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) 2025

BIOLOGY

(VOCATIONAL STREAM)

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) 2025

033 BIOLOGY
(VOCATIONAL STREAM)

Published by:
The National Examinations Council of Tanzania,
P.O. Box 2624,
Dar es Salaam, Tanzania.

TABLE OF CONTENTS

FOREWORD

This report presents the Students' Item Response Analysis (SIRA) on the Form Two National Assessment (FTNA) 2025 in Biology (Vocational Stream). The FTNA is a formative assessment designed to provide 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 the Biology FTNA 2025 (Vocational Stream) was generally weak as only 2 (0.54%) students attained a passing grade of D, while the remaining 364 students (99.46%) attained F grade. The weak performance was attributed to a combination of factors, including insufficient knowledge and skills in the tested competences, inadequate competence in conducting scientific experiments and writing experimental reports, misspelling of biological terminologies, poor drawing skills, low proficiency in the English language, and providing responses that did not meet the demands of the questions.

Conversely, the two students who demonstrated average performance showed limited understanding of the tested concepts and were able to provide some correct responses. However, their performance was affected by incomplete explanations, limited application of knowledge, errors in biological terminology, partially labeled diagrams, and insufficient elaboration of key points, which limited their ability to attain higher scores.

The National Examinations Council of Tanzania (NECTA) expects that the feedback provided in this report will highlight the challenges that education stakeholders should take appropriate measures to improve the teaching and learning of the Biology subject. Consequently, students will acquire knowledge, skills and competences outlined in the syllabus thereby improving their performance in future assessments and examinations.

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

Prof. Said Ally Mohamed.
EXECUTIVE SECRETARY

1.0 NTRODUCTION

The report presents the analysis of responses provided by the students who sat for Biology (Vocational Stream) Form Two National Assessment (FTNA) in November 2025. The Biology paper was set following the NECTA format issued in the year 2025. It assessed all the main and specific competencies as stipulated in the 2023 Biology syllabus for secondary education.

The assessment paper contained sections A, B and C with a total of 100 marks. Section A consisted of two (2) objective questions; question 1 and 2. Question 1 consisted of 10 multiple choice items, while question 2 consisted 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.

Data indicates that a total of 389 students were registered for FTNA 2025 Biology (Vocational Stream), of whom 368 sat for the assessment. Only two (2) students (0.54%) attained a passing grade D. The findings reveal that performance in this subject was weak, as 99.46 per cent of the students scored below 30 marks. In terms of grade distribution, only two students achieved Grade D, while all remaining students obtained Grade F, as presented in the following Table:

The Students' Performance in FTNA 2025 Biology (Vocational Stream)

Year	Sat	Performance Grades					Passed
		A	B	C	D	F	%
2025	368	-	-	-	2	366	0.54

The table indicates that the majority of students attained Grade F, reflecting a failing performance; while only a small number of students (2) attained Grade D.

The subsequent section of this report presents a detailed analysis of students' performance on each question. It begins by explaining what the question required and proceeds to the analysis of students' responses. The analysis highlights the challenges encountered by students in answering the questions and explores possible reasons for these difficulties. Selected

extracts from students' scripts are included to illustrate how students responded in relation to the specific demands 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' score 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 IN EACH QUESTION

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

2.1 SECTION A: OBJECTIVE QUESTIONS

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

2.1.1 Question 1: Different Competences

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 against the item number in the box provided in the question paper. The items were set from three competences: Demonstrating Mastery of the Concepts, Principles and Processes of Biology specifically in Describing the Physiological, Anatomical and Ecological Processes of Living Organisms, Communicating Using Scientific Biological Terminologies specifically in Demonstrating mastery of Scientific Biological Terminologies, and Conducting Biological Investigations focusing in Demonstrating Mastery of Basic Skills for Conducting Biological Investigations.

This question was attempted by all 368 (100%) students. Analysis shows that 220 (59.78%) students scored from 0 to 2 marks out of whom, 25 (6.79%) scored 0 mark. Students who scored from 3 to 6 marks were 147 (39.95%) whereas only 1 (0.27%) scored 7 marks. The general performance

on question 1 was average because 40.22 per cent of the students scored from 3 to 7 marks. Figure 1 summarises the performance of the students on question 1.

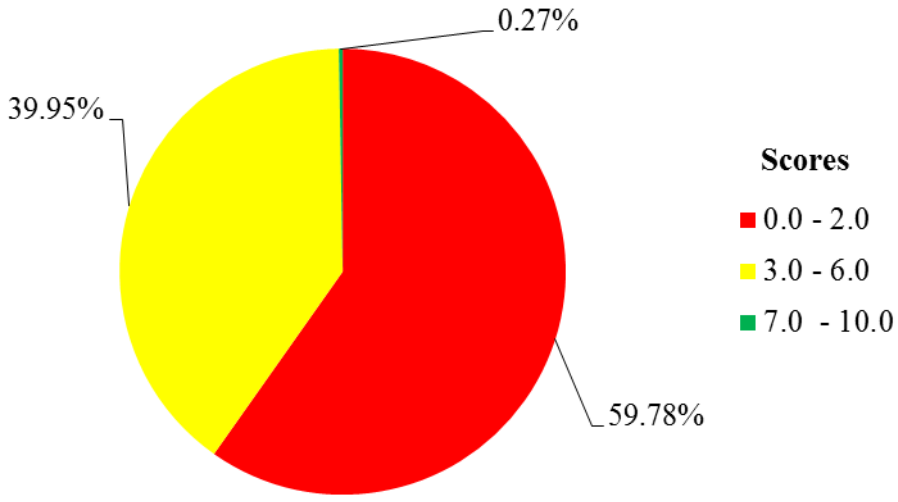


Figure 1: *Students' Performance on Question 1*

Further, the analysis shows that the 1 (0.27%) student who scored 7 marks was aware of the concepts tested. Therefore, he/she chose correct responses to most of the items. The students who scored 3 to 6 marks provided correct responses to 3 up to 6 items hence loss of marks. Students who scored low marks (0 - 2) either provided correct responses to only two items or failed to provide correct responses to any of the items. This suggests that these students lacked adequate knowledge of the assessed concepts. The analysis of the items is presented as follows:

Item (*i) Which part of the cell is concerned with production of energy?*

A	*Vacuole*	*B*	*Cytoplasm*
C	*Nucleus*	*D*	*Mitochondrion*

The correct answer was *D, Mitochondrion.* Students who chose the correct response had adequate knowledge about cell structure and functions. Therefore, they realized that mitochondria are the powerhouses of the cell, responsible for energy production through cellular respiration. Conversely, students who selected *A, Vacuole* failed to recognise that the vacuole helps plant cells maintain their shape and is involved in the storage of water,

nutrients, and waste materials. Those who selected *B, Cytoplasm*, and *C, Nucleus,* were not aware that cytoplasm is the site for chemical reactions within the cell while nucleus controls the functions of the cell.

Item (ii) *Which nutritional disorder occurs when a person intentionally refuses to eat enough food, leading to a severe loss of body mass?*

A	*Obesity*	*B*	*Kwashiorkor*
C	*Anorexia nervosa*	*D*	*Bulimia nervosa*

The correct response was *C, Anorexia nervosa.* Students who answered correctly were competent in understanding nutritional deficiencies and disorders. Contrarily, students who chose responses *A, Obesity* and *D, Bulimia nervosa* failed to recognise that obesity is a nutritional disorder caused by eating large amount of fats and carbohydrate while Bulimia nervosa is caused by eating large amount of food followed by self-induced vomiting, fasting and excessive exercising. Similarly, students who opted for *B, Kwashiorkor* were not aware that kwashiorkor is a nutritional deficiency caused by inadequate protein intake in the body.

Item (iii) *Which practice will you recommend to family members to prevent them from the risk of stroke?*

A	*Eating a low fat diet*	*B*	*Eating a high sugar diet*
C	*Taking a high salt diet*	*D*	*Consuming a high fat diet*

The correct answer was A, *Eating a low fat diet*. Students who responded correctly understood that eating low-fat diet minimises fats accumulation in the blood vessels supplying the brain, thereby helping blood to maintain normal blood pressure and reduce the risk of stroke. On the other hand, students who opted for *B, Eating a high sugar diet*, were not aware of the risk factors associated with stroke, as excessive consumption of sugary foods can lead to obesity, which increases the likelihood of stroke. Those who opted for *C, Taking a high salt diet* and *D*, Consuming a high fat diet failed to recognise that high salt and fat intake contribute to elevated blood pressure and arterial blockage, thereby increasing the risk of stroke.

Item (iv) *Which part of the mammalian respiratory system moves antagonistically during breathing?*

A	*Ribcage*	*B*	*Intercostal muscles*
C	*Pleural membrane*	*D*	*Epiglottis*

The correct response was *B, Intercostal muscles.* Students who selected this response demonstrated awareness that the intercostal muscles function antagonistically, such that when the external intercostal muscles contract, the internal intercostal muscles relax. However, students who selected *A, Ribcage* failed to recognise that the ribcage functions cooperatively to expand and contract the thoracic cavity during breathing, rather than acting in an antagonistic manner. Similarly, students who selected *C, Pleural membrane* and *D, Epiglottis s*howed a lack of understanding of their respective functions. The pleural membrane contains pleural fluid, which reduces friction and allows the lungs to move smoothly within the thoracic cavity during respiration, while the epiglottis prevents food from entering the trachea by closing it during swallowing.

Item (v) *Photosynthesis is a process by which green plants manufacture their own food. What are the raw materials required for the process to take place?*

A *Glucose and chlorophyll*
B *Oxygen and sunlight energy*
C *Sunlight energy and glucose*
D *Carbon dioxide and water*

The correct response was option *D, Carbon dioxide and water*. Students who selected this option demonstrated an understanding of the photosynthetic process, recognising that plants use carbon dioxide and water as raw materials to produce food in the presence of sunlight and chlorophyll, resulting in the formation of glucose and oxygen. Conversely, those who selected options *A, glucose and chlorophyll, B, Oxygen and sunlight energy and C, Sunlight energy and glucose*, showed misconceptions about the process. These students failed to distinguish between raw materials, conditions, and products of photosynthesis, incorrectly identifying sunlight energy and chlorophyll which are necessary conditions for the process; and glucose and oxygen, which are the products rather than the inputs.

Item (vi) *A scientists found two organisms which have many features in common and can interbreed freely under natural conditions to produce fertile offspring. In which of the lowest classification rank do they belong?*

A Species *B Genus*
C Kingdom *D Family*

The correct response was alternative *A, Species*. Students who chose the correct answer demonstrated an understanding of the classification hierarchy, recognising that organisms capable of interbreeding freely under natural conditions to produce fertile offspring belong to the same species, which is the lowest and most specific rank. Students who selected *option B, Genus, and D, Family* were not aware that organisms classified within these higher ranks share some common characteristics but do not necessarily interbreed. Similarly, students who selected option C, *Kingdom* failed to recognize that this is the highest rank of classification, incorporating a wide diversity of organisms that share relatively few characteristics in common.

Item (vii) *Why is it advised to use natural system of classification when classifying living organisms?*

A It requires simple skills and is less expensive
B It considers both internal and external features
C It has limited predictive value and is less accurate
D It is usually fast and considers only external features

The correct response was option *B, It considers both internal and external features*. Students who chose the correct response were competent on the systems of classification, recognising that the natural system of classification is based on both internal and external characteristics of organisms. However, those who selected option *A, It requires simple skills and less expensive, and D, It is usually fast and considers only external features* failed to understand that these statements describe advantages of the artificial system of classification rather than the natural system. Similarly, students who selected option *C, It has limited predictive value and is less accurate* failed to recognise that this statement refers to a disadvantage of the artificial system of classification, not the natural system.

