BIOLOGY Sample INQUIRY BASED LEARNING 5 E Model Lesson Plan

TopicReception, Response and Coordination

Subtopic Simple Reflex: Simple Reflex Action

Class Form Four

Rationale

Organisms usually come into contact with the different types of stimuli. Some stimuli are injurious while some are useful. Learning about the reflex arc and the reflex action enables learners to understand how the nervous system helps organisms respond to injurious stimuli and the importance of the reflex action to the survival of the organism.

Pedagogical Rationale

Using the 5E instructional model: In order to help students build a strong foundation of knowledge through active learning and participation (inquiry) the teacher could incorporate the 5E Model instructional models during the lesson. The 5E phase by phase lesson development/learning cycle aims at motivating learners to actively participate and experience specific outcomes and skill development at each stage.

By the end of the lesson the learner should be able to

- 1. Model the structure of a simple reflex arc
- 2. Describe how the simple reflex action takes place
- 3. Appreciate the importance of a simple reflex action

Perquisite skills and knowledge

- Structure of the nerve cells
- Types and functions of neurons motor, effector and relay neurons
- Structure of the spinal cord



Resources

- ¹/₂ Manila paper
- Modelling clay of different colours
- Onions and scalpels
- Petri Dishes
- Worksheets

Brief Explanation of the E Instructional Model of a Lesson

ENGAGEMENT

- Describe how the teacher will capture students' interest.
- What kind of questions should the students ask themselves after the engagement?

Questioning

- Prior knowledge: Ask questions to assess students prior knowledge and conceptions
- Initiate inquiry...ask questions that formulate simple questions to guide inquiry about objects, organisms and events

EXPLORATION

- •Describe what hands-on/minds-on activities students will be doing.
- List "big idea" conceptual questions the teacher will use to encourage and/or focus students' exploration

Questioning

• Observation: ask questions to focus student thoughts on their observation and data

EXPLANATION

- Student explanations should precede introduction of terms or explanations by the teacher. What questions or techniques will the teacher use to help students connect their exploration to the concept under examination?
- List higher order thinking questions which teachers will use to solicit *student* explanations and help them to justify their explanations.

Questioning

- Patterns and relationships: Ask questions that require students to identify patterns and relationship from their data
- Explanations: ask questions that require students to offer explanations of why an even took place

ELABORATION

- Describe how students will develop a more sophisticated understanding of the concept.
- What vocabulary will be introduced and how will it connect to students' observations?
- How is this knowledge applied in our daily lives?

Questioning

• Application. Ask questions that require students to apply new knowledge in new situations

EVALUATION

- How will students demonstrate that they have achieved the lesson objective?
- This should be embedded throughout the lesson as well as at the end of the lesson

Questioning

• Continual Assessments: ask questions that assess students' knowledge, understanding and inquiry process.

Time	Teacher activity	Learner activity	Learning points
5 E - IBL			
Phase			
Introduction	i) Through an illuminated mobile phone light in		That the body has a mechanism for
	the eyes of one or two students	Learners observe the	escaping/ preventing injurious stimuli
5 Minutes	The teacher will ask questions like:	reactions of others	from causing grievous harm
	o What did I do?		
Engage	o What was the reaction to my act?		
ENGAGEME	o Why did it happen?		
NT	• If my action was not sudden, what could	Learner given time to	
	be the reaction?	respond/answer	Blinking and closing of eyes
	Alternate engagement Activity	Why do you think she	Jumping and screaming due to pain
	Teacher gives a scenario: Mary accidentally steps	screamed?	
	on some hot charcoal: What do you think she		
	would dojump up due to pain, shout/scream?		
	Teacher probes the pain aspecthow did the		
	pains like what is painhow did it reach the		
	mouth?		

Source; (Carin, Bass, & Contant, 2005)

Lesson Stages

	ii) iii) The teacher then announces the title and the objectives of the lesson.(consider putting them down)	Paintoo much light Look at the charcoal	
Development 20 minutes Engage	Teacher explains the structure of the lesson and the expectations and learning outcome (can the structure be explained)	Learners listen and seek for any clarification	Lesson is a practical application of the function of the parts of the nervous system they had learnt in the previous lessons the (neurons and the spinal cord)
ENGAGEME NT Explore	Learners are given passage in the text book to read on the simple reflex action; KLB on pg. 89 Reflex action With a focus on the reflex action (what is the focusreflex action or arc?) Teacher instructs learners to use their understanding of the passage and the diagram of the reflex arc to model the pathway of a reflex arc.	Learners read individually the given passage on simple reflex action They discuss their understanding in a group Using modelling clay on manila paper, learners in groups	A reflex arc as the nerve pathway through which a nervous impulses travel to cause a quick autonomic response known as a reflex. Define a reflex action as an automatic response to a stimulus. Instantaneous movement in response to a stimulus. Examples: touching a hot object, stepping on a sharp object. Blinking, tearing, coughing, sneezing,
Explain	importance of the reflex? Which parts make the pathway	the reflex arc and action Learners present and explain their models and how it explains a certain stimulus	Communication biological information to others to others.
	Teacher explains what happens and the concept of the reflex action	Allow learner to ask questions	A reflex arc is a neural pathway that controls a reflex action. In higher animals, most sensory neurons do not pass directly into the brain, but synapse/terminate in the spinal cord.

Conclusions	Teacher writes down the points as they are raise by learners, noting any issue with facts as well misconceptions Teacher consolidates learners outcomes and makes any clarifications ariging	Learners could ask questions to the presenters	Explanation of a reflex action Redefines a reflex moment the afferent neuron receives a signal from the
10 minutes Elaborate Extension	makes any clarifications ansing		sensory organ; it transmits the impulse via a dorsal nerve root into the CNS/spinal cord. The efferent neuron then carries the signal from the CNS to
Evaluation/ Assessment 5 minutes			the effector . The stimulus thus forms a reflex arc. In the reflex action there is no involvement of the brain, hence it is instantaneous. BUT
	 Ask each group to think of 3 reflex actions other than the already mentioned and for each reflex action state the precise stimulus/sense organ; name the receptor which first detects this stimulus, names the effect or the reflex action (response) The importance of each 	Learners discuss and come up with response	Knee Jerktapping of the knee; sensory; knee jerk up. tearing, sneezing, coughing
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References

Carin, A. A., Bass, J. E., & Contant, T. L. (2005). Methods of Teaching Science as Inquiry (9 ed.). New Jersey: Pearson.

Kenya Institute of Education. (2002). Secondary Education Syllabus (Vol. 2). Nairobi: Kenya Institute of Education.

Kenya Literature Bureau. (1989). Secondary Biology: Form Four student Book. Nairobi: Kenya Literature Bureau.



A Reflex Action Pathway

Assessment: A reflex arc



Note*

- The optimal use of the 5E Model is a learning sequence of two to three lessons where each phase is used as the basis for one or more lessons.
- Using the 5E Model as the basis for a single lesson (could) reduces the effectiveness of individual phases due to the shortening of the time and opportunities for meaningful and deep learning across a learning sequence.