

**THE INFLUENCE OF PERSONALITY FACTORS ON
STUDENT PERFORMANCE IN BIOLOGICAL SCIENCES IN
KENYA: THE CASE OF SECONDARY SCHOOLS IN
RACHUONYO NORTH SUB COUNTY, HOMABAY COUNTY**

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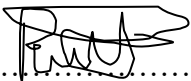
DECLARATION

Declaration by the student

This Research Project Report my original work and has not been presented for a degree or other academic award in a university.

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Declaration by supervisors

This Research Project Report has been submitted for examination with our approval as University of Nairobi project Supervisors.

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DEDICATION

I dedicate the research academic work to beloved siblings, currently undertaking their secondary education, Esther of Rapogi Girls', Samson of Rapogi boys, my youngest sister Teresa and the Kenyan Secondary school biology teachers as a whole.

ACKNOWLEDGEMENT

I want to thank Yahweh in a special way, who has not only granted me life but also has seen me through the rough and the smooth to this moment that I am submitting this paper. I hereby appreciate my able supervisors Mr. George Meroka and Dr. Anne Aseey, who not only persevered with my frequent mishaps but also guided me to the very last minute to see to my success with this project work. Thanks giving to my sibling, Esther and Samson who has given me the drive to write in this line of research.

ABSTRACT

This study seeks to investigate the influence of the student personality factors on performance in the biological sciences. The following research objectives guided the study: influence of conscientiousness in biological performance in secondary schools, the influence of intellect of students on their performance in biological sciences, influence of character of the student on the performance in biological sciences, the influence of motivation on the student performance in biological sciences and the influence of student openness on the performance in biological sciences. The research was conducted in Rachuonyo North Sub- County with a target population of fifteen schools out of fifty secondary schools. A descriptive survey research design was used where students were obtained by stratified simple random sampling technique while biology teachers were obtained using purposive sampling technique. Data was collected using questionnaires and oral interviews. Pearson's correlation statistics was used to analyze data. Findings revealed that there is a great positive influence of openness, conscientiousness, motivation and intelligence on students' performance in biological sciences. This then led to the conclusion that open students outperform their counterparts whose extent of openness is minimal. Students of high intellectual capability performed higher than those of low intellectual power in biological sciences. Students who are highly motivated give better results in biological sciences than those less motivated. The above outcome led to the recommendations as the need to reshape students' characters to suppress bad traits by all stakeholders. Parents and teachers to instill discipline in students at all times, encourage learners to be open and free to express ideas and issues, promotion of reward at all times to improve aspect of motivation in learners and further research to be done on the influence of intelligence on the three domains of learning at large.

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LIST OF ABBREVIATIONS

KNEC: Kenya National Examinations Council

KCSE: Kenya Certificate of Secondary Education

COVID-19: Corona Virus Disease of 2019

3R : Read, Recall, Recite.

Strongly agree (SA), Agree(A), Disagree(D) and strongly disagree (SD)

B.Ed. Sc. – Bachelor of Education Science

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Biological science is among the most crucial disciplines globally. Global fight against viral infections and food shortage are among the top problems the world faces today in the field of science. A lot of biological researches are underway internationally, spearheaded by the first world countries.

Globally, research on personality factors has been conducted widely. Mendolia (2014) studied impact that has been exhibited on performance in English language and also on subject choice by human personality traits on students in the USA. During the study, it was found that self-discipline play a direct role on students' plans, effective learning strategies and high school performance. Almlund (2011), studied personality factors in education and concluded that personality traits have a strong effect on educational acquisition, grades and test scores. In particular, Almund suggested that openness to experience and conscientiousness are very vital in determining education duration, grades and test scores; and that conscientiousness might be as predictive as cognitive ability in determining good school results, with the effect being mediated through toiling and positive study habits. According to Ryan (2010), conscientiousness is strongly related to academic maturity and performance.

In Africa, motivation has been studied in Nigeria, Ugwu (2011), found motivation to be a key drive towards good outcome ventures. Similarly, Ikpi (2014) Nigerian, did a study on how personality traits affect academic performance of secondary school students in cross River state, where he found that conscientiousness directly affects performance where those with high concentration of discipline experienced extremely good academic performance. This study used the causal comparative approach design. Harriett and Gbollie (2017) studied the role of motivational beliefs on student performance in Liberia where they found that motivation is a key player in success in academic.

Regionally, Maniraguha (1997) studied factors of performance at the tertiary level in Rwanda and found that student behaviour and previous academic success play a greatly significant role in their performance at all levels. Similarly, Hermas (2014) studies on factors for poor performance in Tanzania found that teacher shortage, quality and motivation play a great role

in student performance. These studies show that a lot of research has been done on hinderances to student performance particularly on personality factors. However, no specific studies have been documented on the relation between performance in biological sciences and personality factors.

In Kenya, Chrispus (2012) studied personality variables affecting student performance in high schools. He found that personality variable is an important determinant of academic achievement. Introverts performs better than the extroverts. Similarly, Awuondo, Kiplagat and Peter (2019) studied extraversive personality traits on achievement in mathematics among secondary school students. They found that extroverts do better in mathematics than their counterpart introverts. Yungungu (2014) et al, conducted a study on students' performance versus teacher-based factor. In this study findings were that about 70% of the Biology teachers had taught for a period of below 10 years while about 30% had more than 10 years teaching experience, on average, Biology students were seldom allowed to ask questions by their teacher, Biology teachers hardly conducted demonstrations during practical in Nyakach District and Teachers who always adopted and used teachers guided class discussions had the highest means and also those who does demonstrations It also found out that lecture method sought the least mean among the teaching methods. A similar study had been conducted by Jolif (2013-2016). He found that learners come from financially crippled families where there is no constant income hence learners struggle to afford some educational expenses such as buying study material and academic trips. In excess of five deciles of the parents had not gone beyond secondary education implying that they have been disadvantaged on knowledge acquisition. Inadequate of teaching and learning resources results to students not preparing well for their examinations hence mediocre performance. With all these areas documented to have been researched on, therefore leaves unraveled, the student personality factors as the only remaining aspects, thus the basis of the research.

