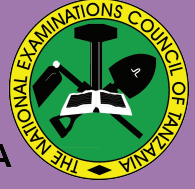




THE UNITED REPUBLIC OF TANZANIA
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA



**STUDENTS' ITEM RESPONSE ANALYSIS
REPORT ON THE FORM TWO NATIONAL
ASSESSMENT (FTNA) 2024**

BIOLOGY



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033 BIOLOGY

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FOREWORD

This report presents the Students' Item Response Analysis (SIRA) on the Form Two National Assessment (FTNA) 2024 in Biology. The FTNA is a formative assessment which provides feedback that teachers, students and other education stakeholders can use to improve the teaching and learning process.

The report shows that the students' performance in Biology in FTNA 2024 was average as 47.00 per cent of the students passed the assessment. The students who attained high scores demonstrated sufficient knowledge about the assessed concepts, ability to correctly write biological terms, good drawing skills and competence in presenting ideas in logical form. The weak performance was attributed to students' lack of adequate knowledge, skills and competences in the tested concepts, misspelling of biological terminologies, poor drawing skills, low proficiency in the English language and giving responses which were not relevant to the demands of the questions.

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 the 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 (FTNA) in Biology in November 2024. The Biology paper was set following the NECTA format issued in the year 2021 which is based on the 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 and 2. Question 1 consisted of 10 multiple choice items, while question 2 comprised of 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 students who sat for Biology FTNA 2024 were 797,131 where 374,334 (47.00%). The students' performance in this year has decreased by 8.74 per cent when compared to the 2023 Biology FTNA in which 694,882 sat for the paper and 386,866 (55.74%) students passed the assessment. The summary of the students' performance in each grade for 2023 and 2024 is presented in the following Table:

The Students' Performance in Biology FTNA in each Grade for 2023 and 2024

Year	Sat	Performance Grades					Passed
		A	B	C	D	F	%
2023	694,882	42,004	34,832	116,834	193,196	307,147	55.74
2024	797,131	26,353	28,559	117,880	201,442	422,065	47.00

The table shows that most (201,442) students who passed in 2024 attained grade D which is a marginal pass. A few of them (26,353) attained A grade.

The next part of this report provides an analysis of the students' performance on each question. It begins by explaining what the question required and proceeds to the analysis of students' responses. The analysis has highlighted the challenges that the students faced in responding to the questions and possible reasons as to why it occurred. Extracts of responses

from the students' scripts have been presented to show how they responded in view of the demand of each question.

The analysis of the students' responses to a particular question is considered to be good, average or weak if the percentage of the students who scored 30 per cent or above of the marks allocated to the question fall 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 in sections A, B, and C.

2.1 Section A: Objective Questions

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

2.1.1 Question 1: Multiple Choice Items

This question had ten (10) multiple-choice items, carrying a total of ten (10) marks. For each of the items (i) to (x), 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 in the question paper. The items were set from nine (9) topics, which are: Cell structure and Organisation, Balance of Nature, Classification of Living Things, Gaseous Exchange and Respiration, Introduction to Biology, Transport of Materials in Living Things, Health and Immunity, Safety in Our Environment and Nutrition.

This question was attempted by all students 797,131. Analysis shows that 172,412 (21.63%) students scored from 0 to 2 marks out of whom, 13, 170 scored 0. Students who scored from 3 to 6 marks were 483,664 (60.67%) whereas 141,055 (17.7%) scored from 7 to 10 marks. Further analysis reveals that 16,173 (2.03%) scored 10 marks. The general performance on

question 1 was good because 78.37 per cent of the students scored from 3 to 10 marks. Figure 1 shows the performance of the students in question 1.

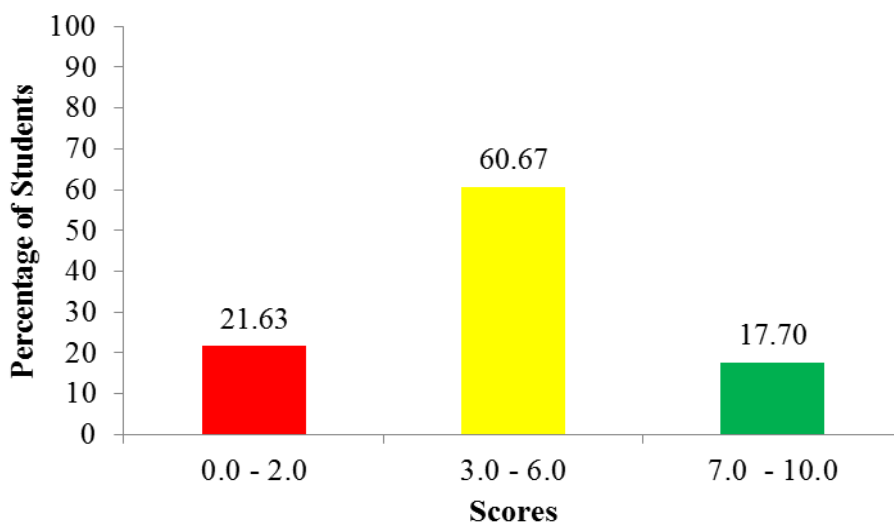


Figure 1: *Students' performance on question 1*

Further, the analysis shows that 16,173 (2.03%) students who scored high marks (7 - 10) had adequate knowledge of the concepts tested. Therefore, they chose correct responses to all or most of the items. The students who scored 3 to 6 marks provided correct responses to 3 to 6 items hence loss of marks. Those who scored low marks (0 - 2) either provided correct responses to 2 items or provided incorrect responses to all. This implies that these students had insufficient knowledge of the concepts tested. The analysis of the items is presented as follows:

Item (i) *During experiment a student observed an organism's cell that had nucleus not bounded by membrane. From which organism was cell taken?*

- | | | | |
|---|-------------|---|---------|
| A | Human being | B | A maize |
| C | Bacterium | D | Virus |

The correct answer was C, Bacterium. Students who chose the correct response had adequate knowledge of the types of cells, prokaryotic and eukaryotic cells. They were aware that bacteria possess prokaryotic cell which lacks a membrane bound nucleus. On the other hand, those who

chose A, Human being and B, A Maize, failed to understand that these organisms possess eukaryotic cell which has a nucleus bound by a membrane. Moreover, those who chose the alternative D, Virus did not realize that the virus lacks cellular structures.

Item (ii) *Study the following food chain and answer the question that follow:*

Shrubs → *Wildebeests* → *Hyena* → *Fungi*
Which trophic level is occupied by the Wildebeests?

- | | | | |
|----------|-------------------------|----------|---------------------------|
| <i>A</i> | <i>Primary consumer</i> | <i>B</i> | <i>Secondary consumer</i> |
| <i>C</i> | <i>Producer</i> | <i>D</i> | <i>Tertiary consumer</i> |

The correct response was A, Primary consumer. Students who got it correct realised that wildebeests are herbivores that feed on producers and occupy the second trophic level. Conversely, some students chose B, Secondary consumer and D Tertiary consumer, these students failed to realize that secondary consumers are organisms that feed on primary consumers and occupy the third trophic level in a food chain whereas tertiary consumers consist of organisms that feed on secondary consumers that which occupy the fourth trophic level. Similarly, those who chose alternative C, Producer were not aware that producers are organisms that can manufacture their foods and occupy the first trophic level in a food chain.

Item (iii) *Which organism belong to Division Bryophyta?*

- | | | | |
|----------|-------------------------------|----------|------------------------------|
| <i>A</i> | <i>Paramecium and euglena</i> | <i>B</i> | <i>Ferns and liverworts</i> |
| <i>C</i> | <i>Liverworts and amoeba</i> | <i>D</i> | <i>Liverworts and mosses</i> |

The correct answer was D, Liverworts and mosses. Students who correctly responded to this item demonstrated adequate knowledge about the classification of living things. Therefore, they correctly identified the representative organisms found in the division Bryophyta. However, those who chose A, Paramecium and euglena, did not understand that paramecium belong to the phylum Ciliophora while euglena is in phylum Euglenophyta. Those who chose B, Ferns and liverworts and C, Liverworts and amoeba, failed to understand that although liverworts are classified into the division Bryophyta, the fern is in division Filicinophyta while amoeba belongs to phylum Rhizopoda.

Item (iv) *In which specific part of mammalian respiratory system does trapping of dust and microorganisms takes place?*

- | | |
|-------------------|---------------------|
| <i>A Alveolus</i> | <i>B Epiglottis</i> |
| <i>C Nose</i> | <i>D Diaphragm</i> |

The correct answer was C, Nose. Students who chose C, Nose had adequate knowledge about gaseous exchange in mammals specifically the features of different parts of the respiratory system and their adaptive features. Therefore, they realized that the nose has mucus lining and hairs for trapping dust and microorganisms. Those who chose A, Alveolus, failed to realise that alveolus is an air space in the lungs where gaseous exchange takes place. Likewise, those who chose B, Epiglottis, and D, Diaphragm, failed to realize that epiglottis closes the trachea during swallowing to prevent food from entering the respiratory system while diaphragm is a sheet of muscles which allows gaseous exchange by becoming dome-shaped or relaxed.

Item (v) *Which part of the microscope should one use to regulate the amount of light passing from the mirror to the condenser?*

- | | |
|----------------------|----------------------|
| <i>A Stage clip</i> | <i>B Diaphragm</i> |
| <i>C Hinge screw</i> | <i>D Ocular tube</i> |

The correct response was B, Diaphragm. Students who chose the correct response had sufficient knowledge of different parts of the light/compound microscope and their function. Therefore, they realized that the diaphragm regulates the amount of light entering the microscope during observation. However, those who chose alternatives A, Stage clip, C, Hinge screw and D, Ocular tube, did not understand that the stage clip holds the slide containing the specimen in place, hinge screw raises and lowers the stage to keep the specimen in the right position for observation and ocular tube allows light to pass from objective lens to eyepiece lens.

