Initial Primary Teacher Education

Science and technology

Module 2

Malawi Institute of Education

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Foreword

Education is the lifeblood of the nation. It is a prerequisite for individual, community and national development. Education prepares learners to play their roles effectively to promote and sustain a country's socio-economic development. Parents or guardians desire that their children develop into adults with sound minds and healthy bodies through the acquisition of appropriate knowledge, skills and desirable attitudes to enable them to live productive and happy lives.

Education should, therefore, help learners to develop high standards of conduct, attitudes, judgment and a sense of responsibility. Student teachers have to be well prepared in order to be able to take this responsibility of teaching children effectively.

The purpose of quality education is based on many factors and good quality teachers is one of them. Teachers play a central role because they are the key source of knowledge, responsible for facilitating the learning process and act as role models for the learners.

The function of initial teacher education in Malawi is to prepare student teachers in their aspiration of becoming teachers of high quality. This is achieved by helping the student teachers to acquire the right knowledge, skills and competences to enable them to effectively teach children. In view of this, the Initial Primary Teacher Education curriculum has been reviewed to ensure that student teachers who graduate from this programme are well trained and prepared for their profession.

The process and implementation of this review has been guided by the Teacher Education Philosophy which states as follows:

'To produce a reflective, autonomous, lifelong learning teacher, able to display moral values and embrace learners' diversity.'

It is therefore hoped that Teacher training colleges will find this curriculum effective in helping the student teachers to build a solid foundation in their teaching profession.

Executive Director
Malawi Institute of Education

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Contents

Introduction

The purpose of primary teacher education is to produce and continually develop competent and responsive teachers who effectively deliver quality education to all learners under prevailing conditions and demands in primary schools and promote their desire for life-long learning. IPTE endeavors to educate teachers in sufficient numbers, continually develop their professionalism so that they are able to effectively and efficiently deliver quality and relevant education to primary school learners.

National goals for primary teacher education

The national goals of primary teacher education in Malawi are to produce teachers who are:

- academically well-grounded and professionally competent
- flexible and capable of adapting to the changing needs and environment of the Malawian society
- capable of adhering to and maintaining the ethics of the teaching profession imaginative in adapting, creating and utilising locally available resources suitable for the needs of their learners

Teacher education philosophy

The following has been the guiding principle during the design, development and implementation of the IPTE curriculum.

To produce a reflective, autonomous, lifelong learning teacher, able to display moral values and embrace learners' diversity has been designed.

IPTE programme structure

The duration of the teacher education is two years. The general outlook of the two years is as follows:

Year 1			**Year 2**		
Term 1	**Term 2**	**Term 3**	**Term 1**	**Term 2**	**Term 3**
In college, learning subject content with a special focus on methods for lower classes	In college, learning subject content with special focus on methods for upper classes	Out in teaching practice schools, practising teaching mainly in the lower classes	Out teaching practise schools, practising teaching mainly in the upper classes	In college, with special emphasis on reflection, inclusion and further practice on teaching methods	In college, with special emphasis on subject content, policies and frameworks

Unique features

The features of the reviewed curriculum are as follows:

- The curriculum design is based on reflective and practice principles.
- Early grade teaching methodologies are distinct.
- The delivery of the subject content follows the modular approach.
- Student teachers will be allowed to practise teaching both in the lower classes (Standards 1 to 4) as well as in upper classes (Standards 5-8).
- Cross cutting issues such as Assessment for Learning, ICT, IE and CT are integrated.

IPTE subject matrix

The new curriculum has adopted the reflective practitioner model of teacher education which connects practice and theory and integrates content and pedagogy in teaching and learning. In this structure, student-teachers will be in college for two terms of year 1 and be in primary schools for teaching practice in the third term of first year and first term of the second year. Student teachers will be back to colleges in terms 2 and 3 of year 2 to continue learning subject content, reflecting on their experiences of teaching practice and then, wind up their studies.

This curriculum is designed in a modular structure and contains eleven subjects. These are Chichewa, English, mathematics, education foundation studies,

agriculture, social studies, life skills, science and technology, expressive arts, religious studies and human ecology. In this modular design, a set of topics forms a module in a subject. A module consists of 40 hours contact time.

IPTE outcomes based curriculum

This outcomes-based curriculum is focused on student teachers' achievements. These achievements are teaching competences.

The teaching competences student teachers develop from the IPTE programme will be seen when student teachers are able to transfer the knowledge and skills directly in primary schools.

Subject and core elements

The IPTE curriculum comprises of eleven subjects namely Agriculture, Science and Technology, Mathematics, Expressive arts, Chichewa, English, Education Foundation studies, Social studies, Life skills, Religious studies and Human ecology. Each subject has a rationale from which core elements are derived.

Teacher education core element outcomes

Teacher education core element outcomes are descriptions of the competences to be acquired by the student teacher for successful teaching.

IPTE assessment procedures

In Outcomes-Based Education (OBE), assessment is a significant part of the teaching and learning process. The main purpose of assessment is to facilitate learning by constant monitoring of the progress of individual student teachers. The process is on-going and it uses clearly defined criteria with a variety of tools, methods and techniques in different situations and contexts. This helps to gather valid and reliable information on the student teachers' achievement of outcomes.

Assessment in initial primary teacher education in Malawi comprises two major components: continuous and summative assessment. Both modes involve assessment tasks that measure the student teachers' achievement of knowledge, skills, values and attitudes. These tasks include oral presentations, practical and reflective tasks, reports, researches, tests and examinations.

In the reviewed curriculum, the weighting of continuous assessment in the final grade will be *60% continuous assessment* and *40% summative assessment.*

The continuous assessment will comprise:

- two grades based on each module
- end of module examinations for terms 1 and 3 of year 1
- teaching practice grades
- school experience journal grade

While the summative assessment will comprise:

- moderated grade from teaching practice in term 1 of year 2
- national examinations to be administered in term 3 of year 2 based on the modules of terms 2 and 3 of year 2.

Core elements and their outcomes

Rationale for teaching science and technology

Science and technology will contribute to the intellectual and practical development of the learners to enable them to manage the changes that it brings all sectors of the economy. The learners will achieve this through accessing both indigenous and modern technologies. Science and technology will enable the learner, through investigations and inquiry, to understand and acquire basic knowledge and skills relevant for their survival and advancement in life. The student teachers will use the scientific and technological knowledge to effectively teach primary school science and technology and also utilize technology to improve their living standards.