1.2 Statement of the problem

Student performance in the biological sciences has been poor for some years. According to the KNEC report 2011-2020, for the last two decades, there has been mass failure in the KCSE biology with the largest mass failure being experienced in the year 2006 with a percentage of 49.64% of the total candidature recording grades Ds and Es. Within the 20 years period, best performed year was 2004 with a 12.03% of quality grades, who qualify for

the highly demanding biological courses in the health and food sectors. The rest of the years since then has shown a downward trend in performance with the quality grades dropping by the year.

Wabwoba (2019) and Momanyi (2012), show teaching methods to have been changed towards better understanding of the science more teachers have been employed for effective content delivery, student book ratio has been reduced to increase their contact hours with the text. This study therefore will illuminate on the influence of student personality factors on the performance in biological sciences as other studies have focused more on non-personality related issues such as teaching methods and teacher support, school based factors Onyara(2013) and parental involvement in academic achievement Zakaria, Nor and Alias (2021).

1.3 Purpose of study

This study is purposed at investigating the influence of student personality factors on performance of biological sciences.

1.4 Research objectives

- i) To determine the influence of openness on students' performance in biological sciences.
- ii) To establish the influence of intelligence on students' performance in biological sciences.
- iii) To establish the influence of conscientiousness on students' performance in biological sciences.
- iv) To establish the influence of motivation on students' performance in biological sciences.

1.5 Research questions

- i) What is the influence of openness on the performance in biological sciences?
- ii) What is the influence of level of intellect of students on their performance in biological sciences?
- iii) What is the influence of conscientiousness of students on their performance in biological sciences?
- iv) What is the influence of motivation of students on their performance in biological sciences?

1.6 Significance of the study

This study will equip the Kenyan candidates with the required level of adjustments on their part so as to excel in the biological sciences, in order to qualify for the highly demanded professions such as nursing to provide the vital services diligently to the Kenyan citizens and save the looming crisis. It will help the policy makers to formulate better objectives that are circumstantially achievable by the field officers. The teachers will be enriched after this research with the possible solutions to existing loopholes as they strive to impart the knowledge on the children. They will be informed of the possible areas to look out for besides the mere classwork in order to realize their lesson objectives.

1.7 Scope of the study

The study is in Rachuonyo North Sub-county of Homa-bay County, delimited within the secondary schools therein.

1.8 Limitations of the study

Some interviewees acted uncooperative in terms of response to questions asked during the interview. This challenge was overcome by expressing the reality behind this research to the teachers after which they realized how significant it would be to them. Biasness from some respondents as a result of fatigue from the day's work. This was overcome by having subsequent sessions on non-business days when all respondents were free and fresh. Some of the schools were inaccessible due to rugged nature of the terrain and bad weather crowned by heavy rains. This was taken care of by involving locals about the alternative access roads to the affected schools. Certain school heads were unhelpful with claims of tight schedule with the candidate classes. This was overcome by allowing such schools to respond later and data be collected at some other times.

1.9 Delimitations of the study

This study was aided by the ease of communication since the respondents were all English and Kiswahili literate, enabling effective communication with them during data collection. The respondent in Karachuonyo were welcoming, ready to listen and help with routing logistics enabling quick accessibility to the various schools. In the area finally, weather was very friendly leaving the routes fully accessible thus easy movement.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter explains the dependent variable which is student performance in biological sciences. It brings out the key personality factors and their influence on performance in biological sciences.

2.1 The concept of student personality factors and performance

Performance refers to something that a person leaves behind and which exists outside the said purpose (Kane (1996)). In this line, student's performance refers to the correct scores in class assignments, high scores in school tests and eventually quality grades of C+ and above, qualifying an individual to pursue related courses in tertiary institutions. Farlex (2008) defines biological science as the life-related disciplines in which studies are undertaken to understand living things. Coetzee (2014) et al, clearly reveals general players towards students' performance in the biological sciences worldwide to be institutional factors, teacher factors and student factors. Biological sciences refer to any of the branches of natural science dealing with living things. It entails acquisition of both theoretical and practical skills, both of which are accrued through laboratory and ordinary class sessions, during which students are taught and trained on skills for manipulation and observations. At the end of the course, three-paper examinations testing on cognitive, psychomotor and affective domains of Blooms' taxonomy is administered for placement in tertiary level of studies.

Student factors refer to the key players in education success lying with the learner themselves. They include the student discipline, student character, motivation, intellect, extroversion and openness. Student discipline refers to the accepted code of conduct in a learner encompassing following instructions, being time conscious, accepting corrections and also respecting other role players in the school and home vicinities. It can be high or low.

Student motivation refers to the urge from within the learner to spend time on a particular subject in studying it, revising it and understanding it better at personal level. It can be present normally, highly present or lacking.

Research purposed at studying the connection between personality traits and academic prosperity among students unveiled personality traits to be significantly related with academic achievement. Particularly, conscientiousness to be the most important predictor trait in performance in academics. (Hakimi et al., 2011) Many studies hereby concur that

conscientiousness of students plays a key role in performance outcome in academics. (Komarraju et al., 2011). A number of research works find openness to equally portray significant role in students' performance. Motivation, particularly extrinsic, and student character are also tested to be players in the student's academic outcome. The questions remain, what is the influence of intrinsic motivation on student performance and what influence does such personality factors have on specifically biological sciences, an area that is yet to be researched on. The latter forms the basis of this research study.