Item (vi) *Which blood vessel transport deoxygenated blood from the heart to the lungs?*

- | | |
|----------------------------|---------------------------|
| <i>A Pulmonary vein</i> | <i>B Pulmonary artery</i> |
| <i>C Mesenteric artery</i> | <i>D Coronary vein</i> |

The correct answer was B, Pulmonary artery. Students who chose the correct answer had sufficient knowledge of the structure of the mammalian heart. They understood that all arteries transport oxygenated blood except the pulmonary artery which carries deoxygenated blood from the heart to the lungs. Conversely, students who opted for A, Pulmonary vein, and D, Coronary vein were not aware that all veins transport deoxygenated blood except the pulmonary vein which transports oxygenated blood from the lungs to the heart while the coronary vein transports deoxygenated blood from heart muscles to vena cava. Similarly, those who chose C, Mesenteric artery did not realise that the mesenteric artery supplies oxygenated blood to the stomach and small intestine.

Item (vii) *How can HIV/AIDS be prevented from spreading?*

- A *By sharing skin piercing instruments*
- B *By touching people's blood with bare hand*
- C *By transfusion using unscreened blood*
- D *By abstaining from sexual intercourse*

The correct answer was D, By abstaining from sexual intercourse. Students who chose the correct answer were aware of the ways of preventing the spread of HIV/AIDS from an infected person to an uninfected person. However, those who chose A, By sharing skin piercing instruments, B, By touching people's blood with bare hand and C, By transfusion using unscreened blood failed to distinguish between ways of spreading HIV/AIDS and ways of preventing the spread of HIV/AIDS since alternatives A, B and C are the ways of spreading HIV/AIDS from infected to uninfected person. This indicates that the students lacked knowledge about health and immunity specifically ways of preventing the transmission of HIV/AIDS.

Item (viii) *Why is dangerous to put kerosene in the places where children play?*

- A *It can cause death when taken into the body*
- B *It can cause injury when poured on the skin*
- C *It emits harmful radiations which can cause damage*
- D *It contains microorganisms which cause diseases*

The correct response for this item was A, It can cause death when taken into the body. The students who got it right had adequate knowledge of safety at home and school specifically the ways of preventing accidents at home. Therefore, they realized that kerosene should be stored in a safe lockable place when not in use since it is poisonous when ingested. Conversely, those who chose B, It can cause injury when poured into the skin, failed to realize that substances that cause such injuries are corrosive substances like acids, for example, sulphuric acid. Those who chose C, It emits harmful radiations which can cause damage, had inadequate knowledge about warning signs and its effect therefore, failed to realize that radioactive substances are the ones that emit harmful radiation. Likewise, those who opted alternative D, It contain microorganism which causes diseases, failed to understand that kerosene is a flammable substance that catch fire easily but does not contain microorganisms.

Item (ix) *Your friend complains of passing hard and dry faeces. Which practice would you advise him to treat the problem?*

- A Limiting the amount of fruits in the diet*
- B Ignoring the urge to go for a long call*
- C Taking adequate amount of fibres in the diet*
- D Reducing the intake of vegetables and fruits*

The correct response was C, Taking adequate amount of fibres in the diet. The students who correctly responded to this item demonstrated an understanding of the disorders and diseases of the human digestive system. They were aware that constipation is a disorder of the human digestive system caused by a deficiency of fibres or roughage in diet and a low intake of water. Therefore, the disorder can be treated by providing a diet that has adequate fibres, the indigestible materials that help in the passage of food and faeces through the gut by aiding contraction and relaxation of the gut muscles.

Those who opted for B, Ignoring the urge to go for a long call failed to understand that when undigested food substances are allowed to remain longer in the colon results in maximum absorption of water, thus passing out hard and dry faeces. Those who opted for alternative A, Limiting the amount of fruits in the diet and D, Reducing the intake of vegetables and fruits, were not informed that vegetables and fruits have a high amount of

fibres that facilitate the smooth passage of undigested food substances and prevent constipation.

Item (ix) *Study the following set of diseases then answer the question that follows:*

- (i) *Malaria and bilharzia*
- (ii) *Syphilis and gonorrhoea*
- (iii) *Tuberculosis and plague*
- (iv) *Hepatitis B and AIDS*

Which diseases are transmitted through unprotected sexual intercourse?

- | | | | |
|---|----------------|---|---------------|
| A | (iii) and (iv) | B | (i) and (ii) |
| C | (i) and (iv) | D | (ii) and (iv) |

The correct answer was D, (ii) and (iv). Students who opted for the correct response had adequate knowledge about sexually transmitted diseases. They were aware that Hepatitis B, AIDS, Syphilis and Gonorrhoea are Sexually transmitted diseases that are transmitted through unsafe sexual intercourse. On the other hand, those who chose A, (iii) and (iv), did not recognise that tuberculosis is spread through droplets when coughing or sneezing while the plague is spread by fleas found in rats. Similarly, those who chose alternatives B, (i) and (ii), and C, (i), and (iv), did not understand that although syphilis, gonorrhoea, hepatitis B and AIDS are sexually transmitted diseases but malaria and bilharzia are spread by vectors such female anopheles mosquito and water snails, respectively.

2.1.2 Question 2: Matching Items

The question consisted of five (5) matching items set from the topic of Safety in Our Environment. In this question, students were required to match the uses of the components of the First Aid Kit in List A with their corresponding First Aid kit components in List B by writing the letter of the correct response below the item number in a table provided. The list of items to match is shown in the following table:

List A	List B
(i) <i>Reducing muscle pain</i>	A <i>Sterile gloves</i>
(ii) <i>Cleaning and drying wounds</i>	B <i>Adhesive bandage</i>
(iii) <i>Covering small wounds</i>	C <i>Cotton wool</i>
(iv) <i>Securing bandages</i>	D <i>Liniment</i>
(v) <i>Treating burns and scalds</i>	E <i>Petroleum jelly</i>
	F <i>Pain killers</i>
	G <i>Scissors</i>
	H <i>Safety pins</i>

This question was attempted by all students 797,131 (100%). The analysis reveals that 293,873 (36.87%) students scored from 0 to 1 mark out of whom 136,574 (17.13%) scored 0 marks. Students who scored from 2 to 3 marks were 270,538 (33.94%) and only 232,720 (29.19%) students scored from 4 to 5 marks. Further analysis reveals that 117,188 (14.70%) scored all the 5 marks. The general performance on this question was average because 63.13 per cent of the students scored from 2 to 5 marks. Figure 2 summarises the performance of the students in question 2.

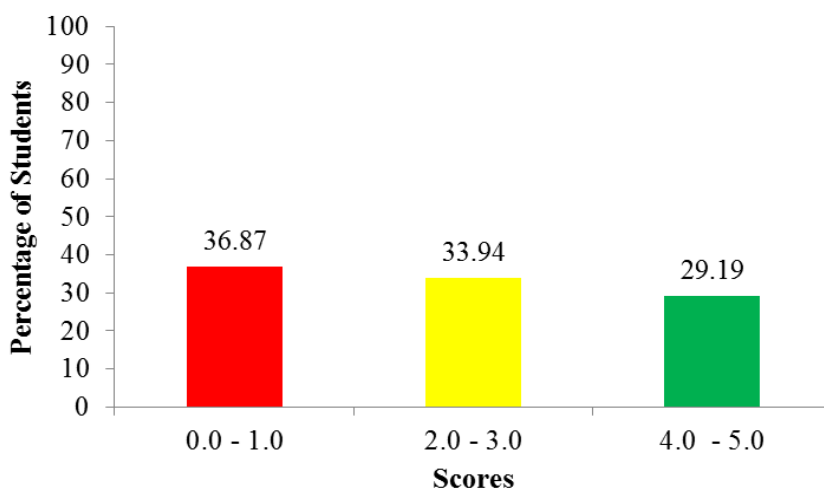


Figure 2: *Students' performance on question 2*

The students who scored 2 to 3 marks lost marks as they matched correctly either 2 or 3 items. Further analysis indicates that students who scored high marks had sufficient knowledge about safety in our environment

specifically the components of the First Aid kit. Therefore, they were aware of the uses of different components of the first aid kit and thus matched them correctly.

Conversely, the students who scored low marks (0 to 1) either gave incorrect responses to all the items or gave a correct response to only one item, hence losing the rest of the marks. The analysis of the student's responses to each item is presented as follows:

Item (i) required the students to match the component used to reduce muscle pain. The correct answer was D, Liniment. However, some students opted for F, Pain killer which is used to reduce pain.

Item (ii) required the students to match the component used for cleaning and drying wounds. The correct response was C, Cotton wool. Although some students matched with B, Adhesive bandage, which is used for covering small wounds.

Item (iii) required the students to match the component used for covering small wounds. The correct answer was B, Adhesive bandage. Although some students opted for A, Sterile gloves, which are used for covering hands to prevent direct contact with the victim's body fluids.

Item (iv) required the students to match the component used for securing bandage. The correct answer was H, Safety pins. However, some students chose other alternatives. For example, some students opted for G, Scissors while others opted for A, Sterile gloves instead of safety pins. These students did not realize that scissors are used for cutting dressing materials while sterile gloves are used to cover the hands to avoid infecting wounds.

Item (v) required the students to match the component used for treating burns and scalds. The correct answer was E, Petroleum jelly. Most of the students matched it correctly indicating adequate knowledge of the uses of components of First aid kit.

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: Introduction to Biology

This question had two parts; (a) and (b). In part (a), the students were required to outline seven steps for carrying out a scientific investigation. In part (b), they were required to state the sense organs used in making the following observations:

- (i) Colour change during food test experiment
- (ii) Identifying the smell of a flower
- (iii) Identifying the texture of sand

The question was attempted by all students 797,131 (100%). The analysis shows that 441,748 (55.42%) students scored from 0 to 2.5 marks, out of whom 264,352 (33.16%) scored 0 marks. Students who scored from 3 to 6 marks were 231,066 (28.98%) and 124,317 (15.60%) students scored from 6.5 to 10 marks. Further analysis reveals that 17,310 (2.17%) scored all the 10 marks. The general performance on this question was average because 44.58 per cent of the students scored from 3 to 10 marks. Figure 3 summarises the students' performance in question 3.

