Performance difference was un expected. <b>C<sub>5</sub></b> : This Medical school has more workload than previously in the secondary school. <b>C<sub>6</sub></b> : Tough living conditions at university of Juba are responsible for the variation. <b>C<sub>7</sub></b> : Financial issues and lack of support.
6	In your opinion, what main factor have been a contributor to students' failure in the School of Medicine at the University of Juba?	<b>C<sub>8</sub></b> : Mistake made by lecturers in results entry and tabulation. <b>C<sub>9</sub></b> : Failure of lecturers to complete course units on time. <b>C<sub>10</sub></b> : Students' failure to cover all the reading materials. <b>C<sub>11</sub></b> : Poor management in the School of Medicine, lecturers are tough on students. <b>C<sub>12</sub></b> : Most lecturers start their lectures towards the beginning of examinations time, such work becomes too bulky for students to understand in the shortest possible time. <b>C<sub>13</sub></b> : Some lecturers are not fair and transparent in awarding grades. <b>C<sub>14</sub></b> : Lack of study resources. <b>C<sub>15</sub></b> : Indefinite examination format i.e., marks awarded, students don't know which section carries what marks. <b>C<sub>16</sub></b> : The learning environment is not conducive for students. <b>C<sub>17</sub></b> : Poor students' accommodation. <b>C<sub>18</sub></b> : Lack of concentration due to large number of students in lecture halls. <b>C<sub>19</sub></b> : Lack of handouts provided by lecturers. <b>C<sub>20</sub></b> : Lack of enough learning materials. <b>C<sub>21</sub></b> : Financial issues facing students.
7	Explain in own words, the impact of your performance in high school on your progression in the school of Medicine, at the University of Juba?	<b>C<sub>22</sub></b> : My high school performance has made me strong and encouraged me to pursue what I hope for and it made me to read hard in the school of Medicine. <b>C<sub>23</sub></b> : It made my passion strong in the school of medicine due to serious work we had in high school. <b>C<sub>24</sub></b> : The good performance at high school has made me believe in myself that even if I don't attend classes I will still pass. <b>C<sub>25</sub></b> : Through my commitment and transparency from lecturers, I can maintain and improve on my performance. <b>C<sub>26</sub></b> : There is positive impact towards my university performance. <b>C<sub>27</sub></b> : I had performance better in high school than now, hence I feel more stupid now and discourages me a lot. <b>C<sub>28</sub></b> : It is so great that the spirit of studies during my high school is now activated. <b>C<sub>29</sub></b> : My secondary school performance motivated me in my university study. <b>C<sub>30</sub></b> : It acted as a strong foundation for me to Pass MBBS. <b>C<sub>31</sub></b> : The high impact of my performance in high school is on my progression in school of Medicine. <b>C<sub>32</sub></b> : In secondary school, the teachers made sure they complete the syllabus and what was set in exam is entirely what is taught and that contributed positively in the performance. <b>C<sub>33</sub></b> : My Program in high school gave me hint about the school of Medicine especially my A level studies.

*Source: Researcher (2024)*

**c) Phase 3: Search for themes**

After coding all the responses in phase 1, the researcher grouped similar codes together base on common meanings.

The coded data can be reviewed, analyzed and combined according to shared meanings so that they may form themes or sub-themes (Braun & Clarke 2013). Therefore, this research data codes were re-organized nine themes as follows:

**Theme 1: Variation in Academic pathways:**

- i. C1: 14 students answered Medicine, and 1 student mentioned Mechanical engineer
- ii. C2: 15 students responded as follows: Medicine (6), Nephrologist (1), Public health (1), oncologist (1), ophthalmologist (1), gynecology (1), Mechanical engineering (1), obstetrician (1), orthopedic surgeon (1).
- iii. C3: 12 scored from 77.9% to 86.1% in the SSCSE, while 2 scored 78.7% in the UCE and 87% UACE respectively

**Theme 2: Performance Differences and Expectations:**

- i. C4: Performance difference was unexpected.
- ii. C24: The good performance at high school has made me believe in myself that even if I don't attend classes I will still pass.
- iii. C27: I had performed better in high school than now, hence I feel more stupid now and it discourages me a lot.

**Theme 3: Impacts of High School Performance:**

- i. C22: My high school performance has made me strong and encouraged me to pursue what I hope for and it made me read hard in the school of Medicine.

- ii. C23: It made my passion strong in the school of medicine due to serious work we had in high school.
- iii. C26: There is a positive impact on my university performance.
- iv. C28: It is so great that the spirit of studies during my high school is now activated.
- v. C29: My secondary school performance motivated me in my university study.
- vi. C30: It acted as a strong foundation for me to pass MBBS.
- vii. C31: The high impact of my performance in high school is on my progression in the school of Medicine.
- viii. C32: In secondary school, the teachers made sure they complete the syllabus and what was set in the exam is entirely what is taught and that contributed positively to the performance.
- ix. C33: My Program in high school gave me a hint about the school of Medicine especially my A-level studies.

**Theme 4: Lecturers' factors and academic workload:**

- i. C5: This Medical school has more workload than previously in secondary school.
- ii. C9: Failure of lecturers to complete course units on time.
- iii. C10: Students' failure to cover all the reading materials.
- iv. C12: Most lecturers start their lectures towards the beginning of examination time, such work becomes too bulky for students to understand in the shortest possible time.
- v. C13: Some lecturers are not fair and transparent in awarding grades.
- vi. C15: Indefinite examination format i.e., marks awarded, students don't know which section carries what marks.

**Theme 5: Learning Environment:**

- i. C16: The learning environment is not conducive for students.
- ii. C17: Poor students' accommodation.
- iii. C18: Lack of concentration due to a large number of students in lecture halls.

**Theme 6: Learning and teaching resources:**

- i. C14: Lack of study resources.
- ii. C19: Lack of handouts provided by lecturers.
- iii. C20: Lack of enough learning materials.

**Theme 7: Financial Issues:**

- i. C7: Financial issues and lack of support.
- ii. C21: Financial issues facing students.

**Theme 8: Management and Institutional Issues:**

- i. C6: Tough living conditions at the University of Juba are responsible for the variation.
- ii. C8: Mistake made in results entry and tabulation.
- iii. C11: Poor management in the school of Medicine, lecturers are tough on students.

**Theme 9: Personal Commitment and Support:**

- i. C25: Through my commitment and transparency from lecturers, I can maintain and improve my performance.

