THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

STUDENTS' ITEM RESPONSE ANALYSIS REPORT ON THE FORM TWO NATIONAL ASSESSMENT (FTNA) 2022

BIOLOGY

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033 BIOLOGY

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FOREWORD

This report presents Students' Items Response Analysis (SIRA) on Form Two Biology National Assessment which was conducted in November 2022. The report aims to provide feedback to all educational stakeholders on the factors that contributed to the students' performance in Biology.

The Form Two National Assessment (FTNA) is a formative evaluation which intends to monitor students' learning to provide feedback that teachers, students and other educational stakeholders can use to improve teaching and learning respectively. This analysis shows justification for the students' performance in the Biology subject. The students who attained high scores had adequate knowledge of the assessed topics, ability to understand the demands of the questions and good drawing skills. However, the students who scored low marks faced difficulties in responding to the questions due to insufficient knowledge of the tested concepts, failure to understand the demands of the questions, poor proficiency in the English language and little drawing skills.

This report will help students to identify strengths and weaknesses for them to improve learning before sitting for their Certificate of Secondary Education Examination (CSEE). It will also help teachers to identify the challenging areas and take appropriate measures during teaching and learning.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will shed light on the challenges for which education stakeholders should take proper measures to improve teaching and learning of the Biology subject. Consequently, students will acquire knowledge, skills and competences indicated in the syllabus for better performance in future assessments and examinations.

The Council appreciates the contribution of all those who prepared this report.

Dr. Said Ally Mohamed
EXECUTIVE SECRETARY

1.0 INTRODUCTION

The report presents the analysis of responses provided by the students who sat for the Form Two National Assessment in Biology 2022. The FTNA paper in Biology was set in accordance with the NECTA format issued in the year 2021. The paper was based on 2005 Biology syllabus for secondary education, reprinted in 2012.

The assessment paper contained sections A, B and C. Section A consisted of two (2) objective questions. Question 1 consisted of 10 multiple choice items, while question 2 comprised five (5) matching items. Section B consisted of seven (7) short answer questions, whereas section C comprised one (1) essay question. The students were required to answer all questions in all sections.

The analysis shows that, the general performance in Biology FTNA 2022, was average because 297,344 (46.96%) students passed. The students performance in grades was as follows: A - 21,630 (7.27%), B - 23,475 (7.89%), C - 88,917 (29.90%) and D - 163,322 (54.93%). However, 335,847 (53.04%) students failed by scoring F grade. The students' performance in this year has decreased by 5.02 per cent when compared to 2021 Biology FTNA in which 312,777 (51.98%) students passed out of 601,746 students who sat for the paper.

Further, the report provides analysis of the students' performance on each question. It begins by explaining what the questions required and proceeds to analyse the students' performance. The report has highlighted the challenges that the students faced in responding to the questions and suggested the plausible reasons as to why they occurred. Extracts of responses from the students' scripts have been presented to show how they responded to the questions in view of the demand of each question. The analysis of the national assessment results were categorized into five score intervals, which are: 75 - 100 (excellent), 65 - 74 (very good), 45 - 64 (good), 30 - 44 (satisfactory) and 0 - 29 (fail). For the purpose of this report, the analysis of students' responses to a particular question were considered to be good, average or weak if: the percentage of the students who scored 30 percent or above of the marks allocated to the question fell within the range of 65 to 100, 30 to 64 and 0 to 29, respectively. Moreover,

the green, yellow and red colours have been used in charts and graphs to indicate good, average and weak performance, respectively.

2.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER QUESTION

This section analyses the performance of the students in each question and item in sections A, B, and C.

2.1 Section A: Objective Ouestions

This section comprised questions one (1) and two (2) which were multiple choice and matching items, respectively. The students were instructed to answer all questions.

2.1.1 Question 1: Multiple Choice Items

This question had 10 multiple choice items, carrying a total of 10 marks. For each of the items (i) to (x), the students were required to choose the correct answer from the given four (4) alternatives and write its letter (A, B, C or D) against the item number in the box provided. The items were extracted from eight (8) topics, which are: Nutrition, Safety in Our Environment, Gaseous Exchange and Respiration, Balance of Nature, Health and Immunity, Transport of Materials in Living Things, Introduction to Biology and Classification of Living Things.

The question was attempted by 634,781 (100%) students. Analysis shows that 144,641 (22.79%) students scored from 0 to 2 marks out of whom, 10,643 (1.68%) scored 0 in this question. The students who scored from 3 to 6 marks were 399,753 (62.97%) and 90,387 (14.24%) scored from 7 to 10 marks. Further analysis indicates that, only 2,224 (0.35%) students scored 10 marks in this question. Figure 1 summarizes the students' performance in this question.

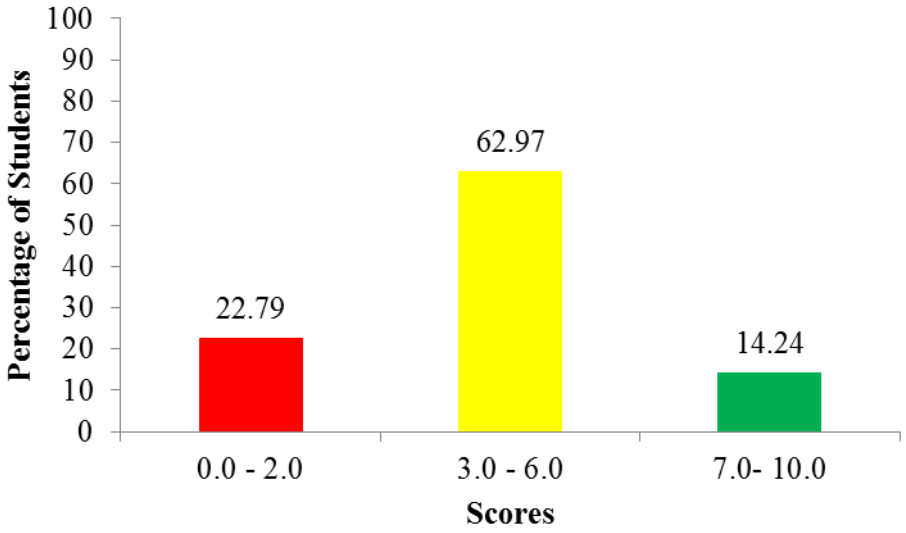


Figure 1: *Students' performance in question 1*

Figure 1 indicates that the performance on this question was good as 77.21 per cent scored from 3 to 10 marks. This shows that the students had adequate knowledge of the tested topics. The analysis of the items is presented as follows:

Item (i) *Farmers in a certain village found their maize crops have yellow leaves with dead spots at the margins and tips. Which mineral do maize crops lack ?*

A	*Calcium*	*B*	*Sulphur*
C	*Phosphorus*	*D*	*Potassium*

The correct response for this item was alternative *D, Potassium*. The students who chose *D, Potassium* were knowledgeable about the roles the of mineral elements in plants nutrition and their deficiency symptoms. On the other hand, the students who chose an alternative *A, Calcium* and *C, Phosphorus* failed to understand that calcium deficiency results into poor root growth and death of growing regions, while phosphorus deficiency results into poor growth of roots, leaves and branches and the leaves become reddish purple. Similarly, students who chose alternative *B, Sulphur* failed to realize that sulphur results into stunted growth and yellow patches on leaves.

Item (ii) *The Saranga Football Team's goalkeeper fell down during the match due to muscle cramps. Which component in the First Aid kit will you use to give him first aid?*

A	*Vaseline*	*B*	*Spirit*
C	*Liniment*	*D*	*Scissor*

The correct answer was alternative *C, Liniment*. Students who chose alternative *C, Liniment* had adequate knowledge of the components of First aid kit and their uses, therefore, they underststood that a liniment is used to reduce muscle pains. Conversely, students who chose alternative *A, Vaseline* and *B, Spirit* did not realize that vaseline is used for treatment of burns and scalds, while spirit is used as an antiseptic to clean wounds and reduce bleeding. Likewise, those who chose alternative *D, Scissor* were not aware that scissor is used for cutting dressing materials such as gauze or bandage.

Item (iii) *What is the main product of anaerobic respiration in animals?*

A	*Lactic acid*	*B*	*Alcohol*
C	*Water*	*D*	*Carbon dioxide*

The correct response for this item was alternative *A, Lactic acid*. The students who chose alternative *A, Lactic acid* had adequate knowledge about the process of anaerobic respiration in animals. Therefore, they understood that when glucose is broken down in the absence of oxygen, it produces lactic acid and energy. On the other hand, students who chose alternative *B, Alcohol*, and *D, Carbon dioxide*, failed to understand that alcohol and carbon dioxide are products of anaerobic respiration in plants. Similarly, those who chose alternative *C, Water* failed to understand that water is produced during aerobic respiration.

Item (iv) *Which organisms feed on primary consumers?*

A *Lion, Hyena and Leopard*
B *Leopard, buffalo and Giraffe*
C *Hyena, Zebra and Wildebeest*
D *Zebra, Wildebeest and Buffalo*

The correct answer for this item was alternative *A, Lion, hyena and leopard.* Students who chose alternative *A, Lion, hyena and leopard* had adequate knowledge about interactions of organisms in the environment.

Therefore they could easily recognize that primary consumers (herbivores) are the organisms which feed on green plants, while the organisms which feed on them are secondary consumers (carnivores). On the other hand, those who chose alternatives *B, Leopard, buffalo and giraffe*, *C, Hyena, zebra and Wildebeest* and *D, Zebra, wildebeest and buffalo,* failed to realize that even though leopard and hyena are secondary consumers, buffalo, giraffe, zebra and wildebeest are primary consumers which feed on plants.

Item (v), *If there is cholera outbreak in the nearby school, which way will you use to prevent the disease?*

A	*Killing mosquitoes*	*B*	*Covering nose when sneezing*
C	*Boiling drinking water*	*D*	*Eliminating rat fleas*

The correct answer for this item was alternative *C, Boiling drinking water*. Students who chose alternative C, *Boiling drinking water* were aware that cholera is spread through contaminated water or food, therefore, boiling water will kill microorganisms such as bacteria which might be present in the water, thus preventing the spread of the disease. Conversely, students who chose alternatives *A, Killing mosquitoes*, *B, Covering nose when sneezing* and *D, Eliminating rats and fleas* did not understand that killing mosquitoes prevents spread of malaria, covering nose when sneezing prevents spread of tuberculosis, and eliminating rats and fleas prevents spread of plague.

Item (vi), *Why screening of donors' and recipients' blood samples before transfusion important?*

A	*Ensuring compatibility*	*B*	*Preventing bleeding*
C	*Ensuring incompatibility*	*D*	*Enhancing coagulation*

The correct response was alternative *A, Ensuring compatibility.* Students who chose alternative *A, Ensuring compatibility* were aware of the precautions to be taken during blood transfusion that the donors' and the recepients' blood should be compatible to avoid agglutination. Conversely, students who chose alternative *B, Preventing bleeding*, *C, Ensuring incompatibility* and *D, Enhancing coagulation* did not understand that incompatibility results into agglutination which is extremely dangerous and

can cause death to the recipient, while coagulation is enhanced when a person is injured through formation of a blood clot to prevent bleeding.

Item (vii), *Which apparatuses are used for heating substances in the Biology laboratory?*

A Test tube holder and Thermometer
B Spirit lamp and Bunsen burner
C Bunsen burner and Thermometer
D Spirit lamp and Test tube rack

The correct response for this item was alternative *B, Spirit lamp and Bunsen burner.* Students who chose alternative *B, Spirit lamp and Bunsen burner* had adequate knowledge about common apparatuses and equipment of Biology laboratory and their uses. However, those who chose alternative *A, Test tube holder and thermometer*; *C, Bunsen burner and thermometer* and *D, Spirit lamp and test tube rack* failed to understand that although Bunsen burner and spirit lamp are used for heating substances, test tube holder is used to hold test tubes when they are being heated, thermometer is used to measure temperature, and test tube rack is used for storing test tubes so that they do not roll or break.

Item (viii), *Why is it necessary to chew food properly before swallowing?*

A Dissolves chemicals taken to the mouth
B Kills harmful organisms present in the food
C Helps digestive enzymes to penetrate the food
D Breaks down small pieces of food into large

The correct answer for this item was alternative *C, Helps digestive enzymes to penetrate the food.* The students who chose the correct answer had sufficient knowledge about parts of the human digestive system and their adaptive features. Those who selected distracters *A, Dissolve chemicals taken to the mouth* and *B, Kills harmful organism present in the food* did not recognize that one of the roles of saliva is to dissolve chemicals taken into the mouth while hydrochloric acid in the stomach kills harmful organisms such as bacteria which might enter the stomach with food. Similarly, those who chose alternative *D, Break down small pieces of food into large* failed to realize that chewing is done to break down large pieces of food into small for easy swallowing and digestive enzymes to penetrate.

Item (ix*), Which statement is true about virus?*

A It is active outside the host cell and dormant inside it
B It is active inside the host cell but dormant outside it
C It carries life processes when outside the host cell
D It has both DNA and RNA as genetic materials

The correct answer for this item was *B, It is active inside the host cell but dormant outside it.* Students who chose the correct answer had sufficient knowledge about viruses. Therefore, they could easily realize that since viruses have both living and non living characteristics, they are active inside a host cell but exist in a dormant state when outside the host cell. Those who chose *A, It is active outside the host cell and dormant inside it*, *C, It carries life processes when outside the cell* and *D, It has both DNA and RNA as genetic materials* failed to understand that viruses are active and also carries life processe inside a host cell. Also, virus have either DNA (Deoxyribonucleic acid) or RNA (Ribonucleic acid) as genetic material, but not both.

Item (x*), How is plaque is transmitted from one person to another?*

A Through sexual intercourse with an infected person
B By contact with water containing parasitic larvae
C Through tsetse fly bites from infected to a health person
D Through rat fleas bites from infected to a health person

The correct answer was alternative *D, Through rat fleas bites from infected to a health person.* Students who chose the correct alternative had adequate knowledge of infections and diseases specifically on modes of transmission. However, those who chose alternative *A, Through sexual intercourse with an infected person* did not understand that sexual contact is a way of transmitting diseases such as HIV/AIDS, gonorrhea and syphilis. Those who chose *B, By contact with water containing parasitic larvae* and *C, Through tsetse fly bites from infected to a health person* disease failed to realize that these are modes of transmission of bilharzia/bilharziasis and sleeping sickness, respectively.