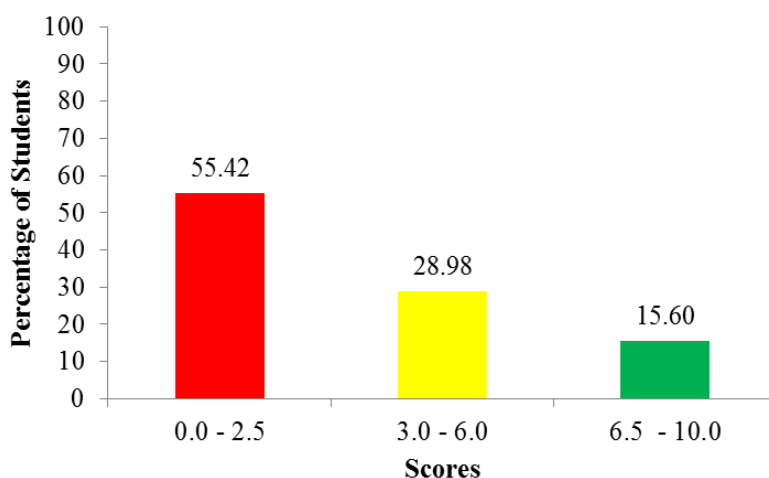


Figure 3: *Students' performance on question 3*

Students who scored average marks (3 to 6) outlined three steps correctly and gave the correct response to part (b) hence losing some marks. On the other hand, those who scored full marks 17,310 (2.17%) correctly outlined the seven steps used for carrying out scientific investigation in part (a), and they correctly identified the sense organs used for observations in part (b). This shows that the students had adequate knowledge about scientific processes used to conduct scientific studies. Extract 3.1 is a sample of students' correct responses.

3.	(a)	Outline seven steps for carrying out scientific investigation.
	(i)	Identification of problem
	(ii)	Formulating hypothesis
	(iii)	Experimentation
	(iv)	Observation and data recording
	(v)	Data analysis and interpretation
	(vi)	Drawing conclusion
	(vii)	Reporting results
	(b)	State the sense organs used in making the following observations.
	(i)	Colour change during food test experiment. Eyes
	(ii)	Identifying the smell of a flower Nose
	(iii)	Identifying the texture of sand. Skin

Extract 3.1: Student's correct responses to question 3

In Extract 3.1, the student correctly outlined the steps for carrying out scientific investigations in part (a). Also, in part (b) students correctly stated the sense organs used in making the given observations.

Conversely, students who scored low marks (0 to 2.5) either gave correct responses to one part of the question or some parts, hence obtaining 1 to 2 marks. The students who scored 0 in part (a), gave incorrect responses as they failed to understand the demand of the question. For example, some students wrote the characteristics of living things such as growth, reproduction, excretion, sensitivity, movement, respiration and nutrition instead of the steps for carrying out scientific investigation. Others wrote laboratory rules such as not entering the laboratory without permission, not running in the laboratory, not eating in the laboratory and not wearing loose

clothes instead of the steps. Other students outlined the branches of biology such as zoology, botany, mycology, bacteriology, virology and anatomy instead of the steps for carrying out scientific investigation.

In part (b), some students failed to recognise the sense organs used to make correct observations as a result they wrote about other organs in the human body instead of the sense organs. For instance, some students wrote brain, kidney and heart. Moreover, some students listed the apparatuses used in the biology laboratory. For example, one student wrote the sense organ used to observe colour change during a food test experiment is test tube. Another student wrote white tile instead of the eye. Other students stated instruments for measuring mass, length and temperature as beam balance, ruler and thermometer while others stated food types. For example, one student wrote starch, protein and lipid instead of stating the sense organs used in making the given observations. Extract 3.2 is a sample of students' incorrect responses.

3. (a) Outline seven steps for carrying out scientific investigation.
(i) Data analysis and interpretation
(ii) observation and data recording
(iii) Writing report
(iv) Identifying the problem
(v) Experimentation
(vi) Formulation of hypothesis
(vii) Drawing conclusion
(b) State the sense organs used in making the following observations.
(i) Colour change during food test experiment. Tongue
(ii) Identifying the smell of a flower Eyes
(iii) Identifying the texture of sand. Nose

Extract 3.2: Student's incorrect responses to question 3

In Extract 3.2, the student interchanged the steps for carrying out a scientific investigation in part (a). For example, he/she wrote *identifying the problem* as the fourth step instead of the first step. Also, he/she stated incorrect sense organs such as the *tongue* used in identifying colour change during food test experiments instead of the eye.

2.2.2 Question 4: Health and Immunity

This question required the students to explain five (5) methods of preventing the spread of malaria.

A total of 797,131 (100%) students attempted the question. Data show that 575,467 (72.19%) scored from 0 to 2.5 marks, out of whom 410,184 (51.46%) scored 0 marks. The students who scored from 3 to 6 marks were 158,499 (19.89%), whereas 63,165 (7.92%) scored from 6.5 to 10 marks. Further analysis reveals that 18,439 (2.31%) students scored all the 10 marks. The general performance on this question was weak because 27.81 per cent of the students scored from 3 to 10 marks. Figure 4 summarises the students' performance in question 4.

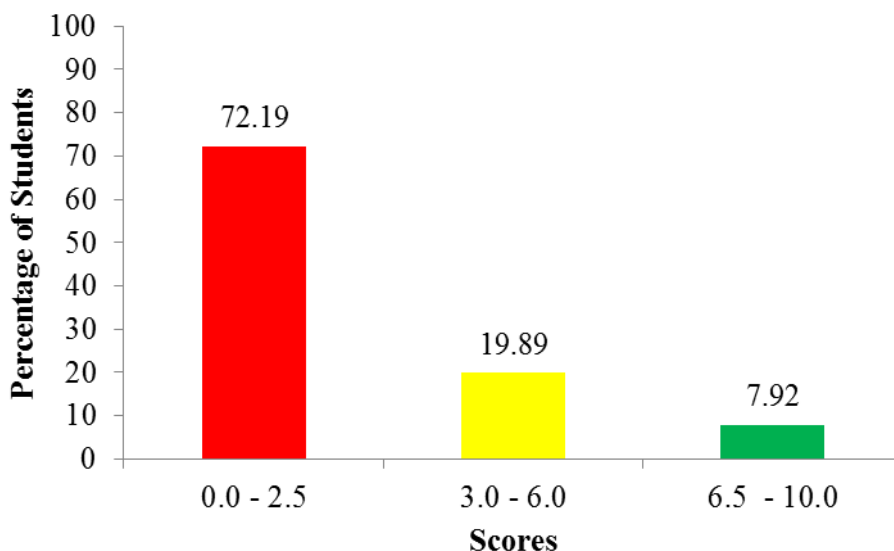


Figure 4: Students' performance on question 4

The students who scored low marks (0 to 2.5) failed to understand the requirements of the question and, therefore gave incorrect responses. The

410,184 (51.46%) students who scored 0 wrote incorrect answers to the preventive measures of malaria. For example, some of them wrote ways of preventing sexually transmitted diseases such as the use of condoms, abstaining from sexual intercourse, using screened blood during blood transfusion and avoiding sharing personal items such as underwear.

Other students explained the symptoms of malaria as one student wrote headache, tiredness, high fever, vomiting, pain in joints and abdominal pain instead of the methods of preventing malaria. In addition, some students lacked knowledge about the methods of preventing diseases and thus wrote answers which are not related to the question. For example, some of them explained the factors affecting body immunity such as lack of vaccination, lack of a balanced diet, diseases, chemicals and drugs instead of explaining the methods of preventing the spread of malaria. Extract 4.1(a) is a sample of students' incorrect responses.

4. Briefly explain five methods of preventing the spread of malaria.
- (i) Eat the hot food; Due to the following reason / solution this are used in this points because malaria are disease caused by mosquito anopheles. This are important in this section of number:
 - (ii) Wash your hands and soap after visit your toilet. Also this are used in method to preventing the spread of malaria in the body; Because Malaria are live in one area to another area:
 - (iii) Cleaning the environment and toilets every morning. Due also are preventing the spread of malaria the environment and the body of the human being and other mammalian in the environment; This also are important for the life:
 - (iv) Wash your fruits and vegetables before the used; Also this are used in the home and other place the people live; Finally wash your fruits and vegetables before and after the use:
 - (v) Wash your hands after and before the eaten the food; This also are used in this points / in the number because are caused before and after eaten your food in home, school, hospital, hotel and other place:

Extract 4.1(a): Student's incorrect responses to question 4

In Extract 4.1(a), the student explained the ways of preventing cholera such as *eat the hot food* instead of the methods of preventing malaria.

Additionally, the analysis shows that some students had low competence in the English language. These students understood the demand of the question but failed to explain the point in English therefore they used Kiswahili language instead of the English language. Extract 4.1(b) is a sample of students' incorrect responses.

4. Briefly explain five methods of preventing the spread of malaria.

- (i) ..Kulala ndani ya neti ili using'atwe na mbu.....
- (ii) ..Kufyeka nyasi ndefu ili kuandaa mbu kwa sababu mbu wanapendelea maeneo yenye nyasi ndefu.....
- (iii) ..Kupikia madimbwi ya maji yaliyokaribu na nyumba ili kupunguza ongezeko la mbu kwa sababu mbu wanazaliana maeneo yenye majimaji.....
- (iv) ..Kuponyo maji kila vitu maeneo yanayozungulia nyumba au mazingira yote vile ya nyumba.....
- (v) ..Kutumia dawa ya kuua mbu mfano rungu.....

Extract 4.1(b): Student's response to question 4 written in Kiswahili

Extract 4.1(b), is a response of the student who used Kiswahili language in responding to a question. The student explained correctly the methods of preventing spread of malaria such as kulala ndani ya neti (sleeping under mosquito nets), kufyeka nyasi ndefu (cutting long grasses) and kutumia dawa ya kuua mbu (using insecticides such as rungu) but lost marks due to the use of Kiswahili which was not the language of instruction.