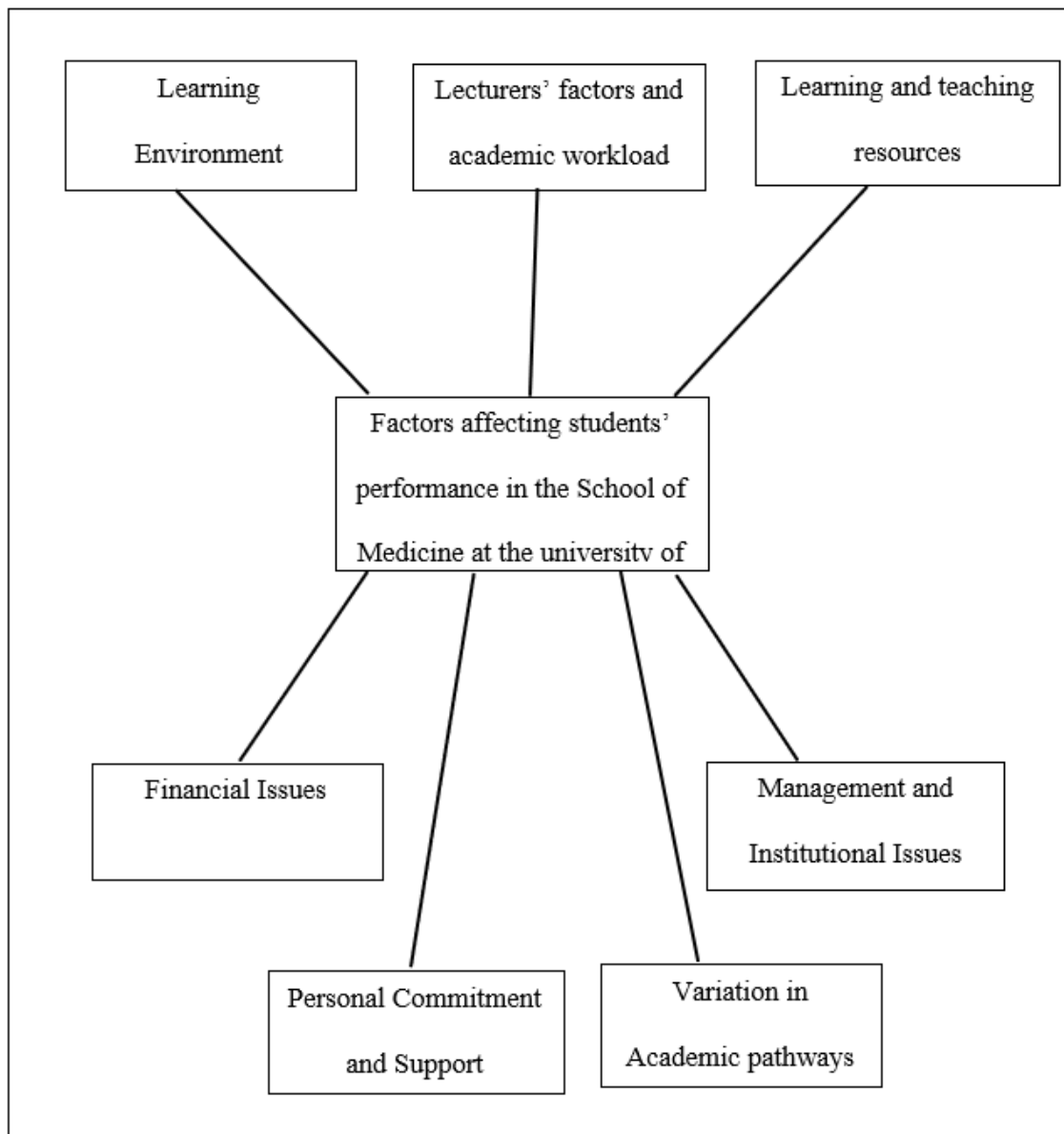
**d) Phase 4: Review themes**

According to Braun and Clarke (2006), Phase 4 involves refinement of candidate theme. In case, the researcher has deleted some irrelevant themes. For example, themes 3 given in phase 3 was removed from the list, since there is no enough evidence supporting it. Secondly, themes 4, 5, 6, 7 and 8 were merged into one under main theme named as factors influencing students' performance. So, the reviewed themes were as follows:

- i. Theme 6: Learning and Teaching Resources
- ii. Theme 5: Learning Environment
- iii. Theme 4: Lecturers' factors and academic workload
- iv. Theme 7: Financial Issues
- v. Theme 8: Management and Institutional Issues
- vi. Theme 1: Variation in Academic pathways.

e) **Phase 5: Defining and naming theme**

According to Braun and Clarke (2006), Phase 5 begins when a person has a satisfactory thematic map of the data. At this point, one then defines and further refine the themes that you will present for your analysis, and analyze the data within them. The thematic map for the candidate theme is shown in figure 4.5 below.



**Figure 4.5: Thematic maps showing main themes**

*Source: Researcher (2024)*

### **Theme: Learning and Teaching Resources**

**The theme definition:** This theme effectively conveys the general deficiency of study materials that University of Juba students face. This comprises the study materials that are necessary for academic performance, such as textbooks, internet resources, and lecture notes that are not provided. When asked; In your opinion, what main factor have been a contributor to students' failure in the School of Medicine at the University of Juba? An anonymous student answered as follows:

*"...there is lack of handouts provided by lecturers" (C19, March 15, 2024).*

**Analysis:** The student's testimonies that they don't have enough study resources brings to light a basic problem with the supply of resources required for successful learning, which has an impact on their capacity to learn effectively.

### **Theme: Learning Environment**

**The theme definition:** This theme discusses how inadequate the University of Juba's learning environment. It includes a number of elements that render it as an inappropriate for learning. These include problems with the facilities used for instruction and learning, student housing, and resource availability. According to one student,

*"...the learning environment is not conducive for students. The same student continued, there is also an issue of poor students' accommodation at the university of Juba" (C16 & C17, March 14, 2024).*

**Analysis:** According to the students' statements, there are a number of reasons why the University of Juba is not a good place to succeed academically. Students' remarks about accommodation, for instance, highlight particular issues with the living situation and

highlight how poor housing conditions negatively impact the learning environment as a whole. Furthermore, crowded lecture halls indicate that students find it difficult to focus on their studies. This interferes with the students' capacity to concentrate and learn.

**Theme: Lecturers' factors and academic workload**

**The theme definition:** This subject focuses on situations where students, especially those in challenging disciplines like medical school, always face a large rise in their academic workload when they go from secondary school to university. It also emphasizes how teaching staff members affect students' success in the University of Juba's School of Medicine. Notably, a few students shared their thoughts on the primary causes of students' failure in the University of Juba School of Medicine, which are as follows:

*“Most lecturers start their lectures towards the beginning of examination time, such work becomes too bulky for students to understand in the shortest possible time.” (C12, March 14, 2024).* Another student says, *“failure of lecturer to complete lectures or course unit on time affects our understanding” (C9, March 12, 2024).*

**Analysis:** The observations made by the medical students demonstrate the significant increase in effort in university medical school when compared to secondary school, which inevitably results in more complex schoolwork. Students also express concern about lecturers' failure in finishing course sections, which leaves them with gaps in their knowledge. Furthermore, the University of Juba medical students' experience suggests that most lecturers begin their classes close to examinations time. All of these elements highlight how difficult it is for students to swiftly process vast volumes of information, which affects their performance and stress levels in the classroom. The students also

brought up the topic of unclear exam forms and marking schemes, which typically causes students' worry and uncertainty when they get ready for the examinations.