Item (viii) *In an experiment for testing for starch in a leaf, the student took the leaf that has been in the sunlight for 6 hours and put it in boiling water for 2 to 3 minutes. Why was this procedure necessary?*

A *To dissolve the chlorophyll*
B *To decolourise the leaf*
C *To stop further chemical reactions*
D *To soften the leaf to ease testing*

The correct response was alternative *C, To stop further chemical reactions.* Students who opted for the correct response demonstrated an understanding of the procedures for testing for starch in a leaf. They recognised that after exposing a leaf to sunlight for six hours, photosynthesis would have occurred, and boiling the leaf in water stops further chemical reactions, preserving the starch content for accurate testing. Conversely, students who opted for response *A, To dissolve the chlorophyll and B, To decolourise the leaf* did not understand that decolourisation and chlorophyll removal occur by boiling the leaf in alcohol not in water. Likewise, those who opted for response D, *To soften the leaf to ease testing,* failed to recognise that leaf softening occurs after decolourisation, typically by rinsing the leaf in warm water, rather than during the initial boiling step.

Item (ix) *What happens to an animal cell when placed in hypertonic solution?*

A *It loses water by osmosis and become crenated*
B *It gains water by osmosis and become haemolysed*
C *It loses water by osmosis and become plasmolysed*
D *It gains water by osmosis and become turgid*

The correct response was option *A, It loses water by osmosis and become crenated.* Students who chose the correct response demonstrated an understanding of the effects of osmosis on living organisms, recognising that when an animal cell is placed in a hypertonic solution, it loses water by osmosis and becomes crenated. Students who opted for the response *B, It gains water by osmosis and become haemolysed,* did not understand that an animal cell gains water and undergoes haemolysis (bursting) only when placed in a hypotonic solution due to the absence of a cell wall. Those who chose response *C, It loses water by osmosis and becomes plasmolysed,*

failed to understand that it is the plant cell that becomes plasmolysed when placed in a hypertonic solution due to the presence of a rigid cell wall. Similarly, those who opted for *D, It gains water by osmosis and become turgid,* did not recognise that turgidity is a characteristic of plant cells in hypotonic solutions, as plant cells gain water by osmosis and develop turgor pressure due to the presence of a rigid cell wall.

Item *(x) What is the function of the stage clip found in the light microscope?*

A Support the eyepiece and the rotating nosepiece
B Magnifies the specimen under observation
C Hold the slide containing the specimen in place
D Reflects light to the specimen under observation

The correct answer was option *C, Hold the slide containing the specimen in place*. The students who opted for the correct response demonstrated an understanding of the parts of the light microscope and their respective functions. Contrarily, students who chose response *A, Support the eyepiece and the rotating nosepiece, B, Magnifies the specimen under observation and D, Reflects light to the specimen under observation* did not recognise that these statements correspond to the functions of the body tube, objective lens, and mirror, respectively, rather than the function of the stage clips.

2.1.2 Question 2: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The question consisted of five (5) matching items set from the basic concepts of biology. In this question, students were required to match the description of sub branches of biology in List A with their corresponding branches 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) The study of classification of living things.	*A Anatomy*
(ii) The study of heredity and variation.	*B Cytology*
(iii) The study of structure and functions of cells.	*C Ecology*
(iv) The study of body structures of organisms.	*D Genetics*
(v) The study of interactions of organisms with their environment.	*E Immunology*
	F Mycology
	G Taxonomy
	H Parasitology

The question was attempted by all students 368 (100%). The analysis shows that 259 (70.38%) students scored from 0 to 1 marks, out of whom 124 (33.70%) scored 0 marks. Students who scored from 2 to 3 marks were 99 (26.90%) and only 10 (2.72%) students scored from 4 to 5 marks. Further analysis reveals that 6 (1.6%) students scored all the 5 marks. The general performance on this question was weak because 70.38 per cent of the students scored from 0 to 1 marks. Figure 2 summarises the performance of the students on question 2.

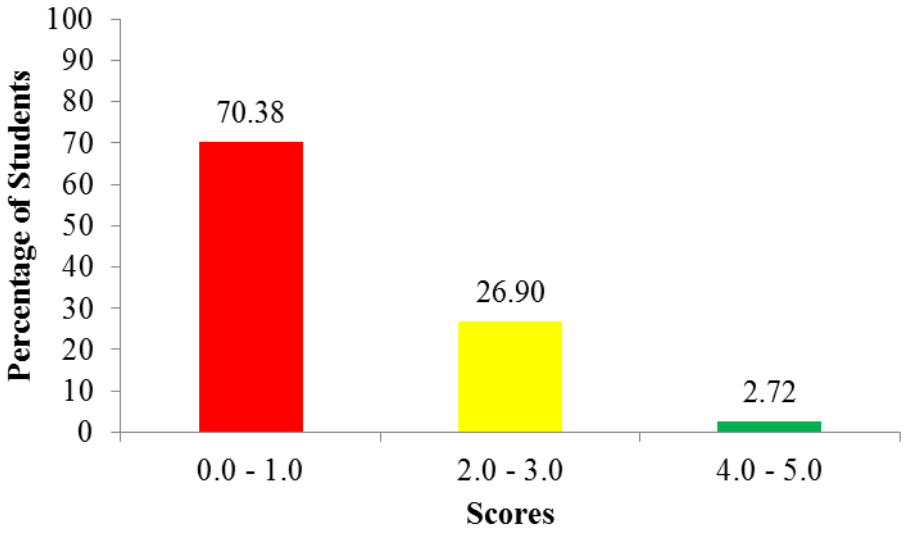


Figure 2: *Students' Performance on Question 2*

The students who scored from 2 to 3 marks lost marks as they matched correctly either 2 or 3 items. Further analysis indicates that students who scored high marks were competent on basic biological concept as they were able to understand the branches of biology and their meanings. 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. This shows that the students were incompetent on basic biological concept. The analysis of the student's responses to each item is presented as follows:

Item (i) required the student to match the description of sub branch of biology which deals with the study of classification of living things. The correct answer was *G, Taxonomy* although some students matched it with *H, Parasitology,* which is the branch of biology that deals with the study of parasites.

Item (ii) required the student to match the description of sub branch of biology which deals with the study of heredity and variation. The correct answer was *D, Genetics*. However, some students matched it with *E, Immunology* which is the branch of biology that deals with the study of immunity.

Item (iii) required the student to match the description of sub branch of biology which deals with the study of structure and functions of cells. The correct answer was *B, Cytology*. However, some students matched it with *F, Mycology* which is the branch of biology that deals with the study of fungi.

Item (iv) required the student to match the description of sub branch of biology which deals with the study of body structures of organisms. The correct answer was *A, Anatomy* although some students matched it with *D, Genetics* which is the branch of biology that deals with the study of study of heredity and variation.

Item (v) required the student to match the description of sub branch of biology which deals with the study of interaction of organisms with their environment. The correct answer was *C, Ecology* although some students matched it with *G, Taxonomy,* which is the branch of biology that deals with the study of classification of living things.

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: Demonstrating Mastery of Basic Skills for Conducting Biological Investigations

This question had two parts (a) and (b). In part (a), the students were required to identify four sense organs and give one use for each. In part (b), they were required to give reason why the observation made using sense organs is said to be disadvantageous.

The question was attempted by all students 368 (100%). The analysis shows that 291 (79.08%) students scored from 0 to 2 marks, out of whom 233 (63.32%) scored 0 marks. Students who scored from 3 to 6 marks were 71 (19.29%) while 6 (1.63%) scored 7 marks. Further analysis reveals that no student who scored above 7 marks. The general performance on this question was weak because 70.08 per cent of the students scored from 0 to 2 out of the 10 marks allocated to this question. Figure 3 summarises the students' performance on question 3.

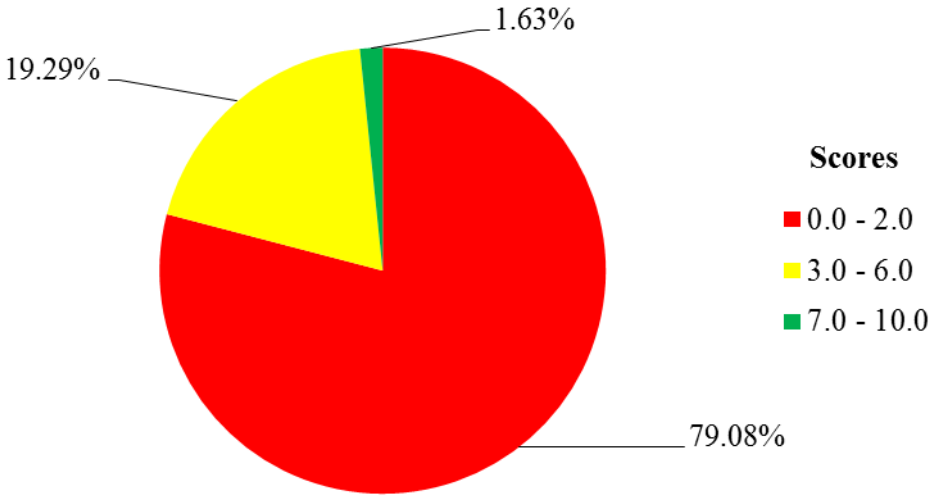
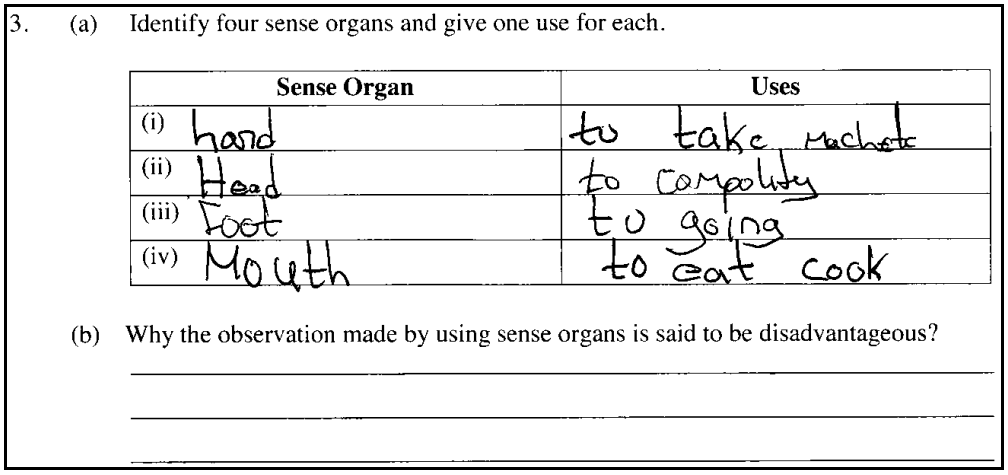


Figure 3: *Students' Performance on Question 3*

The students who scored low marks (0 to 2) provided correct responses to one or two sense organs resulting in scores of one to two marks. The students who scored 0 demonstrated a lack of understanding of the demands of the question. For example, in part (a), some of the students listed body organs such as the *lungs, kidneys, brain,* and *liver* instead of the sense organs. Others incorrectly identified parts of the cell or listed organisms such as *cow, goat, lion,* and *dog*. Some students lacked knowledge about the skills used in studying biology and therefore wrote answers which are not related to the question. Statements such as *animal cell used as blood cell, plant cell used as guard cell, plant tissue used as plant organ, and blood is used for gas exchange in animals* were found in students' scripts. These students failed to understand that sense organs are specialized organs responsible for detecting and responding to stimuli from both the external and internal environment of the body. The organs receive sensory information and transmit it to the brain through the nervous system for interpretation. The primary sense organs include the eyes for vision, the nose for smelling, the skin for the perception of temperature (hotness or coldness), touch, and pain, the tongue for taste, and the ears for hearing.

In part (b), these students misunderstood the requirement and focused on laboratory accidents, such as *fire hazards and choking*, rather than explaining the disadvantages of using sense organs for observation.