Conversely, students who scored 3 to 6 marks explained two to three methods of preventing malaria instead of five hence lost marks. Further, the analysis shows that 18,439 (2.31%) students who scored 10 marks had adequate knowledge about communicable diseases specifically malaria. Therefore, they explained clearly five methods of preventing the spread of malaria. Extract 4.2 is a sample of students' correct responses.

4. Briefly explain five methods of preventing the spread of malaria.

- (i) Covering stagnant water sources and slashing tall grasses in the environment. This helps to destroy the mosquito breeding places in order to prevent Malaria.
- (ii) Spraying of insecticides in the houses. This helps to kill the mosquitoes in the house in order to prevent Malaria.
- (iii) Putting wire mesh on windows and doors. This helps to prevent the mosquitoes from penetrating the living houses.
- (iv) Sleeping under well treated mosquito nets. Treated mosquito nets protect a person from being bitten by mosquitoes while sleeping.
- (v) Making sure that all septic tanks are airtight and if possible fumigation should be conducted to destroy mosquito breeding places.

Extract 4.2: Student's correct responses to question 4

In Extract 4.2, the student correctly explained the methods of preventing the spread of malaria.

2.2.3 Question 5: Nutrition

This question had two parts; (a) and (b). In part (a), the students were required to list four major requirements for photosynthesis to take place. In part (b), the students were required to support the statement that “photosynthesis is important to the living organisms.”

The question was attempted by all students 797,131 (100%). Analysis indicates that 406,766 (51.03%) students scored from 0 to 2.5 marks. Out of whom, 234,954 (29.47%) scored 0 in this question. Students who scored from 3 to 6 marks were 296,773 (37.23%), whereas 93,592 (11.74%)

scored from 6.5 to 10 marks. Further analysis indicates that 17,944 (2.25%) scored all the 10 marks. Students' general performance on this question was average since 48.97 per cent scored from 3 to 10 marks. Figure 5 summarises the students' performance on question 5.

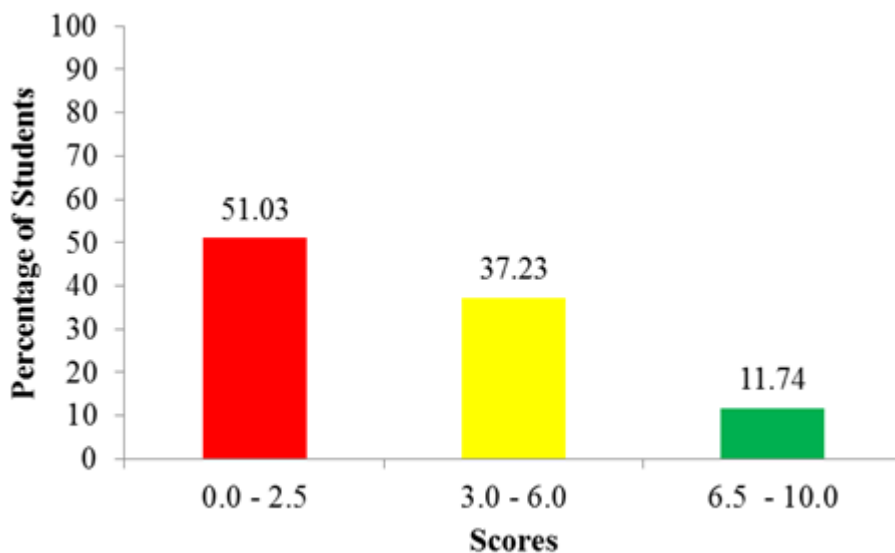


Figure 5: *Students' performance on question 5*

The students who scored from 3 to 6 marks lost most of the marks in part (b) of the question. This was caused by students' partial competence in the concept of photosynthesis. Some of the students outlined the importance of photosynthesis correctly but they failed to explain it. Further analysis shows that 17,944 students who scored 10 marks correctly gave four requirements for photosynthesis to take place such as sunlight, chlorophyll, carbon dioxide and water in part (a). Also, they correctly explained three importances of photosynthesis to the living organisms in part (b). This implies that the students had sufficient knowledge about photosynthesis. Extract 5.1 is a sample of students' correct responses.

5. (a) What are the four major requirements for Photosynthesis to take place?
- (i) Carbon dioxide
 - (ii) Water
 - (iii) Presence of sunlight
 - (iv) Presence of chlorophyll
- (b) In three points, support the statement that "Photosynthesis is an important process to the living organisms."
- (i) Production of oxygen - During Photosynthesis oxygen is released as a product. Oxygen gas is important for various life processes such as gaseous exchange and respiration.
 - (ii) Reduction of atmospheric carbon dioxide - During photosynthesis carbon dioxide is absorbed and used as one of the raw materials during the process. The use of carbon dioxide tend to reduce amount of carbon dioxide in the atmosphere.
 - (iii) Production of food - During photosynthesis plants manufacture their own food and store excess food in leaves or storage organs these storage organs are later eaten by other organisms and are used as source of food.

Extract 5.1: Student's correct responses to question 5

In Extract 5.1, the student correctly stated the major requirements for photosynthesis to take place in part (a). Also, he/she correctly explained the importance of photosynthesis to living organisms in part (b).

However, analysis shows that almost half (51.03%) of the students scored low (0 to 2.5) marks. Those who scored 1 to 2 marks stated one to two requirements of photosynthesis in part (a) hence losing marks. Most of the students who scored 0 misconceived the question and therefore gave incorrect responses in all parts. In part (a), some of them stated the products of photosynthesis such as oxygen, carbohydrate and starch. Others did not understand the demand of question as they outlined essential minerals elements such as phosphorus, magnesium, calcium and nitrogen instead of the requirements of photosynthesis.

Similarly, in part (b), some students failed to explain the importance of photosynthesis to living organisms. For instance, some of them explained the importance of plants to living organisms such as providing habitat, source of medicines, adding nutrients when decomposing and preventing soil erosion instead of the importance of photosynthesis. There were other students who explained one to two importance while others outlined the importance of photosynthesis and failed to explain it, as a result they scored low marks. Extract 5.2 is a sample of students' incorrect responses.

5. (a) What are the four major requirements for Photosynthesis to take place?

(i) Stomata

(ii) Leaf

(iii) vapour

(iv) Light

(b) In three points, support the statement that "Photosynthesis is an important process to the living organisms."

(i) It used to cool plant. This because photosynthesis it is important to the living organism. s. because some plant wanted photosynthesis to growth so this part it is important because it cool plant in order the plant to growth very well when take photosynthesis

(ii) the plant loose excessive water. This because photosynthesis it is important during the plant loose excessive water in the plant so photosynthesis it is important to the living organism like plant because it loose some excessive water in the plant.

(iii) It mantaing transpiration pull. This because photosynthesis it is important to the living organism some organism they mantaing transpiration pull in the plant so photosynthesis it is importance for living organism like plant to mantaing transpiration pull

Extract 5.2: Student's incorrect responses to question 5

In Extract 5.2, the student wrote incorrect responses in all parts. For example, in part (b) he/she explained the importance of transpiration such as *it used to cool the plant* instead of the justifying the importance of photosynthesis to living organisms.

2.2.4 Question 6: Gaseous Exchange and Respiration

This question required the students to explain how gaseous exchange occurs across the alveoli by giving five (5) points.

This question was attempted by all students 797,131 (100%). The analysis indicates that 786,443 (98.66%) scored from 0 to 2.5 marks, out of whom, 774,979 (97.22%) scored 0. Students who scored from 3 to 6 marks were 6,521 (0.82%) whereas 4,167 (0.52%) scored from 6.5 to 10 marks. Further analysis shows that 2,406 (0.30%) scored all the 10 marks. The students' performance on this question was weak because 1.34 per cent scored from 3 to 10 marks. Figure 6 summarises the students' performance on question 6.

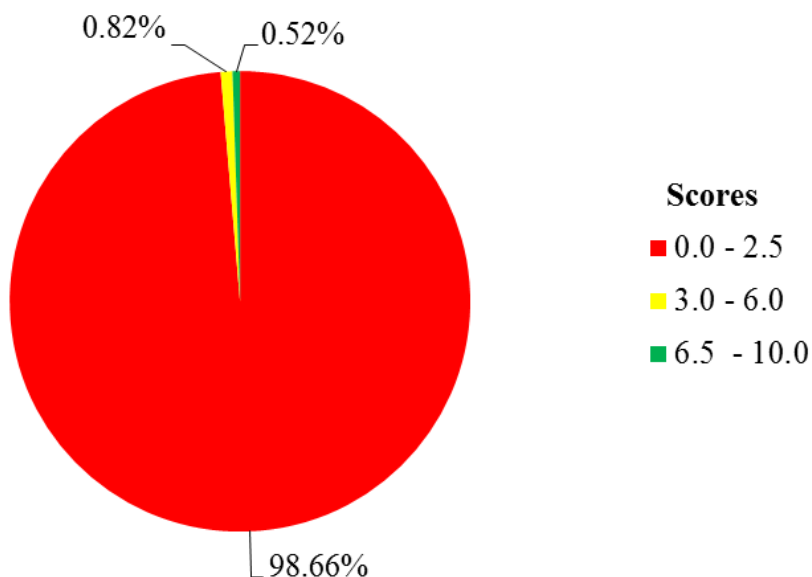


Figure 6: Students' performance on question 6

Students who scored low marks (0 to 2.5) lacked adequate knowledge about gaseous exchange in mammals and thus failed to explain correctly how gaseous exchange occurs across the alveolus. Some students mentioned respiratory organs of various organisms such as lungs, gills, trachea system and book lungs while others mentioned the parts of the human respiratory system such as the trachea, bronchi, nose, diaphragm and bronchioles. Other students explained factors affecting the rate of gaseous exchange such as physical activity, age, altitude, health and temperature instead of how gaseous exchange occurs across the alveolus.