2.1.1 Students' openness and performance in biological sciences

Openness is a multi-faceted personality trait that entails being curious, imaginative, creative, complex, refined and sophisticated (Colquitt, 2009). It plays a great role in students' performance especially in sciences. (Farsidesa & Woodfield, 2002). Open individuals are intellectually curious, sensitive to beauty, and appreciative of art. They tend to be more acquainted with their feelings, compared to introverts. They tend to raise ideas and put it to practice in an individualistic and non-traditional means. Friedman & Schustack, (2016). The skills and concepts involved herein require a programmed study pattern with a lot of consistency in the trends adopted within.

Programmed study pattern is steered by determination and commitment to the act of learning. There is a positive link between students' academic achievement and their openness to put to practice new things. Students who are open to new experiences are more likely to undertake academic assignments, which better their academic achievement. Students that are open to new experiences are seen to be cleverer, idealistic and also industrious. Such students are therefore are determined, focused and dedicated to achieving impressively in academics. Britwum et al (2022).

A study method adopted should be such that it adheres to the rules of learning as stipulated in the various portrayed theories of learning. All link back to practice as the main associated activity for effective learning. During the practice time, difficulties and obstacles are encountered, all of which can only be solved if the student is open enough in order to seek help from the experts who are their teachers. Openness therefore, promotes cognitive exploration and consequently increases the possibility and efficiency of learning. (Danay et al 2012). Students who are not open to teachers on challenges will not get it right and therefore are likely to miss the point when such problems are faced in subsequent tests. This will in the long run, compromise their performance in these areas of science, concurring with the

findings of Farsides & Woodfield (2002). Openness has a direct impact on academic performance. Bakker et al., (2002) realized through study that people with greater openness to experience reflect a more limber, imaginative, and a more informed unusual formulation in situations associated with emotional torture, such as science and mathematics subjects.

Academic outcome had a direct relation to openness to experience, among other personality traits. Open-minded students have been found to be better performers in sciences and mathematics but averagely in languages. Science is a broad field of study investigated herein. Martey and Aborakwa-Larbi (2016). One question which is, influence openness has on performance in biological sciences remains as the missing link to the series of performance determinants, yet to be researched on. It, therefore, seems to be the missing link in the deteriorating performance since not much documented research has been done on this line to unearth the misery behind the mediocre outcome in the ultimate exam results in biological sciences. This is one of the research objectives in this study.

2.1.2 Student intellect and performance in biological sciences

Aspects of intellect essential in performance include Self-awareness, empathy, sympathy, morale, discipline and social skills. These skills mold useful performance-oriented characteristics in learners such as hard work, perseverance, determination and focus. They also regulate student speed towards excelling in such highly demanding study disciplines such as physical and biological sciences. Goleman (2015). Such traits also enable biological science students to interact effectively and share on various science facts and information, thereby boosting their understanding of the even the so classified as high order concepts.

Students with high cognitive, psychomotor and affective capability are likely to remain organized throughout, focused and in the end do well in the science subjects. They keep organized notes with a lot of ease of reference and general studies, without missing links ensuring the student captures a concept sequentially as postulated in the texts. However, poor listening skills, poorly maintained notes have several missing links, which then imply inadequate learning of sequential concepts and therefore poor understanding, a trait in those with below average intellectual capability, translating back to wrong or incomplete responses in tests and examination situations eventually generating poor grades, supported by the findings of Dzulkipli & Alias (2012).

Students' personality and intelligence influence their academic performance. As observed by Chamorro-Premuzic & Furnham (2003), intelligence comprises salient individual differences affecting performance. Personality traits of the low and high achieving students are the same except for that there is a significant relationship between personality traits and cognitive abilities in students who under score, concurring with Dzul kifli & Alias findings. Very intelligent students perform extremely well if nurtured and guided and usually under minimal information dissipation. Averagely intelligent ones do well when trained well academically with all resources available. However, those of low intelligent capabilities need constant monitoring, tutoring, teaching and high contact hours to do averagely well. This aspect of intelligence on performance has been studied in several localities except for in Rachuonyo North, leaving the study of influence of student intelligence on performance in biological sciences in this particular subcounty as one of the unraveled research areas making an objective of this study.

2.1.3 Student's motivation and performance in biological sciences

Motivation is defined as the power that triggers action that follows. (Cheng & Cheng 2012). According to McDonough (2007), motivation is what moves people to act, and whose elements are the reasons why we want to learn, the strength of our yearning to learn, the kind of person we are, and the duty and our estimation of what it requires of us. Motivation factors include incentives, recognitions and internal self-drive towards a continued activity. Motivation can be either extrinsic or intrinsic. Extrinsic motivation refers to factors that are outside of the student which encompass gifts, recognition and praise. On the contrary, intrinsic motivation is a type of motivation that occurs within the person. In this regard intrinsic motivation refers to the urge to strategize to excel in biological sciences. Academic motivation is one of the effective factors on learners' achievement. Learners need to be interested in learning; otherwise, all endeavors of the teaching and learning strategies would flop. (Hazrati-Viari et al., 2011). Students who are targeting great courses ahead, good job crowned by good earning, and better life are always self-steered to plan and work smart for better grades and they always end up excelling in the academics, particularly biological sciences. Those who lack motivation tend not to put up any plans, no efforts toward good grades and in the end perform dismally in the biological sciences.

Intrinsic Motivation as a personality factor is a significant player in academic achievement of the students, Ritho (2015). This agrees with findings of Goodman et al. in their study (2011). Additionally, motivation has a vital role-play on a learner's study behavior and achievements.

Internal motivation acts as a drive and an accelerator in the student's academic and non-academic work, making them stay focused and committed to their studies as they work towards their goals. An ultimate reward or gain usually is the reference herein for the hard work. Motivated students work with lots of focus and in the end do very well, unlike demotivated learners, who has no morale, fail to concentrate and focus thereby doing poorly in comparison. However, no documented study has been conducted to investigate the influence student motivation has on their performance in biological sciences in particular. There is thus need for research on student motivation role on performance nationally. This forms one of the research objectives under study in this paper particularly in Karachuonyo subcounty.