Examples of incorrect responses included statements such as *some observations cannot be made using sense organs, observation can cause death when chemicals are tested using the mouth, It is because sometimes sense organs may not see other things example bacteria,* and *sense organs can be broken so one cannot see anything*. In addition, some students omitted the question entirely. They failed to recognize that disadvantage of using sense organs is that they are subjective/based on a person's interest or opinions rather than fact. Extract 3.1 is a sample of students' incorrect responses.



3. (a) Identify four sense organs and give one use for each.

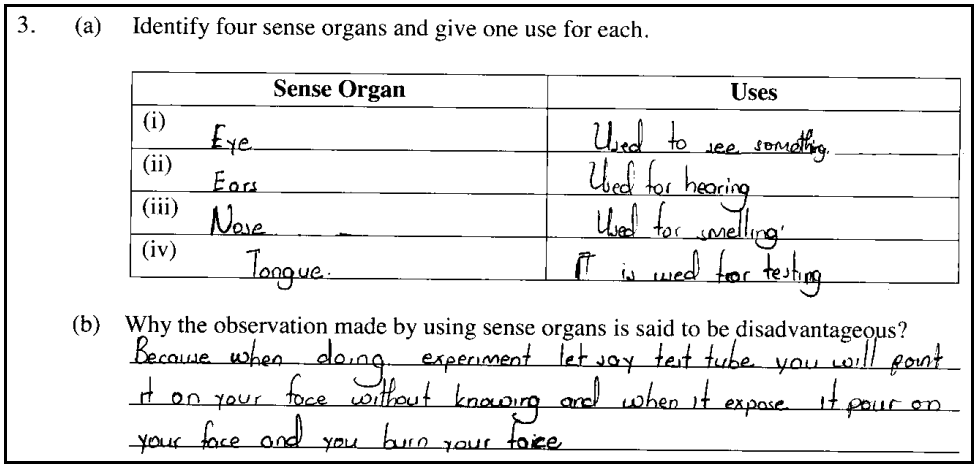
Sense Organ	Uses
(i) hand	to take machete
(ii) Head	to compolity
(iii) Foot	to going
(iv) Mouth	to eat cook

(b) Why the observation made by using sense organs is said to be disadvantageous?

Extract 3.1: Student's incorrect responses to question 3

In Extract 3.1, the student wrote parts of the body and their uses such as *hand to take machete* and *mouth to eat cook* instead of identifying sense organs and their use. The student also skipped part (b).

Conversely, 19.29 per cent of the students who scored average marks (3 to 6) identified three to four sense organs and provided one use in part (a); however, they failed to state the uses of the remaining organs and gave incorrect response to part (b) hence losing some marks. On the other hand, 1.63 per cent of the students who scored 7 marks demonstrated a comprehensive understanding of observation as a fundamental skill in the study of biology. They correctly identified the four sense organs and the function of three organs in part (a). However, failed to explain why observation made using sense organs is disadvantageous. Extract 3.2 is a sample of a student's response who scored average marks.



3. (a) Identify four sense organs and give one use for each.

Sense Organ	Uses
(i) Eye	Used to see something
(ii) Ears	Used for hearing
(iii) Nose	Used for smelling
(iv) Tongue	It is used for testing

(b) Why the observation made by using sense organs is said to be disadvantageous?

Because when doing experiment let say test tube you will point it on your face without knowing and when it expose it pour on your face and you burn your faice

Extract 3.2: A sample of a student's response who scored average marks

Extract 3.2, the student correctly identified the four sense organs and provided the use for eye, nose, and ear thereby earning 7 marks. However, the student did not achieve full marks because he/she incorrectly stated the use of tongue in part (a). For instance, he/she wrote *testing* instead of tasting. In addition, the student provided incorrect reason to why the observation made using sense organs is said to be disadvantageous in part (b).

2.2.2 Question 4: Preparing and Presenting Results of Biological Investigations

In this question students were given a statement "During a practical lesson, students were provided with food sample solution containing protein and reducing sugar." Then they were required to write an experimental report that confirms the positive results for the presence of the food substances in the following table:

Food tested	Procedures	Observation	Inference

The question was attempted by all students 368 (100%) students. Analysis indicates that 367 (99.73%) scored from 0 to 2 marks, of whom 288 (78.26%) scored 0 marks. A single student (0.27%) scored 3 out of 10 marks allotted to this question, and no student scored above this range. Overall performance on this question was weak, as the majority (99.73%)

of students scored from 0 to 2 marks. Figure 4 summarises the students' performance on question 4.

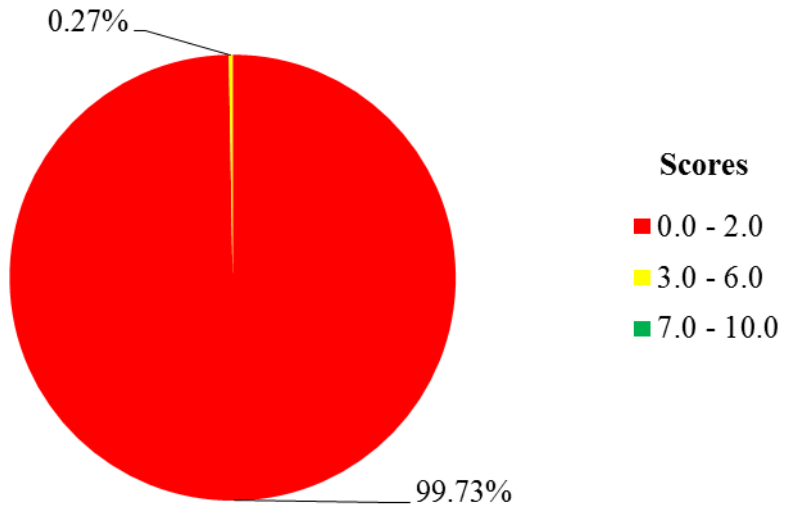


Figure 4: *Students' Performance on Question 4*

The analysis reveals that most of the students who scored low marks (0 to 2) wrote incorrect responses. This indicates that students lacked adequate competence in conducting scientific experiments and in writing experimental reports. Effective performance on this task depended on students having previously engaged in practical food-testing activities as part of the instructional process. However, the majority of students were unable to provide appropriate responses, suggesting limited practical exposure and inadequate mastery of the relevant experimental procedures and underlying concepts.

The students demonstrated a lack of understanding regarding the structure of a food test report, which should include four key sections: food tested, procedure, observation, and inference. In this case, the foods to be tested were proteins and reducing sugars. However, most of the students incorrectly listed substances that were not part of the experiment, such as *vitamins, minerals,* and *roughages*, while others provided examples of natural foods including *meat, cassava, rice, sugar, vegetable, sweet potato* and *orange* instead of focusing on the specific food tests required.

Regarding the procedure, students failed to understand that procedure involves a series of steps to be followed when carrying out the test for a particular food substance. These students demonstrated a lack of understanding that procedure should detail the sequential steps required to test for a specific food substance. Each step should clearly indicate the actions to be performed, the quantity of the food sample taken from the stock solution, the units of measurement, and the apparatus used. Most of the students provided incorrect procedures for testing proteins and reducing sugars. Some of them used inappropriate quantities of reagents, incorrect measurement of units as well as following steps in an improper sequence. For example, one student wrote: *Take a test tube then put 2 cm^3 of sodium solution in your test tube before this put food substance in it then put Benedict's solution* demonstrating a misunderstanding of the correct experimental procedure.

Regarding the observation, students were expected to record the sequence of colour changes that indicate the presence of a particular food substance. However, most students provided incorrect observations. For example, in the protein test, one student reported the color change as *yellow* instead of the expected purple or violet. Similarly, in the reducing sugar test, some students reported the *colour change to blue-black*, rather than the correct progression from green to yellow to orange and finally to brick red. These errors indicate a lack of understanding of the expected chemical reactions and their corresponding visual indicators.

Regarding the inference, students demonstrated a lack of understanding that an inference refers to the conclusion drawn from the observed results, indicating whether a specific food substance is present or absent. The majority of students provided incorrect inferences. For example, some students stated that *starch or lipid or non-reducing sugar* were present instead of identifying the presence of protein or reducing sugars, as required by the question. Others mentioned foods that cannot be tested such as *vitamins*, *minerals*, *vegetables and fruits*. Extract 4 is a sample of students' incorrect responses.

4. During a practical lesson, students were provided with food sample solution containing protein and reducing sugar. Write an experimental report that confirms the positive results for the presence of the food substances. Present your report in the following table:

Food Tested	Procedures	Observation	Inference
Sugar	take equipment 2. take a test tube and put a milk 3. after put a milk take a hydrochloric acid and put in 4. and then put sudan III and put in the heat 5. after your finish make sure you clean the tools.	Make sure that your are observe your practical properly	food

Food Tested	Procedures	Observation	Inference
Food starch	1. Prepare equipments for your practical 2. Start your practical 3. Take the some note in your practical 4. prepare your practical properly	Observe your food properly	take your note

Extract 4: Student's incorrect responses to question 4

In Extract 4, the student incorrectly presented a food test report for the given food sample solution. For example, the student identified *sugar* as the food tested instead of reducing sugar and provided an inaccurate inference by writing *food* rather than stating that reducing sugar was present. These responses indicate that the students lacked competence in presenting results of biological investigations.

The student who obtained 3 out of the 10 allocated marks demonstrated a limited and limited understanding of the requirements of an experimental report. The response showed some awareness of the structure of a food test report; however, key components were either incomplete or incorrectly presented. Although the student was able to identify the food substances, the procedural steps were poorly sequenced and lacked important details such as correct reagents, measurements, and apparatus. Observations were either partially correct or inaccurately described, and the inference did not

fully correspond to the observations recorded. Overall, the response reflected lack of basic knowledge and insufficient practical competence required to produce a complete and scientifically accurate experimental report. The students were supposed to present the correct response in the following manner:

Food tested	Procedure	Observation	Inference
Protein	2 ml of food sample solution were put in a clean and dry test tube, 2 ml of sodium hydroxide solution were added followed by addition of 2 drops of copper (II) sulphate solution dropwise and the mixture was gently shaken.	Purple/Violet colour was observed	Protein was present
Reducing sugar	2 ml of food sample solution were put in a clean and dry test tube, 2 ml of Benedict's solution were added and the mixture was boiled/heated.	Blue colour changed to green to yellow to orange and finally brick red.	Reducing sugar was present

2.2.3 Question 5: Demonstrating Mastery of Scientific Biological Terminologies

The question had two parts (a) and (b). In part (a), students were required to state two distinctive characteristics of organisms belonging to Phylum Chordata. In part (b), the students were required to classify the organisms: Paramecium, Bread mould, Moss plant, and Earthworm from Kingdom to Phylum/division level.

The question was attempted by all students 368 (100%). Data indicate that 353 (95.92%) students scored from 0 to 2, out of whom, 250 (67.93%) scored 0 mark. Only 15 students (4.08%) scored from 3 to 6 marks out of 10 marks allocated to this question, and no student scored above this range. Overall performance on this question was weak, as the majority of students (95.92%) scored from 0 to 2 marks. Figure 5 summarises the students' performance on question 5.

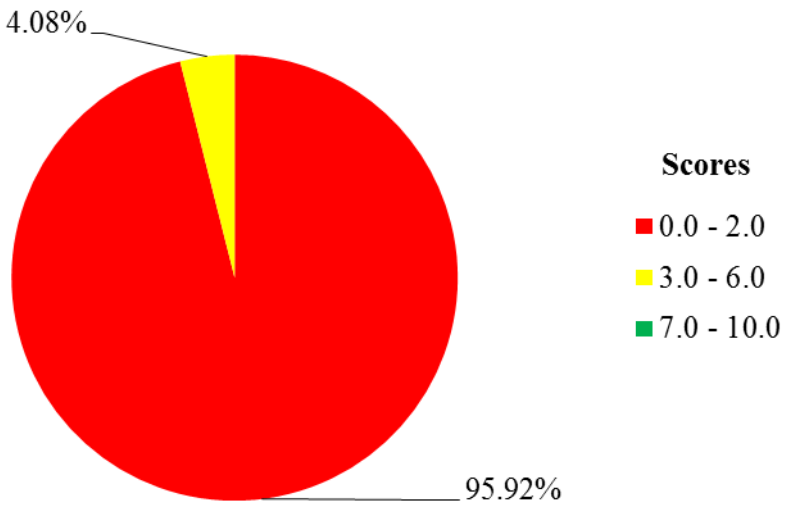


Figure 5: *Students' Performance on Question 5*

Analysis of the students' responses revealed that 95.92 per cent of those who scored low marks (0 to 2) provided incorrect responses in almost all parts of the question. The students who scored zero were incompetent in describing the major groups of organisms.