There were other students who explained the adaptive features of respiratory surfaces such as they are moist, are supplied by a dense network of blood capillaries and have thin membranes. Others gave structures such as they are branched and have spongy-like structures with numerous air spaces instead of explaining how gaseous exchange occurs across the alveolus. These students failed to understand that during inhalation, oxygen accumulates in the alveolus. This causes more concentration of oxygen in the alveolus than in the bloodstream/ blood capillaries. As a result, oxygen diffuses out of the alveoli into the blood capillaries where it combines with haemoglobin to form oxyhaemoglobin. Carbon dioxide produced by respiring tissues accumulates in the blood capillaries where it combines with haemoglobin to form carbaminohaemoglobin. The carbon dioxide therefore diffuses from the blood capillaries into the alveoli to the atmosphere. Extract 6.1 is a sample of students' incorrect responses.

6. How does gaseous exchange occur across the alveolus? Briefly explain by giving five points.
- (i) During inhalation external intercostal muscle contract and during exhalation external intercostal muscle relax.
 - (ii) During inhalation internal intercostal muscle relax while during the exhalation the internal intercostal muscle tend to contract.
 - (iii) During the inhalation diaphragm tend to become contract and during exhalation the diaphragm tend relax.
 - (iv) During the inhalation process the rib tend to be outward and upward and during exhalation rib tend to be inward and downward.
 - (v) During inhalation rib tend to be outward while during exhalation tend to be inward.

Extract 6.1: Student's incorrect responses to question 6

In Extract 6.1, the student explained events which take place during inhalation and exhalation instead of explaining how gaseous exchanges occur across the alveolus.

Despite the weak performance of most students on this question, 0.52 per cent scored 6.5 to 10 marks. Among these 2,406 (0.30%) students scored all 10 marks. This indicates that they had adequate knowledge about gaseous exchange across the alveoli thus, they correctly explained how does gaseous exchanges occur across the alveolus. Extract 6.2 is a sample of students' correct responses.

6. How does gaseous exchange occur across the alveolus? Briefly explain by giving five points.

- (i) When we breathe in, Oxygen enters in the body and then it is accumulated in the alveoli. This shows that in the alveoli there is higher concentration of oxygen than in the blood capillaries.
- (ii) This causes high concentration of oxygen in the alveoli than in the blood capillaries.
- (iii) Then the Oxygen diffuses out of the alveoli into the blood capillaries in which it combines with haemoglobin to form Oxyhaemoglobin.
- (iv) When the Oxygen is used in the muscles of the body, it produces the by-product which is Carbon dioxide. The carbon dioxide accumulates in the blood capillaries where it combines with haemoglobin to form carbaminohaemoglobin.
- (v) The carbon dioxide diffuses from the blood capillaries into the alveoli to the atmosphere.

Extract 6.2: Student's correct responses to question 6

In Extract 6.2, the student gave a correct explanation of gaseous exchange occurring across the alveolus.

2.2.5 Question 7: Nutrition

This question had two parts (a) and part (b). In part (a) the students were required to draw an external structure of a plant leaf and label its four parts. In part (b), students were required to state one function of any two parts labelled in part (a).

This question was attempted by all students 797,131 (100%). Data show that 491,947 (61.71%) scored from 0 to 2.5 marks, out of whom, 179,160 (22.48%) scored 0. Students who scored from 3 to 6 marks were 217,607 (27.30%), and only 87, 577 (10.99%) scored from 6.5 to 10 marks. Further analysis indicates that 12,490 (1.57%) scored all the 10 marks. The students' general performance on this question was average because 38.29 per cent scored from 3 to 10 marks. Figure 7 summarises the students' performance on question 7.

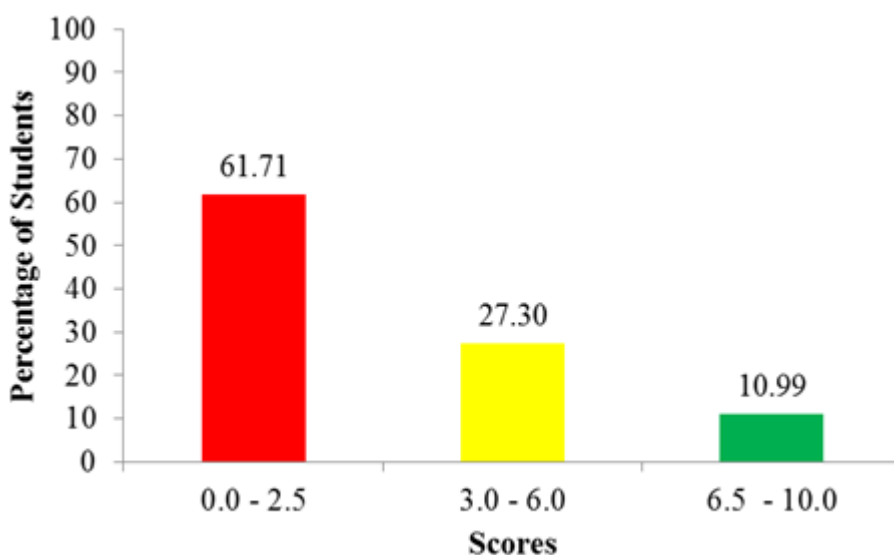


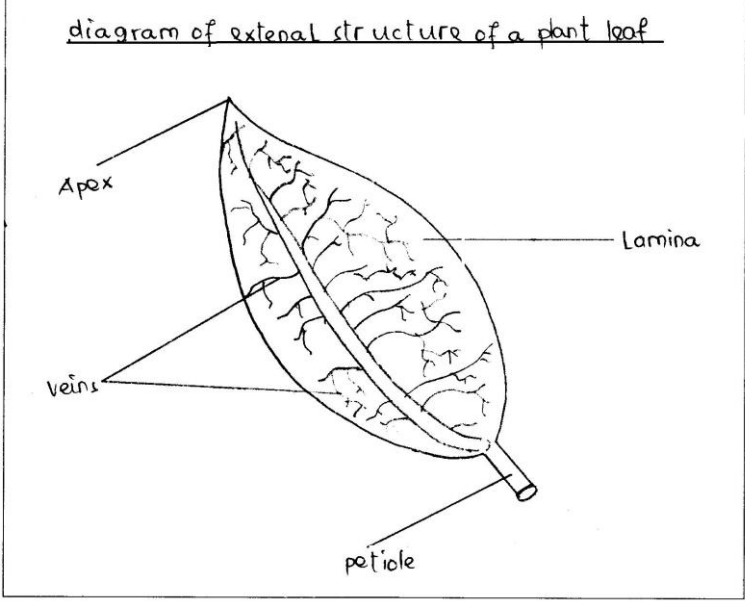
Figure 7: Students' performance on question 7

Students who scored 3 to 6 lost most of the marks in part (b) of the question. This was attributed to students' insufficient knowledge about the concept of photosynthesis. Some of them drew the external structure of a

plant leaf correctly but gave two to three labels instead of four hence losing some marks. On the other hand, 12,490 (1.57%) students who scored 10 marks demonstrated good competence in describing the structure of the leaf in relation to photosynthesis. Furthermore, they were skilful in biological drawing. Therefore, in part (a) they managed to draw a diagram of the external structure of a plant leaf by observing the principles of biological drawing such as the use of pencil, large diagram, neatness, drawing in sharp lines, use of non-arrowed labelling lines, parallel/non-crossing label lines, free-hand drawing and relevant caption. In part (b), they correctly stated one function of the two labelled parts of a diagram. Extract 7.1 is a sample of students' correct responses.

7. (a) Draw the external structure of a plant leaf and label its four parts.

diagram of external structure of a plant leaf



(b) State one function of any two parts which you have labelled in 7 (a).

(i) Lamina - The lamina contains chlorophyll which absorbs and traps sunlight on the leaf

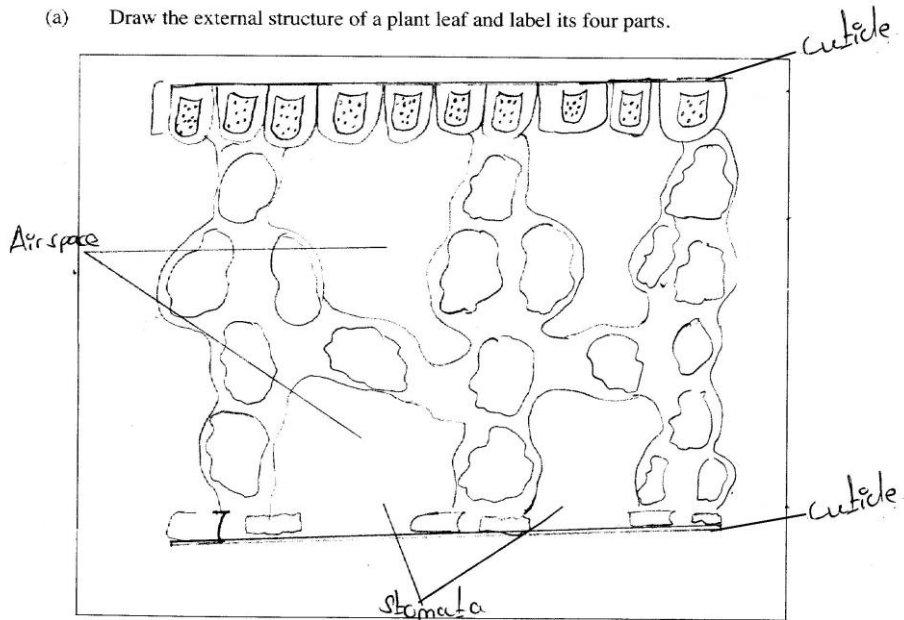
(ii) petiole - This is the part of the leaf which helps to attach the leaf to the branch of the plant.

Extract 7.1: Student's correct responses to question 7

In Extract 7.1, the student correctly drew a diagram of the external structure of a plant leaf and labelled the four parts in part (a). Also, in part (b) the student stated one function of two parts among the labels in part (a).