**Theme: Financial Issues**

**The theme definition:** The theme throws emphasis on how students' performance is generally impacted by financial hardships and inadequate support networks. The difficulties include living expenses, tuition costs, the scarcity of grants, scholarships, and family support, among other costs associated with education. One of the students reported, *“we the students here in the school medicine are struggling with studies. For example, there are a lot of financial issues and lack of support (C7, March 13, 2024).*

**Analysis:** according to the medical students' obstacles related to money frequently interfere with several facets of students' educational experiences and their general quality of life.

**Theme: Management and Institutional Issues**

**The theme definition:** The subject emphasizes how mistakes made in administrative procedures, like entering and tabulating student results incorrectly, impact students' academic records and their impression of the legitimacy of the institution. One student attributed the trend of students' performance in the school of Medicine from the year 2017 to 2021 to the following:

*“lecturers are tough on students” (C11, March 14, 2024), while a second student mentioned that, “there is some times mistake made in results entry and tabulation” (C8, March 14, 2024).*

**Analysis:** The students' concerns with errors in the entry and tabulation of data suggests serious management problems that could result in inaccurate academic records, erode students' faith in institutional procedures, and hinder their academic advancement. The posture taken by academics in response to student criticism of poor management highlights problems in the connection between lecturers and students, which in turn impacts the general academic climate and student morale.

**Theme: Variation in Academic Pathways**

**The theme definition:** This demonstrates how students' academic paths can vary even within similar fields and the range of specializations and career goals within a larger field. Additionally, the variations in students' academic routes and achievements based on these scores are highlighted by the variances in academic performance across multiple standardized exams, including the SSCSE, UCE, and UACE.

**Analysis:** Even though mechanical engineering is included, there are differences in the academic interests and professional aspirations of students in the medical school, even though medicine is still a popular choice.

**f) Phase 6: Producing the report.**

This phase leads to interpretation and discussion of the qualitative data findings. In this phase, themes should connect in a logical and meaningful manner, building a cogent narrative of the data (Braun & Clarke 2012). Therefore, the report writing was covered under the section titled, "interpretation and discussion", which given below under the research objective 3.

### **4.5.3 Interpretation and discussion of both the quantitative and qualitative data results**

In this section, the interpretation and discussion of the findings were done sequentially, according to objectives 1, 2 and 3. The discussions were then linked to the literature review and research problem. In this case, the section started with the quantitative results first, and then merged it with qualitative results.

To begin with, the research problem was highlighted first, namely: According to literature search there is a little knowledge known about relationship between university entrance examinations (SSCSE) and students' progression at university. This research problem relates to a phenomenon in 2021 at the university of Juba. It was reported that majority of fourth-year students failed in the school of Medicine, especially in Pathology, Microbiology and Pharmacology (Akec, 2021).

**4.5.1.1 Objective 1:** “It states that, “to determine correlations between students’ performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in academic years 2017, 2018, 2020 and 2021.” This objective was investigated with the help of four hypotheses.

The result from the correlation table has shown that there is no statistically significant correlation between students’ performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in academic year 2017, 2018, 2020 and 2021.

Although, the researcher failed to reject the second null hypothesis ( $H_0_2$ ) of the four hypotheses, the correlation between the SSCSE Average scores in 2013/2014 and average

scores in year 2 of the school of Medicine at the University of Juba in 2018 was very weak and negative,  $r(55) = -.324$ ,  $p = .016$

**4.5.1.2 Objective 2:** It states that, “to determine whether students’ performance in the SSCSE in 2013/2014, and at the university of Juba in 2017, 2018, 2020 had impact on the fourth-year medical students’ grades in 2021.” Like the objective 1, this objective was investigated in terms of four hypotheses.

The results from multiple linear regression have shown that predictors (independent variables) had a little impact on the fourth-year medical students’ grades in 2021. However, this impact was so negligible that it was not statistically significant to be considered,  $F(4, 50) = 0.194$ ,  $P = .94$ ,  $R^2 = .015$ .

In relation to this, the  $R^2 = .015$  means that the over-all regression model explains only 1.5% of variance in the fourth-year medical students’ grades in 2021. Since, the  $P > 0.05$ , it is not statistically significant. Therefore, the researcher concluded that the predictors had no impact on the dependent variable (year 4 medical students’ grades in 2021).

**a) The impact of the predictors on the year 4 medical students’ scores at the University of Juba, in 2021.**

The general equation for the regression model as in the coefficients table was expressed as follows:

Year 4 average scores in 2021 =  $44.079 + 0.046$  (SSCSE scores in 2013/2014) +  $0.003$  (Year 1 scores in 2017) +  $0.134$  (Year 2 scores in 2018) –  $0.029$  (Year 3 scores in 2020).

Were,

Constant  $\beta_0 = 44.079$ , Coefficient  $\beta_1$  of SSCSE scores in 2013/2014 = 0.046, Coefficient  $\beta_2$  of year 1 scores in 2017 = 0.003, Coefficient  $\beta_3$  of year 2 scores in 2018 = 0.134, and Coefficient  $\beta_4$  of year 3 scores in 2020 = 0.029

**This equation means that,**

- i) As SSCSE students' performance increased by 1 score in 2013/2014, year 4 average performance increased by 0.046 ( $\beta_1$ ) scores in 2021.
- ii) As year 1 students' performance increased by 1 score in 2017, year 4 average performance increased by 0.003 ( $\beta_2$ ) scores in 2021.
- iii) As year 2 students' performance increased by 1 score in 2018, year 4 average performance increased by 0.134 ( $\beta_3$ ) scores in 2021.
- iv) As year 3 students' performance increased by 1 score in 2020, year 4 average performance decreased by 0.029 ( $\beta_4$ ) scores in 2021.

**b) Statistical significance of each predictor/independent variable in the regression model**

Using the Coefficients table, the statistical significance of each independent variable supports the null hypothesis. The results were recorded as follows:

- i) The t-statistics for the SSCSE Average scores in 2013/2014 is 0.225 and P value is 0.823. Since  $P > 0.05$ , we accept the null hypothesis ( $H_0$ ), then concluded that there is no statistically significant impact of the SSCSE average grades in 2013/2014 on year 4 at the University of Juba, in 2021.
- ii) The t-statistics for the medical students' average grades in year 1 in 2017 is 0.012 and P value is 0.991. since  $P > 0.05$ , we accept the null hypothesis and

(H0<sub>2</sub>), then concluded that there is no statistically significant impact of the medical students' average grades in year 3 in 2020 on year 4 at the University of Juba, in 2021.

- iii) The t-statistics for the the medical students' average grades in year 2 in 2018 is 0.851 and P value is 0.399. Since the  $P > 0.05$ , we accept the null hypothesis (H0<sub>3</sub>), then conclude that is no statistically significant impact of the medical students' average grades in year 2 in 2018 on year 4 at the University of Juba, in 2021.
- iv) The t-statistics for the medical students' average grades in year 3 in 2020 is - 0.217 and P value is 0.829. Since the  $P > 0.05$ , we accept the null hypothesis (H0<sub>4</sub>), then concluded that there is no statistically significant impact of the medical students' average grades in year 3 in 2020 on year 4 at the University of Juba, in 2021.