Core elements and outcomes for science and technology

The primary teacher education core elements and outcomes for science and technology are as follows:

Teaching of Basic scientific knowledge, skills and attitudes

The student teachers will be able to utilise appropriate teaching, learning, assessment and class management strategies to enable the primary school learner to understand and apply scientific knowledge, skills and values to solve everyday problems and provide a base for further learning.

Teaching of Scientific investigation for application

The student teachers will be able to demonstrate an understanding of how they will utilise appropriate teaching, learning, assessment and class management strategies to enable the primary school learner to investigate relationships, identify and solve problems in science and technology

Teaching of Knowledge for development

The student teachers will be able to use appropriate teaching, learning, assessment and class management strategies to enable the primary school learner to interpret and apply scientific and technological knowledge with ethical responsibility towards the environment as well as to make improvements in the quality of life and develop interest in scientific and technological occupations.

Teaching of Technology innovation

The student teachers will be able to apply appropriate teaching, learning, assessment and class management strategies to enable the primary school learner to understand innovations and management of scientific and technological changes in all contexts with particular reference to science and technology in Malawi.

Summary of topics for the term and time allocation

Term 3		
Topic	**Allocated time in hours**	**Core element**
Teaching of the human digestive system	4	The teaching of basic scientific knowledge, skills and attitudes
Teaching of the human circulatory system	4	
Teaching of the human respiratory system	4	
Teaching of the human reproductive system	4	
Teaching of common parasites in human beings	4	
Teaching of common infectious diseases	4	
Teaching of sexually transmitted infections	4	
Teaching of simple machines	6	The teaching of scientific knowledge for sustainable development
Teaching of technologies	6	The teaching of technology innovation

TOPIC 1 Teaching of the human digestive system

Time 4 hours

Introduction

The human body has several systems, one of which is the digestive system. After eating, food has to be digested and absorbed to promote good health. Digestion and absorption will make the food useful to the body. It is important therefore, for primary school learners to learn about this topic for them to appreciate the system and later be able to take care of it. In this topic, student teachers will discuss the concept of digestion, how to teach it to primary school learners and how to assess learners' understanding of the human digestive system.

Success criteria

By the end of this topic, you must be able to:

- develop a model of the human digestive system
- explain challenges learners would face in the understanding of the human digestive system
- design teaching strategies to support learners in learning about the human digestive system
- assess learners' understanding of the digestive system

Background information

Digestion is the process through which insoluble food consisting of large particles is broken down into very small soluble molecules for absorption. Digestion occurs in the alimentary canal. Alimentary canal is a series of organs that converts food into essential nutrients that are absorbed into the body and eliminates unused waste materials. As a system, it has many parts starting from the mouth to the anus. These parts have distinctive functions.

The two types of digestion are physical and chemical digestion. Physical digestion mostly occurs in the mouth and stomach using mechanical forces. Various enzymes help in the chemical digestion which occurs in different parts of the system except in colon and rectum.

Fig.1.1 shows the human digestive system

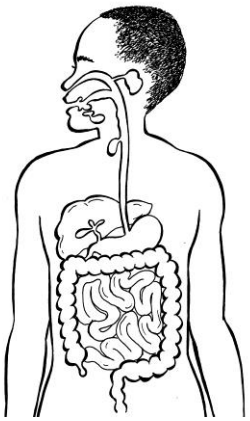

Fig. 1.1 the human digestive system

It is important for student teachers to understand the topic and develop appropriate teaching and learning strategies. This will help them to teach the topic to primary school learners so that they understand their own digestive system.

Tasks

Task 1 Developing models of the human digestive system

All mammals have similar organs because they belong to the same class. In this task, the digestive system of a mammal will be studied so that student teachers understand the parts and functions of the human digestive system. This will enable them to teach the topic confidently.

Activity 1 Identifying parts of the digestive system of small mammals

In groups:

1 Collect small mammals and dissect them.
2 Identify parts of the digestive system of the small mammals
3 Draw and label parts of the digestive system of the small mammals
4 Preserve the dissected mammal
5 Using work stations, present the findings
6 Prepare a micro lesson on dissection of small mammals
7 Present the micro lesson.

Activity 2 Identifying parts, functions, problems, solution to the problems and care of the human digestive system

1 Conduct a research to identify parts, functions, problems, solutions to the problems and care of the human digestive system.
2 Present your research findings in plenary.
3 Compare the research findings of the parts of the human digestive system with the preserved dissected mammal.
4 Record the findings on a chart in tabular format.
5 Paste the chart on the wall and use gallery walk to comment on each other's work.

Activity 3 Modelling the human digestive system

1 Use one stay and three astray to discuss how to model the human digestive system.
2 In groups, collect necessary materials from local

environment for modelling the human digestive system.

3 Develop the model.

4 Display the model on the science corner for comments.

Tips

Activity 1

- Consider the culture and religion of the community you are in before choosing and dissecting the small mammals
- To make the mammal unconscious place it in a tin containing few drops of methylated spirit.
- Care should be taken when dissecting the mammals to avoid injuries and contamination.
- Alternatively colleges may arrange with butcher men to slaughter their animals at the college or students to go to the slaughter house to observe parts of the digestive system.

Activity 3

- For ideas on resource development, refer to Andy Byers, the science teachers Handbook.
- Make sure that student teachers with special education needs participate in the practical activities

Task 2 Explain challenges learners would face in understanding the human digestive system

Understanding of the challenges will enable teachers to plan and organise lessons that will lead to conceptual change. In this task, student teachers will identify challenges in learning about the digestive system.

Activity 1 Identifying challenges in learning about the digestive system

1 Think about the challenges you had when learning about the topic 'Human digestive system". List the challenges you experienced.

2 Discuss misconceptions learners have when learning about the digestive system.

3 Suggest strategies that you might use to address the challenges and clear out the misconceptions.

4 Use author's chair to report your findings.

Tips

- Students should come up with as many ideas as possible.
- Use models of different stages of digestion to illustrate abstract ideas. In this way, they will be able to appreciate the importance of the topics and their knowledge of it can be used to improve their daily living standards.
- Begin by finding out what students already know about digestion.

Task 3 Designing strategies in teaching to support learners in learning about the human digestive system

Different strategies can be used in teaching human digestive system. In this task, student teachers will suggest appropriate strategies that can be used to teach the topic effectively.

Activity 1 Developing different strategies on how to teach the human digestive system

1 Generate a list of teaching strategies and resources for teaching human digestive system.
2 Explain why each of the strategies is appropriate for teaching the topic.
3 Present your findings in plenary.
4 Write a lesson plan on any concept of the topic human digestive system and use the different teaching strategies and resources identified.
5 Conduct a micro teaching using the lesson plan developed.
6 Use a check list to evaluate the lesson on the use of the teaching strategies and resources.