2.1.2 Question 2: Matching items

The question consisted of five (5) items for matching derived from the topic of Introduction to Biology. In this question, students were required to match descriptions of warning signs provided in **List A** with the corresponding warning sign label in **List B** by writing the letter of the correct response below the item number in a table provided.

List A		***List B***	
(i)	*Substances which are dangerous and may cause death.*	*A*	*Corrosive*
(ii)	*Substances which can catch fire easily.*	*B*	*Explosive*
(iii)	*Substances which emits harmful radiation.*	*C*	*Toxic*
(iv)	*Substances which can damage the skin and other tissues.*	*D*	*Irritant*
(v)	*Substances containing microbes which can cause diseases.*	*E*	*Fragile*
		F	*Flammable*
		G	*Biohazard*
		H	*Radioactive*

The question was attempted by 634,781 (100%) students. Analysis shows that 67,706 (10.69%) students scored from 0 to 1 marks; out of whom 22,782 (3.59%) scored 0. The students who scored from 2 to 3 marks were 203,649 (32.08%) and 363,269 (57.23%) students scored from 4 to 5 marks in this question. Figure 2 summarizes the students' performance in question 2.

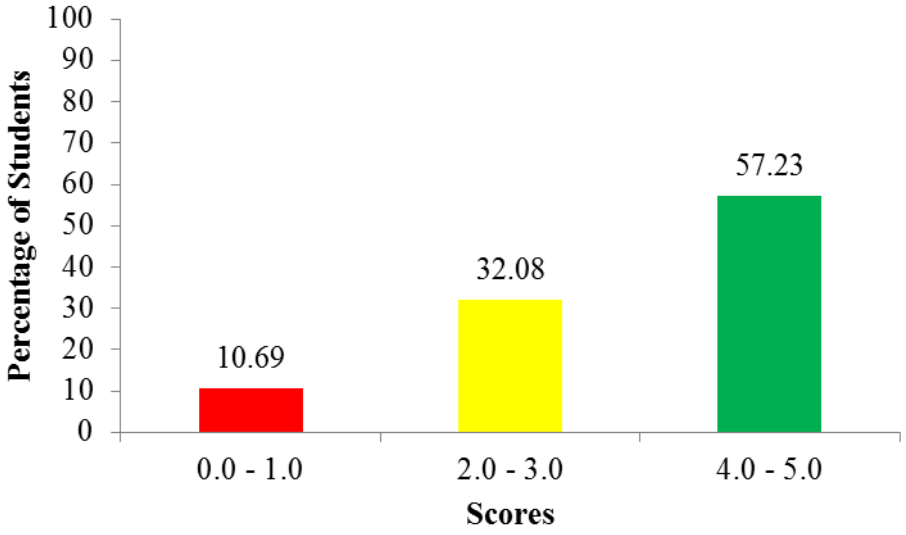


Figure 2: *Students' performance in question 2*

Figure 2 shows that students' performance on question 2 was good because 89.31 per cent of the students scored from 2 to 5 marks. Further analysis indicates that 187,332 (29.51%) students scored all the five (5) allocated marks in this question. The students who scored full marks had adequate knowledge about (Introduction to Biology) specifically on the Biology laboratory. Extract 1.1 shows a response from a student who matched the descriptions of warning signs correctly.

Answer

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	C	F	H	A	G

Extract 1.1: A sample of the student's correct responses to question 2

In Extract 1.1, the student matched correctly the descriptions of warning signs with the warning signs label, thus scored full marks. This indicates that the student had adequate knowledge about the assessed concepts.

On the other hand, those who scored low (0 - 1) mark had little or no knowledge of Biology laboratory. Analysis of the item responses is presented as follows:

Item (i) required the students to select a response which correctly matches with a description of substances which are dangerous and may cause death. The correct answer was *C, Toxic.* However, some students wrote alternative *D, Irritant.* These students failed to understand that irritant label represents substances which can cause discomfort and reddening or blistering of the skin.

Item (ii) required the students to select a response which correctly matches with a description of substances which can catch fire easily. The correct answer was *F, Flammable.* Most students matched it correctly, showing that they had adequate knowledge of the Biology laboratory.

Item (iii) required the students to select a response which correctly matches with a description of substances which emits harmful radiation. The correct answer was *H, Radioactive.* However, some students wrote alternative *E, Fragile.* These students failed to understand that fragile label represent substances which can break easily.

Item (iv) required the students to select a response which correctly matches with a description of substances which can damage the skin and other tissues. The correct answer was *A, Corrosive.* Most of the students provided the correct response, signifying adequate knowledge of Biology laboratory. However, other students chose alternative *G, Biohazard.* These students failed to understand that biohazard label represents substances containing microbes which can cause diseases.

Item (v) required the students to select a response which correctly matches with a description of substances containing microbes which can cause diseases. The correct answer was *G, Biohazard.* Most of the students provided the correct response. Conversely, some lacked knowledge of interpretation of warning signs in the Biology laboratory, hence, chose *B, Explosive.* They failed to understand that explosive label represents substances which can explode easily. Extract 1.2 is a sample of a student's incorrect responses.

Answer

List A	(i)	(ii)	(iii)	(iv)	(v)
List B	D	G	B	F	A

Extract 1.2: A sample of the student's incorrect responses to question 2

In Extract 1.2, the student failed to match all the items of the question. These responses suggests that the student had insufficient knowledge of the assessed concepts.

2.2 Section B: Short Answer Questions

This section consisted of seven (7) short answer questions, each carrying 10 marks.

2.2.1 Question 3: Gaseous Exchange and Respiration

The question had two parts: (a) and (b). In part (a), students were required to identify organs which are responsible for gaseous exchange in (i) Cow (ii) Frog (iii) Maize leaf and (iv) Fish. In part (b), students were required to justify in three points the statement "Plants can not survive without carrying out the process of gaseous exchange."

The question was attempted by 634,781 (100%) students. Analysis shows that 245,908 (62.03%) students scored from 0 to 2.5 marks, out of whom 233,391 (35.74%) scored 0 mark. The students who scored from 3 to 6 marks were 222,738 (35.09%), whereas 18,302 (2.88%) scored from 6.5 to 10 marks. Further analysis reveals that out of 18,302 (2.88%) students who scored 6.5 to 10 marks, 2,713 (0.43%) scored all the 10 marks. Figure 3 summarizes the students' performance in question 3.

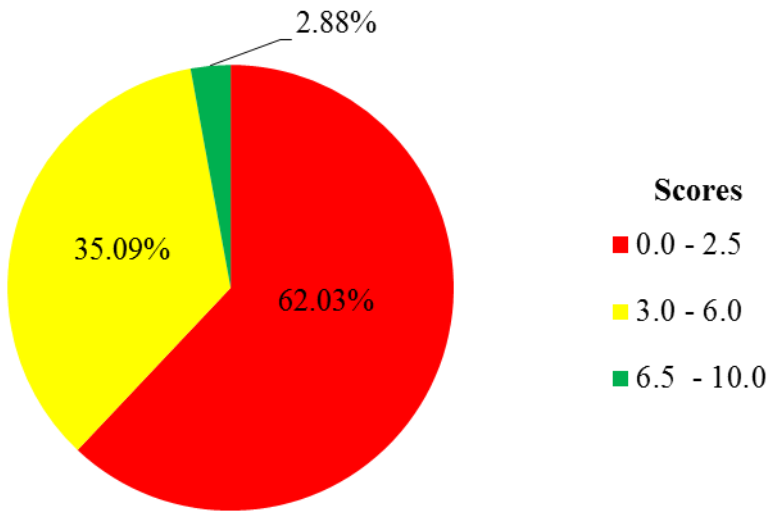
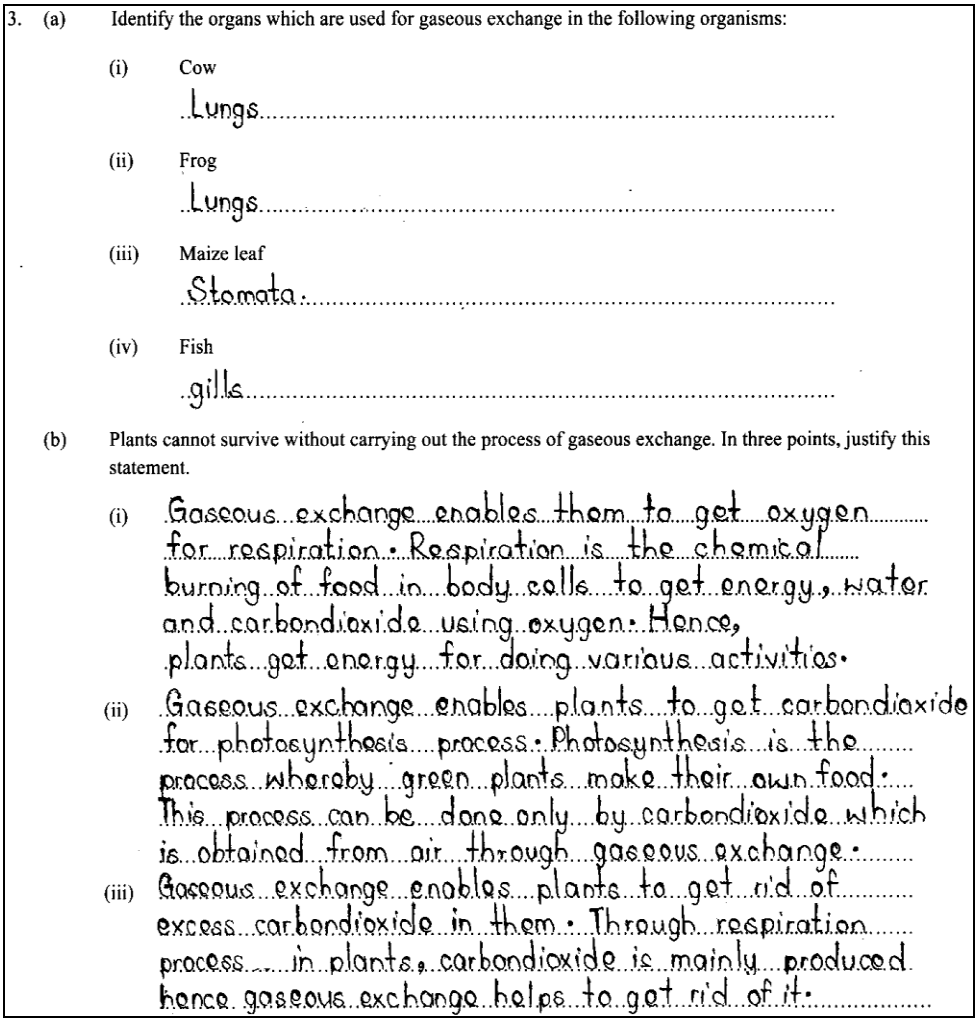


Figure 3: *Students' performance in question 3*

Figure 3 shows that students' performance on this question was average because only 37.97 per cent of the students obtained 3 to 10 marks out of the 10 marks allocated to this question. Students who scored high marks (6.5 - 10) had adequate knowledge of the concepts tested. Therefore, they correctly identified the organs responsible for gaseous exchange in cow, frog, maize leaf and fish. Also, they correctly justified the statement that plants cannot survive without carrying out the process of gaseous exchange in part (b). This shows that the students had adequate knowledge of the subtopics of the concept of gaseous exchange and gaseous exchange in plants. Extract 2.1 is a sample of a student's correct responses.



3. (a) Identify the organs which are used for gaseous exchange in the following organisms:

(i) Cow

Lungs

(ii) Frog

Lungs

(iii) Maize leaf

Stomata.

(iv) Fish

gills

(b) Plants cannot survive without carrying out the process of gaseous exchange. In three points, justify this statement.

(i) Gaseous exchange enables them to get oxygen for respiration. Respiration is the chemical burning of food in body cells to get energy, water and carbondioxide using oxygen. Hence, plants get energy for doing various activities.

(ii) Gaseous exchange enables plants to get carbondioxide for photosynthesis process. Photosynthesis is the process whereby green plants make their own food. This process can be done only by carbondioxide which is obtained from air through gaseous exchange.

(iii) Gaseous exchange enables plants to get rid of excess carbondioxide in them. Through respiration process in plants, carbondioxide is mainly produced hence gaseous exchange helps to get rid of it.