**a) The link between the quantitative data findings and the existing literature**

This research findings for the objectives 1 and 2 agree with the previous studies. Firstly, a research study by Aciro et al. (2023) shows that there is no significant relationship between admission scores for the undergraduate achievement in the Bachelor of Medicine and Bachelor of Surgery at Gulu and Makerere universities in Uganda. Secondly, Research was conducted by Nweze and Uzochukwu (2019) to investigated university matriculation examination (UME) scores for chemistry as predictors of first-year university students' achievement at the Federal Universities, in Nigeria. The study's finding shows no significant relationship between between UME-chemistry scores and first-year results in biochemistry, medicine, and surgery courses. Finally, In Australia, McMillan and Edwards

(2019) looks into the link between senior high school mathematics subject choice and first-year university pass rates in biology, chemistry, mathematics, and physics. The findings revealed that the majority of first-year students pass their first-year biology, chemistry, mathematics, and physics subjects, regardless of their level of mathematics in senior high school.

Since, the results for the objective 1 and 2 were not statistically significant and yielded a limited answer to the research problem, the objective 3 given below provided more information about the research question.

So, in support of the quantitative results, the qualitative data which composes of responses from the medical students at the university of Juba was used to provide answers to the research problem

4.5.1.3 **Objective 3:** the objective states that, “to find out from students’ perceptions the secondary school and university factors that affected performance in the school of Medicine at the university of Juba in 2021. Also, the research question under investigation was, “What secondary school and university factors had impact on students’ performance in the school of Medicine at the university of Juba in 2021?”

**a) Students’ perceptions: Secondary school and university factors which impacted students’ performance in the school of Medicine at the university of Juba in 2021**

The following interpretation and discussion were originated from phase 5 of the thematic analysis of the qualitative data given above under section titled, “qualitative data presentation and interpretation.”

**Theme: Lecturers’ factors and academic workload.**

Medical students at the University of Juba face pressures due to increased university workload, inefficient lecture scheduling, extensive reading materials, and grading and examination transparency issues. They believe addressing these challenges will reduce stress and enhance the overall academic experience. Improved academic performance is anticipated as a result. This is supported by the literature. Students' poor performance and drop out at the tertiary level is associated with the teaching quality at the higher education institution (Behr et al., 2020). In addition, a research study of public day schools in Nyeri county has revealed that teachers' factors such as teaching experience and academic qualifications influences academic performance in the Kenya Certificate of Secondary Education (Wanjiru, 2020).

**Theme: Learning and teaching resources**

This theme reveals insufficient study materials and teaching aids at the University of Juba, significantly impacting student learning and academic performance. Medical students have reported poor accommodations and overcrowded lecture halls, creating a non-conducive learning environment. This aligns with previous research showing that the learning environment and student motivation affect academic performance (Guo et al., 2022). Addressing these issues is crucial for improving students' academic outcomes.

**Theme: financial issues**

Medical students at the University of Juba identify financial issues as significant barrier to academic success, compounded by inadequate support. According to the students, addressing these financial challenges is crucial for improving performance outcomes and ensuring equal opportunities. Research from Spain and Bangladesh supports this, showing

that socioeconomic factors and lack of support impact academic performance and dropout rates (De la Cruz-Campos, 2023; Alam & Islam, 2022).

**Theme: Management and administrative issues**

Qualitative data shows that management and administrative issues at the University of Juba negatively impact students' academic performance. The factors include tough living conditions, administrative errors, and poor management practices, highlighting the need for improved institutional support and effective governance. The literature agrees with this. For instance, a research study has identified that institutional issues such as education policy and pedagogy contribute to university drop out (Castao et al., 2006, as cited in Alejandro et al., 2023).

**Theme: Variation in academic pathways**

Qualitative data reveals that medical students at the University of Juba have diverse educational backgrounds and varying future aspirations, contributing to inconsistent academic performance. Some students took the Uganda Certificate of Education (UCE) while others took the South Sudan Certificate of Secondary Education (SSCSE) in 2013/2014. Segura et al. (2022) recognizes that while academic achievement is always an important indicator that can be used to predict students' future performance, other variables such as students' preferences for which course to follow also play a role.

**4.5.4 Chapter summary**

This chapter was organized in a logical order such that introduction and general information about the research data comes first. This was followed by data presentation and analysis. In this stage, quantitative data analysis using multiple linear regression and

Pearson correlation was carried out first. Then, qualitative data analysis and presentation was the next one. Other sub section was the interpretation and discussion. The qualitative data was interpreted to compliment the quantitative finding. In addition, the discussions were made with reference to literature review, theoretical framework, the study hypotheses and questions.

## CHAPTER FIVE

### SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

#### 5.1 Introduction

Briefly, the purpose of this study was to investigate the relationship between students' performance in the SSCSE in 2013/2014 and their progression from year 1 to 4 in the school of Medicine at the University of Juba. So, this chapter is going to summarize the findings in relation to the research hypotheses and questions. Moreover, the chapter includes conclusion drawn from the research results and their discussions that were made previously. Finally, the recommendations will follow immediately.

#### 5.2 Summary of the findings

The problem statement for this research study was as follows: according to literature search there is little knowledge known about relationship between university entrance examinations (SSCSE) and students' progression at the University of Juba in the South Sudan context. This research problem relates to a phenomenon in 2021 when students' failure was reported to be alarming at the university of Juba, including the school of Medicine (Akec, 2021). In the investigation of this research problem, the sample sizes included 310 quantitative observations and 15 respondents. According to research hypotheses and questions, presented below were the research results:

Firstly, the results have shown that no statistically significant correlation between students' performance in the SSCSE in 2013/2014 and progression in the school of Medicine at the University of Juba in the academic year 2017, 2018, 2020 and 2021. For all correlation coefficients, P values were greater than 0.05. Contrary to this was the existence of correlation between the SSCSE Average scores in 2013/2014 and average scores in year 2

of the school of Medicine at the University of Juba in 2018. However, it is a weak and negative correlation,  $r(55) = -.324$ ,  $p = .016$ .

Secondly, the results have also shown that predictors (independent variables) had a little impact on the fourth-year medical students' grades in 2021. However, this impact was not statistically significant,  $F(4, 50) = 0.194$ ,  $P = .94$ ,  $R^2 = .015$ .

Lastly, the analysis of the students' responses has yielded four main themes, which are both secondary school and university factors believed to be affecting students' performance in the school of medicine at the university of Juba. These include; inadequate learning and teaching resources, management and administrative issues, Variation in academic pathways, lecturers' factors and academic workload.

### **5.3 Conclusion**

Based on the study objectives, hypotheses and question, the conclusions that were drawn from the research results are as follows:

There was enough evidence from the research results to suggest that the outcomes for both the Pearson correlation and multiple linear regression analysis unlikely occurred by chance.