Tip

Make sure students use different strategies and resources including experiments and models.

Task 4 Assessing learners' understanding of the human digestive system

Assessment is one of the most important aspects of the teaching and learning process because it monitors learners progress. In this task, student teachers will practice on how to formulate assessment items and administer them.

Activity 1 Developing assessment items to assess learners understanding of the human digestive system

1 Collect assessment items from the demonstration primary school to evaluate learners' understanding of the digestive system.
2 Check them critically if they are covering the key concepts of the topic and levels of difficulty based on Blooms Taxonomy.

3 Develop your own assessment items using microsoft word to check learners' understanding of the digestive system.
4 Develop a check list that will be used to evaluate the assessment items according to Blooms Taxonomy.
5 Present the checklist for discussion.
6 Administer the items to the learners.
7 Record the results using excel packages.
8 Present results and analyse the performance of the learners.

Summary of key concepts

- Digestion is a process through which insoluble food consisting of large particles is broken into small soluble molecules for absorption.
- The digestive system is made up of several parts such as mouth, tongue, stomach, small and large intestines.
- Each part of the digestive system has a special function.
- There are problems associated with the human digestive system.
- There is need to care for the digestive system in order for it to function effectively.
- The concept of the human digestive system is abstract; therefore the use of models and dissection of small mammals can enhance learners understanding.
- There are different strategies that can be used to teach the human digestive system.
- The teacher should use different ways and tools of assessing learners' understanding of the human digestive system.

Reflection and assessment

1 Explain why it is necessary to teach primary school learners about human digestive system
2 Explain the two main functions of the digestive system.
3 Using demonstration method, explain how a teacher can show the function of enzymes on foods.
4 Drawing on your knowledge of child development explain why it is important to use a model of digestive system to teach digestion in the stomach.
5 Develop any two assessment items that can be used to assess learners when doing experiments on how enzymes work on food.
6 Design a checklist with any five items you would use to evaluate learners understanding of the human digestive system.

Glossary

Enzymes: a protein formed in living cells or produced synthetically which speeds up or slows down chemical processes or reactions.

Digestion: a process through which insoluble food consisting of large particles is broken into small soluble molecules for absorption

Physical digestion: breaking down large particles into smaller pieces using mechanical forces

Chemical digestion: breaking down of large particles into smaller molecules that can be absorbed by the small intestines using enzymes.

Absorption: taking in of digested food molecules into the blood stream or lymphatic system through the small intestines.

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Further reading

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https://www.niddk.nlh.gov>gallstones

TOPIC 2 Teaching of the human circulatory system

Time 4 hours

Introduction

The human circulatory system is composed of the heart, blood vessels and the blood. These parts have different functions. One of the functions is to provide the body tissues with the necessary materials to perform different processes. It is therefore important for learners to learn about the human circulatory system, its main parts and their functions. This will enable them to appreciate how blood circulates in the body in addition to understanding the importance of blood transfusions and related ethical issues.

Success criteria

By the end of this topic, you must be able to:

- describe the concept for teaching the human circulatory system
- analyse challenges learners would face in understanding the topic
- deploy different strategies on the teaching of the human circulatory system
- assess learners' understanding of how the circulatory system works

Background information

The human circulatory system is a vast network of organs and vessels that is responsible for the flow of blood, nutrients, hormones, oxygen and other substances to and from cells. The heart pumps blood around the body. The blood vessels carry blood to all parts of the body. Blood is a fluid mixture that carries substances like nutrients, oxygen through the body. The circulatory system also removes unwanted substances from the body. Figure 2.1 shows parts of the circulatory system.

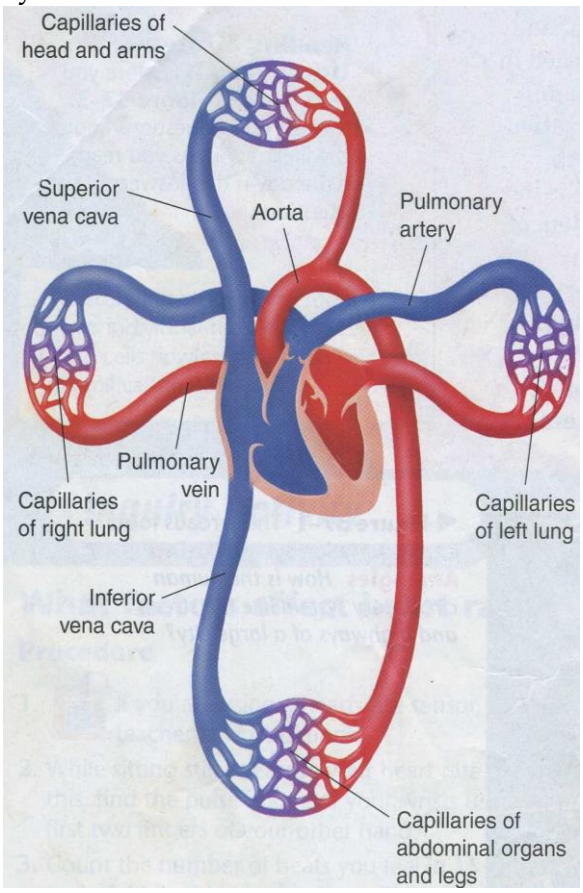

Fig. 2.1 Circulatory system from Miller and Levine (2004)

There are two types of human circulatory system namely the pulmonary circulatory system and the systemic circulatory system. The concepts of the human circulatory system are mainly abstract. To teach the topic effectively, student teachers need to understand the concepts about human circulatory system and the strategies to use in teaching human circulatory system. This will enable learners to understand how their circulatory system works.

Tasks

Task 1 Describing the concepts for teaching the human circulatory system

There are several concepts covered both in primary school and teachers' colleges on the human circulatory system. In this task, student teachers will research on the human circulatory system, discuss the reasons why it is important for learners to learn about the human circulatory system, dissect heart, model the human circulatory system, research on blood components and mode blood cells.

Activity 1 Researching on parts, functions, problems and care of the human circulatory system

1 Conduct a research to identify parts, functions, problems and care of the human circulatory system.
2 Analyse science and technology instructional materials to explore what learners should learn about the human circulatory system.
3 Present your findings to the class for comments.

Activity 2 Discussing the reasons why it is important for learners to learn about the human circulatory system

1 In groups, explore the reasons why learners should learn about the human circulatory system.
2 write your points on chart papers and paste them on the wall for discussion.