Despite the average performance on this question, more than half (61.71%) of the students scored 0 to 2.5 marks. In part (a), some students drew the diagrams of a plant and labelled its parts such as root, leaf and stem instead of drawing the external structure of a plant leaf. Other students drew a diagram of a plant cell and labelled its parts such as the cell wall, cell membrane and nucleus. Other students drew diagrams of various organisms. For example, some students drew a moss plant and labelled its parts such as rhizoids, seta and capsules while others drew a mushroom and fern plant. In part (b), some of the students stated the function of other parts of a plant. For instance, one student wrote leaf is used for photosynthesis, the stem contains vascular bundles and roots anchor the plant to the soil instead of the function of the external parts of a leaf. This implies that the students lacked knowledge about the structure of the leaf and its function in plants. Extract 7.2 is a sample of students' incorrect responses.

7. (a) Draw the external structure of a plant leaf and label its four parts.



- (b) State one function of any two parts which you have labelled in 7 (a).

- (i) Stomata allows gases to pass through the leaf.
- (ii) Air space used to be open so as to allow gaseous exchange in the plant when it's needed and also allows amount of gases to be cover a space.

Extract 7.2: Student's incorrect responses to question 7

In Extract 7.2, a student drew a diagram of the internal structure of a plant leaf instead of the external structure in part (a). Also, he/she stated the function of the parts found in the internal structure of a leaf such as *stomata* instead of the external parts found on the plant leaf in part (b).

2.2.6 Question 8: Classification of Living Things

The question had two parts (a) and (b). In part (a), students were required to classify the organisms from Kingdom to Phylum level as shown in the following table:

<i>Organisms</i>	<i>Kingdom</i>	<i>Phylum</i>
(i) <i>Plasmodium</i>		
(ii) <i>Amoeba</i>		
(iii) <i>Mushroom</i>		

In part (b), the students were required to provide one disadvantage of the following organisms to human beings: (i) *Amoeba* and (ii) *Mushroom*.

The question was attempted by all students 797,131 (100%). Data indicate that 506,676 (63.56%) students scored from 0 to 2.5, out of whom, 265,328 (33.26%) scored 0 mark. Students who scored from 3 to 6 marks were 243,863 (30.60%) and, 46,592 (5.84%) scored from 6.5 to 10 marks. Further analysis shows that 5,995 (0.75%) scored all the 10 marks. The performance on this item can be categorized as average because 36.44 per cent scored from 3 to 10 marks. Figure 8 summarises the students' performance on question 8.

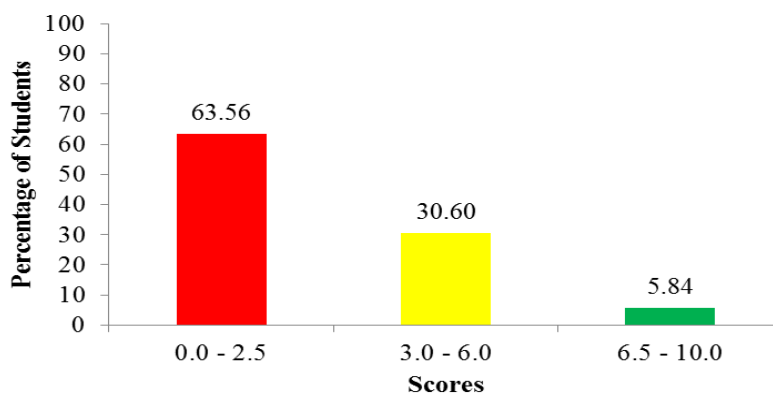


Figure 8: Students' performance on question 8

Students who had average performance (3 to 6) correctly classified one to two organisms given in the table from Kingdom to Phylum level and provided the disadvantages of the organisms given, hence lost some marks. On the other hand, 5,995 (0.75%) students who scored 10 marks correctly

classified all three organisms from Kingdom to Phylum level in part (a), and in part (b), they gave one correct disadvantage of the organism such as; amoeba causes disease to humans while some species of mushroom are poisonous thus may cause death when eaten. This indicates that the students had sufficient knowledge about classification of Living Things. Extract 8.1 is a sample of students' correct responses.

8. (a) Classify the organisms given in the Table from Kingdom to the Phylum level.

Organisms	Kingdom	Phylum
(i) Plasmodium	Protoctista	Apicomplexa
(ii) Amoeba	Protoctista	Rhizopoda
(iii) Mushroom	Fungi	Basidiomycota

(b) Provide one disadvantage of the following organisms to human being.

(i) Amoeba
 Amoeba can cause disease to human beings, so they are harmful to humans health.

(ii) Mushroom
 Some mushrooms are poisonous so they can cause death when eaten.

Extract 8.1: Student's correct responses to question 8

In Extract 8.1, the student correctly classified organisms given from Kingdom to Phylum level in part (a). Also, he/she correctly gave one disadvantage of amoeba and mushroom to human beings in part (b).

Conversely, more than half (63.56%) of the students scored low (0 to 2.5) marks. They gave responses contrary to the demand of the question. For example, in part (a), some students wrote ranks of classification such as Kingdom, Phylum, Class, Order, Family and Species instead of classifying the organisms to phylum level. Other students had correct ranks but lost marks due to misspelling of the biological terminologies. For instance, they misspelt words like kingdom protoctita, phylum apicoplexa and basidimycota. Other students incorrectly placed the organisms in the wrong Kingdom and Phyla/Division due to a lack of competence in classification. For example, some of the students incorrectly classified Plasmodium as

kingdom monera, phylum rhizopoda instead of kingdom protoctista, phylum apicomplexa. Amoeba was classified to the kingdom animalia, phylum Ciliophora instead of the kingdom Protoctista phylum Rhizopoda and mushroom was classified to the kingdom Protoctista, phylum Ascomycota instead of the kingdom Fungi and phylum Basidiomycota. However, the misspelling of scientific words and incorrect classification of the organisms led them to lose some marks.

Similarly, in part (b), some of the students provided incorrect answers. For instance, one student wrote that amoeba spread disease and mushroom attract or act as a habitat for dangerous animals such as scorpions while others wrote amoeba is a vector of disease to human beings and mushrooms make the environment unattractive since they can grow anywhere. Other students wrote the characteristics of the organisms instead of their disadvantages. For instance, one student wrote amoeba is a unicellular organism and mushroom is a saprophytic organism instead of providing the disadvantage of each organism. Extract 8.2 is a sample of students' incorrect responses.

8. (a) Classify the organisms given in the Table from Kingdom to the Phylum level.

Organisms	Kingdom	Phylum
(i) Plasmodium	Kingdom Animalia	Phylum zoomatigima
(ii) Amoeba	Kingdom Fungi	Phylum Basidimycota
(iii) Mushroom	Kingdom Monera	Phylum Ciliophora

(b) Provide one disadvantage of the following organisms to human being.

(i) Amoeba
 - It cause the body to have the good strong health.

(ii) Mushroom
 - It cause to plant and body to be adve.

Extract 8.2: Student's incorrect responses to question 8

In Extract 8.2, the student incorrectly classified organisms from kingdom to phylum level in part (a). For example, he/she classified amoeba into the *kingdom Fungi* and *phylum Basidiomycota* instead of the kingdom Protocista and phylum Rhizopoda. Also, the responses given in part (b) are incorrect.

2.2.7 Question 9: Transport of Materials in Living Things

This question required the students to study the figure which shows the arrangement of vascular bundles in a monocotyledonous root and then answer the questions: in part (a), they were required to name the parts labelled A, B, C and D while in part (b) they were required to state the function of the parts labelled A, B and C.

The question was attempted by all students 797,131 (100%). The analysis indicates that 730,979 (91.70%) students scored from 0 to 2.5 marks, out of whom, 665,366 (83.47%) scored 0. Students who scored from 3 to 6 marks were 45,166 (5.67%), whereas 20,986 (2.63%) scored from 6.5 to 10 marks. Further analysis reveals that 5,440 (0.68%) scored all the 10 marks. The students' general performance on this question was weak since 8.30 per cent scored from 3 to 10 marks. Figure 9 summarises the students' performance on question 9.

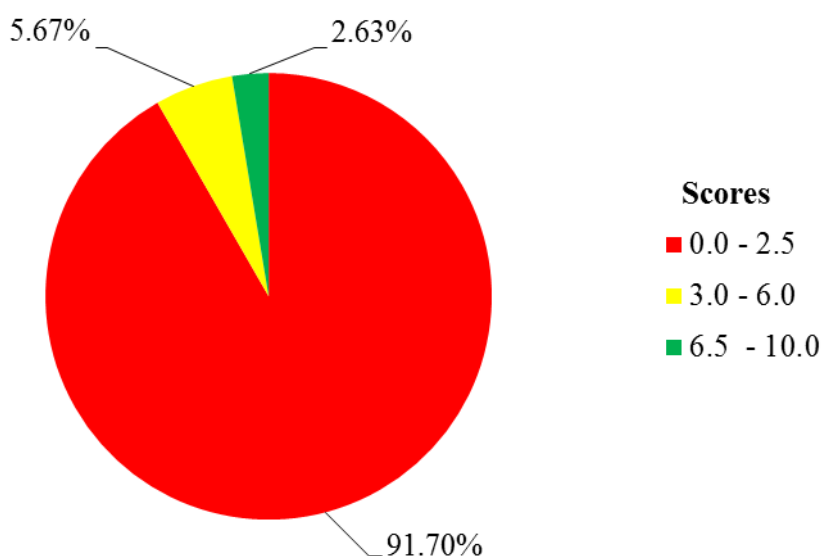
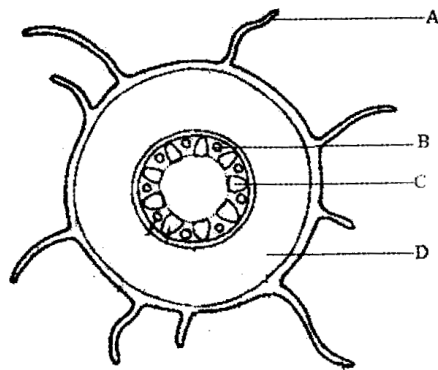


Figure 9: Students' performance on question 9

The students who scored zero were incompetent in the tested concept while those who scored from 1 to 2 marks demonstrated a lack of knowledge about the Transport of Materials in Plants specifically the Vascular System. In part (a), some of the students did not adhere to the question demand as they stated parts of the plant cell such as A, cell wall, B, nucleus, C, vacuole and D, chloroplast instead of the parts of monocotyledonous root which were A, root hair, B, Phloem, C, Xylem and D, Cortex respectively. Others misconceived the cross-section of the monocotyledonous root with the heart and labelled parts of the heart. For example, one student labelled A as pulmonary artery instead of root hair, B was labelled as auricle instead of phloem and C was labelled as pulmonary vein instead of xylem. Other students who labelled one to two parts correctly instead of four parts resulted in scoring low marks in part (a).