Therefore, it was concluded that:

- i) The SSCSE students' performance in 2013/2014 was not a reliable predictor of academic success or failure in the medical school at the University of Juba in 2021. In addition, the performance in the SSCSE and early university years 1, 2 and 3 did not significantly influence the fourth-year medical students' academic grades in 2021. Regarding this, the research results have shown that

the predictors (independent variables) have no statistically significant connection with the dependent variable.

- ii) The fourth-year medical students for 2021 believe that following factors have significant influence on students' performance in the school of Medicine at the university of Juba: inadequate learning and teaching resources, management and administrative issues, variation in academic pathways, lecturers' factors and academic workload.

### **5.3.1 Contributions of the research finding to the literature.**

Research gaps were identified as contextual gap and existence of conflicting findings, according to the literature review. Therefore, this research result contributes considerably in supporting the view that there is no statistically significant relationship between students' performance in the university entrance exams and university. Also, it addresses a contextual gap as the finding provides unique insights from the South Sudan perspective.

### **5.4 Recommendations**

The following recommendations were arrived at, based on the discussions and conclusions from the research finding. So, the researcher suggests the following actions to be taken on the finding by the administration of the University of Juba, School of Medicine, Ministry of Higher Education Science and Technology, Ministry of General Education and Instruction, and future researchers.

Based on the finding that medical students encounter challenges such as inadequate learning and teaching resources, management and administrative issues, variation in academic pathways, lecturers' factors and academic workload, the following actions are highly recommended:

- a) **Improve learning and teaching resources at the University of Juba:** this can be achieved by increasing investment in up-to-date textbooks, medical equipment, and digital resources to enhance the quality of education. Also, implementation of the e-library system to offer access to a wide range of medical journals, e-books, and other online educational materials is highly recommended.
- b) **Make the University of Juba a supportive learning environment:** by diversifying teaching and learning approaches e.g establishing peer support groups and tutoring programs to help students collaborate and support each other academically. also, by setting up an early support programs for first-year students to better their transition into university life.
- c) **Address management and administrative Issues:** this can be solved by enhancing communication between administration, faculty, and students to ensure transparency and address concerns promptly.
- d) **Review and revise admission criteria in order to achieved a standardized academic pathway:** By incorporating other admission criteria, such as interviews, aptitude tests, or assessment of non-academic skills instead of reliance on the SSCSE performance only.
- e) **Improve on lecturers' engagement and quality:** this can be achieved by regularly monitor systems for lecturers' evaluations and students' feedback in order to ensure high teaching standards are maintained. Furthermore, through continuous review and update of the medical school curriculum, up to date educational standards can be met.

- f) **Manage academic workload:** it can be achieved through timely start and end of lectures before examination.

#### **5.4.1 Suggestions for further research**

Based on the research findings that SSCSE performance and early university years 1, 2, and 3 had no significant influence on the fourth-year medical students' academic grades in 2021 at the University of Juba, further research on this topic is highly encouraged. It is advisable for future researchers to look into variables such as psychological, social, and environmental in relation to the medical students' academic performance.

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## APPENDICES

### Appendix I: Open-ended questionnaires

Introduction

Dear Sir/Madam,

I am Mabior Manyok Gong, a postgraduate student pursuing Master of Educational research at Moi University, Kenya. I would like to invite you to participate in a research study at the University of Juba, titled “an investigation of the relationship between science students’ performance in the Certificate of Secondary Education (CSE) and progression at the University of Juba, South Sudan”. Your voluntary participation will offer valuable insights into this relationship. To ensure confidentiality, all gathered data will be strictly confidential and anonymized. Your responses will not be tied to your personal identity or contact details. Your involvement is entirely voluntary, allowing you to withdraw at any point without consequences. You can also skip any questions you prefer not to answer, and it won't affect your relationship with the university or associated institutions.

While direct personal benefits may not result from your participation, the study's findings could enhance our understanding of factors affecting science students' academic advancement. There are no known risks associated with this research.

Should you have any queries or concerns about the study, your rights, or participation, please contact [mabiormanyokgong@gmail.com](mailto:mabiormanyokgong@gmail.com) or call +211923578224 or +254715084996.

By signing below, you consent to take part in this study. Your agreement acknowledges your understanding of the provided information and grants permission for the researcher to use collected data for the study purpose.

Sign \_\_\_\_\_ Date \_\_\_\_\_

Thank you very much for accepting to participate in this research study.

**Instruction: write your answers in the spaces provided below**

- 1) When (year) did you sit for the South Sudan Certificate of Secondary Education (SSCSE)?.....
- 2) What was your dream-career (specialization) before becoming a university-student?.....
- 3) As a university-student now, what would your choice be, if you were given a chance to specialize again?.....
- 4) Mention exactly or approximate the average mark/grade that you scored in the SSCSE?.....
- 5) Why would you think there is a variation in your previous performance in the SSCSE and the current one in the school of medicine at the university of Juba?.....  
.....
- 6) In your opinion, what main factor have been a contributor to students' failure in the School of Medicine at the University of Juba?.....  
.....

- 7) Based on your experience of the SSCSE Examinations that you sat for by then, how did your previous learning and teaching practices affect the grade that you scored?.....
- 8) Explain in own words, the impact of your performance in high school on your progression in the school of Medicine, at the University of Juba?.....  
.....

## **Appendix II: the quantitative data collection table**

### **Introduction**

Dear Sir/Madam,

I am Mabior Manyok Gong, a postgraduate student pursuing Master of Educational research at Moi University, Kenya. I would like to invite you to participate in a research study at the University of Juba, titled “an investigation of the relationship between science students’ performance in the Certificate of Secondary Education (CSE) and progression at the University of Juba, South Sudan”. Your voluntary participation will offer valuable insights into this relationship. To ensure confidentiality, all gathered data will be strictly confidential and anonymized. Your responses will not be tied to your personal identity or contact details. Your involvement is entirely voluntary, allowing you to withdraw at any point without consequences. You can also skip any questions you prefer not to answer, and it won't affect your relationship with the university or associated institutions.

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**Appendix III: A complete data collection table showing raw data as it appeared in the students' databases at the University of Juba.**

S/N	Secondary school	School of Medicine- University of Juba			
	SSCSE Scores in 2013/2014	Year 1 scores in 2017	Year 2 scores in 2018	Year 3 scores in 2020	Year 4 scores in 2021
	Average scores in Mathematics, Chemistry, Physics, Biology and Others in Percentage (%)	Average scores in Mathematics, Chemistry, Physics, Botany and Zoology	Average scores in Anatomy, Physiology and Biochemistry	average scores in Anatomy, Physiology and Biochemistry	average scores in Pathology, Microbiology and Pharmacology
1	66	Fail	Pass	Fail	Fail
2	58.8	Good	Pass	Good	Fail
3	60.5	Pass	Pass	Pass	Fail
4	81.6	Good	Fail	Fail	Pass
5	81.5	Good	Fail	Good	Fail
6	81.4	Pass	Pass	Fail	Pass
7	81.3	Fail	Pass	Pass	Pass
8	81.2	Good	Fail	Fail	Fail
9	81.1	Good	Fail	Fail	Fail
10	81.4	Pass	Fail	Good	Good
11	81	Pass	Fail	Fail	Pass
12	62	Good	Pass	Pass	Pass
13	80.7	Good	Pass	Good	Fail
14	80.4	Pass	Pass	Good	Fail
15	80.3	Pass	Fail	Good	Pass
16	80.3	Pass	Pass	Good	Fail
17	80.2	Pass	Fail	Pass	Pass
18	80.2	Good	Fail	Fail	Fail
19	80.1	Pass	Fail	Pass	Fail
20	80.1	Pass	Fail	Pass	Fail
21	80.1	Good	Fail	Good	Fail
22	80.4	Pass	Fail	Pass	Fail
23	70	Pass	Fail	Pass	Pass
24	79.3	Fail	Pass	Fail	Pass
25	78.4	Pass	Pass	Good	Fail
26	77.1	Pass	Fail	Pass	Pass
27	76.4	Pass	Fail	Pass	Fail
28	76.3	Good	Pass	Good	Pass