Extract 2.1: A sample of the student's correct responses to question 3

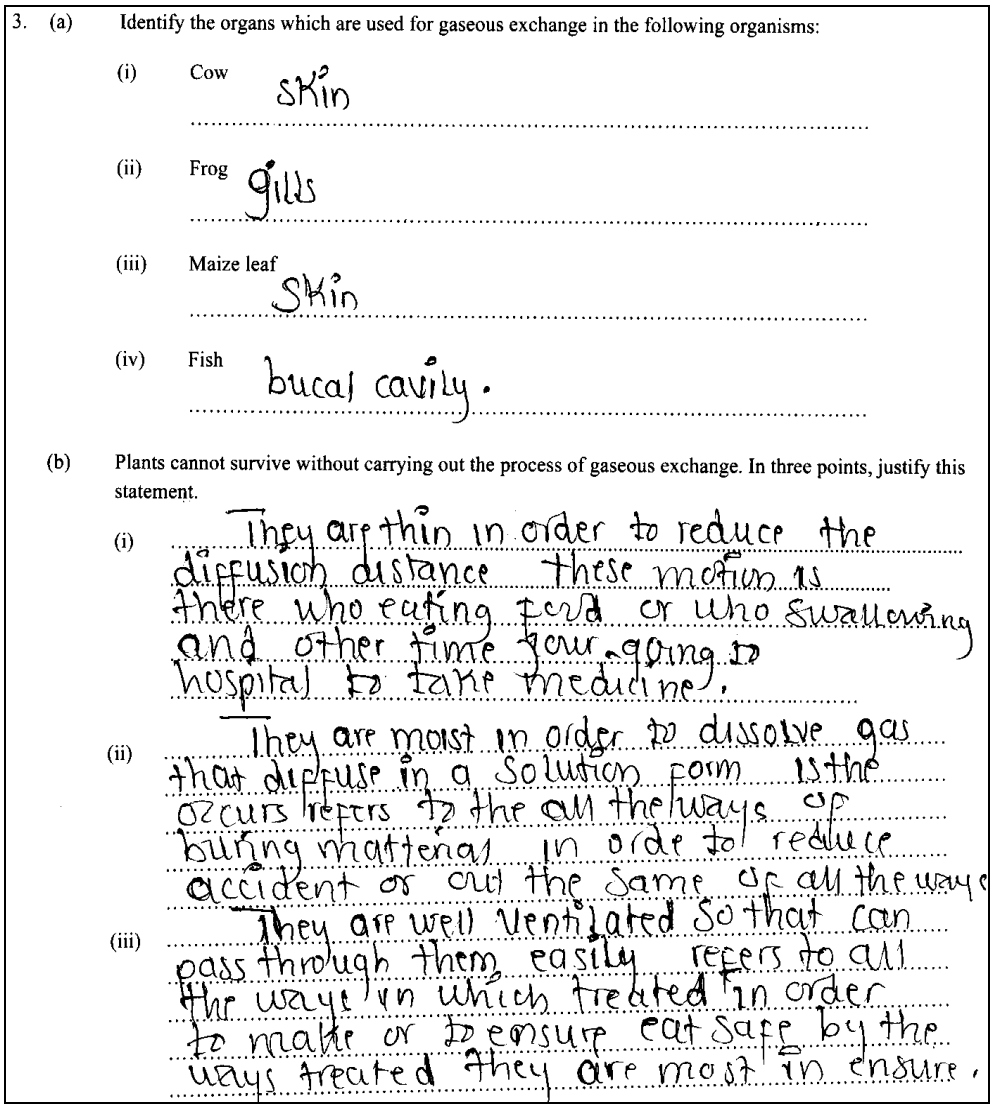
In Extract 2.1, the student correctly identified the organs responsible for gaseous exchange in part (a). Also, he/she correctly justified the statement that, plants can not survive without carrying out the process of gaseous exchange in part (b).

The students who scored average marks (3 - 6) identified the organs responsible for gaseous exchange in two to three organisms in part (a). Also, they gave one to two points in justifying the statement that plant cannot survive without carrying out gaseous exchange in part (b), hence could not score full marks.

The analysis shows further that the students who scored low marks (0 - 2.5) either did not understand the demands of the question or they lacked knowledge of the tested concepts, thus provided incorrect responses in all or most parts of the question. In part (a), most of the students wrote incorrect responses. For example (a) (i) some of the students wrote parts of the mammalian respiratory system such as *nose, mouth, ribs, trachea* and *diaphragm* instead of lungs. In part (a) (ii), some of the students wrote respiratory organ of insects as *trachea system* while others wrote *book lungs* which are respiratory organs for spider instead of lungs/skin/buccal cavity/mouth lining. In part (a) (iii), some of the students wrote parts of a plant as *roots* and *stems*. Others wrote parts of the leaf as *vein, mid rib* and *lamina* instead of stomata. Similarly, in part (a) (iv), most of the students wrote parts of the fish body as *fins, mouth* and *scales*. There were also other students who wrote other organs in the human body which are not respiratory as *liver, brain, stomach* and *kidney*. The incorrect responses provided by students indicate inadequate knowledge of the tested concepts.

Similarly, in part (b), students provided incorrect responses. For example, some of the students wrote the importance of photosynthesis as *it helps plants to manufacture food* and *converts sunlight energy into chemical energy*. Other students wrote *it helps to live, it helps to get air* and *it helps to manufature food*. Others wrote factors which affect the rate of gaseous exchange as *physical activity, age* and *concentration of carbon dioxide*. There were also other students who wrote the events which take place during gaseous exchange in mammals as *the intecostal muscles relax, diaphragm contract* and *the volume of the thoracic cavity increases.* Such

responses indicate that the students had inadequate knowledge of Gaseous exchange and respiration, specifically gaseous exchange in plants. Extract 2.2 is a sample of student's incorrect responses.


3. (a) Identify the organs which are used for gaseous exchange in the following organisms:

(i) Cow skin

(ii) Frog gills

(iii) Maize leaf skin

(iv) Fish bucal cavity.

(b) Plants cannot survive without carrying out the process of gaseous exchange. In three points, justify this statement.

(i) They are thin in order to reduce the diffusion distance these motion is there who eating food or who swallowing and other time four going to hospital to take medicine.

(ii) They are moist in order to dissolve gas that diffuse in a solution form is the ozcurs refers to the all the ways of burning mattenal in orde to reduce accident or cut the same of all the ways

(iii) They are well ventilated so that can pass through them easily refers to all the ways in which treated in order to make or to ensure eat safe by the ways treated they are most in ensure.

Extract 2.2: A sample of the student's incorrect responses to question 3

In Extract 2.2, the student incorrectly identified the organs in part (a). For example, he/she wrote *skin* and *buccal cavity* instead of lungs and gills in part (a) (i) and (iv). Also, he/she wrote characteristics of respiratory surfaces such as *they are thin to reduce diffusion distance* instead of justifying the statement that plants can not survive without carrying out the

process of gaseous exchange. The explanations given were incorrect as well.

2.2.2 Question 4: Introduction to Biology

In this question, students were required to draw the following apparatuses which are found in the Biology laboratory and state the use of each: (a) Spatula (b) Tripod stand (c) Test tube holder and (d) Filter funnel

The question was attempted by 634,781 (100%) students. Students who scored from 0 to 2.5 marks were 225,006 (35.45%) out of whom, 87,120 (13.72%) scored 0 in this question. Students who scored from 3 to 6 marks were 336,537 (53.01%), whereas 73,238 (11.54%) scored from 6.5 to 10 marks. Further analysis reveals that 10,370 (1.63%) students scored all the 10 marks. Figure 4 summarizes the students' performance in question 4.

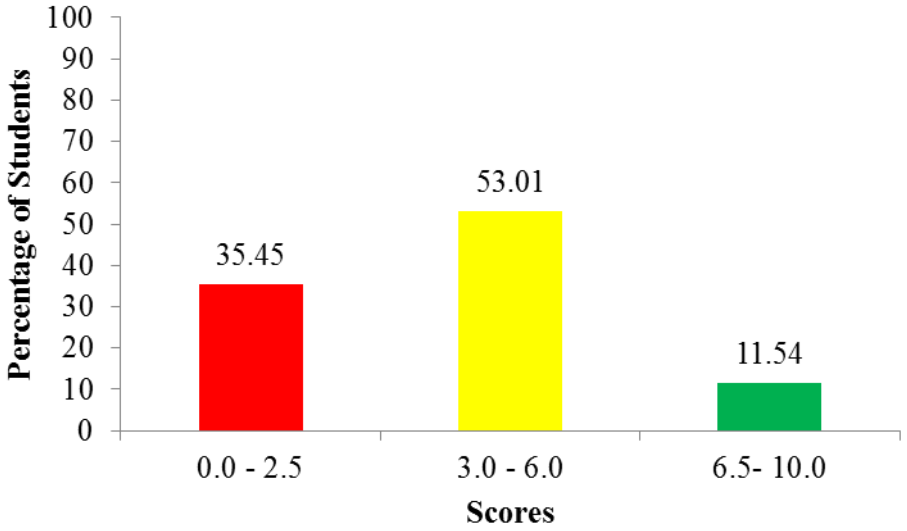
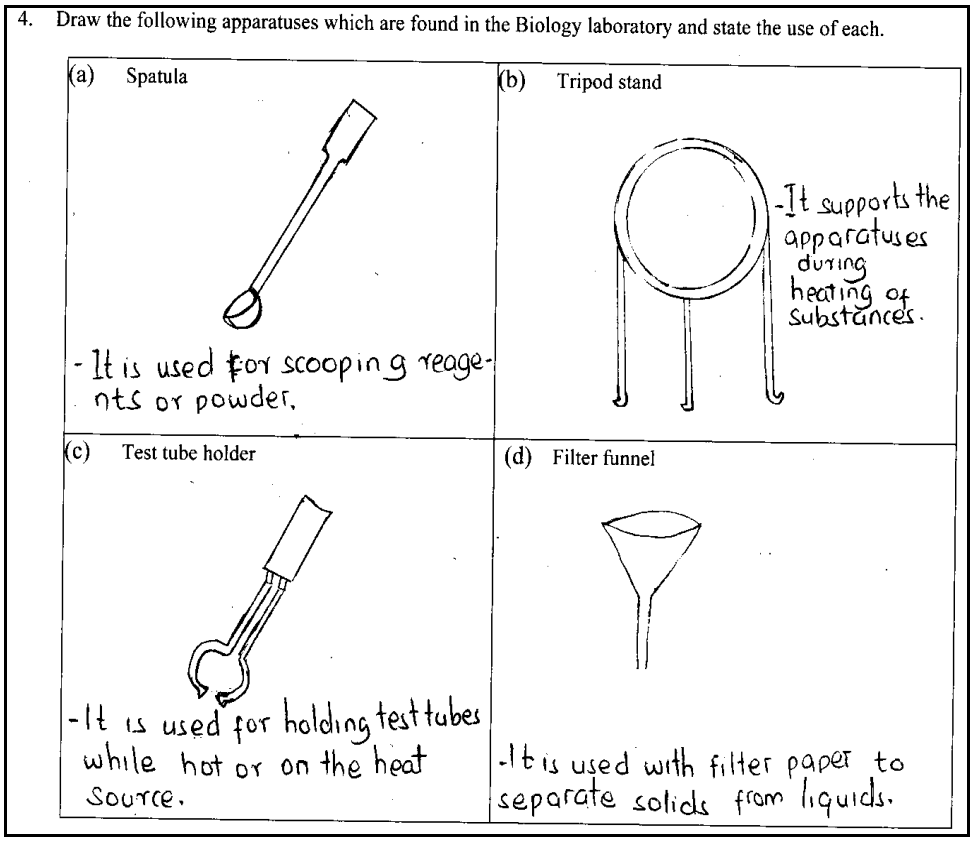


Figure 4: *Students' performance in question 4*

Based on Figure 4, students' performance on question 4 was average because 64.55 per cent scored from 3 to 10 marks out of the 10 marks allocated to this question. Students who scored high marks (6.5 - 10) had adequate knowledge of the Biology laboratory, and demonstrated good drawing skills. Therefore, they used pencil in drawing, drew large diagrams, drew in sharp lines, observed neatness and used free hand drawing. Extract 3.1 is a sample of student's correct responses.



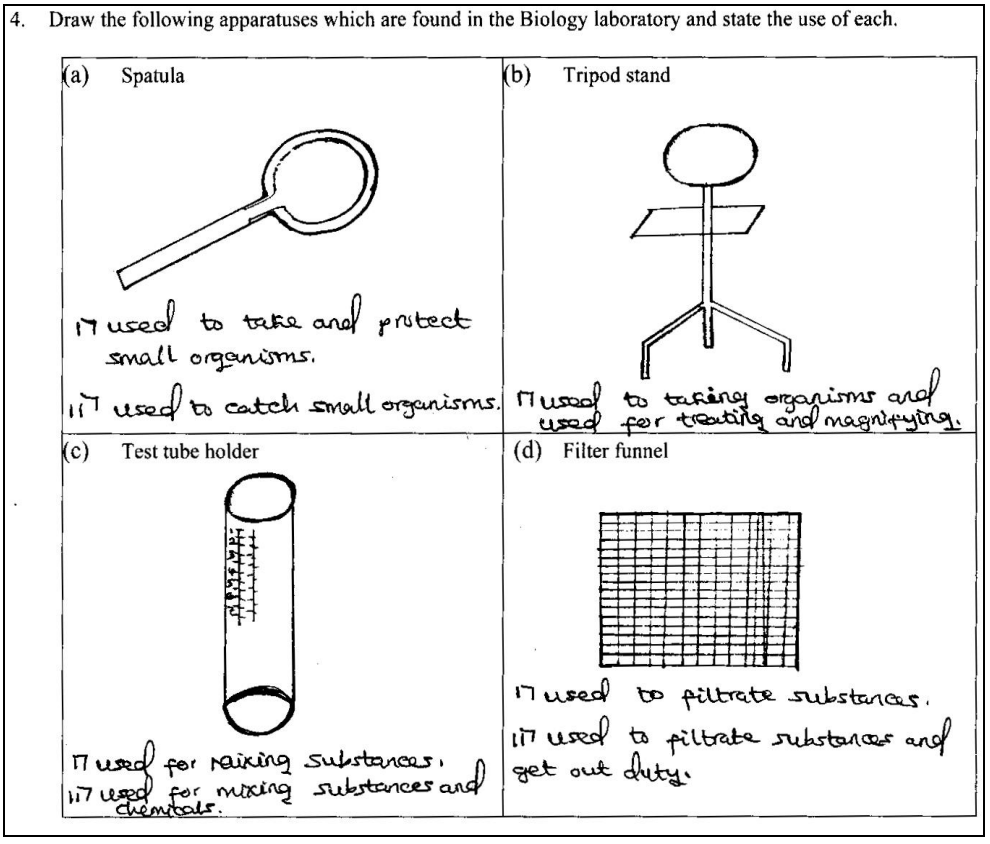
Extract 3.1: A sample of the student's correct responses to question 4

In Extract 3.1, the student correctly drew the apparatuses (a) spatula, (b) tripod stand, (c) test tube holder and (d) filter funnel and stated their uses.

Most of the students who scored average marks (3 - 6), managed to draw two to three apparatuses and stated their use. Also, other students stated the uses of each apparatus correctly but managed to draw only 1, hence loss of marks.