Moreover, in part (b) they gave incorrect functions of parts A, B and C. For example, some students wrote A (petiole) attaches the leaf to the branch, and B, lamina traps sunlight energy. These students failed to recognise that Part A (Root hair) absorbs water and mineral salts in the soil. Part B (Phloem) transports manufactured food from the leaves or storage organs to the other parts of a plant and part C (Xylem) transports water and mineral salts from the roots to the other plant parts. Extract 9.1 is a sample of students' incorrect responses.

9. The following Figure shows the arrangement of vascular bundles in a monocotyledonous root. Study it carefully and answer the questions that follow:



- (a) Name the parts labelled A, B, C and D.

A = Root

B = Xylem

C = Phloem

D = Cytoplasm

- (b) What are the functions of the parts labelled A, B and C?

A = Root

Function is to

⇒ transport nutrients and water to the plant.

Part B = Xylem

Function is to

⇒ create a wall and overcome pressure flow.

Part C = Phloem

Function is to

⇒ absorb water and nutrients from the roots.

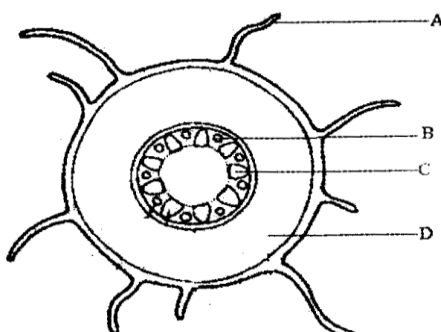
Extract 9.1: Student's incorrect responses to question 9

In Extract 9.1, the student incorrectly named the parts of the cross-section of the monocotyledonous root. For example, he/she interchanged parts labelled B and C as *xylem* and *phloem* instead of phloem and xylem in part (a). Also, the student wrote incorrectly the functions of the wrongly labelled parts in part (b).

Further analysis of the students' responses reveals that the students who scored from 3 to 6 marks, lost some marks since they incorrectly stated some of the parts and gave the correct function of one to two labelled parts in (b). Further the analysis indicates that, 5,440 (0.68%) students who

scored 10 marks were aware of cross-section of monocotyledonous roots with vascular structures arranged in a circular pattern around the central pith. Therefore, they stated correctly the names of the parts labelled A, B, C and D. In part (b), they stated the function of the parts labelled A, B, and C. This indicates that the students had adequate knowledge about transport of materials in plants particularly the vascular system. Extract 9.2 is a sample of students' correct responses.

9. The following Figure shows the arrangement of vascular bundles in a monocotyledonous root. Study it carefully and answer the questions that follow:



(a) Name the parts labelled A, B, C and D.

A - Root hair
 B - Phloem
 C - Xylem
 D - Cortex

(b) What are the functions of the parts labelled A, B and C?

Part A : Its function is to absorb mineral salts and water from the soil to the plant.

Part B : Its function is to transport the manufactured food from the leaves to the other parts of the plant.

Part c : Its function is to transport mineral salts and water from the roots to the other parts of the plant.

Extract 9.2: Student's correct responses to question 9

In Extract 9.2, the student stated correctly the names of the parts labelled A, B, C and D in part (a). Also, he/she stated correctly the function of the parts labelled A, B and C in part (b).

2.3 Section C: Essay Question

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

2.3.1 Question 10: Transport of Materials in Living Things

In this question, students were required to explain why blood circulation is important in animals by giving six points.

The analysis shows that all students 797,131 (100%) attempted the question. The data show that 695,676 (87.27%) students scored from 0 to 4 marks, out of whom 516,629 (64.81%) scored 0 marks. Further analysis indicates that 71,027 (8.91%) students scored from 4.5 to 9.5 marks and 30,428 (3.82%) students scored from 10 to 15 marks. Further analysis reveals that 3,234 (0.41%) students scored 15 marks. The general performance on this question was weak because 12.73 per cent of the students scored from 3 to 10 marks. Figure 10 summarises the students' performance on question 10.

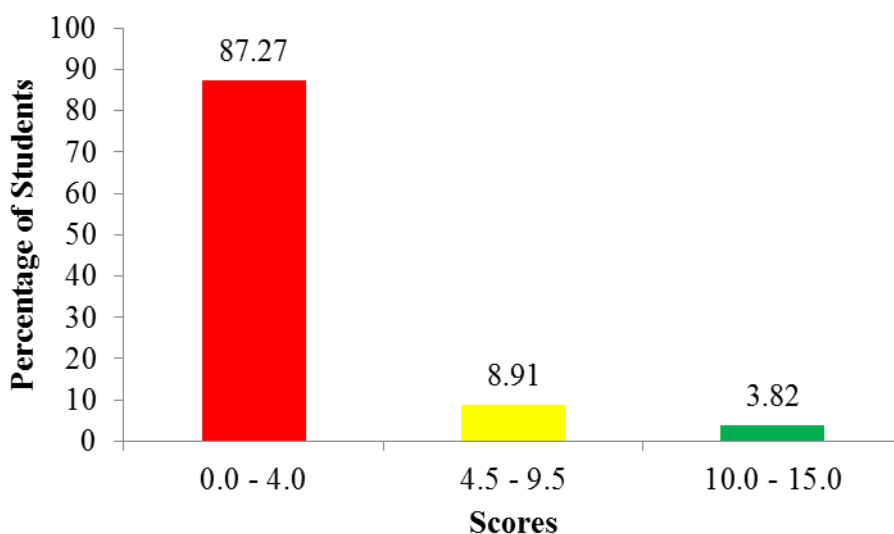


Figure 10: *Students' performance on question 10*

The analysis shows that 87.27 per cent of the students scored low marks (0 to 4). The students who scored 1 to 4 marks gave either a correct introduction or conclusion and outlined one to two correct points. The students (64.81%) who scored zero marks did not understand the requirements of the question and therefore, provided incorrect responses.

Most of them lacked essay-writing skills which are introduction, main body and conclusion. Instead of explaining the meaning of blood circulation in the introduction, some of the students wrote heart is a pumping organ in the body while others wrote blood vessels are channels through which blood is distributed to the various parts of the body. Others defined blood as a specialized fluid tissue in humans, thus losing some marks.

In the main body, they were supposed to explain the importance of blood circulation but they gave incorrect responses. For instance, one student explained the function of different blood vessels such as the pulmonary vein for transporting oxygenated blood from the lungs to the heart, the aorta for transporting oxygenated blood from the heart to different parts of the body, the coronary artery for supplying oxygenated blood to heart muscles and vena cava for transporting deoxygenated blood from different part of the body to the heart. Other students drew the structure of the mammalian heart and labelled different parts such as ventricles, auricles, bicuspid valve, tricuspid valve and aorta while others drew the diagram showing blood circulation in the whole human body and indicated the flow of blood. Additionally, some students wrote the structural differences between vein and artery instead of explaining the importance of blood circulation in animals. The students also provided wrong conclusion. Extract 10.1(a) is a sample of students' incorrect responses.

10. Why is blood circulation important in animals? Explain by giving six points.

Blood transfusion is the transfer of blood from one person to another. The person who donates blood is called a donor and the one who receives blood is called a recipient. The transfer of blood from one person to another is very important cause it has many disadvantages and also advantages to the victim and the environment in general. Blood transfusion can take place in hospital to different seminars and also to the schools. There are several types of groups that donate and receive

blood example ; blood group A , B , AB and also Group o. Blood transfusion is very important . The following are the importance of blood transfusion to our society .

It helps to save lives of the victims eg. pregnant mother . Blood transfusion can also save lives of many people in the society . For example when there is an accident and one has lost a lot of blood people can donate and transfer blood to a victim , so as to not get some of the infection and even death of the victims and also some of the diseases that can cause someone to die due to the loss of blood in the body , so blood transfusion is very important to human beings since it saves lives of accident victims in the society during and after accidents and any other events .

It helps to regain the blood lost ; Due to several accidents or delivering a child , Blood transfusion enable a person to gain the blood lost ; it can be due to the occurrence of accidents or complication during delivery which makes a mother or a victim get much loss of blood in the body . So when he or she is transferred blood from a donor it helps to regain and get energy and also regains blood .

It helps people with sickle cell anaemia to live healthy and happily . Blood transfusion enable the people suffering from sickle cell anaemia to get blood . This is because they lose much blood for a short period of time because their contain much white blood cells (WBCs) than the red blood cells (RBCs) also blood transfusion enable people with sickle cell feel happy and healthy .

It helps to reduce the risk of death. Blood transfusion also enable the people to avoid from the risk of death and because when you have loss of blood in the body it can lead to many dangerous diseases like suffocation and so many other problems in the body so when someone has to transfer or to be transferred blood he or she should be very careful because if not can lead to various infections like HIV/AIDS and so many other infections in the body can occur.

It helps to save the life of people. Blood transfusion also enable the person to gain all the substances transported through the blood. For example oxygen, food nutrients, water, heat and removing of carbon dioxide in the body. So when a person transfers blood it enables a victim to regain the materials found in the blood which are very important for someone's health and are supposed to be in the body for good health.

It encourages love and care towards each other. Blood transfusion promotes and encourages love and care toward each other in the society. Because when you care and love someone you will be able to donate and share blood with him or her. So when the society really care and love each other they are ready to donate or give blood to the people in need of it so as to save their lives and continue with the life process on the earth. So blood transfusion encourages love and caring to the society members.

All in all; Blood transfusion is very important to the animals life as mentioned above. Also blood transfusion has also negative impacts if not observed some steps. Blood transfusion can lead to spread of HIV/AIDS if not well screened and also it can lead to spread of some infections and diseases through fluid contact between one person another and so many other more.