29	75.1	Pass	Fail	Pass	Pass
30	73.9	Pass	Good	Fail	Good
31	73.8	Good	Fail	Good	Fail
32	72.7	Very good	Good	Good	Good
33	72.7	Good	Pass	Good	Very good
34	71.9	Pass	Fail	Fail	Pass
35	71.5	Pass	Good	Pass	Good
36	71.3	Good	Fail	Fail	Pass
37	69.3	Pass	Good	Pass	Good
38	69	Pass	Pass	Very good	Pass
39	73	Pass	Fail	Pass	Good
40	68.1	Pass	Good	Good	Pass
41	70.1	Pass	Pass	Good	Pass
42	73.4	Good	Fail	Good	Pass
43	69	Pass	Fail	Very good	Fail
44	69	Pass	Pass	Pass	Pass
45	77.9	Very good	Good	Fail	Pass
46	69.1	Pass	Pass	Pass	Good
47	72.3	Good	Pass	Fail	Fail
48	75.2	Pass	Fail	Good	Good
49	73	Good	Pass	Fail	Fail
50	74.9	Very good	Good	Fail	Good
51	77.5	Fail	Pass	Good	Fail
52	74.9	Good	Good	Pass	Pass
53	77.5	Pass	Fail	Good	Fail
54	77.5	Good	Pass	Fail	Pass
55	77.5	Good	Pass	Pass	Pass
56	77.5	Very good	Pass	Pass	Pass
57	77.5	Pass	Pass	Fail	Fail
58	74.9	Good	Fail	Pass	Pass
59	66	Good	Good	Fail	Fail
60	71.8	Good	Pass	Pass	Pass
61	68.8	Pass	Pass	Fail	Fail
62	68.4	Pass	Good	Good	Fail
63	80.8	Pass	Fail	Pass	
64	63.9	Very good	Good	Pass	
65	77.2	Good	Fail	Good	
66	78.1	Good	Fail	Pass	
67	65.5	Pass	Fail	Good	
68	88.1	Good	Pass	Good	
69	79.7	Pass	Fail	Pass	

70	71.6	Good	Pass	Fail	
71	71.6	Pass	Fail		
72	63	Very good	Good		
73	84.6	Fail	Pass		
74	67.9	Very good	Pass		
75	83.3	Pass	Good		
76	72	Pass	Fail		
77	83.4	Pass	Good		
78	74.6	Good	Pass		
79	70.1	Very good	Good		
80	83.5	Good	Fail		
81	77.4	Good			
82	73.7	Very good			
83	89.2	Good			
84	88.2	Good			
85	87.8	Good			
86	87.1	Pass			
87	87	Pass			
88	86.1	Fail			
89	85.5	Good			
90	84.4	Good			
91	82.8	Good			
92	82.7	Good			
93	83.6	Very good			
94	78.9	Pass			
95	77.4	Good			
96	76.4	Pass			
97	76.3	Good			
98	75.1	Good			

**Appendix IV: A completed data collection table showing conversion of the raw data (year 1, 2, 3 and 4) from words to percentage (%)**

S/N	Secondary school	School of Medicine- University of Juba data			
	SSCSE Scores in 2013/2014	Year 1 scores in 2017	Year 2 scores in 2018	Year 3 scores in 2020	Year 4 scores in 2021
	Average scores in Mathematics, Chemistry, Physics, Biology and Others in percentage (%)	Average scores in Mathematics, Chemistry, Physics, Botany and Zoology	Average scores in Anatomy, Physiology and Biochemistry	average scores in Anatomy, Physiology and Biochemistry	average scores in Pathology, Microbiology and Pharmacology
1	66	38	55	35	45
2	58.8	62.5	55	65	35
3	60.5	52.5	58.33	55	48.33
4	81.6	63.5	25	48.33	55
5	81.5	63	25	61.67	45
6	81.4	58.5	55	35	58.33
7	81.3	48	58.33	51.67	55
8	81.2	61	45	45	45
9	81.1	66.5	38.33	25	45
10	81.4	53	45	61.67	61.67
11	81	55	45	45	58.33
12	62	60.5	51.67	55	55
13	80.7	66	55	68.33	45
14	80.4	52	58.33	65	48.33
15	80.3	53	48.33	68.33	55
16	80.3	56	55	65	45
17	80.2	59	48.33	58.33	58.33
18	80.2	62.5	45	48.33	45
19	80.1	56.5	35	55	35
20	80.1	57.5	45	58.33	48.33
21	80.1	64	45	61.67	45
22	80.4	61	48.33	55	48.33
23	70	59	45	51.67	58.33
24	79.3	43	51.67	45	55
25	78.4	50.5	55	61.67	48.33
26	77.1	59.5	35	51.67	55

27	76.4	55.5	45	55	48.33
28	76.3	61.5	55	65	58.33
29	75.1	55	35	58.33	55
30	73.9	52.5	61.67	48.33	61.67
31	73.8	63.5	45	61.67	45
32	72.7	79.5	61.67	63.33	65
33	72.7	64	58.33	65	73.33
34	71.9	56.5	48.33	48.33	58.33
35	71.5	59.5	61.67	51.67	65
36	71.3	63	45	35	55
37	69.3	55	61.67	58.33	61.67
38	69	56	55	70	58.33
39	73	57	38	50	61.67
40	68.1	50.5	61.67	63.33	55
41	70.1	56	55	60	58.33
42	73.4	66.5	48.33	65	55
43	69	57.5	45	70	45
44	69	58	51.67	58.33	58.33
45	77.9	79	61.67	38.33	55
46	69.1	56	55	55	61.67
47	72.3	65.5	58.33	48.33	45
48	75.2	58.5	48.33	68.33	68.33
49	73	57	55	48.33	45
50	74.9	76	61.67	41.67	65
51	77.5	49	55	61.67	48.33
52	74.9	61.5	61.67	58.33	58.33
53	77.5	56.5	45	60	45
54	77.5	68	58.33	48.33	58.33
55	77.5	66	51	55	55
56	77.5	72	55	51.67	51.67
57	77.5	54.5	58.33	45	48.33
58	74.9	62.5	45	55	58.33
59	66	60	61.67	48.33	41.67
60	71.8	63	58.3	51.67	55
61	68.8	55.5	58.33	48.33	48.33
62	68.4	52	61.67	61.67	45
63	80.8	50	48.33	51.67	
64	63.9	71	61.67	55	
65	77.2	67	45	65	
66	78.1	65	48.33	51.67	
67	65.5	58	45	61.67	