Activity 3 Dissecting the heart of a goat or a chicken to identity the parts

1 Dissect the heart of a chicken or a goat.
2 Identify parts of the heart.
3 Draw and label parts of the dissected heart.
4 Preserve the dissected heart.
5 Compare the parts of the dissected heart with the parts of a model of the human heart.
6 Explore functions of the parts of the human heart.
7 Display your work for gallery walk.

Activity 4 Modelling of the human circulatory system

1 Using walk around talk around, discuss local materials that can be used to model the human circulatory system.
2 Use ideas on modelling from the science teachers' handbook by Byers, A….et al:[2014] *Ideas and activities for every classroom* page 33 on how you can model the human circulatory system.
3 Display your work.
4 Use gallery walk to appreciate other groups work.

Activity 5 Researching on blood components and their functions and blood transfusion

1 Conduct a research on blood components and their functions and blood transfusions.
2 Report your research findings.

Activity 6 Modelling blood cells

1 Design a lesson plan you can use to demonstrate the modelling of components of blood using appropriate materials.
2 Micro teach using the designed lesson plan.
3 Evaluate the lesson using a checklist focusing on the effectiveness of the materials used and appropriateness of the models.
4 Investigate the functions of each component of blood by using the following website: www.livescience.com and books such as Miller and Levine.
5 Using Jig- saw method, discuss functions of each component of blood.
6 Imagine this was one of the topics taught during teaching practice, how would the learners be used to demonstrate how white blood cells engulf bacteria?

Tips

Activities 2 and 5

Research work should be outside the classroom work.

Activity 3

- Ensure that safety is maintained to avoid injuries and contamination.
- Student teachers should be provided with chicken or goat hearts.
- The lecturer should try out the dissection procedure before class time.

Activity 4

In modelling the human circulatory system, make sure the model is a real representation of the system.

Activity 6

- Student teachers must be familiar with the concept of engulfing.
- Materials for modelling must be sourced in advance.

Task 2 Analysing challenges learners would face in understanding the topic

It is important for the student teachers to reflect on the misconceptions and challenges learners have on learning about human circulatory system. In this task, student teachers will discuss challenges learners face in understanding human circulatory system.

Activity Discussing challenges learners would face in understanding the concept of heart, blood vessels and blood transfusion

1 Reflect on the misconceptions and challenges that learners would face when learning about the human circulatory system.
2 Using think–ink–pair –share, brainstorm strategies of how the challenges and misconceptions above can be addressed.
3 Report your ideas to the class during plenary.

Task 3 Developing different strategies on the teaching of the human circulatory system

The choice of strategies is very important in the teaching and learning process. In this task, student teachers will explore strategies and micro teach lessons on human circulatory system.

Activity 1 Exploring the strategies to be used in the teaching of the human circulatory system taking into account the challenges in large classes

1 Reflect on your own learning and list strategies that your teacher used to teach human circulatory system.
2 Explore strategies that can be used to teach the human circulatory system in large classes.
3 Record the points on a chart paper.
4 Present your points during plenary.
5 Discuss how the circulation game in Figure 2.5 can be used to teach the human circulatory system in large classes.
6 Demonstrate how the game can be played.

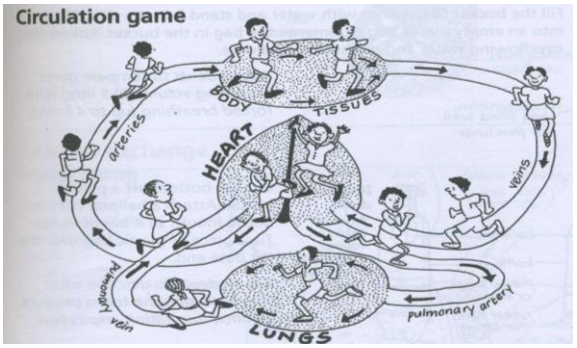

Fig. 2.5 Diagram showing Circulation game. from Byers, A….et al

7 Play the circulatory game.
8 Identify challenges in using the game and suggest solutions to the challenges.

Activity 2 Micro teaching a lesson on human circulatory system

1 In groups, prepare a lesson using ICT skills and present it for class discussion.
2 Micro-teach the lesson.
3 Do peer evaluation emphasizing on the appropriate strategies of the lesson on the teaching of the human circulatory system.

Task 4 Assessing learners' understanding of how human circulatory system works

In evaluating learners' understanding of the human circulatory system, it is important to undertake a range of assessments. The assessment should include skills and knowledge in conducting scientific experiments as well as knowledge and understanding about the teaching of the human circulatory system. In this task, student teachers will develop assessment tools to assess learners' understanding on the human circulatory system.

Activity Using assessment tools effectively to evaluate learners understanding of the circulatory system

1 Develop appropriate assessment items at varied levels of Blooms taxonomy to cater for learners of different education needs.
2 Develop assessment tools for assessing learners' understanding of the human circulatory system.
3 Discus the effectiveness of the assessment items using the tools developed.

Summary of key concepts

- The human circulatory system is composed of the heart, blood vessels and blood.
- The human circulatory system can be taken care of by healthy living.
- Development of different strategies to teach the human circulatory system such as experiments is essential in the teaching and learning of the topic.
- Exploration of ways of assessing learners' understanding in large classes using ICT knowledge and skills is important.

Reflection and assessment

1 How can you use a model of components of blood to teach the human circulatory system?
2 Explain the scientific ideas in the following ways of caring for the circulatory system:
a) avoiding stress
b) having time to rest
3 What are the most appropriate strategies for the teaching of the human circulatory system and why?
4 Design a checklist with any four items that would be used to

evaluate learners' understanding of the human circulatory system.

Glossary

Pulmonary circulatory system: carries deoxygenated blood from the heart through pulmonary arteries to the lungs and oxygenated blood to the heart through pulmonary vein

Systemic circulatory system: is the network of veins, arteries and capillaries that transports blood from the heart, services the body's cells and then re-enters the heart

Hormone: a chemical produced in the body that acts as a 'messenger`

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Further reading

www.origene.com/

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TOPIC 3 Teaching of the human respiratory system

Time 4 hours

Introduction

The human respiratory system carries oxygen into the body which is used to release energy and takes out carbon dioxide. Breathing mechanism, gaseous exchange and problems associated with the system are some of the concepts in the topic. It is important for learners to learn about this topic in order for them to understand and be able to take care of the respiratory system. The knowledge of this topic will help student teachers to teach the topic effectively.