2.1.4 Student's discipline (Conscientiousness) and performance in biological sciences

Discipline refers to a controlled behavior guided by self-control, Weiner (1989). Good performance is usually associated to discipline which is accredited to effortful control such as the willful direction of attention, sustenance of task focus, and avoidance of muddiness, hardworking, organized, able to complete tasks and duties properly and timely and usually reliable in deeds. Such individuals are achievement oriented. Rothbarth, (2007). A student who observes time and therefore does the required activity at the correct time, intended venue morally purposive is conscious of self-discipline. They will hardly waste time and therefore are likely to also be in good terms with the surrounding authority ranging from the parent, villagers and even the school teachers. Their discipline is highly recommendable and usually is reflected in their performance. They therefore do well and score highly in their subjects. Indiscipline students are irresponsible, impulsive, disordered therefore, they defy authority, get involved in lots of shoulder rubbing with the various stakeholders therefore ultimately wasting a lot of their precious time, which otherwise they would have channeled into their academic works for good results. Driskell et al., (2006) They therefore perform dismally usually, due to time wastage, stresses and other distractions that keep them astride from class work, eventually bad grades come forth to them. Conscientiousness predicts academic achievement while openness was proved to be the greatest foreteller of doable academic outcome. (Noftle & Robins, 2007).

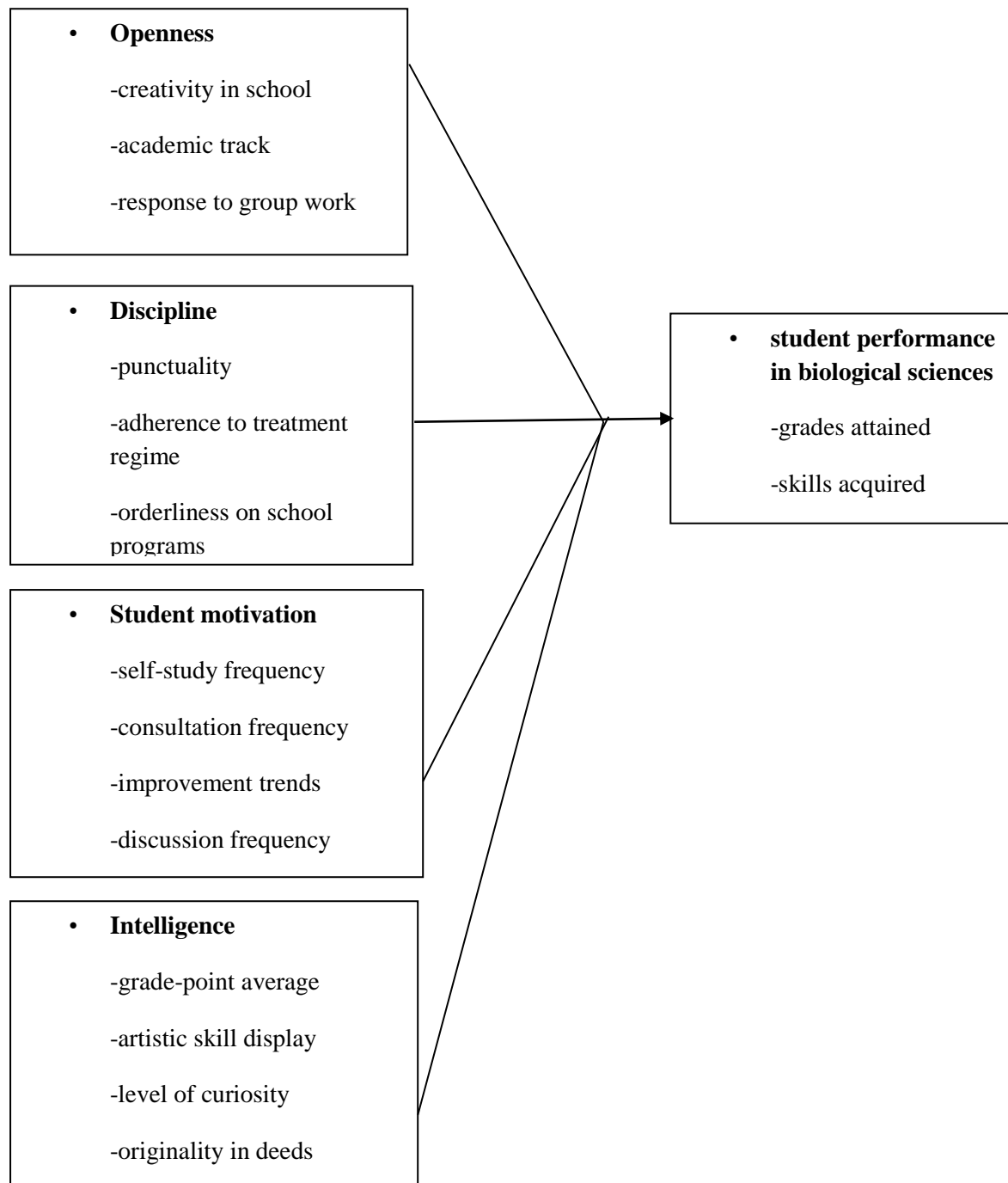
There is consensus from studies by characters such as McAbee and Oswald (2013), O'Connor and Paunonen (2007), Poropat (2009) that conscientiousness is the strongest and most consistent personality trait for predicting students' academic achievement. Conscientiousness strongly predicts academic achievement, or rather, academic performance

strongly correlates to conscientiousness. (Poropat, Arthur 2009). Personality and learning styles are both likely to play meaningful roles in directing academic scores on general academics. (Komarraju et al., 2011). Conscientiousness among other traits strongly relate to the learning styles among the learners.