68	88.1	69.5	58.33	68.33	
69	79.7	58	45	51.67	
70	71.6	63	58.33	45	
71	71.6	59	45		
72	63	70.5	61.67		
73	84.6	49.5	58.33		
74	67.9	72.5	55		
75	83.3	56.5	61.67		
76	72	56	48.33		
77	83.4	52.5	61.67		
78	74.6	63	55		
79	70.1	70.5	65		
80	83.5	61	48.33		
81	77.4	66.5			
82	73.7	69.5			
83	89.2	60.5			
84	88.2	62.5			
85	87.8	59.5			
86	87.1	50			
87	87	56.5			
88	86.1	49.5			
89	85.5	61.5			
90	84.4	65			
91	82.8	60.5			
92	82.7	69.5			
93	83.6	70			
94	78.9	52.5			
95	77.4	65			
96	76.4	58.5			
97	76.3	66			
98	75.1	62			

**Appendix v: The quantitative data set exported to the SPSS**

	Performance_High school_South_Sud an_SSCSE	Progression_Universi ty_of_Juba_School_ of_Medicine_Year1	Progression_Universi ty_of_Juba_School_ of_Medicine_Year2	Progression_Universi ty_of_Juba_School_ of_Medicine_Year3	Progression_Universi ty_of_Juba_School_ of_Medicine_Year4
1	66.00	38.00	55.00	35.00	45.00
2	58.80	62.50	55.00	65.00	35.00
3	60.50	52.50	58.33	55.00	48.33
4	81.60	63.50	25.00	48.33	55.00
5	81.50	63.00	25.00	61.67	45.00
6	81.40	58.50	55.00	35.00	58.33
7	81.30	48.00	58.33	51.67	55.00
8	81.20	61.00	45.00	45.00	45.00
9	81.10	66.50	38.33	25.00	45.00
10	81.40	53.00	45.00	61.67	61.67
11	81.00	55.00	45.00	45.00	58.33
12	62.00	60.50	51.67	55.00	55.00
13	80.70	66.00	55.00	68.33	45.00
14	80.40	52.00	58.33	65.00	48.33
15	80.30	53.00	48.33	68.33	55.00
16	80.30	56.00	55.00	65.00	45.00
17	80.20	59.00	48.33	58.33	58.33
18	80.20	62.50	45.00	48.33	45.00
19	80.10	56.50	35.00	55.00	35.00
20	80.10	57.50	45.00	58.33	48.33
21	80.10	64.00	45.00	61.67	45.00

22	80.40	61.00	48.33	55.00	48.33
23	70.00	59.00	45.00	51.67	58.33
24	79.30	43.00	51.67	45.00	55.00
25	78.40	50.50	55.00	61.67	48.33
26	77.10	59.50	35.00	51.67	55.00
27	76.40	55.50	45.00	55.00	48.33
28	76.30	61.50	55.00	65.00	58.33
29	75.10	55.00	35.00	58.33	55.00
30	73.90	52.50	61.67	48.33	61.67
31	73.80	63.50	45.00	61.67	45.00
32	72.70	79.50	61.67	63.33	65.00
33	72.70	64.00	58.33	65.00	73.33
34	71.90	56.50	48.33	48.33	58.33
35	71.50	59.50	61.67	51.67	65.00
36	71.30	63.00	45.00	35.00	55.00
37	69.30	55.00	61.67	58.33	61.67
38	69.00	56.00	55.00	70.00	58.33
39	73.00	57.00	38.00	50.00	61.67
40	68.10	50.50	61.67	63.33	55.00
41	70.10	56.00	55.00	60.00	58.33
42	73.40	66.50	48.33	65.00	55.00

43	69.00	57.50	45.00	70.00	45.00
44	69.00	58.00	51.67	58.33	58.33
45	77.90	79.00	61.67	38.33	55.00
46	69.10	56.00	55.00	55.00	61.67
47	72.30	65.50	58.33	48.33	45.00
48	75.20	58.50	48.33	68.33	68.33
49	73.00	57.00	55.00	48.33	45.00
50	74.90	76.00	61.67	41.67	65.00
51	77.50	49.00	55.00	61.67	48.33
52	74.90	61.50	61.67	58.33	58.33
53	77.50	56.50	45.00	60.00	45.00
54	77.50	68.00	58.33	48.33	58.33
55	77.50	66.00	51.00	55.00	55.00
56	77.50	72.00	55.00	51.67	51.67
57	77.50	54.50	58.33	45.00	48.33
58	74.90	62.50	45.00	55.00	58.33
59	66.00	60.00	61.67	48.33	41.67
60	71.80	63.00	58.30	51.67	55.00
61	68.80	55.50	58.33	48.33	48.33
62	68.40	52.00	61.67	61.67	45.00

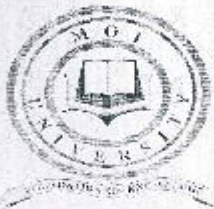
63	80.80	50.00	48.33	51.67	.
64	63.90	71.00	61.67	55.00	.
65	77.20	67.00	45.00	65.00	.
66	78.10	65.00	48.33	51.67	.
67	65.50	58.00	45.00	61.67	.
68	88.10	69.50	58.33	68.33	.
69	79.70	58.00	45.00	51.67	.
70	71.60	63.00	58.33	45.00	.
71	71.60	59.00	45.00	.	.
72	63.00	70.50	61.67	.	.
73	84.60	49.50	58.33	.	.
74	67.90	72.50	55.00	.	.
75	83.30	56.50	61.67	.	.
76	72.00	56.00	48.33	.	.
77	83.40	52.50	61.67	.	.
78	74.60	63.00	55.00	.	.
79	70.10	70.50	65.00	.	.
80	83.50	61.00	48.33	.	.

81	77.40	66.50	.	.	.
82	73.70	69.50	.	.	.
83	89.20	60.50	.	.	.
84	88.20	62.50	.	.	.
85	87.80	59.50	.	.	.
86	87.10	50.00	.	.	.
87	87.00	56.50	.	.	.
88	86.10	49.50	.	.	.
89	85.50	61.50	.	.	.
90	84.40	65.00	.	.	.
91	82.80	60.50	.	.	.
92	82.70	69.50	.	.	.
93	83.60	70.00	.	.	.
94	78.90	52.50	.	.	.
95	77.40	65.00	.	.	.
96	76.40	58.50	.	.	.
97	76.30	66.00	.	.	.
98	75.10	62.00	.	.	.