In part (a), most of the students failed to adhere to the demands of the question. Instead of stating the distinctive characteristics of organisms belonging to the phylum Chordata, some students provided only general characteristics. For example, some students stated that *they have a complete digestive system, they are multicellular,* and *they have an endoskeleton.* Other students described characteristics of organisms from different phyla. For instance, one response stated that *they have a cell wall made up of chitin* and *segmented bodies,* which are distinctive features of organisms in the phylum Arthropoda. Additionally, some students incorrectly wrote the advantages of organisms in phylum Chordata such as *source of food* and *used in biological studies* instead of the distinctive characteristics of organisms in phylum Chordata.

Similarly, in part (b), the students incorrectly classified paramecium, bread mould, moss plant, and earthworm. For example, some of the students classified paramecium to *kingdom Monera* and *phylum Ascomycota* instead of kingdom Protoctista and phylum Ciliophora; Bread mould was

incorrectly classified into *kingdom Plantae* and *phylum Basiomycota* instead of Kingdom Fungi and phylum Zygomycota. Moss plant was incorrectly classified to *kingdom Fungi* and *division Pteridophyta* instead of Kingdom Plantae and division Bryophyta. Likewise, they classified earthworm to *kingdom Protoctista* and *phylum Nematoda* instead of kingdom Animalia and phylum Annelida.

Furthermore, several students lost marks due to the misspelling of scientific terminology. Examples include *Kingdom Fung* instead of Kingdom Fungi and *Phylum Ciophora* instead of Phylum Ciliophora. Some students also failed to classify the organisms as required, instead they listed the hierarchical ranks of classification, such as *kingdom, phylum, class, order, family,* and *genus*. Others provided unrelated examples of organisms, including *amoeba, fern, yeast,* and *mushroom,* rather than classifying the given organisms. Overall, inadequate conceptual understanding of biological classification and misspelling of scientific terminology contributed significantly to students' loss of marks. Extract 5.1 is a sample of students' incorrect responses.

5. (a) State two distinctive characteristics of organisms belonging to the phylum Chordata.

(i) They have a simple structure. And they have no true nucleus.

(ii) They reproduce from their own without other organism

(b) Classify the organisms provided in the following table from Kingdom to Phylum/Division level.

Organisms	Kingdom	Phylum/Division
(i) Paramecium	Kingdom protocista.	Phylum
(ii) Bread mould	Kingdom fungi monera	Phylum
(iii) Moss plant	Kingdom fungi	Division
(iv) Earthworm	Kingdom Anamalia	Phylum.

Extract 5.1: students' incorrect response to question 5

In Extract 5.1, the student provided incorrect responses in both parts (a) and (b). In part (a), the student incorrectly classified all the given organisms. For example, paramecium was incorrectly placed under *Kingdom Protocista* instead of Kingdom Protoctista; bread mould was classified under *Kingdom Monera* rather than Kingdom Fungi; moss plant was placed into *Kingdom Fungi* instead of Kingdom Plantae; and earthworm was placed into *Kingdom Anamalia* instead of Kingdom Animalia in part (b). Moreover, the student wrote only the term *Phylum* without specifying the correct phylum for the organisms provided. In addition, the student incorrectly described the distinctive characteristics of organisms belonging to the phylum Chordata in part (a).

Conversely, students who obtained average marks (3 - 6) were generally able to identify the kingdoms of the given organisms and state one corresponding phylum. However, incorrectness in their responses resulted in a loss of marks. Moreover, these students failed to correctly describe the distinctive characteristics of organisms belonging to the phylum Chordata. This indicates an inadequate understanding of the major groups of living organisms. In particular, they did not recognise that members of the phylum Chordata are characterized by the presence of a notochord, which serves as a supporting skeletal structure; a dorsal, hollow, tubular nerve cord; pharyngeal (gill) slits at some stage of development; and a post-anal tail.

Furthermore, correct classification of the organisms should have been as follows: Paramecium belongs to the kingdom Protoctista and phylum Ciliophora; bread mould belongs to the kingdom Fungi and phylum Zygomycota; moss plants belong to the kingdom Plantae and division Bryophyta; and the earthworm belongs to the kingdom Animalia and phylum Annelida. Extract 5.2 is a sample of students' response who scored average marks.

5. (a) State two distinctive characteristics of organisms belonging to the phylum Chordata

(i) They are destructive to the environment. / can infect-diseases

(ii) They are thicknesses.

(b) Classify the organisms provided in the following table from Kingdom to Phylum/Division level.

Organisms	Kingdom	Phylum/Division
(i) Paramecium	Kingdom protoctista	Annelida.
(ii) Bread mould	Kingdom fungi.	Annelida.
(iii) Moss plant	Kingdom plantae.	Angiospermophyta.
(iv) Earthworm	Kingdom animalia.	Annelida.

Extract 5.2: A sample of a student's response who scored average marks

In Extract 5.2, the student correctly classified the earthworm from kingdom to phylum and identified the kingdoms of the organisms paramecium, bread mould, and moss plant, thereby earning 5 marks. However, the student did not achieve full marks because the phyla of paramecium, bread mould, and moss plant were incorrectly stated. In addition, the student provided incorrect distinctive characteristics of organisms belonging to the phylum Chordata in part (a).

2.2.4 Question 6: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The question had two parts (a) and (b). In part (a) students were required to draw a diagram of cross section of a dicot stem and label the Xylem, Phloem, Epidermis, Pith, and Cortex. In part (b), they were required to state the function of the Xylem.

The question was attempted by all students 368 (100%). Data show that 364 (98.91%) students scored from 0 to 2 marks, out of whom, 355 (96.47 %) scored 0 mark. Only 4 students (1.09%) scored from 3 to 6 marks out of 10 marks allotted to this question, and no student achieved a score above

this range. Overall performance on this question was weak, as the majority (98.91%) of students scored from 0 to 2 marks. Figure 6 summarises the students' performance on question 6.

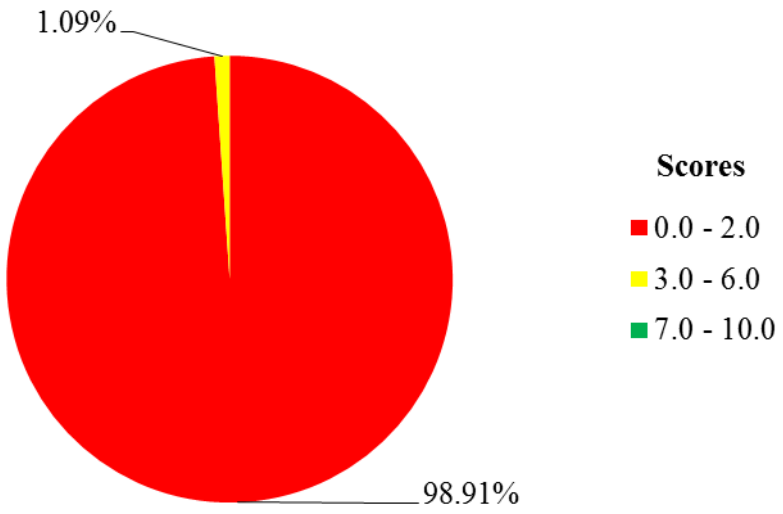


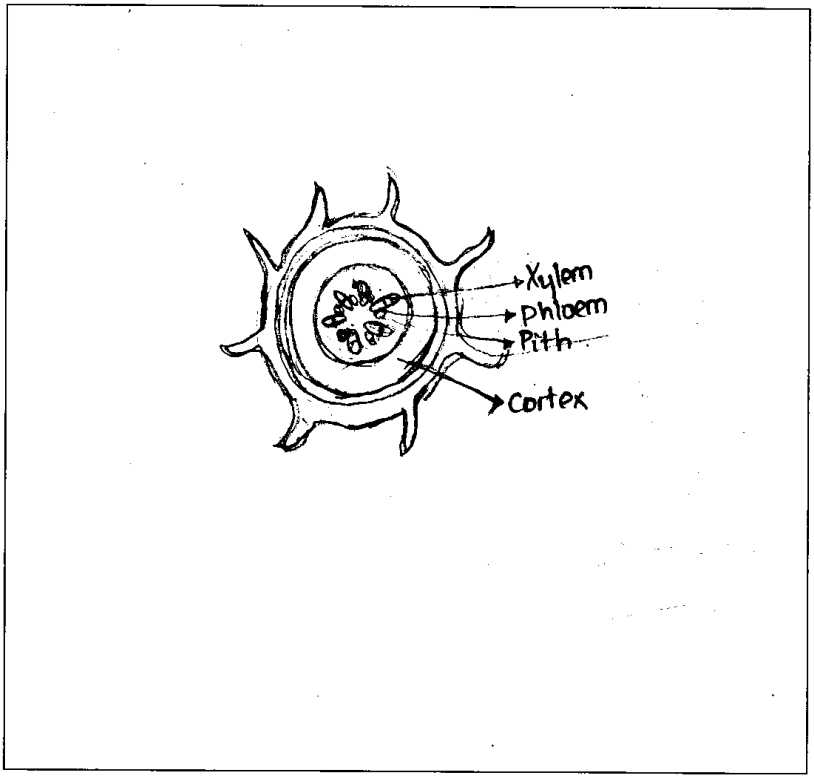
Figure 6: *Students' Performance on Question 6*

The students who scored low marks (0 to 2) lacked understanding of plant tissue structure and function. As a result they gave responses which were contrary to the demand of the question to both parts (a) and (b). For example, in part (a), some students drew the external structure of a plant leaf. Others drew diagrams of Euglena or bacteria. In addition, some students presented diagrams of moss, bread mould, mushroom, and fern, while others drew diagrams of stomata or villi. Also, some students wrote incorrect caption while others did not write a caption. In addition, some students omitted the question entirely.

In part (b), most of the students gave incorrect functions of xylem. For instance, some of the students wrote the function of phloem instead of xylem as they wrote *xylem transport manufactured food from the leaf to other parts of a plant.* Other students wrote *the function of xylem is to cover the dicot stem in the plants.* Others wrote the function of haemoglobin in the human body instead of the function of xylem. For instance, one student wrote *it transport oxygen and carbon dioxide in the body*. Other student wrote the function of root hair as such one student wrote *it absorbs water*

and mineral salts from the soil. Therefore, limited understanding of the vascular system led them to incorrect diagrams, mislabeling, and wrong or missing functions of xylem. Extract 6 is a sample of students' incorrect responses.

6. (a) Draw a diagram of cross section of a dicot stem and label the Xylem, Phloem, Epidermis, Pith and Cortex.



(b) What is the function of xylem you have labelled in 6 (a)?