Success criteria

By the end of this topic, you must be able to:

- design a model of a human respiratory system using locally available resources
- analyse the difficulties that learners may experience in understanding concepts on the human respiratory system
- apply appropriate methodologies when teaching theoretical and practical aspects of the human respiratory system
- use appropriate assessment strategies to evaluate learners' knowledge of respiration

Background information

The respiratory system is a series of organs responsible for taking in oxygen and expelling carbon dioxide. It consists of the organs that provide the body with a continuous supply of oxygen and rid the body of carbon dioxide. The primary organs of the human respiratory system are lungs, trachea, bronchi, bronchioles and alveoli. When a person breathes in and out, air with a high concentration of oxygen enters and air with high concentration of carbon dioxide goes out.

Figure.3.1 Shows the human respiratory system

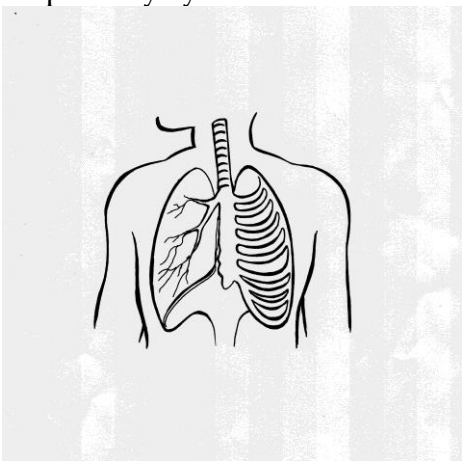

Fig. 3.1 The human respiratory systems

The respiratory system and circulatory system are related as such student teachers need to understand this relationship. Use of models is important as the topic has abstract concepts. The use of

appropriate assessment strategies is important to evaluate learners knowledge.

Tasks

Task 1 Designing a model of a human respiratory system using locally available resources

In this task, student teachers will research on parts of the human respiratory system and construct a lung model to be used during the teaching and learning process. This will help them to teach the topic effectively to learners in primary schools. They will also investigate how respiratory system is linked to the circulatory system.

Activity 1 Researching how the organs of the human respiratory system relate to each other

1 Research on the internet using mobile phones and computers to find out organs which comprise the human respiratory system and how they relate to each other.
2 Analyse primary school instructional materials to identify what learners should learn about the human respiratory system.
3 Share your findings in plenary.

Activity 2 Making a model of the respiratory system using different resources

1 Use inter-group challenges to identify materials that can be used to make a lung model
2 In groups, construct a lung model.
3 Demonstrate the breathing mechanism using the lung model to the class.
4 Discuss the strengths and weakness of the model.

Activity 3 Investigating how the respiratory system is linked to the circulatory system

1 View online resources to investigate how the human respiratory system is linked to the human circulatory system.
2 With the aid of a well labelled diagram, present your findings using power point.

Tips

Activity 1

- Research should be done outside classroom work.
- Ensure that you involve all learners in designing and carrying out practical tasks.

Activity 3

- There should be a model ready in the laboratory (made in advance by the lecturer to compare with those students will make).
- Use locally available resources for modelling the lung.
- Learners can be used as resources in breathing mechanism.

Task 2 Analysing difficulties learners may experience in understanding concepts on the human respiratory system

There are many challenges that learners may experience in the learning of the human respiratory system. In this task, student teachers will identify these challenges and suggest the solutions.

Activity 1 Observing learners' engagement in a lesson at a demonstration school

1 Observe a lesson at a demonstration school to identify challenges learners face in the teaching and learning of science and technology. Focus on methodology used, the use and availability of resources and assessment strategies.
2 Report the findings in plenary for discussion.

Activity 2 Analysing the challenges observed and suggesting solutions

1 Analyse the challenges identified in Activity and suggest their solutions.
2 From the challenges observed, discuss challenges learners would face in learning the human respiratory system and suggest solutions.
3 Use authors chair to report the findings.

Tip

Identify as many challenges as possible that learners are likely to face.

Task 3 Applying appropriate methodologies when teaching theoretical and practical aspects of the human respiratory system

The topic" Human respiratory system" requires hands-on and brain-on methods to be understood by both student teachers and learners. In task, student teachers will research appropriate methods which can be used to teach the topic effectively and micro-teach a lesson on the human respiratory system.

Activity 1 Researching methodologies that can be used to teach the human respiratory system

1 Reflect on the methods your teacher used to teach the human respiratory system.
2 Discuss and research other methods that can be used to teach the human respiratory system in large classes.
3 Using fish bowl, identify the reasons why some methodologies would be more effective than others in teaching the human respiratory system in large classes.

Activity 2 Micro-teaching a lesson on the human respiratory system

1 Prepare a micro-lesson on any concept of the human respiratory system.
2 Teach the micro lesson and video record it.
3 Evaluate the micro-lesson to identify the most appropriate method(s)and how they were used in the lesson by referring to the video.

Task 4 Using appropriate assessment strategies to evaluate learners' knowledge of respiration

The teaching and learning process needs to be assessed to monitor acquisition of knowledge, skills and attitudes and values. In this task, student teachers will develop assessment items and tools to be used when assessing learners in primary schools.

Activity 1 Developing items to assess learners' knowledge in the breathing mechanism

1 Using knowledge of child development, develop assessment strategies which may be used to assess learners on the concept, breathing mechanism.
2 Using the assessment strategies, formulate assessment items to assess learners' knowledge of breathing mechanism.
3 Using web discussion, discuss the assessment items developed to establish their appropriateness according to the levels of blooms taxonomy.

Activity 2 Developing assessment tools to assess learners' knowledge on breathing mechanism

1 In paired brainstorming, develop a rubric to assess learners' knowledge and skills when learning breathing mechanism.
2 Using mind-mapping, evaluate the features of the rubric developed.

Tip

Evaluate the tools constructed by students and offer assistance on which items to be included to assess learners understanding and acquisition of skills on the topic.

Summary of key concepts

- Respiratory system is important for ensuring the supply of oxygen to all parts of the body and removal of carbon dioxide.
- Nose, nasal passages, mouth, pharynx, larynx, trachea bronchi and bronchioles form the respiratory tract.
- Model making and use of participatory and inclusive strategies will illustrate the concept of breathing clearly.
- The teaching and learning of the human respiratory system has challenges and misconceptions.

- Assessment items and tools should be evaluated according to Bloom's Taxonomy.

Reflection and assessment

1 Develop a higher order assessment item to compare and contrast the lung model and the real chest cavity.
2 Draw a well labelled diagram of the human respiratory system.
3 Name one of the problems of the respiratory tract that is caused by:
   a. A pathogen
   b. Life style
4 How can a lung model be used to teach the process of inhalation?
5 Formulate a checklist to assess learners' understanding of gaseous exchange in the alveolus.