On the other hand, students who scored low marks (0 - 2.5) either gave incorrect responses to all parts of the question or to some parts, hence obtained 0 to 2.5 marks. Most of the students drew irrelevant apparatuses. For example, In part (a), some of the students drew tripod stand while others drew microscope and test tube instead of spatula. In part (b), some of the students drew thermometer and retort stand instead of tripod stand. In part (c), some of the students drew petri dish while others drew dropper and test tube rack instead of test tube holder. Likewise, in part (d), some of the students drew measuring cylinder instead of filter funnel. Furthermore,

some of the students wrote incorrect uses and failed to draw the apparatuses. There were other students who drew one correct apparatus but failed to state its use or wrote incorrect uses, hence loss of marks. For example, one student wrote the use of a spatula as *to hold liquids during heating experiments* instead of scooping/taking powder or crystalline substances or chemicals. Also, he/she wrote tripod stand is used *for keeping specimen during observation* instead of supporting apparatus during heating. Likewise, test tube holder is used to *hold chemical and to heat substances over a short period of time* instead of holding test tubes when they are being heated. The incorrect responses show that students lacked skills about laboratory apparatuses and their uses. Extract 3.2 illustrates the students' incorrect responses.



Extract 3.2: A sample of the student's incorrect responses to question 4

In Extract 3.2, the student drew hand lens, test tube and wire gauze instead of drawing spatula, test tube holder and filter funnel in parts (a), (c) and (d),

respectively. Also the uses stated in each apparatus and the apparatus drawn in part (b) were incorrect.

2.2.3 Question 5: Transport of Materials in Living Things

The question had two parts: (a) and (b). Students were given a statement, ‘‘Two people visited the hospital complaining of general body weakness. The doctor diagnosed them with sicke cell anaemia.’’ Then they were required to outline six symptoms of sickle cell anaemia in part (a), and state two ways they would recommend to control the disorder in part (b).

The question was attempted by 634,781 students. The analysis indicates that 501,964 (79.08%) students scored from 0 to 2.5 marks out of whom, 380,724 (59.98%) scored 0 in this question. A total of 120,677 (19.01%) students scored from 3 to 6 marks, whereas 12,140 (1.91%) scored from 6.5 to 10 marks. Further analysis reveals that 288 (0.05%) scored all the 10 marks. Figure 5 summarizes the students’ performance in question 5.

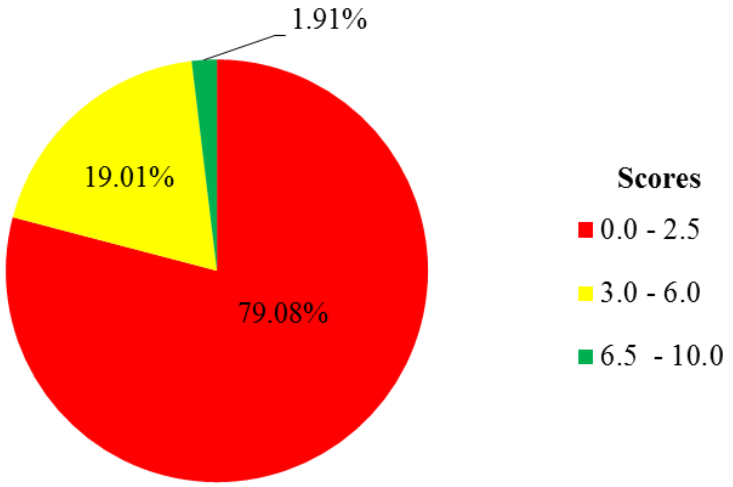


Figure 5: *Students’ performance in question 5*

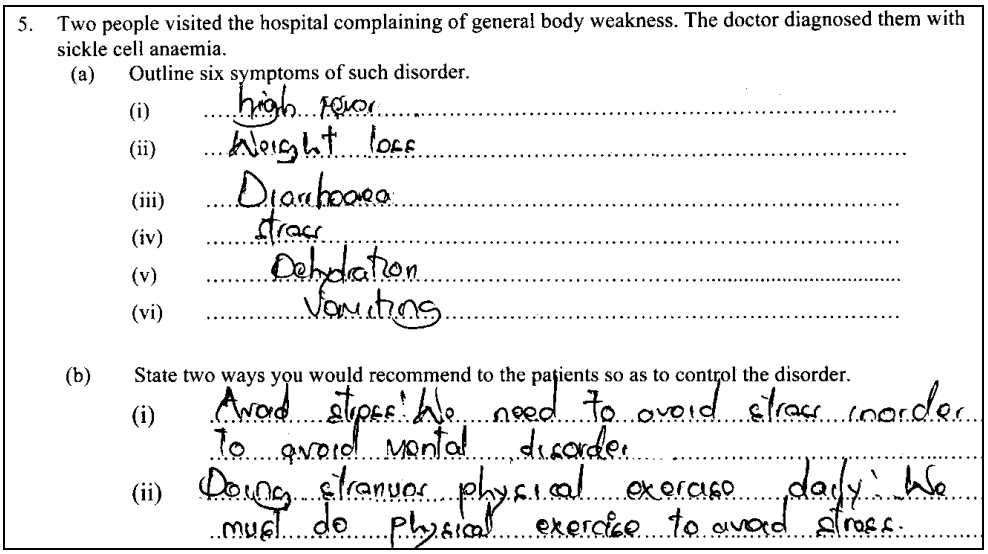
In view of Figure 5, students’ performance on question 5 was weak because 79.08 per cent scored 0 to 2.5 out of the 10 marks allocated to this question.

Students who scored low marks (0 - 2.5) had inadequate knowledge of disorders and diseases of the human blood circulatory system. In this category, there were some of the students who outlined one to two symptoms in part (a), therefore, scored 1 to 2.5 marks. Those who scored 0

had no knowledge, hence provided incorrect responses. Most of the students outlined the symptoms of communicable diseases. For example, in part (a), some of them outlined symptoms of tuberculosis as *frequent coughing, fever, night sweats, poor appetite* and *loss of body weight.* Others outlined symptoms of malaria as *nausea, chills, sweating, vomiting* and *pain in joints* while others outlined the symptoms of sexually transmitted diseases as *itching in the private parts, painful intercourse, pain when urinating, genital rashes* and *yellow discharge from the vagina*. Others outlined the symptoms of disorders of the human blood circulatory system other than the sickle cell anaemia. For example, some of them outlined the symptoms of diabetes as *frequent excessive thirsty, frequent urination, extreme thirsty, wound take time to heal, sugar in urine and feeling hunger* while others outlined the symptoms of high blood pressure as *nose bleed, chest pain* and *ringing in the ears.* There were also other students who outlined the symptoms of nutritional deficiency diseases. For example, some of the students outlined the symptoms of kwashiorkor as *skin becomes dry, thin arms and legs, protruding stomach, hair becomes soft* and *loss of appetite.* These students failed to understand that the symptoms of sickle cell anaemia are *Fatigue or excessive tiredness, Shortness of breath during exercises/Difficulty in breathing/Poor breathing, Headaches, Dark coloured urine, Abdominal pain/extreme pain/pain crises, Abnormal heartbeat, Frequent infections, Delayed growth or puberty in infants/children and teenagers, Vision problems, Swelling of the hands/feet, Jaundice/yellowish skin/eyes, Pale skin, Low oxygen in the blood/malaise, Low red blood cell count* and *Fainting.*

Similarly, in part (b), most of the students wrote incorrect responses. Some of them stated control measures of other circulatory system disorders. For example, some of the students stated control measures of leukaemia as *radiotherapy* and *chemotherapy*. Others stated control measures of high blood pressure as *keeping healthy weight* and *avoid taking too much oily foods.* There were also other students who wrote preventive measures of malaria as *clearing bushes, draning stagnant water, use antimalarial drugs* and *sleeping under mosquito nets* while others stated preventive measures of cholera as *boiling drinking water, eat hot food, wash hands and fruits before eating* and *vaccination* instead of control measures of sickle cell anaemia which are *Avoid excessive physical exercise, Eating a well-balanced diet/food rich in minerals and vitamins, Avoid smoking, Drink*

plenty of water, Medical treatment such as use of folic acid, Frequent blood transfusion, Stay in a well ventilated areas and *Bone marrow transplants.* Extract 4.1 illustrates the sample of students' incorrect response.



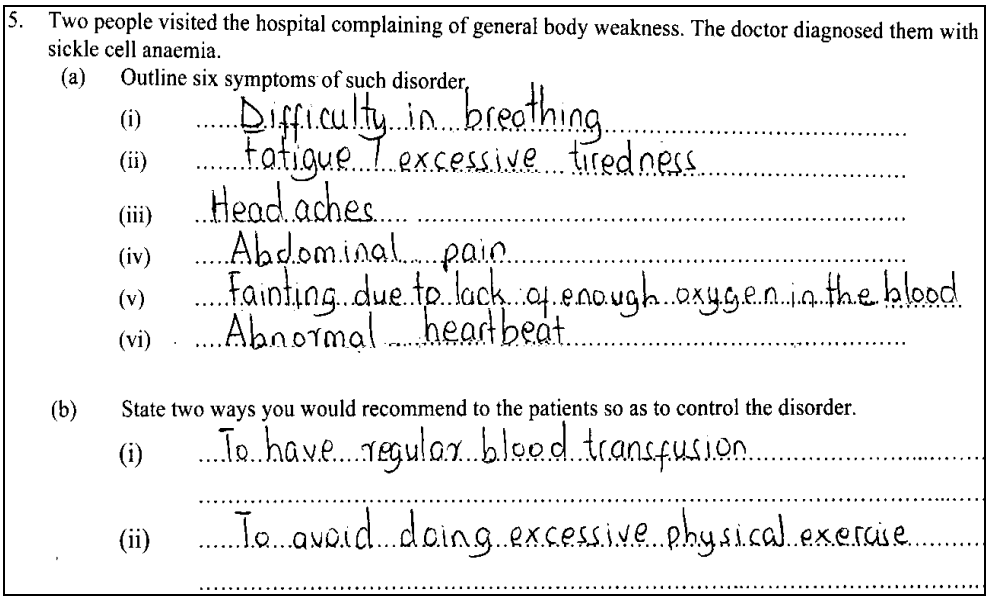
5. Two people visited the hospital complaining of general body weakness. The doctor diagnosed them with sickle cell anaemia.
   (a) Outline six symptoms of such disorder.
   (i) high rever
   (ii) Weight loss
   (iii) Diarhoaea
   (iv) stress
   (v) Dehydration
   (vi) Vomitions
   (b) State two ways you would recommend to the patients so as to control the disorder.
   (i) Avoid stress! We need to avoid stress disorder. To avoid mental dicorder.
   (ii) Doing stranuos physical exercise daily! We must do physical exercise to avoid stress.

Extract 4.1: A sample of the student's incorrect responses to question 5

In Extract 4.1, the student outlined the symptoms of cholera in part (a) (ii), (iii) and (vi) instead of symptoms of sickle cell anaemia. He/she wrote control measure of high blood pressure in part (b) (i) instead of measures to control sickle cell anaemia. Also, the other responses given were incorrect.

The analysis shows that for the students who scored average marks (3 - 6), majority obtained the marks in part (a) by outlining three to six symptoms of sickle cell anaemia. However, in part (b, they did not obtain any marks, hence, scored low marks.

The students who scored high marks (6.5 -10) had enough knowledge of disorders and diseases of the human blood circulatory system. Therefore, in part (a), they correctly outlined the six symptoms of sickle cell anaemia, and stated two ways to control sickle cell anaemia in part (b). Extract 4.2 is a sample of responses from students who scored high marks.


5. Two people visited the hospital complaining of general body weakness. The doctor diagnosed them with sickle cell anaemia.

(a) Outline six symptoms of such disorder.

(i) Difficulty in breathing

(ii) fatigue / excessive tiredness

(iii) Head aches

(iv) Abdominal pain

(v) Fainting due to lack of enough oxygen in the blood

(vi) Abnormal heartbeat

(b) State two ways you would recommend to the patients so as to control the disorder.

(i) To have regular blood transfusion

(ii) To avoid doing excessive physical exercise

Extract 4.2: A sample of the student's correct responses to question 5

In Extract 4.2, the student responded correctly by outlining the symptoms of sickle cell anaemia in part (a), and stated ways to control sickle cell anaemia in part (b).

2.2.4 Question 6: Cell Structure and Organisation

The question had two parts namely (a) and (b). In part (a), students were required to outline three similarities between plant and animal cells as seen under the light microscope. In part (b), they were required to draw a diagram of a plant cell as seen under the light microscope and label six parts.

The question was attempted by 634,781 students. Analysis shows that 169,804 (26.75%) students scored from 0 to 2.5 marks, out of whom 136,969 (21.58%) scored 0. Students who scored from 3 to 6 marks were 284,778 (44.86%), whereas 180,199 (28.39%) scored from 6.5 to 10 marks. Further analysis reveals that 10,651 (1.68%) students scored all the 10 marks. Figure 6 summarizes the students' performance in question 6.

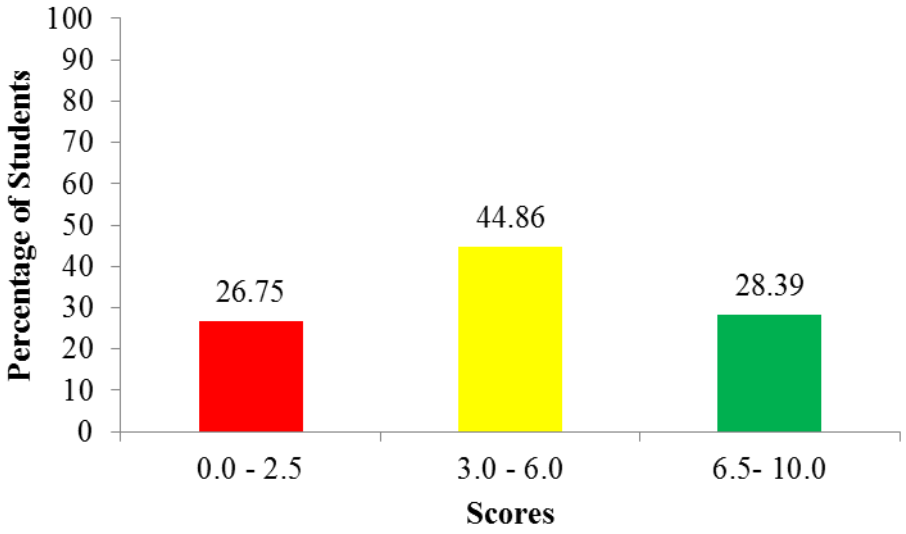


Figure 6: *Students' performance in question 6*

Figure 6 indicates that the students' performance on this question was good since 73.25% per cent scored from 3 to 10 marks, out of 10 marks allocated to this question.