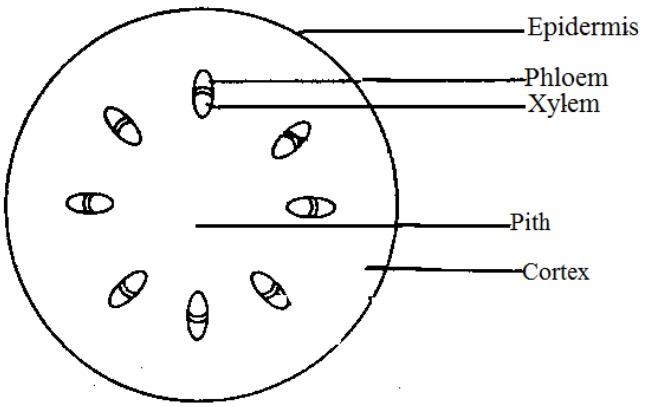
is Cortex it is chloplast
is Xylem it is source of oxygen
is Phloem it is source of carbonderyocsade
is Pitch it is source of energy

Extract 6: Student's incorrect responses to question 6

In Extract 6, the student drew a diagram of the cross-section of a monocot root instead of the required cross-section of a dicot stem in part (a). In addition, the student incorrectly stated the functions of several plant parts,

namely the cortex, xylem, phloem, and pith, whereas the question specifically required the function of the xylem only. For example, the student incorrectly stated that *the xylem is a source of oxygen,* instead of the correct function of the xylem that is to transport water and dissolved mineral salts in part (a).

The students who obtained average marks (3 - 6) were able to draw a diagram of a cross-section of a dicot stem; however, many incorrectly labelled some of the parts, resulting in a loss of marks. Some students managed to label only one or two parts correctly, while others provided only the function of the xylem, without labeling the diagram, leading to further loss of marks. Specifically, they failed to fully recognise that the xylem transports water and dissolved mineral salts from the roots to other parts of the plant and also provides mechanical support. The question required students to draw a correctly labelled cross-section of a dicot stem, including the xylem, phloem, epidermis, pith, and cortex as follows:
Diagram of cross section of a dicot stem.



2.2.5 Question 7: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The students were required to differentiate arteries from veins based on the given features and present the answer in a following table:

Feature	***Arteries***	***Veins***
(i) Lumen		
(ii) Valve		

Feature	*Arteries*	*Veins*
(iii) Wall thickness		
(iv) Elasticity of walls		
(v) Direction of blood flow		

The question was attempted by all students 368 (100%). Data show that 367 (99.73%) students scored 0 marks. Only 1 (0.27%) student scored 4 out of 10 marks allocated to this question, and no student achieved a score above this mark. Overall performance on this question was weak, as the majority (99.73%) of students scored 0 marks. Figure 7 summarises the students' performance on question 7.

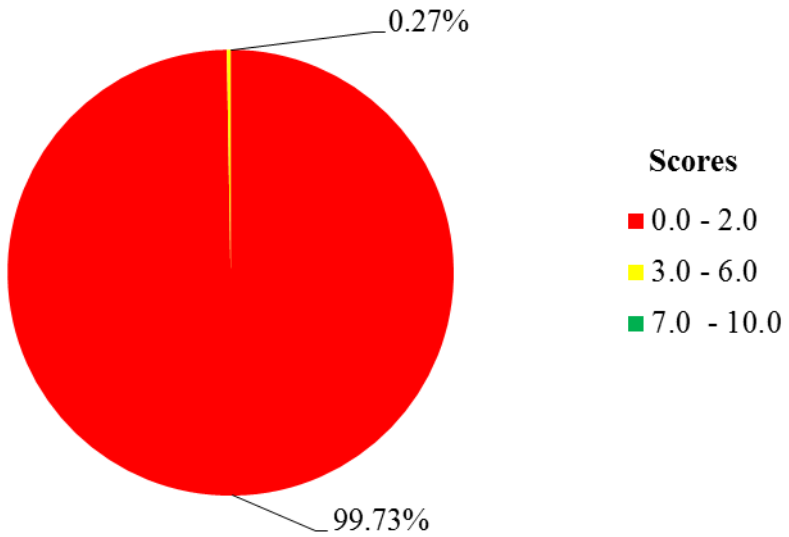
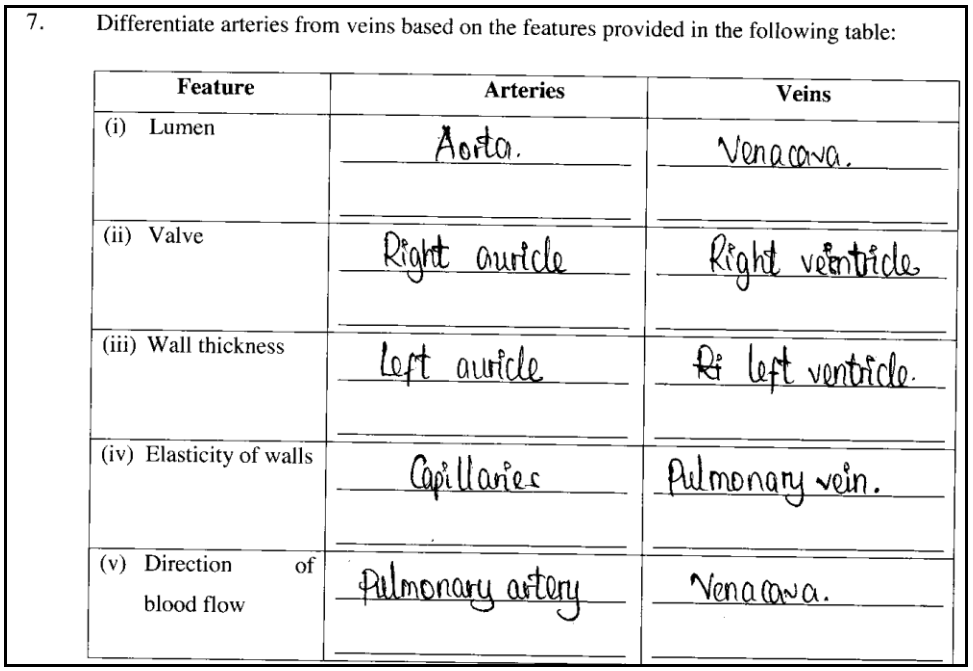


Figure 7: *Students' Performance on Question 7*

The 99.73 per cent of students who scored zero provided incorrect responses to the question. Many of these students demonstrated misconceptions by confusing the structural features of arteries and veins. For example, some stated that *arteries have thin walls while veins have thick walls*, or that arteries have a *wide lumen whereas veins have a narrow lumen*. Others attempted to differentiate the two blood vessels but failed to present contrasting features. For instance, one student wrote that *arteries have a small lumen, veins transport blood towards the heart*, and *arteries*

have thick walls, without making clear comparative distinctions. Other responses showed limited understanding, such as stating that veins *have a wide lumen while arteries do not,* without further explanation. Particularly, a number of students confused the concept entirely by describing differences between plant and animal cells instead of arteries and veins. For example, stating that *arteries have a cell wall while veins do not, or that arteries have a regular shape whereas veins have an irregular shape*. Overall, these incorrect responses indicate a lack of adequate knowledge and understanding of the structure and function of blood vessels. In addition, some students omitted the question entirely. Extract 7 is a sample of students' incorrect responses.



7. Differentiate arteries from veins based on the features provided in the following table:

Feature	Arteries	Veins
(i) Lumen	Aorta.	Vena cava.
(ii) Valve	Right auricle	Right ventricle
(iii) Wall thickness	Left auricle	Ri left ventricle.
(iv) Elasticity of walls	Capillaries	Pulmonary vein.
(v) Direction of blood flow	Pulmonary artery	Vena cava.

Extract 7: Student's incorrect responses to question 7

In Extract 7, the student wrote the names of blood vessels and heart chambers instead of describing the required structural features. For example, under lumen, the student wrote *aorta* in part of artery and *vena cava*, in part of veins which are specific blood vessels, rather than stating the correct distinction that arteries have a narrow, smooth lumen while veins have a wide, irregular lumen. Similarly, under the feature *valve*, the student wrote *right auricle* and *right ventricle* instead of explaining that arteries generally lack valves except at their point of connection to the

heart, whereas veins possess valves at regular intervals to prevent backflow of blood. These responses indicate an inadequate understanding of the circulatory system, particularly the functional and structural differences between the heart and blood vessels. Overall, the remaining responses were also incorrect, further highlighting the student's limited conceptual understanding of blood vessel structure and function.

On the contrary, the student who scored 4 out of 10 marks showed a limited understanding of the differences between arteries and veins. Unlike most students, this student was able to provide a few correct points, but the answers were incomplete and some features were not clearly contrasted. The students' responses showed basic knowledge of the circulatory system. However, this knowledge was not well developed. Generally, the average score indicates limited understanding rather than full mastery of the blood vessel structure and function.

These students failed to recognize the key structural and functional differences between arteries and veins. Specifically, they did not identify that arteries have a narrow, smooth lumen, whereas veins have a wide, irregular lumen. They also failed to note that arteries generally lack valves, except at their point of connection to the heart, while veins possess valves at regular intervals. In addition, the students did not recognise that arteries have thick muscular walls and are highly elastic, whereas veins have thin muscular walls and are less elastic. Additionally, they were unable to correctly state that arteries transport blood away from the heart, while veins transport blood towards the heart.

2.2.6 Question 8: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The question had two parts (a) and (b). In part (a), students were required to identify the organs which are used for gaseous exchange in a spider, grasshopper, bean leaf and lizard. In part (b), the students were required to describe the mechanism of gaseous exchange through the roots of plants growing in well aerated soil.

The question was attempted by all students 368 (100%). Data show that 364 (98.91%) students scored from 0 to 2 marks, out of whom, 326

(88.59%) scored 0 mark. Only 4 students (1.09%) scored from 3 to 6 marks out of 10 marks allocated to this question, and no student scored above this range. Overall performance on this question was weak, as the majority of students (98.91%) scored from 0 to 2 marks. Figure 8 summarises the students' performance on question 8.

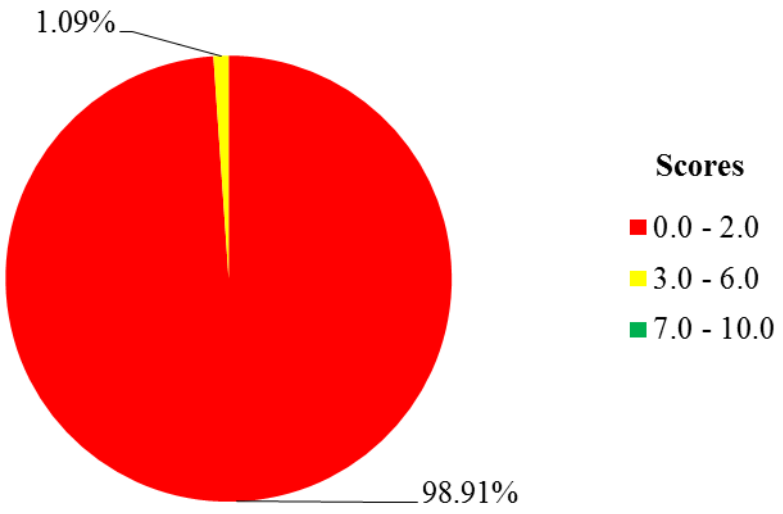
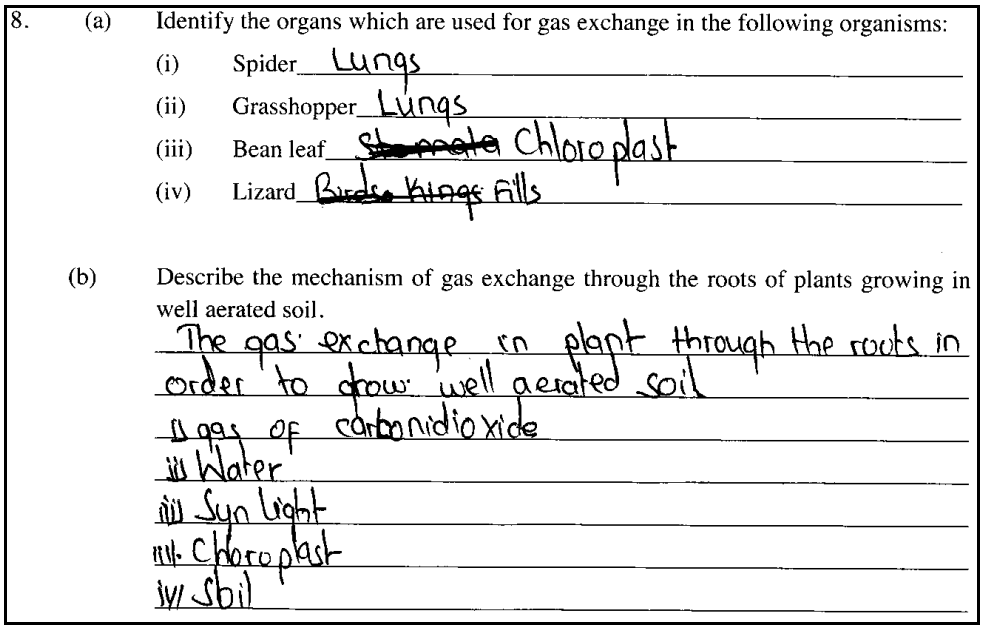