**Appendix VI: The geographical location of the study, the University of Juba in South Sudan-Africa**



## Appendix VII: Research authorization Letter from Moi University, Kenya



**MOI UNIVERSITY**  
Office of the Dean School of Education



MOI UNIVERSITY  
SCHOOL OF EDUCATION  
13 DEC 2023  
P.O. Box 3900-30100, ELDORET

Tel. Eldoret (053) 43001-8/43620 P.O. Box 3900  
Fax No. (053) 43047 Eldoret, Kenya

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REF: MS/R/4840/23 DATE: 13<sup>th</sup> December, 2023

**TO WHOM IT MAY CONCERN**

Dear Sir/Madam,

**RE: RESEARCH PERMIT IN RESPECT OF MABIOR  
MANYOK GONG - MS/R/4840/23**

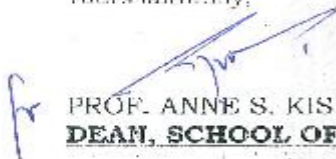
The above named is a 2<sup>nd</sup> year Master of Education Student at Moi University, School of Education, Department of Educational Management and Policy Studies.

It is required of his Master of Education studies to conduct a research project and produce a research report. His research topic is entitled:


**"An Investigation of the Relationship Between Science Students' Performance in the Certificate of Secondary Education (CSE) and Progression at University of Juba South Sudan."**

Any assistance given to enable him conduct research successfully will be highly appreciated.

Yours faithfully,



**PROF. ANNE S. KISILU**  
**DEAN, SCHOOL OF EDUCATION**

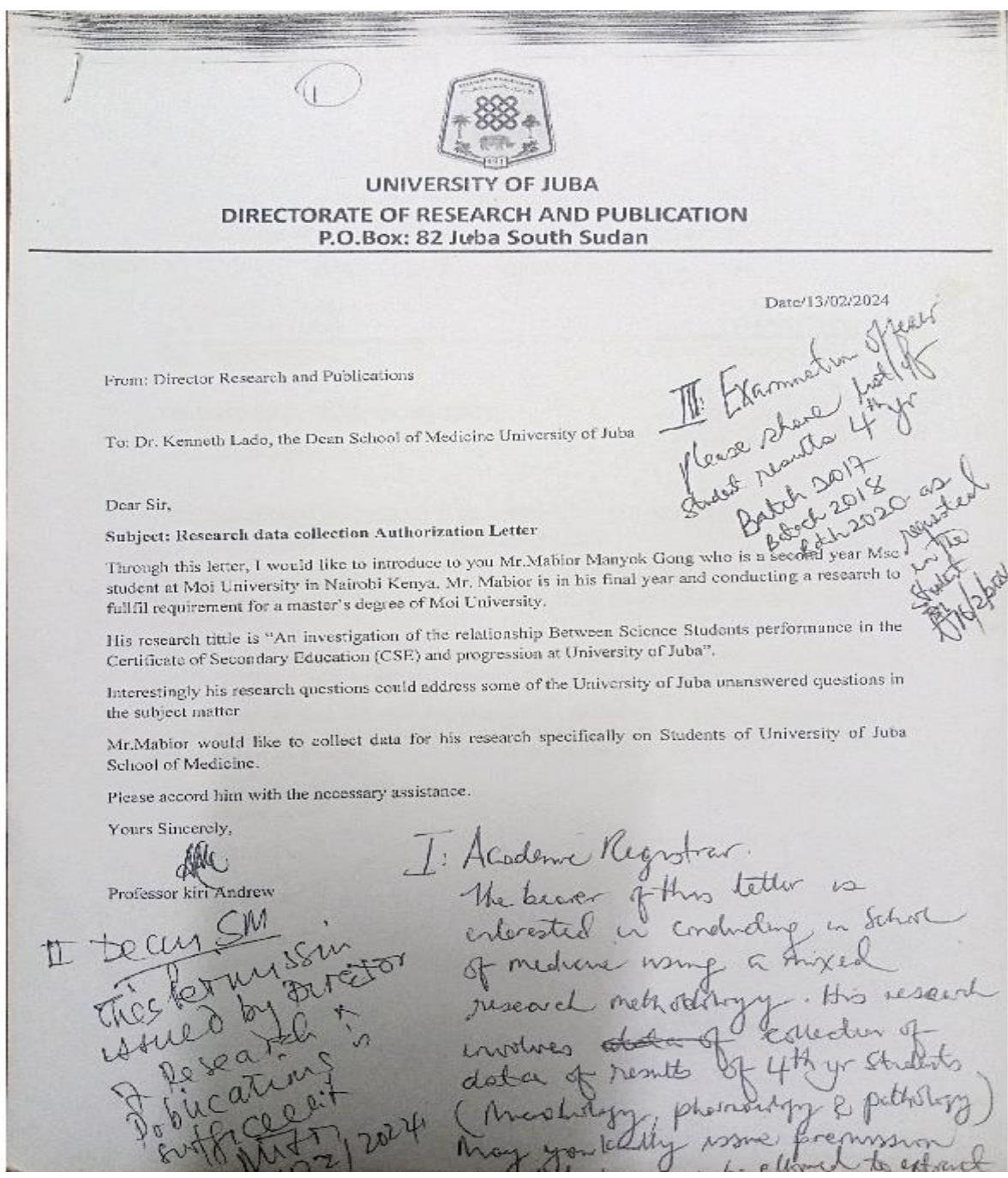


MOI UNIVERSITY  
SCHOOL OF EDUCATION  
13 DEC 2023  
P.O. Box 3900-30100, ELDORET

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MOI UNIVERSITY (ISO 9001:2015 Certified Institution)

**Appendix VIII: Research authorization letter from the University of Juba, South Sudan**



**Appendix IX: Letter of agreement between the researcher and the research assistant**

Mabiormanyokgong@gmail.com

TELEPHONE: +211923578224/+254715084996

JUBA-SOUTH SUDAN

19 FEBRUARY 2024

TO: Dr. KENNETH LINO  
THE DEAN OF THE SCHOOL OF MEDICINE  
UNIVERSITY OF JUBA-SOUTH SUDAN

Dear Sir,

RE: **Request for a research Assistant**

I would like to request your office to assign to me one research assistant in order to support me in my research data collection. If possible, the staff member should be familiar with the students' grades for the South Sudan Certificate of Secondary Education (SSCSE) and School of Medicine, which can be found in both the Admissions and Examinations office.

**Roles and responsibilities:**

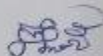
- 1) I and the staff shall work together and extract grades for the Certificate of Secondary Education (SSCSE) for the targeted academic years in the Admissions office.
- 2) We shall also work together to extract students' grades in the data bases for the targeted courses in the school of Medicine.
- 3) The staff member shall help us to find a student-representative who shall disseminate the questionnaires to the targeted students, and then collect them back.
- 4) Support in other activities.

**Terms and conditions of the task**

Since the task is likely to spend the staff's time and effort, I suggest to offer some amount about SSP 100,000 (or not more than 100 USD) to cover for these. However, we shall agree the fix amount together, if there is a need.

Best regards,

Mabior Manyok Gong



Master in educational Research and Evaluation

East and South African-German Center of Excellence for Educational Research Methodologies and Management (CERM-ESA), Moi University

100USD  
I Glenna to  
assist as  
research  
assistant (data  
collection)  
for proposal