The students who scored high marks (6.5 - 10) outlined the similaries between plant and animal cells in part (a) correctly. Also, they drew a diagram of plant cell as seen under light microscope correctly, and labeled six parts in part (b). This shows that, the student had adequate knowledge about the topic of Cell Structure and Organisation, specifically the concept of cell. Moreover, they followed the principles of biological drawing in drawing the diagram of a plant cell, such as use of pencil, large diagram, drawing in sharp lines, neatness, non-arrowed labeled lines, parallel/non crossing labelling lines, free hand drawing and caption. Extract 5.1 is a sample of the student's correct responses.

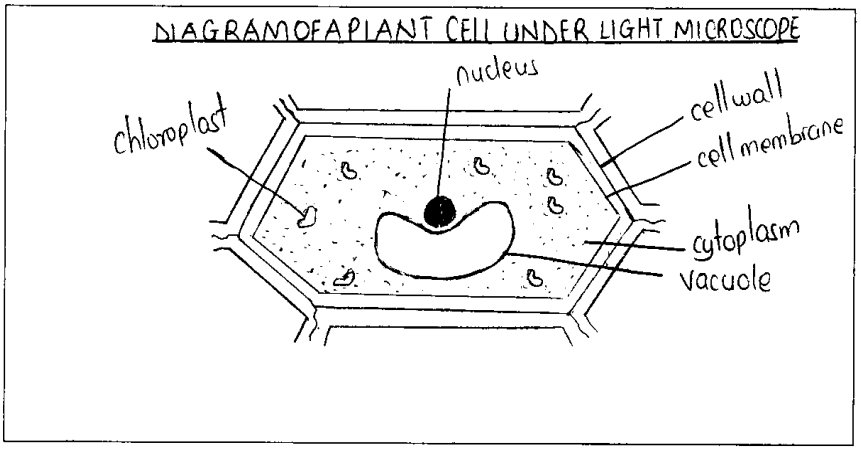
6. (a) Outline three similarities between plant and animal cells as seen under the light microscope.

(i) They have cytoplasm.

(ii) They have cell membrane.

(iii) They have nucleus.

(b) Draw a diagram of a plant cell as seen under the light microscope and label six parts.



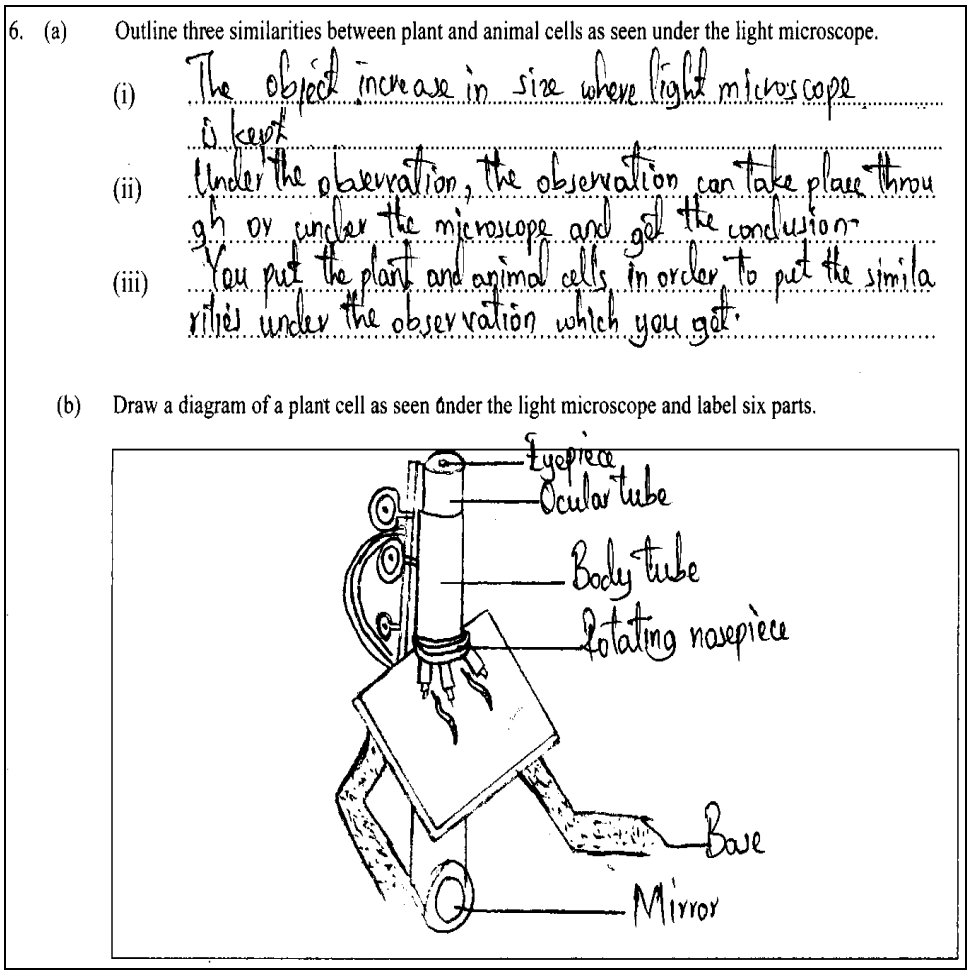
Extract 5.1: A sample of the student's correct responses to question 6

In Extract 5.1, the student outlined three similarities between plant and animal cells correctly in part (a). Also, he/she correctly drew a diagram of the plant cell as seen under the light microscope, and labelled six parts correctly in (b).

Majority of the students who scored average marks (3 - 6), provided one to two correct responses in part (a), and few could draw but labeled two to three parts in (b). Some mixed the similarities with differences between plant and animal cell, therefore, could not score full marks.

Despite the good performance on this question, 169,804 (26.75%) students scored 0 - 2.5 marks. For those who scored zero marks, they either did not understand the demands of the question or they lacked knowledge of the tested concepts, thus provided incorrect responses in all or most of the parts. In part (a), some of the students did not understand the demand of the question, and therefore, outlined the differences between plant and animal

cell instead of similarities as they wrote *plant cell has chloroplast while animal cell has no chloroplast, plant cell has cell wall while animal cell has no cell wall* and *plant cell has fixed shape while animal cell has no fixed shape*. Other students wrote the general features between plant and animal cell, but not as seen under light microscope as *they are microscopic, they store food* and *they are eukaryotic*. Others wrote types of cells in animal and plant body as *white blood cell, red blood cell, root hair cell* and *palisade cell*. There were also other students who wrote *they have cell, tissue, organs* and *system.* Likewise, in part (b) some of the students drew a diagram of animal cell instead of plant cell. Others drew a diagram of plant instead of a plant cell and labelled parts as *leaves, stems* and *roots*. Extract 5.2 is a sample of student's incorrect responses to question 6.



Extract 5.2: A sample of the student's incorrect responses to question 6

In Extract 5.2, the student drew structure of a microscope and labeled six parts, instead of drawing a plant cell as seen under the light microscope in part (b). Also, the responses given in part (a) were incorrect.

2.2.5 Question 7: Classification of Living Things

This question had parts: (a) and (b). Students were given a statement "Form Two students classified mosses and ferns into the same Division simply because they have chlorophyll for photosynthesis.'' In part (a), they were required to identify the system of classification used. In part (b), they were required to briefly explain four demerits of the identified system of classification in part (a).

This question was attempted by 634,781 students. The analysis indicates that 599,697 (94.47%) students scored from 0 to 2.5 marks. Out of whom, 543,181 (85.57%) scored 0 in this question. Students who scored from 3 to 6 marks were 22,895 (3.61%), whereas 12,189 (1.92%) scored from 6.5 to 10 marks. Further analysis shows that 4,170 (0.66%) students scored all the 10 marks. Figure 7 summarizes the students' performance on question 7.

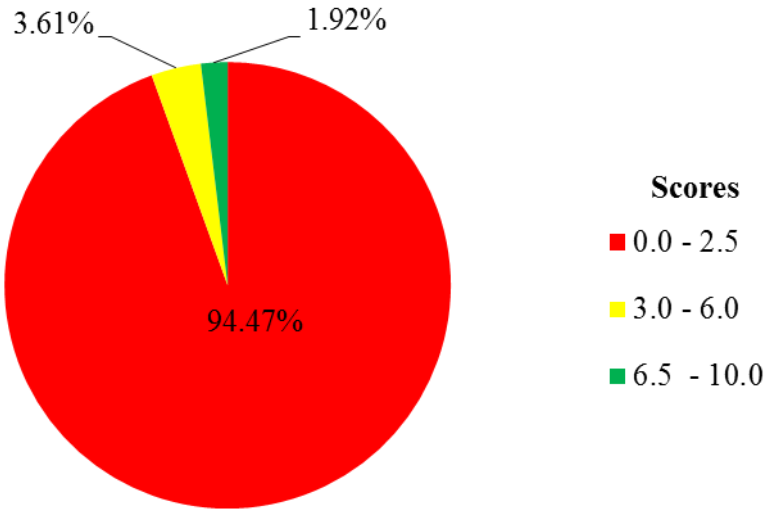


Figure 7: *Students' performance in question 7*

Based on Figure 7, the general performance on this question was weak because 94.47 per cent of the students scored 0 to 2.5 out of the 10 marks allocated to this question. Most of the students gave responses which were

contrary to the demands of the question. For instance, in part (a), most of the students wrote ranks of classification such as *Kingdom, Class, Phylum* and *Species* instead of artificial classification.

Likewise, in part (b), some of the students explained the characteristics of fern plants as, *They have leaf that bear spore-producing structures called sori, the leaves are arranged in clump known as fronds* and *they have vascular system.* Other students explained the characteristics of mosses as, *they lack vascular systems, they lack true roots, stems and leaves* and *they have rhizoids for absorption of water and minerals salts*. Other students defined the term clasification as *a process of grouping living organims according to their similarities and difference* in part (a), and explained the importance of classification in part (b). Others explained the advantages of ferns and mosses as *They are source of food to other organisms, they are used in the laboratory as specimen* and *they provide shelter for insects.* Some other students drew fern plant and moss plant instead of explaining the demerits of artificial classification. There were also other students who just outlined the demerits while others skipped the question. These responses shows that the students had inadequate knowledge about types of classification systems. These students were supposed to give explanation for the demerits such as: *Unrelated/dissimilar organisms may be grouped together, Related organisms may be placed in a separate group, It depends on scientist interest, It is less accurate, It does not allow predictions* and *It provides limited information about each member because it considers few external observable features*. Extract 6.1 is a sample of student's incorrect responses.

7. Form Two students classified mosses and ferns into the same Division simply because they have chlorophyll for photosynthesis.

(a) Which classification system did they use?

They used the natural system of classification.

(b) Briefly explain four demerits of the classification system used in 7 (a).

(i) The classification system is expensive, this system involves accurate classifying organisms, therefore different tools will be used this makes it relative expensive

(ii) The classification system acquire advanced skills, this type of classification requires more advanced skills as a person will need to learn and understand everything

(iii) The classification system is slow. It consumes alot of time, Since it requires classifying of internal and external features of organisms it consumes a lot of time

(iv) The classification system is based on evolutionary trend. This classification system involves knowing the function or roles of various parts of organisms, its origin and other trends.

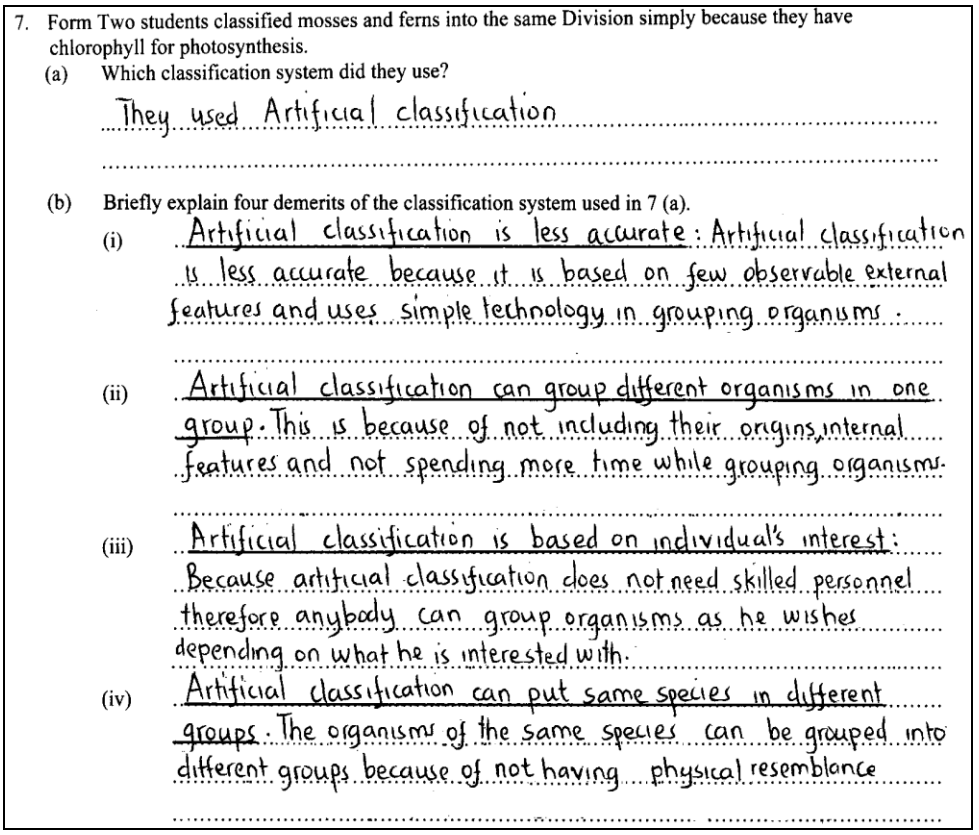
Extract 6.1: A sample of the student's incorrect responses to question 7

In Extract 6.1, the student wrote *natural classification* instead of artificial classification in part (a). Also, he/she explained the demerits of natural classification such as *the classification system is expensive* instead of explaining the demerits of artificial classification.