Glossary

Bronchi: are the main passage ways into the lungs

Bronchioles: passage ways by which air passes through the nose or mouth to the alveoli of the lungs (air sacs)

Alveoli: tiny air sacs within the lungs where the exchange of oxygen and carbon dioxide takes place

Trachea: is the main trunk of the system of tubes by which air passes to and from the lungs

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Further reading

https://www.livescience.com>Health

www.innerbody.com>anatomy>respiration

http://www.teacherplanet.com/node/490

TOPIC 4 Teaching of the human reproductive system

Time 4 hours

Introduction

In previous topics, you have learnt how to teach digestive system, circulatory system and respiratory system. In this topic, we will look at the teaching of the human reproductive system. As is the case with the other systems, human reproductive system has many parts that are complementary and work in conjunction with each other. It is therefore important for learners to learn about this reproductive system in order to understand how it sustains life. Knowledge and understanding of this topic will enable student teachers to impart relevant knowledge to learners in primary school.

Success criteria

By the end of this topic, you must be able to:

- link prior knowledge to the teaching of the human reproductive system
- deploy different strategies on the teaching of the human reproductive system
- assess learners' knowledge of the different parts of the human reproductive system and their functions

Background information

Every living thing reproduces for continuity of the species. There are two types of reproduction; sexual and asexual reproduction.
Human beings reproduce sexually. In human beings, reproduction is complex. There are different parts of the male and female reproductive systems as shown in Figures 4.1 and 4.2.

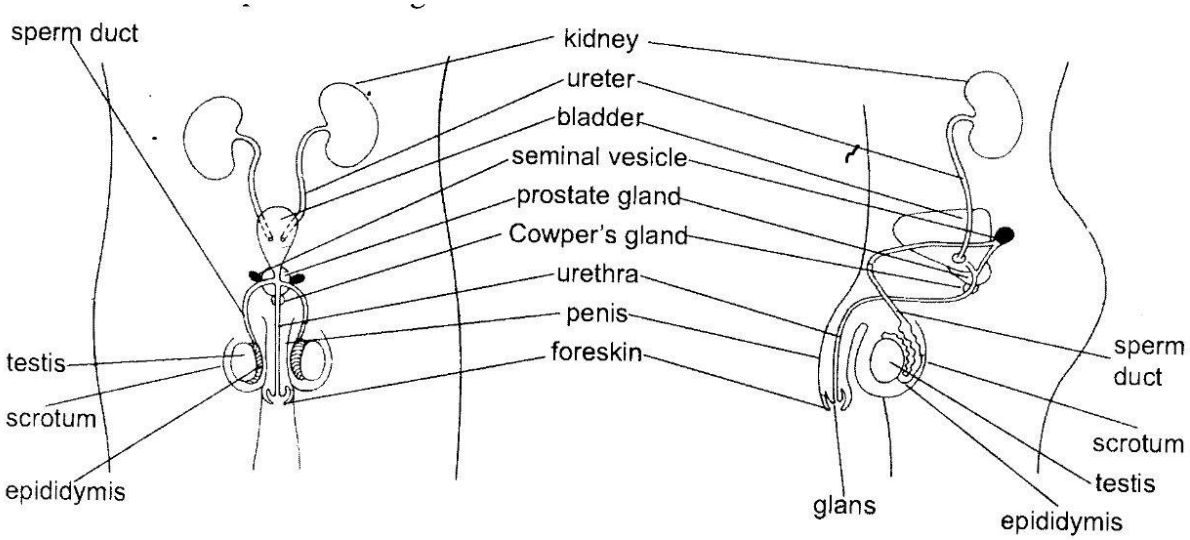

Fig. 4.1 Parts of 'male reproductive system' (Kalibwanji 2010)

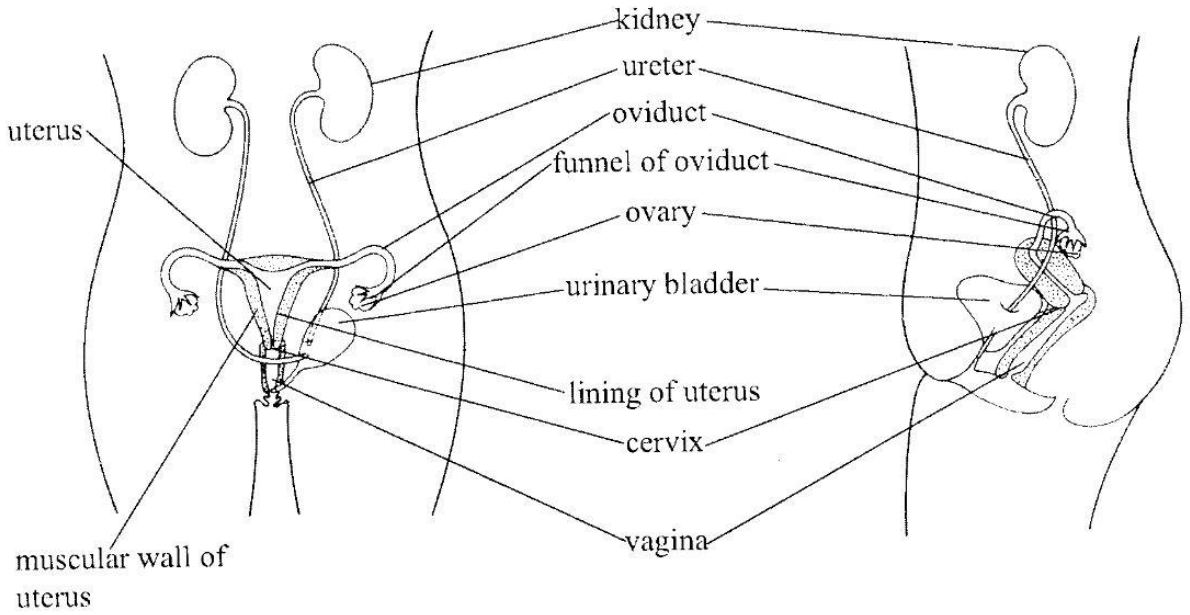

Fig. 4.2 Parts of female reproductive system (Kalibwanji 2010))

Many of these parts are found inside the body making it difficult for learners to understand the concept easily.

For this reason, it is necessary to develop learners' understanding by using different teaching and assessment strategies.

Tasks

Task 1 Link prior knowledge to the teaching of the human reproductive system

The knowledge that learners have about reproductive system, may be incorrect. This is because mentioning of some of the human reproductive parts is considered culturally and religiously sensitive.