A profound disparity between the positive response of students with high level of conscientiousness and those with low levels of the characteristics is observed, Eyong et al., (2014). High levels of conscientiousness depict performance outcome through documentation of knowledge, a direct aspect of learning sciences, agreeing with the findings of Matzlea et al. (2011). Despite all the above findings in the various studies, however, specific study of student discipline on performance in biological sciences has not been recorded to have been studied before. There is need to dig in to the core of this trait in biological areas, as there may be a new idea therein. This therefore forms one of the objectives of this research study.

2.2 Conceptual Framework: Relationship between personality factors and performance in biological sciences.

There exists a number of student personality factors that impact on their performance in the biological sciences. Aspects of Openness, discipline, motivation and intelligence offers an insight to unraveling the influence such factors have on performance in biological sciences. Below illustration shows the conceptualized factor-aspects with respect to students' performance in biological sciences.



CHAPTER THREE RESEARCH METHODOLOGY

3.0 Introduction

This chapter elaborates on the approaches that were adopted to collect data, and the statistical techniques used herein in Karachuonyo north sub-county. Important aspects that were mentioned in details herein are research design, sample size, target population, data collection techniques and data analysis techniques.

3.1 Research Design

This refers to the blueprint to be used to obtain relevant responses to research questions. It involves the procedures for collecting, analyzing, interpreting and reporting data. (Cresswell & Clark 2007). This research adopted descriptive research design. It is concerned with how, what is or what exists related to some previous event that has determined or acted upon a present condition or occurrence. It refers to a type of research that aims at obtaining details on current state of phenomena, by providing an accurate profile of situations, people or events majorly steered by observation and documentation, Creswell (2002). The mentioned above research design is chosen since the research herein involves non-quantified aspects of characters, that is, influence of openness, conscientiousness and motivation are all non-quantifiable topics, hence the choice.

3.2 Target population

Barnsbee (2018), defines target population as the group of individuals that the involvement intends to conduct research in and extract judgement from. It is composed of the secondary biology teachers, who teach, examine and grade learners on biology as a subject the learners whose performance is in question here. Statistics of Rachuonyo North secondary schools' biology teachers were obtained from sub-county education office database at the office as at 18th March 2022.

Table1: Number of biology teachers in secondary schools in Rachuonyo North.

SCHOOLS	Location	Biology teachers
OjijoOteko Sec. school	Apida	3
Oriwo Boys High school	Kandiege	15
Ogenya Girls Sec. school	Pala	4
St. Paul Mboya Sec. school	Apida	4
Jonyo Mixed sec. school	Kanam	6

Miranga Mixed sec. school	KokothKataa	8
TOTAL: 6 schools		40

Source: Rachuonyo North Sub- County Education office, Kasipul. As at 10th March 2022.

3.3 Sample size and sampling techniques

According to Chandran (2004) sampling is the selection of a subsection of population such that the selected portion sufficiently represents the entire entity. The research adopted stratified random sampling. It refers to the division of study population into strata, defined by selected characteristics and each is sampled independently, Cesar (2011). In this case, strata is represented by the individual schools on study. Teachers were engaged with a section selected from the population randomly. It was assumed that the average respondents were represented by the two extremes of performance indices.

Samples for study were determined from a sample size of 30 respondents as shown in table 2 below:

Stratum	Method used: $\frac{30}{total\ pop} \times subgroup\ pop$	Sample, n
OjijoOteko Sec. school	$\frac{30}{40} \times 3 = 2.25$	2
Oriwo Boys High school	$\frac{30}{40} \times 15 = 11.25$	11
Ogenya Girls Sec. school	$\frac{30}{40} \times 4 = 3$	3
St. Paul Mboya Sec. school	$\frac{30}{40} \times 4 = 3$	3
Jonyo Mixed sec. school	$\frac{30}{40} \times 6 = 4.5$	5
Miranga Mixed sec. school	$\frac{30}{40} \times 8 = 6$	6
		$\sum n = 30$

From the computations above, sample details are as summarized in table 3 below:

SCHOOLS	Location			
		N	n	%
OjijoOteko Sec. school	Apida	3	2	66.67

Oriwo Boys High school	Kandiege	15	11	73.7
Ogenya Girls Sec. school	Pala	4	3	75
St. Paul Mboya Sec. school	Apida	4	3	75
Jonyo Mixed sec. school	Kanam	6	5	83.3
Miranga Mixed sec. school	KokothKataa	8	6	75
TOTAL		40	30	75

3.4 Data collection

Data collection techniques employed were two, which are use of developed questionnaire and adoption of interview schedules. The methods are employed because for works involving human beings, no single source of information can be trusted to provide a wholesome point of view in any study program due to skewedness that may arise and different human point of notice. Therefore, preferably, using several methods of data collection help improve on the reliability and validity of the data collected (Smith, 1975, 2005). This use of combined data collection methods and sources such as interviews and questionnaires increase the validity and reliability of the information since the plus of one approach pays back for the demerit of former approach.

The main technique applied was the use of questionnaire due to the multiple merits it exhibits while on use comparatively. Mugenda and Mugenda (2003) portrays questionnaire to be easier to administer as compared to interview. They also promote confidentiality as the since it covers a comparatively wider range of area and also reaches more respondents at an affordable rate in terms of monetary value. It has also proved to be time saving. Instruments used were developed questionnaires and interview schedules.

CHAPTER FOUR

FINDINGS, PRESENTATION AND INTERPRETATION

4.1 Introduction

The chapter four shows the outcome of study findings. It is divided into four major areas which are the demographic aspects of the teacher respondents, consolidated response outcome and findings interpretation in response to study objectives of this research work.