Despite the weak performance on this question, 22,895 (3.61%) students scored average marks (3 to 6). In this category, most of the students wrote correct response in part (a), but explained two to three demerits in part (b), hence, could not score full marks.

The students who scored high marks (6.5 – 10) were aware that even if mosses and ferns have chlorophyll for photosynthesis, they have other features which distinguishes them from each other. Therefore, they cannot be placed in the same division, hence, the system used to put them into same division is the artificial classification in part (a). They were also aware that organisms classified using this system will have the following

demerits: *Unrelated/dissimilar organisms may be grouped together, Related organisms may be placed in a separate group, It depends on scientist interest, It is less accurate, It does not allow predictions* and *It provides limited information about each member because it considers few external observable features*. Therefore, they correctly explained the demerits, hence, scored full marks in part (b). Extract 6.2 is a sample of student's correct responses.



7. Form Two students classified mosses and ferns into the same Division simply because they have chlorophyll for photosynthesis.

(a) Which classification system did they use?

They used Artificial classification

(b) Briefly explain four demerits of the classification system used in 7 (a).

(i) Artificial classification is less accurate: Artificial classification is less accurate because it is based on few observable external features and uses simple technology in grouping organisms.

(ii) Artificial classification can group different organisms in one group. This is because of not including their origins, internal features and not spending more time while grouping organisms.

(iii) Artificial classification is based on individual's interest: Because artificial classification does not need skilled personnel therefore anybody can group organisms as he wishes depending on what he is interested with.

(iv) Artificial classification can put same species in different groups. The organisms of the same species can be grouped into different groups because of not having physical resemblance

Extract 6.2: A sample of the student's correct responses to question 7

In Extract 6.2, the student correctly identified the classification system in part (a). Also, he/she explained the demerits of artificial system of classification in part (b).

2.2.6 Question 8 : Transport of Materials in Living Things

The question had parts (a) and (b). Students were given a statement, ‘‘Form Two students entered the biology laboratory and were provided with water, a tea bag, match box, beaker and a Bunsen burner.’’ Then they were required to use the materials and apparatues given to outline four procedures they would follow to demonstrate the process of diffusion in part (a). In part (b), students were required to briefly explain two importance of diffusion process to living organisms.

The question was attempted by 634,781 students. Analysis shows that 552,141 (86.98%) students scored from 0 to 2.5 marks; out of whom 518,002 (81.60%) scored 0. The students who scored from 3 to 6 marks were 56,139 (8.85%) and 26,501 (4.17%) students scored from 6.5 to 10 marks. Further analysis shows that 7,368 (1.16%) students scored all the 10 marks. Figure 8 summarizes the students’ performance in question 8.

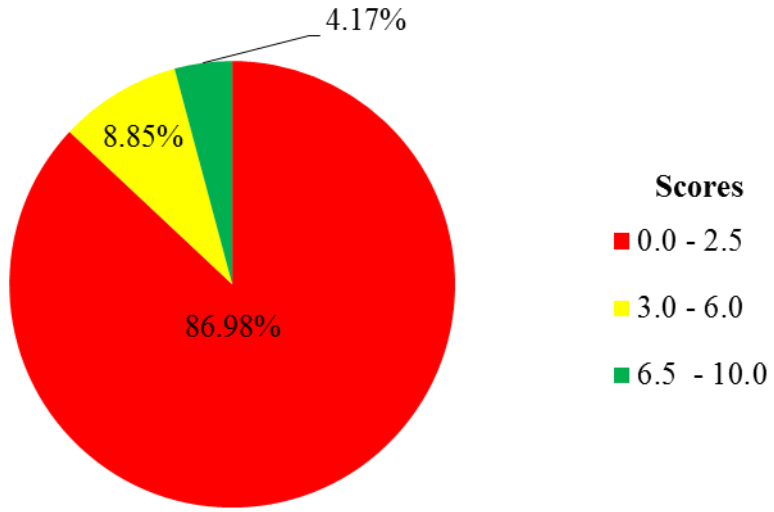


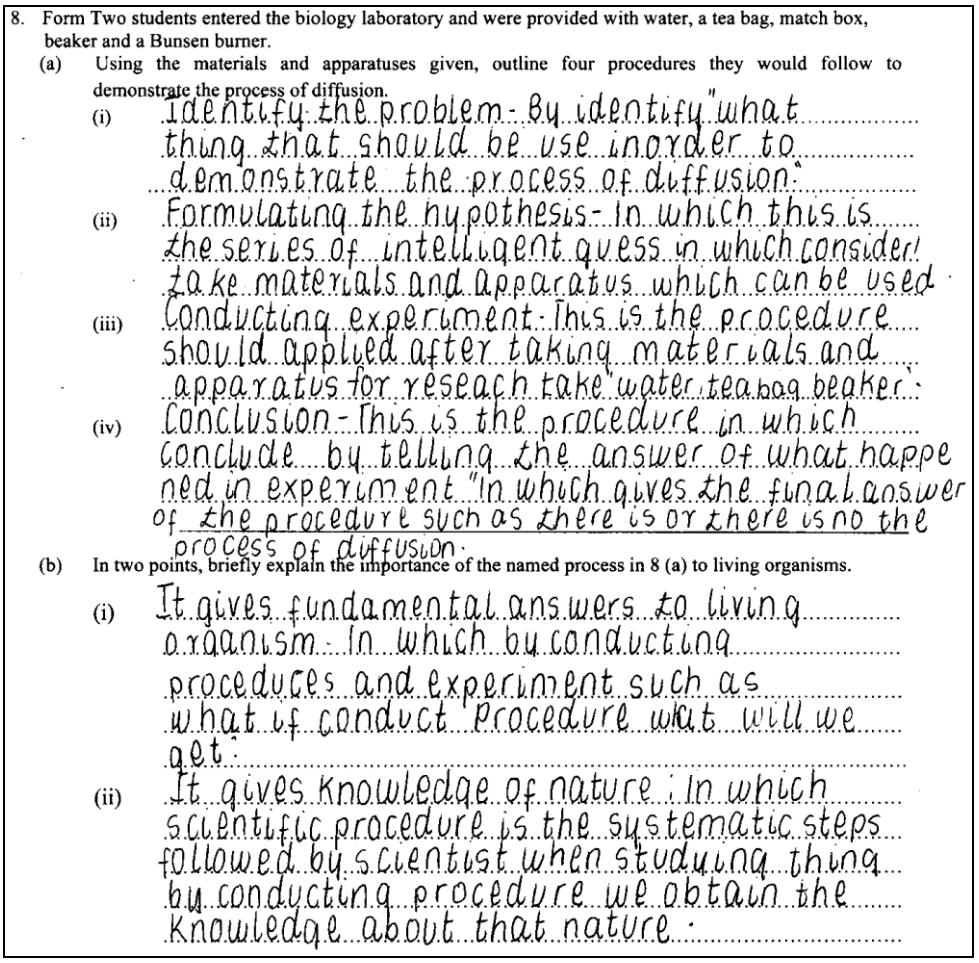
Figure 8: *Students’ performance in question 8*

Figure 8 indicates that the general performance on this question was weak because 86.98 per cent of the students scored from 0 to 2.5 marks, out of 10 marks allocated to this question.

The students who scored low marks (0 - 2.5) had partial knowledge about the process of diffusion. They obtained some marks by giving one to two

procedures and/or importance of diffusion. For the students who scored zero marks most of them did not understand the demand of the question, thus they provided incorrect responses. In part (a), some students outlined procedures of lighting bunsen burner instead of the procedures for demonstrating the process of diffusion as *connect the bunsen burner to the gas main, close the air hole, turn on the gas, light the gas at the top of the barrel with a lighted match stick, adjust the gas tap until the gas supply is enough and turn the collar to close the air hole completely.* Other students wrote the uses of the materials and apparatuses given as *water is used for washing apparatuses and diluting chemicals, tea bag is used for cooking tea, match box is used to start fire, beaker is used for measuring liquids* and *Bunsen burner is used for heating substances in the laboratory*. Others wrote the types of solutions as *hypertonic solution, hypotonic solution* and *isotonic solution*. There were also other students who wrote factors which affect rate of diffusion as *temperature, surface area to volume ratio, concentration gradient* and *distance over which diffusion takes place*. Incorrect responses given imply that, the students had inadequate knowledge about the process of diffusion.

Likewise, in part (b), students failed to explain the importance of diffusion process in living organisms. For example, some students explained the importance of photosynthesis instead of diffusion as *it convert light energy into chemical energy, help plant to manufacture food* and *provides oxygen*. Other students explained the importance of diffusion by mentioning the characteristics of living organisms as *they grow, they reproduce* and *they move.* Also other students wrote the functions of blood as *it is used to transport nutrients in the body, it is used to transport hormnones* and *it is used to transport digested food materials such as glucose.* Others wrote *diffusion transports molecules from high concentration to low concentration* and *it helps in transportation of nutrients.* Extract 7.1 is a sample of responses from a student who did not understand the demand of the question.



8. Form Two students entered the biology laboratory and were provided with water, a tea bag, match box, beaker and a Bunsen burner.

(a) Using the materials and apparatuses given, outline four procedures they would follow to demonstrate the process of diffusion.

(i) Identify the problem- By identify "what thing that should be use inorder to demonstrate the process of diffusion."

(ii) Formulating the hypothesis- In which this is the series of intelligent guess in which consider/ take materials and apparatus which can be used

(iii) Conducting experiment- This is the procedure should applied after taking materials and apparatus for reseach take "water, tea bag beaker".

(iv) Conclusion- This is the procedure in which conclude by telling the answer of what happe ned in experiment "In which gives the final answer of the procedure such as there is or there is no the process of diffusion.

(b) In two points, briefly explain the importance of the named process in 8 (a) to living organisms.

(i) It gives fundamental answers to living organism- In which by conducting proceduces and experiment such as what if conduct Procedure what will we get.

(ii) It gives knowledge of nature; in which scientific procedure is the systematic steps followed by scientist when studying thing by conducting procedure we obtain the knowledge about that nature.

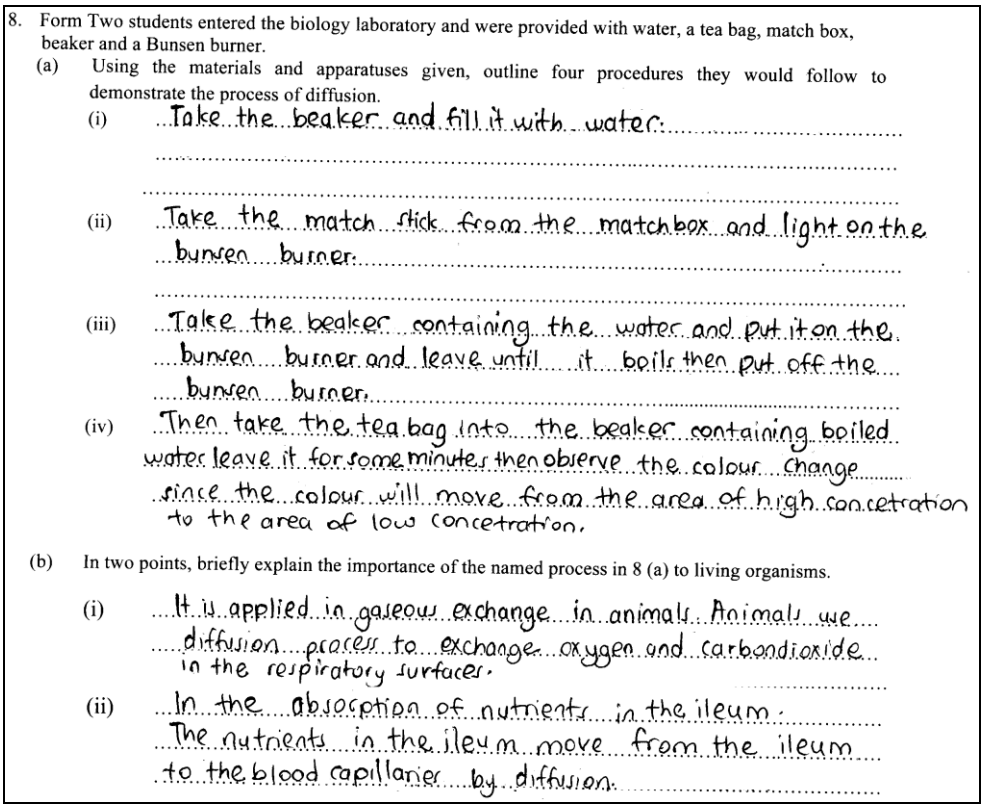
Extract 7.1: A sample of the student's incorrect responses to question 8

In Extract 7.1, the student outlined the steps to be followed during scientific investigation such as *identifying the problem* and *formulating hypothesis* instead of outlining the procedures to demonstrate the process of diffusion in part (a). Also, the responses given in part (b) were incorrect.

Majority of the students who scored average marks (3 - 6), provided two to three procedures in part (a). However, in part (b, they wrote incorrect responses, hence loss of marks.

The students who scored high marks (6.5 - 10) demonstrated good mastery of the process of diffusion. They were aware of the procedures to be followed in demonstrating the process of diffusion in part (a). Similarly, the students had good understanding of the importance of diffusion to living organisms, and therefore, scored high marks. These responses show that the

students had adequate knowledge about the roles of diffusion in living organisms. Extract 7.2 illustrates the case in this question.



8. Form Two students entered the biology laboratory and were provided with water, a tea bag, match box, beaker and a Bunsen burner.