Figure 8: *Students' Performance on Question 8*

The analysis indicates that students who scored low marks (0 - 2) provided incorrect responses in almost all parts of the question. Those who scored 1 to 2 marks were able to correctly identify the organs used for gaseous exchange in one or two organisms only, which accounts for their low scores. The 326 (88.59%) students who scored zero marks, showed inadequate knowledge of the gaseous exchange structures in different organisms. In part (a), most of the students were unable to correctly identify the appropriate organs of gaseous exchange for the organisms provided. Instead, most students listed organs belonging to different organisms that were not given in the question. For example, some students identified the *mouth as the organ of gaseous exchange in a spider, skin for a grasshopper, lenticels for a bean leaf, and gills for a lizard*. These students failed to recognise that a spider uses book lungs, a grasshopper uses a tracheal system, a bean leaf uses stomata, and a lizard uses lungs.

In part (b), most students failed to correctly describe the mechanism of gaseous exchange through plant roots. Many did not mention diffusion as the main mechanism and instead focused on unrelated processes such as water absorption or transpiration. Some students incorrectly described gaseous exchange in leaves rather than roots. Others explained inhalation and exhalation, which are processes involved in the mechanism of gaseous exchange in mammals. These responses indicate that the students lacked an understanding of the mechanism of gaseous exchange through plant roots.
The students failed to understand that the mechanism of gaseous exchange through plant roots occurs as follows: Oxygen is present at a higher concentration in the soil than in the root cells and therefore diffuses into the root cells through the epidermis. During respiration, plants consume oxygen and produce carbon dioxide, resulting in a higher concentration of carbon dioxide in the root cells than in the surrounding soil. Consequently, carbon dioxide diffuses out of the root cells into the soil through the epidermis. Extract 8.1 is a sample of students' incorrect responses.


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

(i) Spider Lungs

(ii) Grasshopper Lungs

(iii) Bean leaf ~~Stomata~~ Chloroplast

(iv) Lizard ~~Birds Kings~~ Fills

(b) Describe the mechanism of gas exchange through the roots of plants growing in well aerated soil.

The gas exchange in plant through the roots in order to grow well aerated soil

i) gas of carbonidioxide

ii) Water

iii) Syn light

iv. Chloroplast

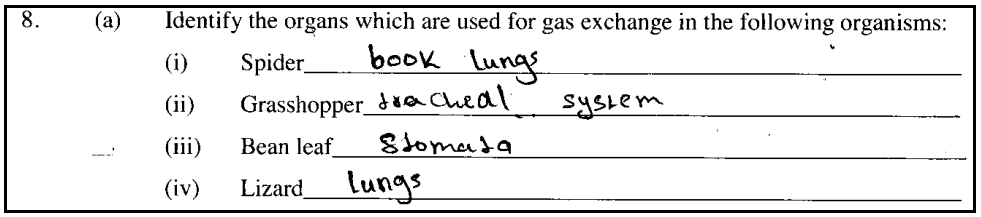
v) Soil

Extract 8.1: Students' incorrect responses to question 8

In Extract 8.1, the student incorrectly identified the organs responsible for gaseous exchange in the given organisms in part (a). For instance, the student identified the *chloroplast* as the organ for gaseous exchange in a bean leaf, instead of stomata. Furthermore, in part (b), instead of describing

the mechanism of gaseous exchange through the roots of plants growing in well-aerated soil, the student listed raw materials and conditions for photosynthesis, such as *water and sunlight*. These responses reflect a lack of understanding of gaseous exchange in plants and confusion between photosynthesis and respiration processes.

The students who scored 4 marks demonstrated a limited understanding of gaseous exchange in living organisms. These students were able to correctly identify the organs used for gaseous exchange in part (a). However, none of the students were able to describe the process correctly. This suggests that students have serious conceptual gaps regarding root respiration and gaseous exchange in plants. Extract 8.2 is a sample of students' correct responses to part (a).


8. (a) Identify the organs which are used for gas exchange in the following organisms:
(i) Spider book lungs
(ii) Grasshopper tracheal system
(iii) Bean leaf Stomata
(iv) Lizard lungs

Extract 8.2: Student's correct responses to question 8(a)

In Extract 8.2, the student correctly identified the organs used for gaseous exchange to the given organisms in part (a).

2.2.7 Question 9: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The students were given a scenario that "Students in Msururu village frequently complained about heartburn disorder". Then they were required to recommend five possible control measures for the disorder.

The question was attempted by all students 368 (100%). Data show that 362 (98.37%) students scored from 0 to 2 marks, out of whom, 350 (95.11%) scored 0. Only 6 (1.63%) students scored from 3 to 6 marks out of the 10 marks allocated to this question, and no student scored above this range. Overall performance on this question was weak, as the majority of students (98.37%) scored from 0 to 2 marks. Figure 9 summarises the students' performance on question 9.

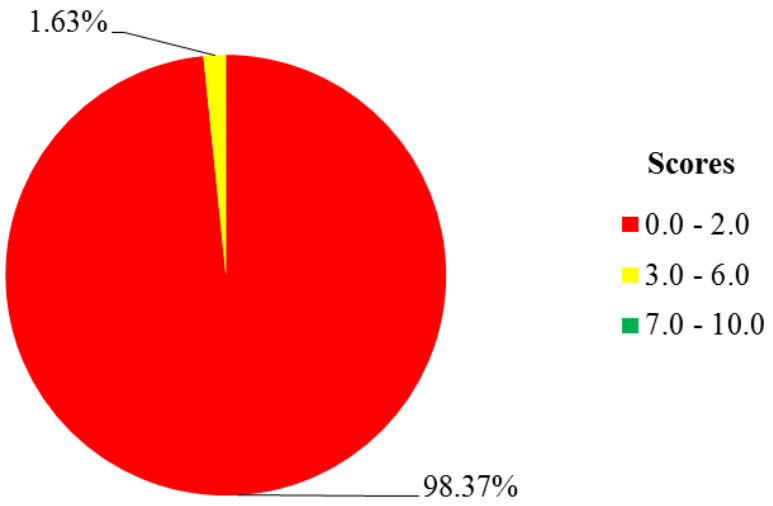
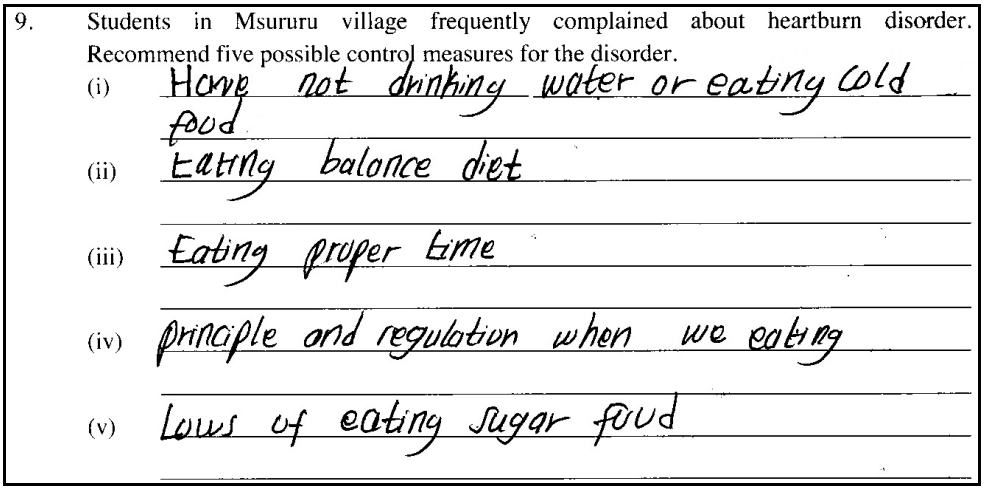


Figure 9: *Students' Performance on Question 9*

The students who scored low marks (0 - 2) demonstrated lack of knowledge of the diseases and disorders of the human digestive system. These students either scored no marks or scored few marks. The students who scored 2 marks recommended only 2 control measures of heartburn. Most of the students who scored zero mark either did not attempt the question or gave irrelevant answers that did not address control measures for heartburn. Several responses showed confusion between heartburn and other disorders of the digestive system such as indigestion, dental caries, constipation, ulcers and flatulence leading to incorrect recommendation. For instance, some of the students wrote preventive measures of constipation such as *eat balanced diet, practicing body exercises and eat fibres foods*.

Others stated the symptoms of heartburn instead of recommending any control measures. For example, some students wrote *burning sensation in the chest, sour taste in the mouth, pain in the chest and difficult swallowing*. Other students wrote causes of heartburn instead of control measures. For instance, some students wrote *Take some sugary foods, eat hot foods,* and *eat fat foods.* This shows that the students lacked adequate knowledge about diseases and disorders of the human digestive system. Extract 9.1 is a sample of students' incorrect responses.


9. Students in Msururu village frequently complained about heartburn disorder. Recommend five possible control measures for the disorder.

(i) Have not drinking water or eating cold food

(ii) Eating balance diet

(iii) Eating proper time

(iv) principle and regulation when we eating

(v) Laws of eating sugar food

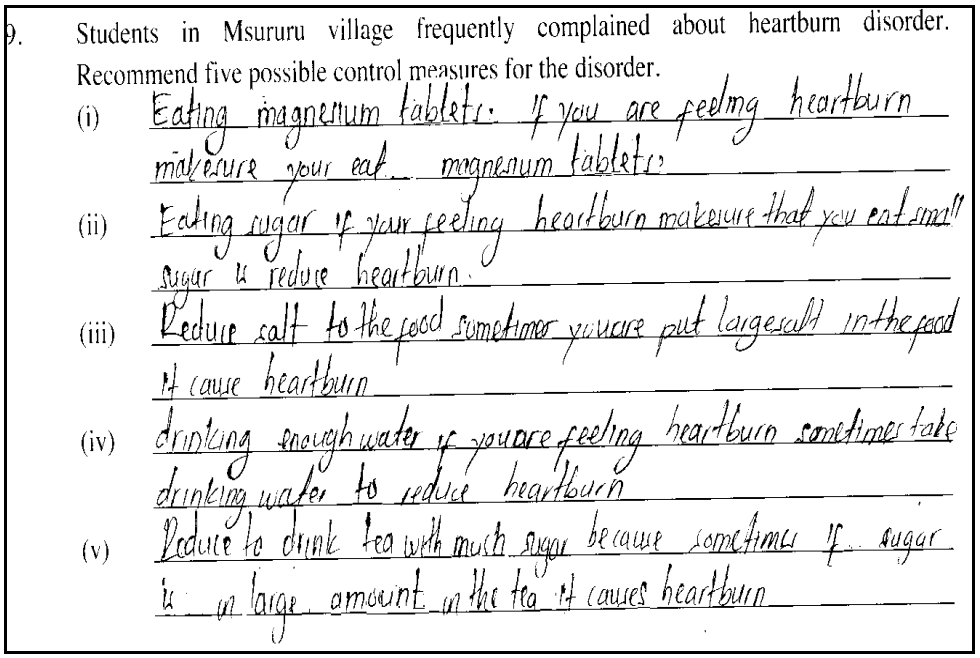
Extract 9.1: Student's incorrect responses to question 9

In extract 9.1, the students incorrectly recommended five possible control measures for the heartburn disorder. For example, he/she wrote *have not drinking water or eating cold food* instead of drinking a lot of water to dilute the acid and avoid eating cold food.