It is important for student teachers to be open when teaching the topic for the learners to understand. In this task, student teachers will research on the human reproductive system and discuss why it is important for learners to learn about the human reproductive system.

Activity 1 Researching on the topic of the human reproductive system

1 Using pen in the middle, write anything you think learners in primary school know about the reproductive system.
2 How can you use the prior knowledge learners have to effectively teach the topic.
3 Do self-study by undertaking research on parts, functions, menstrual cycle and human development.
4 Present your findings using one stay three astray.
5 Analyse primary school books to find out what learners should learn in the topics of the human reproductive system and family planning.
6 Use power point to report the findings to the class.

Activity 2 Discussing why it is important for learners to learn about human reproductive system

1 In groups, discuss why learners should learn about the human reproductive system.
2 Present your work for class discussion.

Tips

- Activities 1 and 2 can be done in one session.
- Ensure that moral standards are maintained throughout these tasks.
- Self study and analysis of primary books should be done outside classroom work.
- Each group should have a different task to research on.

Task 2 Deploying different strategies on the teaching of the human reproductive system

The topic, human reproductive system is very sensitive to both teachers and learners. As such it is important for student teachers to identify teaching strategies which can be used to teach the topic for effective teaching and learning. In this task, student teachers will explore different strategies that can be used when teaching the topic.

Activity 1 Exploring the strategies to be used in the teaching of the human reproductive system

1 In groups, explore the strategies for teaching the human reproductive system.
2 Using construction blocks, identify the most appropriate strategies for the teaching of the human reproductive system.

3 Report the findings in plenary for discussion.

Activity 2 Discussing the sensitivity involved in the teaching of the human reproductive system

1 In pairs, research from local communities the sensitivity or ethical issues involved with the teaching of the human reproductive system.
2 Swap the list of findings for discussion.

Activity 3 Micro-teaching a lesson on the human reproductive system

1 In groups, prepare a micro lesson using ICT knowledge and skills on the human reproductive system.
2 Micro-teach the lesson using the most appropriate strategies chosen.
3 Evaluate the lesson plan and the teaching of the human reproduction focussing on the strategies used.

Tip

The lesson plans should be developed from different concepts

Task 3 Assessing learners' knowledge of the different parts of the human reproductive system

Assessment helps to monitor learning during the teaching and learning process. In this task, student teachers will develop assessment tools and items that can be used to assess learners' understanding of the human reproductive system.

Activity 1 Developing assessment items and tools taking into account of different learning styles

1 In groups, develop assessment items taking into account of different learning styles, to evaluate learners' understanding of the parts and functions of the human reproductive system.
2 Scrutinise the assessment items to check their effectiveness using blooms taxonomy.
3 Develop assessment tools to assess learners' knowledge of the different parts of the human reproductive system and their functions.
4 Evaluate the effectiveness of the assessment tools by looking at their features.

Tip
Items should take account of the need to assess a diverse range of learners.

Summary of key concepts

- The human reproductive system consists of male and female reproductive systems.
- The parts of the human. reproductive system play different functions.
- The topic reproductive system is very sensitive because it involves mentioning the reproductive organs which is believed to be culturally an abomination.
- There are different strategies that a teacher can use to teach the topic.
- Assessing learners' understanding of the human reproductive systems requires appropriate items and tools.

Reflection and assessment

1 Describe the process of fertlisation.
2 Draw on your knowledge of child development and identify issues that need to be considered when demonstrating how a foetus is protected against pressure.
3 What are the most appropriate strategies that you can use to teach parts of the reproductive system?
4 Develop a rubric which can be used to assess learners on models of human growth and development.

Glossary

Asexual reproduction: reproduction by which offspring arise from a single organism

Fertilisation: union or fusion of male and female gametes to produce a zygote

Menstrual cycle:is the regular natural change involving ovulations and menstruations that occurs in the female reproductive system

Reproduction: is the biological process by which offsprings are produced from their parents

Sexual reproduction: reproduction by which offsprings arise from two parts of opposite sex

Species: a group of organism which can mate and produce fertile offsprings

References

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TOPIC 5 Teaching of common parasites in human beings

Time 4 hours

Introduction

There are many common parasites which affect human beings in everyday life. These parasites can be controlled or prevented in Malawi, parasites infections are common even among school going children. It is therefore, necessary to equip learners with knowledge which will help them acquire relevant skills and practices related to health issues.

Success criteria

By the end of this topic, you must be able to:

- describe concepts of common parasites in human beings
- demonstrate different strategies on teaching of the common parasites in human beings
- assess learners' knowledge of common parasites

Background information

Some organisms depend on other organisms for survival while causing harm to the host. These organisms are called parasites. Worms and bed bugs are among the common parasites that affect human beings in Malawi.

Figure 5.1 Shows a bed bug

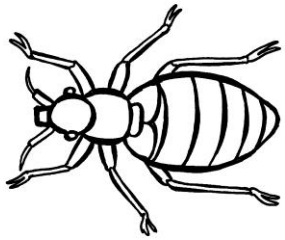

Fig 5.1 Bed bug

There are two types of parasites: ectoparasites and endoparasites. When one is infected, there are signs and symptoms that are experienced.

Different types of parasites develop following different life cycles. Control of these parasites is the best health issue that Malawians can advocate since they cause infections and diseases that slow development of the country.
It is important for learners to know about the most common types of parasites and their life cycles so that they can prevent their spread and if possible, get rid of them.

Therefore, there is need to use appropriate teaching strategies for learners to understand concepts about common parasites.

Task 1 Describing concepts of common parasites in human beings

Common parasites is one of the topics that are taught in primary schools. Therefore, it is important for student teachers to be familiar with the concepts that are taught in this topic.

Activity Researching different types of common parasites which affect human beings- tape worms, hook worms, round worms, migrant worms, bed bugs

1 Research on different types of common parasites which affect human beings: tape worms, hooks worms, round worms, migrant worms and bed bugs. Focus on structure, mode of transmission, life cycle, signs and symptoms and prevention of the parasites.
2 Present your findings using one stay three astray.

Tips
Each group should have different parasites to study.

Task 2 Demonstrating different strategies on the teaching of the common parasites in human beings

Effective teaching and learning process requires knowledge of different teaching strategies to cater for all learners. In this task, student teachers will explore different strategies on the teaching of common parasites.