(a) Using the materials and apparatuses given, outline four procedures they would follow to demonstrate the process of diffusion.

(i) Take the beaker and fill it with water.

(ii) Take the match stick from the matchbox and light on the bunsen burner.

(iii) Take the beaker containing the water and put it on the bunsen burner and leave until it boils then put off the bunsen burner.

(iv) Then take the tea bag into the beaker containing boiled water leave it for some minutes then observe the colour change since the colour will move from the area of high concetration to the area of low concetration.

(b) In two points, briefly explain the importance of the named process in 8 (a) to living organisms.

(i) It is applied in gaseous exchange in animals. Animals we diffusion process to exchange oxygen and carbondioxide in the respiratory surfaces.

(ii) In the absorption of nutrients in the ileum. The nutrients in the ileum move from the ileum to the blood capillaries by diffusion.

Extract 7.2: A sample of the student's correct responses to question 8

In Extract 7.2, the student correctly outlined the procedures to demonstrate the process of diffusion in part (a). Also, he/she explained the importance of diffusion process to living organisms in part (b).

2.2.7 Question 9: Health and Immunity

In this question, students were given a statement ''The school Baraza, selected you to become the chairperson for cholera compaign in the neghbouring community.'' They were required to briefly explain five ways they would use to educate the community about the prevention of the disease.

The analysis revealed that 634,781 (100%) students responded to this question. Among them 509,428 (80.25%) scored from 0 to 2.5 marks, out

of whom 319,637 (50.35%) scored 0 mark. The students who scored from 3 to 6 marks were 66,374 (10.46%), whereas, 58,979 (9.29%) scored from 6.5 to 10 marks. Further analysis reveals that 21,034 (3.31%) students scored all the 10 marks. Figure 9 summarizes the students' performance in question 9.

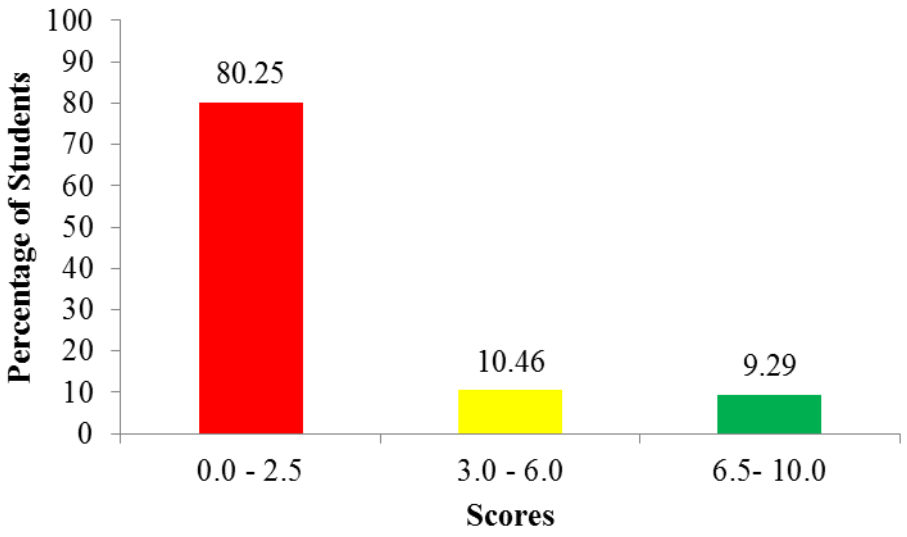
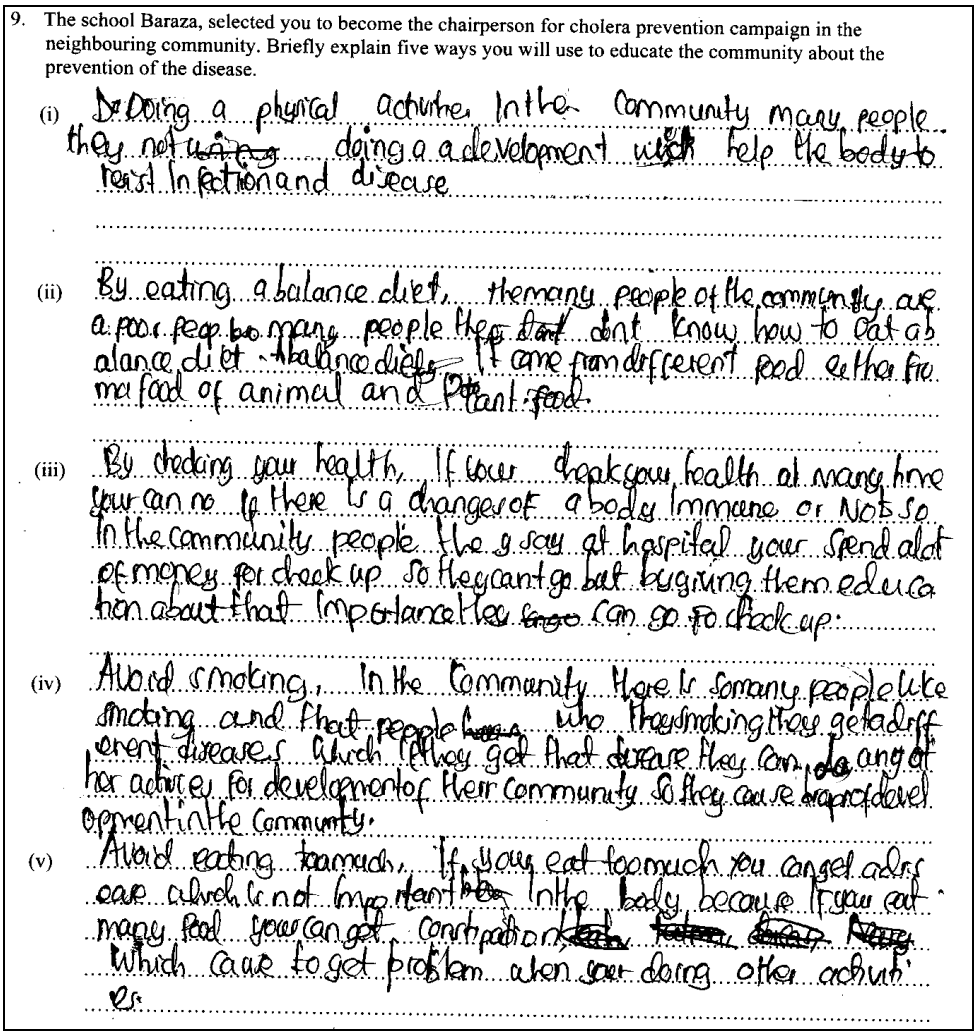


Figure 9: *Students' performance in question 9*

Figure 9 shows that students' performance on this question was weak since 80.25 per cent scored 0 to 2.5 marks, out of the 10 marks allocated to this question. Analysis shows that students who scored 1 to 2.5 marks outlined the responses without giving explanations, hence, loss of marks. For the students who scored 0, they provided responses which were contrary to the demands of the question. Most of the students wrote preventive ways of diseases other than cholera. For example, some of them explained preventive ways of bilharzia as *wearing protective shoes when visiting areas with stagnant water, killing snails* and *draining stagnant water* while others explained preventive ways of tuberculosis as *covering nose and mouth when sneezing, staying in well ventilated houses* and *isolation of patients.* Others explained preventive ways of malaria as *killing mosquitoes, using mosquito repellants, sleeping under mosquito nets* and *cutting long grasses* while others explained preventive ways of COVID 19 as *social distancing, wearing masks, avoid shaking hands with people* and *lock down strategy.* On the other hand, there were other students who

explained ways through which diseases are spread from one person to another. For example, some of them wrote *through contact, droplet infections, contaminated food and water, sexual intercourse* and *using unscreened blood transfusion* while others explained symptoms of cholera as *vomiting, diarrhoea, muscle cramps* and *wrinkled skin* instead of the preventive ways of cholera. Additionally, some of the students explained preventive ways of sexually transmitted diseases as *use of condoms, abstinence, have one faithful partner, avoid sharing sharp tools* and *use screened blood*. These students were supposed to give explanation for the preventive ways of cholera which are: *Use of clean and safe/pure water/boiling drinking water, Use proper waste disposal, Proper use of toilet by disposing human faeces in toilets and covering pit latrines, Maintaining personal hygiene, Washing of hands with soap before eating food, Washing of hands with soap after visiting toilets, Washing fruits and vegetables with clean and safe water, Isolation of patients/quarantine, Use of vaccine/prophylaxis, Immediate treatment/medical treatment* and *Eating hot foods*. Extract 8.1 (a) is a sample of student's incorrect responses.


9. The school Baraza, selected you to become the chairperson for cholera prevention campaign in the neighbouring community. Briefly explain five ways you will use to educate the community about the prevention of the disease.

(i) Doing a physical activity. In the community many people they not doing a a development which help the body to resist infection and disease

(ii) By eating a balance diet, themany people of the community are a poor people so many people the that dont know how to eat a balance diet. balance diet, It came from different food either fro ma food of animal and plant food.

(iii) By cheking your health, If your check your health at many time your can no if there is a changes of a body immune or not so. In the community people the go say at hospital your spend alot of money for check up so they cant go but by giving them education about that importance they can go to check up.

(iv) Avoid smoking, In the community there is somany people like smoking and that people who they smoking they get adiff erent diseases which if they got that disease they can do any other activity for development of their community so they cause bad develoment in the community.

(v) Avoid eating toomuch, If you eat toomuch you angel also ease which is not important in the body because if you eat many food you can get constipation, Which cause to get problem when you doing other activi ties.

Extract 8.1 (a): A sample of the student's incorrect responses to question 9

In Extract 8.1(a), the student explained five things to consider for a person to remain healthy such as *doing physical exercises, eating balanced diet, checking your health, avoid smoking* and *avoid eating too much* instead of explaining five ways to prevent cholera.

Further analysis reveals that some of the students had low proficiency in the English language, therefore their answers had gramatical errors. Others used Kiswahili language contrary to the language of instruction, hence, obtained low marks. This implies that students had poor mastery of the language. Extract 8.1 (b) is a response from a student who had low proficiency in the English language, hence scored low marks.

9. The school Baraza, selected you to become the chairperson for cholera prevention campaign in the neighbouring community. Briefly explain five ways you will use to educate the community about the prevention of the disease.

(i) Fist Community are the ability to right against disease so take the education of the Sociaty to make the right against disease abaut wash hands

(ii) take the education abaut people take go tothe take the chanjo tothe body because the huma n beagg take the chanjo the body to fightthe bacterial

(iii) take the education Sard that go to hospita L you hisi any disease because take the hospi tal to teke the Ushauri abaut treatment medical

Extract 8.1 (b): A sample of the student's incorrect responses to question 9

In Extract 8.1 (b), the student explained the ways of preventing cholera but provided responses with grammatical errors and used Kiswahili words in his/her responses. He/she correctly outlined some of the preventive ways such as *chanjo* (vaccination), but lost marks due to the use of Kiswahili which was not the language of instruction.

The students who scored high marks (6.5 - 10) demonstrated understanding of the infections and diseases, specifically ways of preventing diseases. Thus, they correctly explained five ways of preventing cholera. Extract 8.2 is a sample of student's correct responses.

9. The school Baraza, selected you to become the chairperson for cholera prevention campaign in the neighbouring community. Briefly explain five ways you will use to educate the community about the prevention of the disease.

(i) Treating to drinking water : People should treat drinking water before using it. This can be done through boiling and filtering water. This will help to kill bacteria found in drinking water which may cause cholera.

(ii) Washing hands with clean water and soap after visiting the toilet and before meal : Washing hands with soap and clean water will help to kill bacteria which cause cholera and make your hands clean.

(iii) Washing vegetables and fruits before eating them : This is very important because, sometimes these foods may carry disease causative agents from where they have been obtained. So it is important to wash them before eating to avoid spread of cholera.

(iv) Eating hot foods : People should avoid eating food which is cold and practise eating hot foods. This is recommended because, bacteria which can cause cholera are destroyed by temperature of the food.

(v) Do not leave the food uncovered : Uncovered foods attract flies such as housefly and cockroaches, these insects are vectors which can carry bacteria which cause cholera. Therefore, when these insects come into contact with food, they contaminate the food with bacteria which cause cholera.

Extract 8.2: A sample of the student's correct responses to question 9

In Extract 8.2, the student correctly explained ways of preventing cholera in the community, hence, performed well.

2.3 Section C: Essay Question

This section consisted of one (1) essay type question, carrying 15 marks.

2.3.1 Question 10: Nutrition

In this question, students were given a statement ‘‘Self-employed women have come to Dar es Salaam for training in food preservation methods.’’ They were required to elaborate six methods of food preservation.

The question was attempted by 634,781 students. The analysis shows that 518,712 (81.72%) students scored from 0 to 4 marks, out of whom, 341,207 (53.75%) scored 0 marks in this question. The students who scored from 4.5 to 9 marks were 67,299 (11.13%), whereas 48,770 (7.15%) scored from 9.5 to 15 marks. Further analysis shows that, only 9,993 (1.57%) students scored all the 15 marks in this question. Figure 10 summarizes the students’ performance in this question.