Extract 10.1(a): Student's incorrect responses to question 10

In Extract 10.1(a), the student defined *blood transfusion* instead of blood circulation in the introduction. He/she explained the advantages of blood transfusion to humans such as *it helps to reduce the risk of death* instead of explaining the importance of blood circulation in animals. The conclusion was incorrect as well.

Moreover, the analysis shows that some students had poor command of the English language. These students understood the demands of the question but failed to present the answers in English therefore they used the Kiswahili language instead of the English language. Extract 10.1(b) is a sample of students' incorrect responses.

10. Why is blood circulation important in animals? Explain by giving six points.

- Damu husaidia kusafirisha hewa ya kabonadaya kside kufika nje ya mwinzi wa mwanadamu
- Damu husaidia kusafirisha chakula
- Damu husaidia kusafirisha hormones
- Damu husaidia kusafirisha taka mwinzi

Extract 10.1(b): Student's response to question 10 wrote in Kiswahili

In Extract 10.1(b), the student wrote an unorganized essay with neither an introduction nor a conclusion. However, the importance of blood circulation such as *damu kusaidia kusafirisha hewa ya kabonidayokside kuitoa nje ya mwili wa mwanadamu* (To transport carbon dioxide outside the human body) and *damu husaidia kusafirisha homones* (To transport hormones) were correct but lost marks due to use of Kiswahili which is not the language of instruction.

Despite the weak performance on this question 30,428 (3.82%) students scored high marks (10 to 15). Further, the analysis shows that 3,234 (0.41%) students who scored all the 15 marks had sufficient knowledge about Blood Circulation and essay writing skills. Therefore, they provided a correct introduction, explained the importance of blood circulation and gave a correct conclusion. Extract 10.2 is a sample of the student's correct response.

10. Why is blood circulation important in animals? Explain by giving six points.

Blood circulation refers to the movement of blood from the heart to all parts of the body and back to the heart.

Blood circulation is very important system in the following ways:

The Blood circulation helps in transportation of nutrients from digestive system to other parts of the body. Blood plays a vital role since it transports the nutrients which are end-products of digestion process from the digestive system towards other body parts to be used by the cells for growth purposes. Thus body parts are able to get nutrients through the blood which transport them.

Blood circulation helps to transport white blood cells and antibodies towards the site of infection. Also blood in the circulatory system assist in the transportation of white blood cells and antibodies towards the site of infection so as to fight against the pathogens which causes infections and thus defending the body against different diseases.

Blood circulation system helps in the transportation of waste products from excretory organs where they are secreted towards the site for elimination of waste products. Also blood circulation play a vital role by ensuring that different waste products produced from different metabolic body functions such as respiration are eliminated from the body through excretory organs. Example of such waste products are carbon dioxide gas.

Blood circulation helps/enables in the transportation of hormones from the endocrine glands towards target organs. This means that also blood play a vital role in transportation of hormones from the endocrine glands towards the target organs.

Blood circulation helps in the transportation of oxygen gas so that it can be used for respiration process by the body cells. Oxygen gas is the very important gas which is used in respiration process, thus blood circulation transports oxygen gas at the time when it is inhaled in the alveolus towards the body cells for the break down of glucose molecules which helps in the survival of living organisms.

Blood circulation helps in transportation of chemicals for clotting upon injury so as to prevent excessive loss of blood due to the presence of platelets (thrombocytes) in the blood. Since in the blood, there are protein molecules called fibrinogen, hence they assist in clotting of blood upon injury so as to prevent excessive loss of blood.

Generally, Blood circulation is a very vital process in animals as it aids in transportation of various materials which are essential for metabolic body functions for their survival.

Extract 10.2: Student's correct responses to question 10

In Extract 10.2 the student correctly explained the six importance of blood circulation in animals and demonstrated a good command of the English Language and good essay-writing skills.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER TOPIC

Nine topics were assessed in Biology FTNA 2024. The analysis of the students' performance shows that students performed well (78.37%) in the topics of Cell Structure and Organisation, Balance of Nature, Classification of Living Things, Gaseous Exchange and Respiration, Introduction to Biology, Transport of Materials in Living Things, Health and Immunity, Safety in Our Environment and Nutrition which were assessed in question 1 comprised of multiple-choice items.

The topics of Safety in Our Environment, Introduction to Biology, Nutrition, and Classification of Living Things which were assessed in questions 2, 3, 5, 7 and 8 had an average performance of 63.13, 44.58, 43.63, and 36.44 per cent respectively. Question 2 was a matching item while questions 3, 5, 7, and 8 were short answers.

The topics with weak performance were Health and Immunity (27.81%), Transport of Materials in Living Things (10.52%), and Gaseous Exchange and Respiration (1.34%). These topics were assessed in questions 4, 6, 9, and 10. Questions 4, 6, and 9 were short answers while question 10 was an essay question. A summary of the students' performance in FTNA 2024 in terms of topics and questions is presented in Appendix I.

In comparing the students' performance per topic in the years 2023 and 2024, the analysis shows that in the FTNA 2024, the performance in the topic of Nutrition has improved from weak (14.21%) to average (43.63%). This implies that there were some efforts done in teaching and learning on this topic. Moreover, the performance of the topics of Safety in Our Environment, Introduction to Biology, and Classification of Living Things maintained average performance. Similarly, the topics of Health and Immunity, and Transport of Materials in Living Things have maintained weak performance. The comparison of performance in different topics is summarized in the Appendix II.

4.0 CONCLUSION

The performance in Biology in the FTNA 2024 was average because 47.00 per cent of the students scored 30 marks or above. The analysis of the students' responses revealed that the students had good performance on question 1 (78.37%). The questions which had average performance were 2 (63.13%), 5 (48.97%), 3 (44.58%), 7 (38.29%) and 8 (36.44%). However, questions 4, 10 and 9 had weak performance of 27.81, 12.73 and 8.30 per cent, respectively.

The weak performance of students on the stated questions was attributed to:

- (a) Lack of adequate knowledge about various concepts in Biology. For instance, the majority (98.66%) of the students failed to explain how gaseous exchange occurs across the alveoli in question 6.

- (b) Failure of students to spell biological terminologies and lack of drawing skills. This was evident in the responses to question 8 part (b) which required the students to classify the organisms and question 7 (a) which involved drawing the external structure of the leaf.
- (c) Failure of the students to identify the requirements of the questions. For example, some of the students outlined essential mineral elements in question 5 part (a) instead of the requirements of photosynthesis.
- (d) Low proficiency in the English language: this was obvious in several questions especially those in which students were required to give explanation or descriptions. In some cases, the students failed to understand the demands of the question due to this factor. For example, in attempting questions 4 and 10, some students responded using Kiswahili.

5.0 RECOMMENDATIONS

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

- (a) Teachers should use charts, journal articles on common epidemic, pandemic and endemic diseases to guide students to carry out a survey on the common diseases in the community and write reports. Then guide students to present their reports in the plenary discussion. Give summary and make conclusions on appropriate measures to be taken to control the spread of common epidemic, pandemic and endemic diseases in the topic of Health and Immunity.
- (b) Teachers should use maize, sunflower, microscope, slides and stains to demonstrate an experiment about distribution of vascular system in plants and guide students in a class discussion on it. Also, use map of the human circulatory system, games and simulations to guide students to demonstrate the importance of blood circulation in transporting materials and make group discussion on it in the topic of Transport of Materials in Living Things.

- (c) Teachers should use diagrams/pictures/drawings showing gaseous exchange across the alveolus to guide students to observe and draw the diagrams of alveoli. Then guide them to discuss the structures of the alveolus and explain how gaseous exchange takes place across the alveolus on the topic of Gaseous Exchange and Respiration.
- (d) Students should practice drawing biological diagrams following the principles of drawing such Biology diagrams.
- (e) Students should establish an English-speaking programme via activities such as debates, reading novels, and speaking English in schools all the time. This will improve proficiency in the English language.

Appendix I: Students' Performance Per Topic in Biology FTNA 2024

S/N	Topic	Question Number	Percentage of Students who Scored from 30% or Above	Average Performance Per Topic (%)	Remarks
1.	Cell Structure and Organisation, Balance of Nature, Classification of Living Things, Gaseous Exchange and Respiration, Introduction to Biology, Transport of Materials in Living Things, Health and Immunity, Safety in Our Environment and Nutrition	1	78.37	78.37	Good
2.	Safety in Our Environment	2	63.13	63.13	Average
3.	Introduction to Biology	3	44.58	44.58	Average
4.	Nutrition	5	48.97	43.63	Average
		7	38.29		
5.	Classification of Living Things	8	36.44	36.44	Average
6.	Health and Immunity	4	27.81	27.81	Weak
7.	Transport of materials in Living Things,	10	12.73	10.52	Weak
		9	8.30		
8.	Gaseous Exchange and Respiration	6	1.34	1.34	Weak

Appendix II: Comparison of Students' Performance Per Topic in FTNA 2024 and 2023

SN	Topic	FTNA 2023			FTNA 2024		
		Question number	Percentage of Students With a Score of 30% or Above	Remarks	Question number	Percentage of Students With a Score of 30% or Above	Remarks
1.	Introduction to Biology, Safety in Our Environment, Health and Immunity, Nutrition, Transport of Material in Living Things, Classification of Living Things, Gaseous Exchange and Respiration and Balance of Nature	1	86.05	Good	1	78.37	Good
2.	Safety in Our Environment	7	62.15	Average	2	63.13	Average
3.	Cell structure and Organisation	5	45.73	Average			
4.	Introduction to Biology	4	45.08	Average	3	44.58	Average
5.	Classification of Living Things	8	41.47	Average	8	36.44	Average
6.	Transport of Materials in Living Things	2	35.31	Weak	10	12.73	Weak
		9	15.70		9	8.30	
7.	Health and Immunity	3	34.64	Weak	4	27.81	Weak
		10	15.82				
8.	Nutrition	6	14.21	Weak	5	48.97	Average
					7	38.29	