The few 6 (1.63%) students who scored average (3 to 6) marks demonstrated limited understanding of the control measures for heartburn but lacked depth and completeness in their responses. These students correctly recommended 2 to 3 control measures for heartburn hence lost some marks. They were able to recommend some correct measures such as avoiding spicy or fatty foods, reducing alcohol intake, eating smaller meals, or using antacids, which earned them marks. However, their answers were often limited to a few points lacking clarity, leading to loss of marks.

They failed to recognise that heartburn can be effectively controlled through appropriate lifestyle and dietary modifications. These include minimizing the intake of foods that can cause heartburn, such as sugary, spicy, acidic, and carbonated foods; avoiding alcohol, caffeine, tobacco, and recreational drugs; maintaining a healthy body weight and reducing weight in cases of obesity; and avoiding very hot or very cold foods. In addition, effective control measures include avoiding eating large meals, especially close to bedtime; avoiding late-night meals and vigorous physical activity immediately after eating; and wearing loose clothing to

prevent pressure on the stomach. Other recommended practices include using a wedge-shaped pillow to elevate the head during sleep, adopting stress-reduction measures, drinking adequate amounts of water to help dilute stomach acid, and modifying one's diet based on individual food sensitivities or a history of heartburn triggers. Extract 9.2 is a sample of student response who scored average marks.


9. Students in Msururu village frequently complained about heartburn disorder. Recommend five possible control measures for the disorder.

(i) Eating magnesium tablets. If you are feeling heartburn makesure your eat magnesium tablets.

(ii) Eating sugar if your feeling heartburn makesure that you eat small sugar it reduse heartburn.

(iii) Reduce salt to the food sometimes you are put largesalt in the food it cause heartburn

(iv) drinking enough water if you are feeling heartburn sometimes take drinking water to reduce heartburn

(v) Reduce to drink tea with much sugar because sometimes if sugar is in large amount in the tea it causes heartburn

Extract 9.2: A sample of a student's response who scored average marks

In Extract 9.2, the student correctly recommended three appropriate control measures for heartburn in (i), (iv) and (v). However, full marks were not awarded because some of the responses, specifically *eating sugar and reducing salt in food*, were incorrectly stated.

2.3 SECTION C: ESSAY QUESTION

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

2.3.1 Question 10: Describing the Physiological, Anatomical and Ecological Processes of Living Organisms

The question required the students to analyse six factors affecting the rate of gaseous exchange in mammals.

The question was attempted by all students 368 (100%). Data show that 366 (99.46%) students scored from 0 to 4 marks, out of whom, 316 (85.87%) scored 0. Only 2 (0.54%) students scored from 4.5 to 9 marks out of the 15 marks allocated to this question, and no student achieved a score above this range. Overall performance on this question was weak, as the majority of students (99.46%) scored from 0 to 4 marks. Figure 10 summarizes the students' performance on question 10.

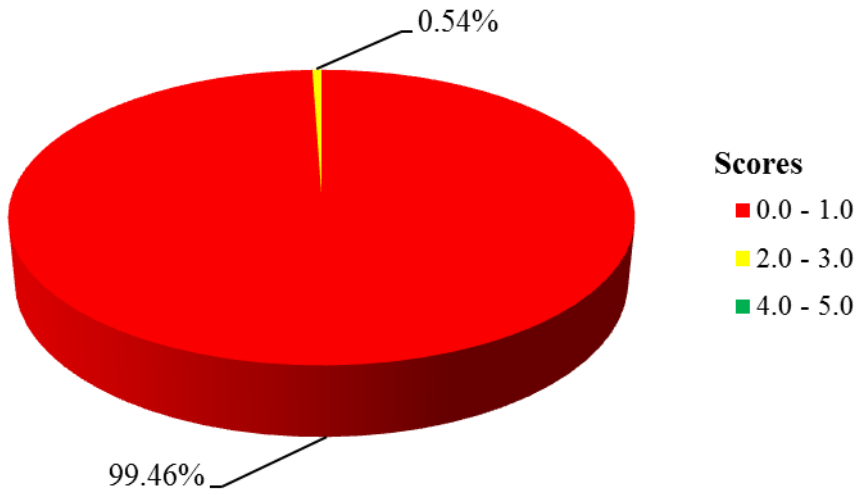


Figure 10: *Students' Performance on Question 10*

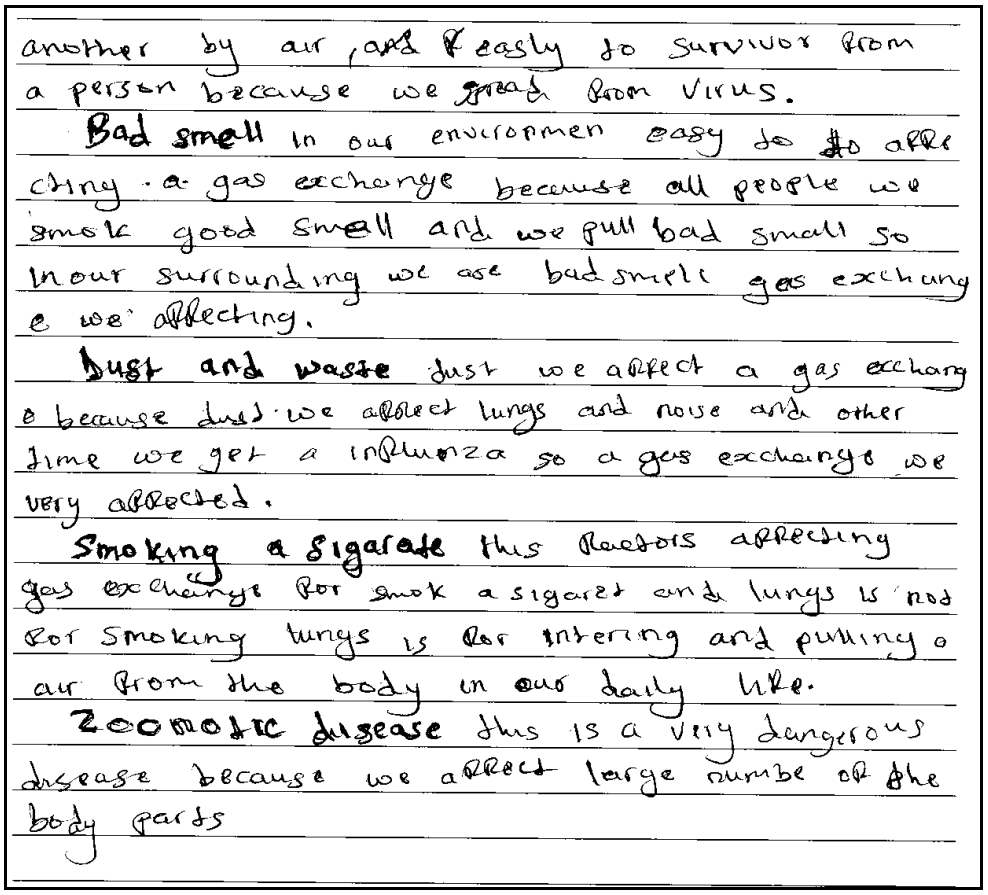
The analysis shows that 99.46 per cent of the students scored low marks (0 to 4). Students who scored from 1 to 4 marks provided a correct introduction and outlined three to four relevant points; however, they failed to provide explanations, which resulted in loss of marks. The 316 (85.87%) students who scored zero marks were not competent in describing the factors affecting gas exchange. Therefore, they gave incorrect responses. Most of them lacked essay writing skills which are introduction, main body and conclusion. In the introduction, instead of explaining gaseous exchange, some students defined respiration. For example, a few wrote that *gas exchange is the process by which food is broken down to release energy.* Others described gas exchange as a movement, defining it as the *process of moving from one part to another*, while some students did not provide any introduction at all.

In the main body of the essay, students were expected to analyse six factors affecting the rate of gaseous exchange in mammals; however, most of the responses were incorrect. Many students failed to analyse the factors as required and instead presented irrelevant, vague, or inaccurate information, with some merely listing unrelated biological terms without any explanation. For example, some students analysed types of food substances such as *carbohydrates, proteins, lipids, and mineral salts*, while others focused on nutritional disorders and deficiencies such as *kwashiorkor, obesity, anorexia, and bulimia nervosa,* none of which address the factors influencing gaseous exchange. Other students wrote about general characteristics of living organisms, including *reproduction, respiration, movement, nutrition, and excretion,* indicating a misinterpretation of the question.

Additionally, several students confused gaseous exchange with breathing or respiration, leading some to incorrectly cite *temperature and body size* as factors affecting gaseous exchange in mammals. This shows that the students had inadequate essay-writing skills and inability to organise and present ideas logically. Furthermore, some students provided incorrect conclusions or omitted the question entirely. Extract 10.1 is a sample of students' incorrect responses.

10. Analyse six factors affecting the rate of gas exchange in mammals.

Gas exchange is a proces by which OR exchanging gase from one place to another example tree plants to mammals there are factor affecting the rate OR gas exchange in mammals:
Influenza this factor affecting a system OR gas exchange, and this disease are contaminated with gas so we spread from one place to


another by air, and easly to survivor from a person because we spread from virus.

Bad smell in our environmen easy to affe cting a gas exchange because all people we smok good smell and we pull bad small so in our surrounding we are bad smell gas exchang e we affecting.

Dust and waste dust we affect a gas exchang e because dust we affect lungs and nose and other time we get a influenza so a gas exchange we very affected.

Smoking a Sigarete this factors affecting gas exchange for smok a sigaret and lungs is not for smoking lungs is for intering and pulling o air from the body in our daily life.