4.2 Respondents demographic details

The information obtained on the respondents was on gender, age, teaching experience and level of education far achieved by each as stipulated in the questionnaire. The above-mentioned details are tabulated below:

Table 4.1 Respondents by gender

Gender	Number	Percent	Principal	Percent
Male	19	63.3	5	83.3
Female	11	36.7	1	16.7
Total	30	100	6	100

From the data obtained in the six sampled schools, findings indicate that: Majority of the secondary school teachers are males by gender. Both boys' schools and mixed schools are headed majorly by male principals. Girls' schools are under the management of female principals.

The result herein implies that in most Kenyan schools as exemplified by the sample, most biology teachers are males across the country. Also, most Kenyan schools encompassing both boys' schools and mixed schools are dominated by male principals.

Table 4.2 Teacher respondents' age distribution

Age (years)	Number	Percent
25-30	1	3.3
31-40	6	20
41-50	17	56.7
Above 50	6	20
Total	30	100

From the age details gathered above it shows that: Most secondary school biology teachers are in the class of 41-50 years by age. Few secondary school biology teachers are above 50 years by age. Only a handful manage to teach biology at the age of below 30 years.

Due to the small percentage of tender biology teachers, it can therefore be said that the influx of biology teachers is very low and thus a shortage might strike in the near future, or rather, more biology teachers will have to be hired in the near future to fill the gap yet to be left by those who are almost nearing the retirement age.

Table 4.3 Demographics on teaching experience.

Experience	Number	Percent
0-10	5	16.7
11-20	21	70
Above 20	4	13.3
Total	30	100

Majority of the secondary school biology teachers have a teaching experience of between 11 – 20 years. Very few have below ten years and above 50 years of teaching experience. It is therefore satisfactory of the response given by such a population of experienced professionals and such information given by such is absolutely a true reflection of the actual situation on the ground, the schools at that and the students.

Table 4.4 Demographics on respondents' level of education

Education level	number	Percent
Diploma	10	33.3
Degree	20	66.7
Post-graduate	0	0.0
Total	30	100

The education distributions reveal that: Majority of the biology teachers are degree holders. One out of every three biology teachers are a diploma holder. None or almost none of the biology teachers pursue further education beyond the graduate level.

From the above findings, all the biology teachers in the Kenyan secondary schools are learned and qualified for their work, with most of them having learnt up to bachelor's level. Hardly do secondary school biology teachers enroll and learn beyond the degree level of education.

4.3 Consolidated Responses

Herein are the tables on consolidated respondents' responses in the various categories of entries as portrayed in the questionnaire.

Table 4.5: Consolidated respondents' responses

Item (traits observed in students by teachers)	Strongly agree (SA)	Agree(A)	Disagree(D)	Strongly disagree (SD)	TOTAL
Creativity	5	20	5	0	30
Academic self-improvement	10	15	4	1	30
Cooperate in groups	0	22	8	0	30
Are punctual	1	25	2	1	30
Are flexible	0	10	19	8	30
Are organized	0	15	10	5	30
Study frequently	6	18	15	0	30
Consult frequently	5	10	4	2	30
Show class improvements	2	20	5	0	30
Discuss frequently	10	10	16	0	30
Display artistic skills	5	5	10	2	30
Curious to learn	5	15	5	0	30
Listen and follow rules	8	10	20	0	30
Show originality in deeds	8	2	18	0	30
Average points are pleasant	0	8	12	0	30

The results above from the teachers' responses portray that: Majority of students are creative in their work. A half population of students shows individual improvements. Over 50% of students are punctual in their deeds Most students are rigid to system rules and instructions. 50-50 chances are that students are organized in their activities. For every student's population, only 50% study and discuss biology frequently. A third of a student's 'population show great artistic skills. For a particular student fraternity, only 40% show originality in their work.

It is therefore conclusive to say that only about half of every student population conform to school system orientation. This therefore, directly translates to the minimal biology scores and therefore the mean score at large. Only very few students manage to do exhibit the right traits, do the right thing and thus perform to the required levels in biological sciences.

4.4 Distribution of trait outcome versus biology school mean scores

Table 4.6 Mean versus response outcome

	Oriwo Boys High School				Ogenya Girls sec. sc.				Miranga sec. school				Jonyo Mixed sec.				Ojjo Oteko sec. School				St. Paul's sec. school			
	SA	A	D	SD	SA	A	D	SD	SA	A	D	SD	SA	A	D	SD	SA	A	D	SD	SA	A	D	SD
Openness	8	20	5	0	2	4	3	0	2	11	3	2	3	10	2	0	0	0	6	0	0	0	9	0
Percentages	84.84%		15.16%		66.67%		33.33%		72.22%		27.78%		86.67%		13.33%		0%		100%		0%		100%	
Conscientiousness	7	20	6	0	0	0	9	0	0	7	7	4	5	11	0	0	0	0	2	4	0	2	7	0
Percentages	81.82%		18.18%		0%		100%		38.89%		61.11%		100%		0%		0%		100%		22.22%		77.78%	
Motivation	9	19	16	0	3	4	5	0	2	6	14	2	2	18	0	0	0	2	6	0	0	3	8	1
Percentages	63.64%		36.36%		58.33%		41.67%		33.33%		66.67%		100%		0%		25%		75%		25%		75%	
Intelligence	15	25	10	5	3	12	0	0	5	1	20	4	5	15	5	0	0	0	8	2	0	7	2	6
Percentages	72.72%		27.28%		100%		0%		20%		80%		80%		20%		0%		100%		46.67%		53.33%	
Biology average scores 2018-21 K.C.S.E.	6.232				3.763				2.600				4.798				1.833				2.636			

Percentage values of between 100 – 75% implies a greater direct influence of the factors in performance if agreed or strongly agreed by the respondents. Percentages between 75 – 50% implies direct influence exists in medium levels, both sides favored if agreed and or strongly agreed. Percentages below 50% is agreed and strongly agreed imply no influence of the factor in consideration in performance. Percentages above 50% for disagreed and strongly disagreed against mean score averages of 3.0 downwards imply the factors in consideration influence performance in biology.