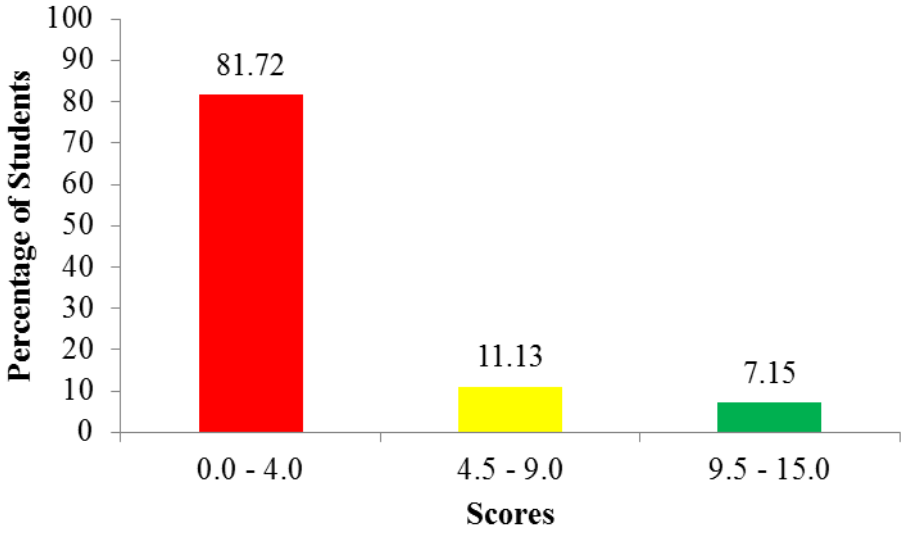


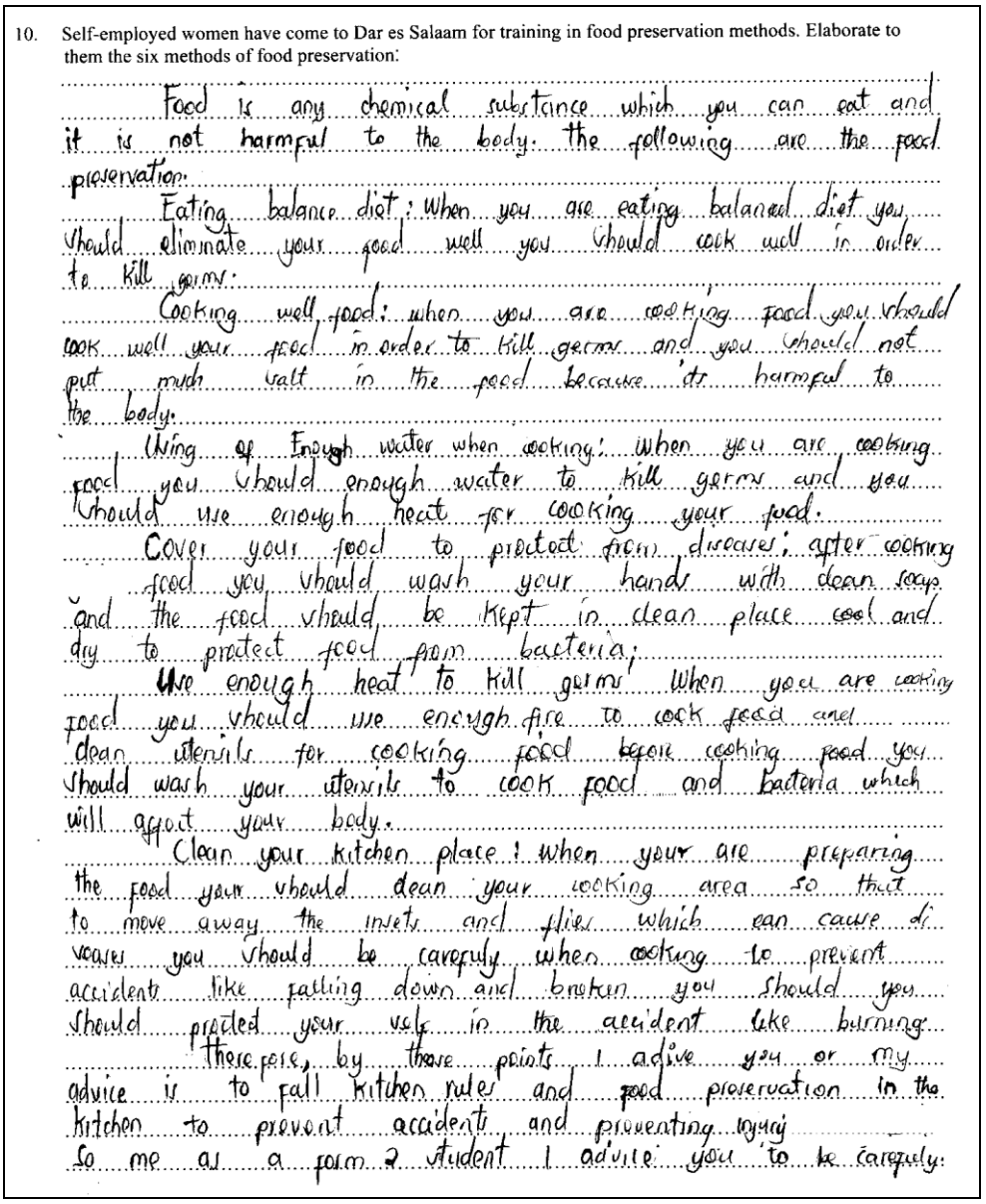
Figure 10: *Students’ performance in question 10*

Figure 10 shows that the students’ performance was weak because 81.72 per cent scored from 0 - 4 marks, out of 15 marks allocated to this question.

Students who scored low marks (0 - 4) had little or partial knowledge of food processing, preservation and storage, thus, outlined the methods of

food preservation without elaborating, therefore, scored 1 to 4 marks. Those who scored 0 provided incorrect responses. Students were supposed to respond by following essay writing rules such as providing an introduction, main body and conclusion. In the introduction, students were supposed to define food preservation. However, most of the students introduced the question incorrectly. Some of them incorrectly defined food preservation as *a way in which food is preserved to get the natural food* while others wrote the importance of food preservation as *a process of preserving food for a long time for future use*. Other students defined food preservation as *food storage* instead of food preservation as *the method used to store food for future use*. Other students defined it as *as the process in which food is transformed into different forms.* Moreover, other students defined it as *a way in which we prepare food before eat*.

In the main body, they were supposed to elaborate different methods of food preservation, but most of them provided incorrect points. There were students who wrote four to five correct points, but failed to elaborate them, hence lost some of the marks. For example, some of the students wrote importance of food preservation as *food is preserved for future use, for bussiness purposes, prevents wastage of food and prevents the growth of microorganisms which spoils the food.* Other students elaborated the importance of various types of food in human body as *body repairing, body strengthening, body building, provide energy to the body, aids in peristalysis* and *insulate the body against heat loss*. Others elaborated about different areas where food can be stored as *storage in granaries, storage in pots, storage in bags, storage in containers* and *storage in houses*. There were also other students who wrote various kitchen utensils such as *hot pots, dishes, sauce pan, knives* and *forks* instead of elaborating methods of food preservation. The students also provided wrong conclusion. Extract 9.1 is a sample of a student's incorrect responses to this question.



10. Self-employed women have come to Dar es Salaam for training in food preservation methods. Elaborate to them the six methods of food preservation.

Food is any chemical substance which you can eat and it is not harmful to the body. the following are the food preservation.

Eating balance diet; When you are eating balanced diet you should eliminate your food well you should cook well in order to kill germs.

Cooking well food: when you are cooking food you should cook well your food in order to kill germs and you should not put much salt in the food because it's harmful to the body.

Using of Enough water when cooking: When you are cooking food you should enough water to kill germs and you should use enough heat for cooking your food.

Cover your food to protect from diseases; after cooking food you should wash your hands with clean soap and the food should be kept in clean place cool and dry to protect food from bacteria;

Use enough heat to kill germs When you are cooking food you should use enough fire to cook food and clean utensils for cooking food before cooking food you should wash your utensils to cook food and bacteria which will affect your body.

Clean your kitchen place! when your are preparing the food your should clean your cooking area so that to move away the insets and flies which can cause di veases you should be carefuly when cooking to prevent accidents like falling down and broken you should you should protect your self in the accident like burning.

Therefore, by those points I adive you or my advice is to fall kitchen rules and food preservation in the kitchen to prevent accidents and preventing injury

So me as a form 2 student I advise you to be carefuly.

Extract 9.1: A sample of the student's incorrect responses to question 10

In Extract 9.1, the student defined *food* instead of food preservation in the introduction. He/she elaborated things to consider when preparing food in the kitchen such as *cover your food to protect from diseases* and *clean your kitchen place* instead of elaborating methods of food preservation. The conclusion was incorrect as well.

The analysis indicates further that, majority of the students who scored average marks (4.5 - 9) elaborated four to five methods of food

preservation instead of six, hence loss of marks. Also, they correctly provided either introduction or conclusion but not both therefore could not score full marks.

The students who scored high marks (9.5 - 15) demonstrated good essay writing skills and mastery of the methods used in preserving foods. They correctly elaborated the methods by writing an introduction, main body and a conclusion. This indicates that the students had adequate knowledge of the topic of Nutrition specifically food processing, preservation and storage. Extract 9.2 is a sample of the student's correct responses.

10. Self-employed women have come to Dar es Salaam for training in food preservation methods. Elaborate to them the six methods of food preservation.

Food preservation is the process of preventing food from getting spoiled for a long time so that it can be used in the future without having its quality decreased. Food can be preserved either traditionally or through modern methods.

The following are the six (6) methods of food preservation:

Freezing: in this method, food is preserved under very low temperatures below freezing point by keeping the foods in a freezer to hinder the growth of microorganisms.

Pasteurization: this method involves heating foods to very high temperatures so as to kill microorganisms which spoil food.

Using additives: These include sodium benzoate and vinegar which when applied on foods, hinder the growth of microorganisms and prevent food spoilage.

Smoking: in this method, food is exposed to smoke which tends to dry the food and remove all moisture content which could have supported the growth of food microorganisms and prevent food spoilage.

Salting: in this method, salt, depending on the amount of food, is added to absorb moisture content and thus hinder growth of microorganisms.

Drying in the sun: in this method, food is exposed to the midday sun so that it can remove all moisture content supporting the growth of the food spoilers and prevent food spoilage.

Generally, all people should preserve food using traditional or through modern methods, as these methods prevents food spoilage, improve food quality and the food can be used in the future.

Extract 9.2: A sample of the student's correct response to question 10

In Extract 9.2, the student elaborated the methods of food preservation correctly. Also, the student demonstrated good command of the English language and good essay writing skills.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER TOPIC

A total of nine (9) topics were assessed in Biology FTNA 2022. The analysis of the students' performance indicates that the topics of *Nutrition, Safety in Our Environment, Gaseous Exchange and Respiration, Balance of Nature, Health and Immunity, Transport of Materials in Living Things, Introduction to Biology* and *Classification of Living Things* had the good performance of 77.21 per cent. The topics were assessed in question 1 which was a multiple choice question. Analysis also reveals that 2 topics namely *Introduction to Biology* which was assessed in questions 2 (matching items) and 4 (short answer) and *Cell Structure and Organisation* which was assessed in question 6 (short answer) had good performance of 76.93 and 73.25 per cent, respectively.

The topic with average performance was *Gaseous Exchange and Respiration* (37.97%). It was assessed in question 3.

The topics with weak performance were *Health and Immunity* (19.75%), *Nutrition* (18.28%), *Transport of Materials in Living Things* (16.97%) and *Classification of Living Things* (5.53%). These topics were assessed in questions 9, 10, 5, 8 and 7 of which questions 5, 7, 8 and 9 were short answer type, while question 10 was essay. Appendix I summarizes the students' performance in FTNA 2022 in terms of topics.

4.0 CONCLUSION

The performance in Biology in the FTNA 2022 was average because 46.96 per cent of the students scored from 30 marks or above. The analysis of the students' responses revealed that the students had good performance on questions 1 (77.21%), 2 (89.31%) and 6 (73.25%). The questions which had average performance were 3 (37.97%) and 4 (64.55%). However, questions 5, 7, 8, 9 and 10 had weak performance of 20.92, 5.53, 13.02, 19.75 and 18.28 per cent, respectively.

The good performance in some topics was attributed to the students' adequate knowledge about the assessed topics, students' ability to understand the demands of the questions and good drawing skills. However, weak performance was contributed by insufficient knowledge of the tested concepts, failure to understand the demands of the questions, poor proficiency in the English language and little drawing skills.

5.0 RECOMMENDATIONS

Based on the Students' Item Response Analysis (SIRA) provided in this report, it is recommended that teachers should:

(a) design simple practical work on grouping living things using artificial and natural classification systems in teaching and learning of *Classification of Living Things.* Students should brainstorm on the merits and demerits of each type of classification system.

(b) use available materials and apparatuses to demonstrate simple experiments on diffusion in teaching and learning of *Transport of Materials in Living Things*. Also, guide students in groups to discuss its roles in living organisms. Moreover, use a chart showing disorders associated with human blood circulatory system to guide students in groups to discuss the causes, symptoms and effects of the disorders.

(c) organise a study visit to processed, preserved and stored food to investigate various methods of food processing, preservation and storage. Also, use a variety of food substances (vegetables, grains, fruits, meat) to guide students in groups to discuss and make presentations on various methods of food processing, preservation and storage in the teaching and learning of *Nutrition.*

(d) guide students to visit local health facility to investigate the causes, symptoms and effects of common infections and diseases in the teaching and learning of *Health and immunity.*

(e) give more exercises on drawing and labelling in order to develop students' drawing skills of biological diagrams.

(f) emphasize students to read questions carefully before answering them in order to understand the demands of the questions and answer them accordingly.

(g) encourage students to use English language in their day to day communication. This will improve their proficiency in the English

language and enable them to understand what is taught in the classrooms as well as the questions' demands.

Appendix: Students' Performance Topic - wise in Biology FTNA 2022

S/N	Topic	Question Number	FTNA 2022		
			Percentage of Students who Scored from 30% or above	Average Performance Per Topic (%)	Remarks
1	Nutrition, Safety in Our Environment, Gaseous Exchange and Respiration, Balance of Nature, Health and Immunity, Transport of Materials in Living Things, Introduction to Biology and Classification of Living Things.	1	77.21	77.21	Good
2	Introduction to Biology	2	89.31	76.93	Good
		4	64.55		
3	Cell Structure and Organisation	6	73.25	73.25	Good
4	Gaseous Exchange and Respiration	3	37.97	37.97	Average
5	Health and Immunity	9	19.75	19.75	Weak
6	Nutrition	10	18.28	18.28	Weak
7	Transport of Materials in Living Things	5	20.92	16.97	Weak
		8	13.02		
8	Classification of Living Things	7	5.53	5.53	Weak