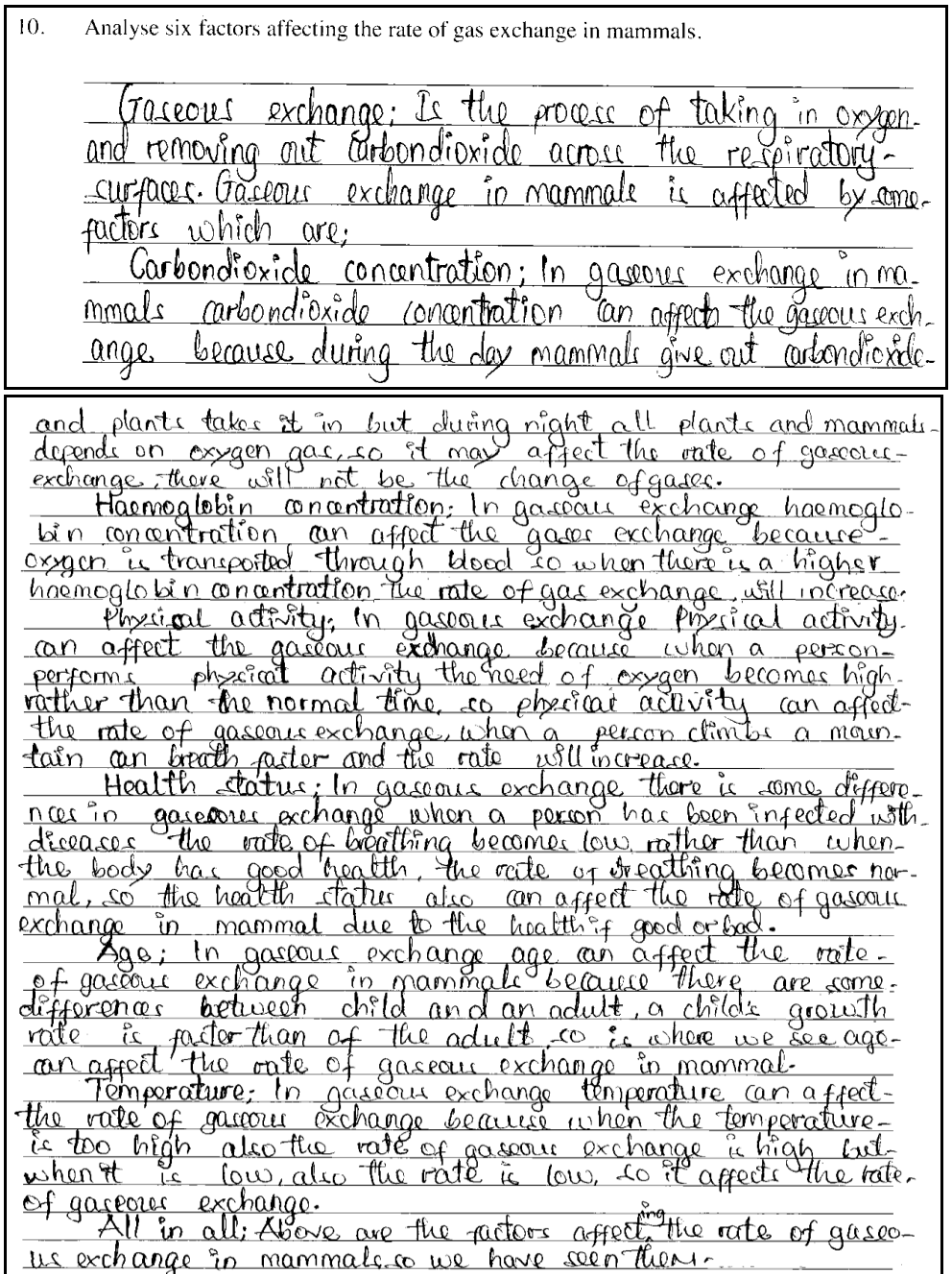
Zoonotic disease this is a very dangerous disease because we affect large numbe of the body parts

Extract 10.1: Student's incorrect responses to question 10

In Extract 10.1, the student incorrectly analysed factors associated with air pollution, including *bad smell*, *dust*, *waste*, and *cigarette smoking*, instead of analysing the factors affecting the rate of gaseous exchange in mammals as required by the question. This misinterpretation resulted in irrelevant responses that failed to address the expected biological concepts, thereby leading to loss of marks.

Despite the overall weak performance on this question, a small proportion of students (0.54%) scored average marks ranging from 4.5 to 9.0. Most of these students were able to write a correct introduction, list factors, and provide explanations for two to three factors. However, they failed to analyse all six required factors, resulting in loss of marks. These students did not recognize that they were expected to explain how carbon dioxide concentration, haemoglobin concentration, physical activity, health status,

altitude, and age affect the rate of gaseous exchange in mammals, which limited their overall performance. Extract 10.2 provides a sample of a student response that scored within the average range.



10. Analyse six factors affecting the rate of gas exchange in mammals.

Gaseous exchange: Is the process of taking in oxygen and removing out Carbondioxide across the respiratory surfaces. Gaseous exchange in mammals is affected by some factors which are;

Carbondioxide concentration; In gaseous exchange in mammals carbondioxide concentration can affect the gaseous exchange because during the day mammals give out carbondioxide and plants takes it in but during night all plants and mammals depends on oxygen gas, so it may affect the rate of gaseous exchange, there will not be the change of gases.

Haemoglobin concentration; In gaseous exchange haemoglobin concentration can affect the gases exchange because oxygen is transpoited through blood so when there is a higher haemoglobin concentration the rate of gas exchange will increase.

Physical activity; In gaseous exchange physical activity can affect the gaseous exchange because when a person performs physical activity the need of oxygen becomes high rather than the normal time, so physical activity can affect the rate of gaseous exchange, when a person climbs a mountain can breath faster and the rate will increase.

Health status; In gaseous exchange there is some differences in gaseous exchange when a person has been infected with diseases the rate of breathing becomes low rather than when the body has good health, the rate of breathing becomes normal, so the health status also can affect the rate of gaseous exchange in mammal due to the health if good or bad.

Age; In gaseous exchange age can affect the rate of gaseous exchange in mammals because there are some differences between child and an adult, a child's growth rate is faster than of the adult so is where we see age can affect the rate of gaseous exchange in mammal.

Temperature; In gaseous exchange temperature can affect the rate of gaseous exchange because when the temperature is too high also the rate of gaseous exchange is high but when it is low, also the rate is low, so it affects the rate of gaseous exchange.

All in all; Above are the factors affecting the rate of gaseous exchange in mammals so we have seen them.

Extract 10.2: A sample of a student response who scored average marks

In Extract 10.2, the student provided a correct introduction and successfully outlined several correct factors, namely *carbon dioxide concentration, haemoglobin concentration, physical activity, health status, and age*. However, the student explained correctly only three of these factors: haemoglobin concentration, physical activity, and age thereby limiting the overall score. In addition, the student incorrectly analysed *temperature*, which is a factor affecting the rate of respiration rather than the rate of gaseous exchange in mammals. The response also contained an incorrect conclusion. As a result of these weaknesses, the student attained an average score of 9 out of 15.

3.0 ANALYSIS OF THE STUDENTS' PERFORMANCE PER COMPETENCE

The Biology FTNA (2025) for the Vocational Stream assessed four specific competences. Three of these competences were assessed in question 1, which comprised multiple-choice items. Analysis of students' performance indicates an average performance (40.25%) in the competences of describing the physiological, anatomical, and ecological processes of living organisms; demonstrating mastery of scientific biological terminologies; and demonstrating mastery of basic skills for conducting biological investigations**.**

However, students demonstrated weak performance in demonstrating mastery of basic skills for conducting biological investigations (20.92%)**,** describing physiological, anatomical, and ecological processes of living organisms (5.71%), and demonstrating mastery of scientific biological terminologies (4.08%). In addition, the competence of preparing and presenting the results of biological investigations recorded an extremely low performance level of 0.27 per cent. These competences were assessed in questions 2, 3, 4, 5, 6, 7, 8, 9, and 10. Specifically, question 2 was a matching item; questions 3, 4, 5, 6, 7, 8, and 9 were short-answer items; while question 10 was an essay question.

4.0 CONCLUSION AND RECOMMENDATIONS

4.1 Conclusion

Generally, performance in Biology in the FTNA 2025 Vocational Stream was weak, as 99.46 per cent of the students scored below 30 marks.

Analysis of students' responses showed average performance on question 1 (40.22%). Questions in which students had weak performance were 3 (20.92%), 2 (20.62%), 5 (4.08%), 9 (1.63%), 6 (1.09%), 8 (1.09%), 10 (0.54%), 4 (0.27%), and 7 (0.27%).

Further analysis revealed that students performed averagely in multiple-choice questions but showed weak performance in matching items and in open-ended questions, including short-answer and essay items. They failed to correctly associate related concepts and also unable to generate accurate responses, provide detailed explanations, or structure essays appropriately. The weak performance can be attributed to several factors, including insufficient knowledge, skills, and competences in the tested concepts; limited ability to conduct scientific experiments and write experimental reports; misspelling of biological terminologies; poor drawing and labeling skills; low proficiency in the English language; and failure to provide responses that aligned with the demands of the questions.

Students with average performance demonstrated limited understanding of the tested concepts, enabling them to provide some correct responses. Their performance, however, was limited by incomplete knowledge, inadequate application of concepts, misspelling of biological terminology, incomplete diagram labelling, and insufficient detail in written explanations. This suggests that students have a low ability to recall, organize, and apply biological knowledge independently. The findings highlight the need to strengthen conceptual understanding, practical skills, and the ability to communicate scientific knowledge clearly, particularly in questions requiring explanation, comparison, and critical thinking.

4.2 Recommendations

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

(a) Teachers should use online resources and teaching aids such as colourful pictures, perfume, hot water, preserved specimens, live plants and animals, and stones to engage students in observation activities. These activities will help students identify sense organs and their uses and understand the limitations of sense-organ in making observations.

(b) Teachers should guide students in manageable groups to discuss the meaning of Biology, basic biological terminologies, the branches and sub-branches of Biology, with emphasis on linking descriptions to their corresponding branches.

(c) Teachers should use charts or photographs showing common diseases and disorders of the human digestive system to guide students, in manageable groups to discuss these conditions. This approach will help students understand the diseases and disorders and enable them to identify appropriate control measures, including those for heartburn.

(d) Teachers should use relevant equipment and apparatus, stains, potted plants, germinated seeds, charts on plant transport, ringed plants, and online resources to guide students in manageable groups to discuss the vascular system. This approach will help them understand the distribution of vascular bundles in plants, draw and label a cross-section of a dicot stem as well as explaining the function of the parts.

(e) Teachers should use models, photographs, charts, potted plants, and online resources to guide students in examining gas exchange organs and simulating gaseous exchange in plants. This will help them identify the organs of gas exchange in various organisms and describe the mechanism of gas exchange through roots in well-aerated soil.

(f) Teachers should guide students in manageable groups to discuss the factors affecting the rate of gaseous exchange in mammals. This approach encourages collaborative learning, enabling students to identify and analyse key factors. Group discussions allow students to clarify concepts, provide explanations for each factor, and develop the analytical skills required to answer questions that demand explanation and evaluation.

(g) Teachers should use mammalian heart models, charts, photographs, online resources on the circulatory system, and dissected specimens showing the heart and major blood vessels to guide students in explaining the structure of the heart and blood vessels. This approach will help students clearly differentiate arteries from veins.

(h) Teachers should organize field trips that allow students, work in manageable groups to collect and observe diverse organisms within the school environment and local vicinity as representatives of major groups of organisms. These activities should be followed by guided group discussions focused on identifying the major groups of organisms, their distinctive features, and appropriate classification. Such hands-on activities will help students clearly understand the characteristic features of organisms and improve their ability to correctly classify organisms.

(i) Teachers should use reagents, apparatus, heat sources and online resources to support guided laboratory practicals for students to test food samples. The instruction should emphasize safe laboratory practices, accurate observation of colour changes, and logical interpretation of results. Students should be trained to present findings in a tabular form and write experimental reports showing the food tested, procedure, observation, and inference. Regular practice will strengthen students' performance in examination questions on food nutrients.

(j) Students should practice drawing biological diagrams following the principles of drawing such Biology diagrams.

(k) Schools should establish and strengthen English-speaking programmes through structured activities such as debates, reading clubs, and the consistent use of English within the school environment for both teachers and students. Improving students' proficiency in the English language will support better understanding of classroom instruction and accurate interpretation of examination questions, thereby enhancing overall academic performance.

Appendix:

Students' Performance Per Competence in Biology FTNA 2025 Vocational Stream

S/N	Specific Competence	Question Number	FTNA 2025		
			Percentage of Students who Scored from 30% or Above	Average Performance Per Competence (%)	Remarks
1.	Describing the Physiological, Anatomical and Ecological Processes of Living Organisms, Demonstrating Mastery of Scientific Biological Terminologies, and Demonstrating Mastery of Basic Skills for Conducting Biological Investigations	1	40.25	40.25	Average
2.	Demonstrating Mastery of Basic Skills for Conducting Biological Investigations	3	20.92	20.92	Weak
3.	Describing the Physiological, Anatomical and Ecological Processes of Living organisms	2	29.62	5.71	Weak
		9	1.63		
		6 &8	1.09		
		10	0.54		
		7	0.27		
4.	Demonstrating Mastery of Scientific Biological Terminologies	5	4.08	4.08	Weak
5.	Preparing and Presenting Results of Biological Investigations	4	0.27	0.27	Weak