4.5 Pearson's correlation coefficient between personality factors and performance in biological sciences

Table 4.7: Correlation coefficients of Performance in biology against personality factors under study

BIOLOGY MEAN SCORE	OPENNESS (% A & SA)	COSCIENTIOUSNESS (% A & SA)	INTELLIGENCE (% A & SA)	MOTIVATION (% A & SA)
6.232	85	82	72	64
3.763	67	0	100	58
2.6	72	39	20	33
4.798	87	100	80	100
1.833	0	0	0	25
2.636	0	22	47	25
CORRELATION COEFFICIENTS, R	0.7565	0.7665	0.7136	0.7624

Correlations coefficient dictates the link therein between student personality traits and performance in biological sciences. Positive coefficients of between 0.5 –1.0 indicate great positive influence of the trait on performance in biology; 0 – 0.5 coefficient indicate little or no influence while negative coefficient indicates a greater negative influence of the trait on biology performance.

From the correlation coefficient of personality traits and performance above, all the coefficients are greater positives, an indication that there is a direct, positive influence, a greater one for that matter, of the personality traits (openness, conscientiousness, intelligence and motivation) on students' performance in biological sciences, typically biology. Exhibition of the personality traits by biology students play a significant role in their academic outcome in the subject.

4.6 Influence of openness on students' performance in biological sciences

Openness has an influence on students' performance in the biological sciences, as portrayed in the data herein. Higher mean scores in the KCSE biology (6.232 and 4.798) coincide with greater percentages on the strongly agreed and agreed (84.84% and 86.67%), as postulated in the Oriwo boys High and Jonyo secondary schools' data above. This further emphasizes the

direct influence of openness on students' performance. On the other hand, 100% as portrayed in Ojijo Oteko and St. Paul's sec. school in the above data for the disagreed and strongly disagreed further show that lack of openness among students result in poor performance as shown by the respective low average scores of 1.833 and 2.636 respectively hence direct influence, aligning with the findings of Nofle& Robins, (2007).

4.7 Influence of intelligence on students' performance in biological sciences

High KCSE mean scores (6.232, 4.798 and 3.763) correspond to higher percentages (72.72%, 80% and 100%) on strongly agreed and agreed responses as shown by Oriwo Boys, Ogenya and Jonyo schools' respondents herein. This implies that aspects of intelligence directly relate to the students' performance. However, students of low intellectual capability recorded low mean scores such as 1.833, 2.600 and 2.636 with such schools recording lower percentages on the positive responses from the respondents (100%, 80% and 53.33%) respectively. Such students hardly exhibit aspects of intelligence as shown by the higher percentage entries for the disagreed and strongly disagreed.

4.8 Influence of conscientiousness on students' performance in biological sciences.

Oriwo Boys and Jonyo schools recorded higher percentages of 81.81% and 100% on agreed and strongly agreed categories, implying such students exhibit aspects of conscientiousness in their activities, resulting in better mean scores of 6.232 and 4.798 respectively. St. Paul's and Miranga schools on the other hand, recorded higher percentages of 77.78% and 61.11% on the disagreed and strongly disagreed implying that the students hardly showed aspects of conscientiousness in their deeds translating to the low performance shown by the low mean scores of 2.636 and 2.600 respectively, agreeing with the findings of Poropat and Arthur, (2009).

4.9 Influence of motivation on students' performance in biological sciences

Jonyo Mixed (0%), Ogenya Girls'(41.67%) and Oriwo Boys(36.36%) showed low entries for disagreed and strongly disagreed implying on a handful of the students did not exhibit aspects of motivation, with majority showing them in their deeds. This translated to the better performance as shown by the higher mean scores of 4.798, 3.763 and 6.232 respectively. Higher percentages were realized on the disagreed and strongly disagreed from Miranga(66.67%), Ojijo(75%) and St. Paul's (75%) implying that majority of the students therein did not show aspects of motivation in their school activities, thereby translating to poor performance as shown by the low mean scores of 2.600, 1.833 and 2.636 respectively.

CHAPTER FIVE

SUMMARY, CONCLUSION, DISCUSSIONS AND RECOMMENDATION

5.1 Introduction

This chapter incorporates discussion, conclusion and recommendations.

5.2 Discussion of findings

Influence of personality factors on performance in biological sciences has been explored in this study.

5.2.1 Findings on influence of openness on students' performance in biological sciences

Findings revealed that there is a direct influence of openness on student performance in biological sciences. This is attributed to their high levels of creativity, which enable them foresee quicker and shorter alternative and acceptable routes to solving scientific problems in class work. Their level of co-operation is also outstanding which help them carry out group studies, research and problem-solving assignment very fast, hence saving them time for more academic work big time. Due to their high-level of co-operation, such cohort of learners' experience and portray great improvement in their academic work hence better performance. Open students, therefore, tend to do better than introverts. Open students raise their concerns, pressing academic issues, areas of difficulty and ultimately get helped and progress well in their academic endeavors. Most introverts tend to keep to themselves pressing issues thus remain without suitable solutions and are therefore disadvantaged against their counterparts hence low performance.

5.2.2 Findings on influence of intelligence on students' performance in biological sciences.

Findings revealed that intellect level has a direct influence on students' performance in biological sciences. Students of high intelligence show greater artistic skills in their interactions in the surrounding, through which they create very fast solutions to scientific problems. They are also curious and this drives them towards search for knowledge hence cover broadly in academic work as expected for better performance. The deeds of this group of students are original and of their own unique kind unlike that of those of low intellectual capability. Intellectual students portray a greater average point comparatively due to their wholistic nature, that drives them to cover deeply all the subject areas, hence higher averages. Generally, students of high intellectual capability process biological concepts faster than their counter parts and usually have higher retention capability and memorability in comparison, thus the greater performance as portrayed in the findings.

5.2.3 Findings on influence of conscientiousness of students on their performance in biological sciences

Findings revealed that student conscientiousness has a direct influence on their performance in biology. This has been backed by the positive correlation between the students' performance and the aspects of this personality, agreeing with the findings of Marquart et al (1997). Highly conscientious students performed better than their counterparts with low conscientiousness. High conscientiousness is characterized by hard work, self-discipline and determination which guide such students to work towards their set targets. They are punctual in their deeds and managed their time well. Such students are also flexible to school regimes and programs with an element of organization in their day-to-day school activities. According to Chowdhury and Gosling (2008), organization, carefulness, discipline, goal setting and diligence of high level by these students enable them perform better than their counterparts, agreeing with this finding.

5.2.4 Findings on influence of motivation on students' performance in biological sciences

Findings revealed that there is great and direct influence of motivation on biology performance among students. Usually, highly motivated students perform better than their fellows who are less or not motivated. This is attributed to the fact that such cohort of student study widely on their subject areas, consult their seniors on the areas of challenge for effective understanding, they discuss heavily in their groups increasing the scope of coverage in the shortest time possible and ultimately experience greater scores improvements. Motivation also comes with greater and pleasant expectations on the side of the students when they are assured of awards and rewards. Students with such ultimate benefits in mind tend to work towards their targets uninterruptedly and do better than their counter parts with limited or no motivation.

5.3 Discussions

The positive correlation between the students' performance and conscientiousness, implying great influence, is in agreement with the findings of Marquart et al (1997). Similarly, findings of Komarraju et al., 2011 equally agree to the findings herein on conscientiousness to performance of students. The positive link between openness and performance in biological sciences is in agreement with the findings of Britwum et al (2022), Danay et al 2012, which relates such good performance to creativity, endurance and hard work. Intelligence plays a crucial role in student performance in biological sciences as portrayed by the positive correlation coefficient in this study, agreeing to the findings of Chamorro-Premuzic &

Furnham (2003). Finally, motivation equally is a key player in student performance in biological sciences as depicted by the greater positive coefficient in this study, concurring with the findings of Ritho (2015), Goodman et al., (2011).

5.4 Conclusion

Based on the data collected, analyzed and the findings derived herein, the following conclusions were made:

There was a significant positive difference between the student academic achievement in biology of students who are highly conscientious, performing better, and those who are of low conscientious or none at all, performing poorly.

There was a significant positive difference the students' academic performance in biology of students who are very open and those who are not. Open students perform relatively better than those who are not open.

There was a significant positive difference between the students' academic achievement in biology of students who are more motivated and those who are less motivated. Motivated students perform better than those not motivated.

There was a significant positive difference between academic achievement in biology of students of high intellectual capability and those of low intellectual ability. High intellect students perform better than their counterparts of low intellect.

There was a significant variation in performance in biology by students of good character than those with bad character.

5.5 Recommendations

Based on the findings in this study, the following recommendations are hereby submitted for adoption as a roadmap towards betterment of performance in biological sciences in secondary schools:

Teachers and parents should aim at shaping students' characters in order to suppress bad traits and only foster the good ones for better academic achievement in biological sciences.

Parents and teachers should encourage and train students to adopt self-discipline in order to always stay focused by planning well on academic matters and working on such guides. Teachers to identify conscientious cooperators and train them to tame others to follow suit on the path of discipline.

Teachers and parents to encourage students to be free and open, by holding friendly and non-academic talks with them where they can freely interact and share general issues about life. This will train them to be open on their pressing issues and challenges.

Parents and teachers to encourage hard work by installing motivation factors such as instant awards, rewards and other possible benefits accrued from good performance by students. This will raise their level of seriousness as they will be working hard aiming at something more real.

Teachers to encourage students of low intellectual ability to always stay consistent in their practice in academics to better their retention power and ultimately better their general performance.

Further studies to be conducted on the influence of intellect on student performance across the three domains of learning to correctly place different learners in their rightful places based on areas of potentiality and interest right from introduction into formal learning.

5.6 Suggestions for Further Research

There is need for research on the influence of institution type (sub-county, county, extra and national against delivery) on performance of students in biological sciences. This was triggered by students of same entry behaviors differing greatly in secondary performance in the higher-ranking high schools.

Further research needs to be conducted on the influence of setting trends on performance in biological sciences. This was stimulated by the extremely high scores in the biological sciences in the recent past which experienced drastic decline to-date.

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APPENDICES: Questionnaire

Instructions: Tick ($\sqrt{\quad}$) if agreed.

Gender	Male:	<input type="checkbox"/>	Female:	<input type="checkbox"/>	Age	<input type="checkbox"/>
Highest level of Education	B. Sc.	<input type="checkbox"/>	Dip. Ed. Sc.	<input type="checkbox"/>	M. Sc.	<input type="checkbox"/>

		Strongly disagree	disagree	agree	Strongly agree
1	Are the students creative in their work?	[]	[]	[]	[]
2	The students make academic self-improvements.	[]	[]	[]	[]
3	Do they co-operate when assigned collective work?	[]	[]	[]	[]
4	The students punctual on timed activities	[]	[]	[]	[]
5	Are students flexible to overstretching school programs?	[]	[]	[]	[]
6	Are they organized in their way of conducting school programs?	[]	[]	[]	[]
7	The students frequently study.	[]	[]	[]	[]
8	They frequently consult.	[]	[]	[]	[]
9	There is improvement in their academic work.	[]	[]	[]	[]
10	Students frequently engage in academic group discussions.	[]	[]	[]	[]
11	Students display artistic skills.	[]	[]	[]	[]
12	The students are always very curious to know and learn new things.	[]	[]	[]	[]
13	Students listen to rules	[]	[]	[]	[]
14	Students are original in their deeds	[]	[]	[]	[]
15.	Students point averages are good and pleasing	[]	[]	[]	[]

Thank you for your response