Activity 1 Identifying challenges in teaching about outbreak of parasites

1 Explore different strategies on the teaching of common parasites.
2 Report your findings in plenary.
3 Imagine you have come from the teaching practice, one of the topics taught was challenges in teaching about outbreak of parasites. Share the challenges in the teaching about outbreak of common parasites that would be encoutered.
4 Use walk around talk around to explore strategies of addressing the challenges.
5 Report your findings in plenary.
6 Brainstorm various activities and local resources that can be used to engage learners in handling outbreaks of common parasites in human beings.
7 Share your ideas to the whole class.

Activity 2 Designing opportunities for learners to undertake investigations into how to eradicate common parasites

1 Investigate actions taken in communities when there is an outbreak of diseases such as cholera, dysentery, birhazia and many others.
2 Report the actions taken.

3 Design opportunities for learners to undertake investigations into how to eradicate common parasites.
4 Present the design opportunities for learners to undertake investigation into how to eradicate common parasites.

Activity 3 Control and prevention of bed bugs

Case study

Two countries Pholi and Saso share boarders. Two villages of Mose in Pholi and Usin in Saso lie on the boundaries of the two countries.

Mr and Mrs Mbalame of Mose Village visisted their relatives in Usi Village. Two week after coming back, Mr and Mrs Mbalame noticed that their home was infested by organisms which some members of the village said they were bed bugs. Three more weeks later, the bed bugs were also noted in compounds of people who visited Mr Mbalame's son who was sick.

Within a short time, it was clear the whole village was complaining about bed bugs.

From Mose Vilage, the bed bugs spread to other villages like Wama, Khukeya and Ntola. It became clear that the parasites were spreading very fast within the district.

Imagine that you were one of the villagers in Mose:

1 What advice would you give to the village headman and their villagers to help them stop further spreading of the bed bugs.
2 Suggest what each household would do to eradicate the bed bugs in their homes.
3 What interventions can the villagers plan to control further spread of bed bugs in future?

Tip

Encourage student teachers to generate as many strategies as possible for the activity.

Task 3 Assessing learners' knowledge of common parasites

Assessment helps to monitor the progress of acquisition of knowledge and skills in a topic by learners. This task involves student teachers in analysing different assessment tools. They will also develop and evaluate assessment items.

Activity 1 Categorizing varied ways of assessing learners on common parasites

1 Use "give one- take one" to categories ways of assessing learners' understanding on the topic, common parasites.
2 Use paired discussion to compare the results.
3 Write the results on the chart.

4 Report the results to the class.

Activity 2 Developing items to assess learners' understanding of the control of common parasites

1 In groups, develop assessment items to assess learners' understanding on the control of common parasites.
2 Evaluate the effectiveness of the assessment items using Blooms Taxonomy.
3 Administer the best paper to learners at demonstration school.
4 Mark the paper.
5 Record and analyse the results
6 Evaluate the effectiveness of the paper using the test scores.

Summary of key concepts

- There are two types of parasites: ectoparasites and endoparasites. Examples of ectoparasites are bed bugs and ticks. Examples of endoparasites are worms and plasmodium.
- Eradication of the common parasites can help communities to be free from parasitic infections.
- There are many teaching and learning methodologies that can be used to teach common parasites in human beings.
- Good assessment procedures help to check learners' understanding of common parasites.

Assessment and reflection

1 Describe the life cycle of a tapeworm.
2 Explain how the knowledge and skills gained in common parasites in human beings can be applied in everyday life.
3 Describe at least four practical activities you can engage learners in when teaching concepts of common parasites in human being.
4 Design a checklist of any five items which can effectively be used to assess learners in understanding of common parasites in human beings.
5 Mention any three resources that a teacher may need when teaching the topic 'common parasites in human being.
6 Explain any three strategies that may encourage full participation of learners in the lesson.

Glossary

Ecto parasites: parasites that live outside the host body
Endo parasite: parasites that live inside the host body
Host: an organism that supports a parasite often at the expense of its own health, nutrition or general comfort and welfare
Lifecycle: developmental stages of an organism from egg to adult

Organism: any living thing such as plant or animal or microbe

Parasite: an organism that grows, feeds and is sheltered on or in another organism

Sign: is a phenomenon that can be detected by someone other than a individual affected by the disease

Symptom: is a phenomenon which is experienced by the individual affected by the disease

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Further reading

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TOPIC 6 Teaching of common infectious diseases

Time 4 hours

Introduction

Diseases which can be passed from one person to another are known as infectious diseases. These diseases can be prevented or controlled. It is therefore necessary to equip learners' with knowledge, skills and practices related to health issues. A thorough knowledge of this topic will also enable teachers to acquire various techniques and strategies to teach the topic effectively and efficiently in the primary school.

Success criteria

By the end of the topic, you must be able to:

- explain the concepts on common infectious diseases
- demonstrate different teaching strategies in the teaching of common infectious diseases
- assess learners' performance on the common infectious diseases

Background information

Diseases which are passed from one person to another are called infectious, communicable or transmissible diseases. They are caused by organisms such as virus, bacteria, fungi, protozoa and various types of worms which get into the body. These diseases include polio, tuberculosis, trachoma, meningitis and bilharzia.

The common infectious diseases are transmitted through skin, air, water or food. Some infectious diseases are transmitted by an intermediate organism called a vector. Infectious diseases are accompanied by signs and symptoms.

Thus it is important that learners are equipped with knowledge about signs and symptoms of the infectious diseases through appropriate teaching strategies. The knowledge, skills and attitude gained will in turn guide learners to take appropriate measures in preventing and controlling infectious diseases in their everyday life.

Tasks

Task 1 Explaining the concepts on common infectious diseases

Teachers must understand what they want to teach to learners so that in turn they teach effectively. In this task, student teachers will conduct a research on common infectious diseases and discuss the reasons why it is important for learners to learn the topic.

Activity 1 Researching on types, causes, modes of transmission, signs and symptoms, prevention and treatment of common infectious diseases

1 Conduct a research on common infectious diseases. In your research, find out types, causes, modes of transmission, signs, symptoms, prevention and treatment of various common infectious diseases.
2 Report your research findings during plenary.
3 Paste your work on a wall and discuss your findings using one stay-three astray method.

Case study on common infectious diseases

A Science and technology lecturer at Cholimba Teachers Training College gave his a class project.

He asked them to visit the villages surrounding the college to find out infectious diseases people suffer from in the area. He asked them to find answers for the following questions:

a) Which diseases affect people most?
b) Which villages have the largest number of patients and why>
c) Which season of the year do the diseases noted occur most and why?

He also asked them to visit the Health Surveillance Assistant to help them with some information on their project.

The lecturer finally advised the students to visit the rural hospital in the area to check their findings against hospital research.

The results showed that two villages Yonas and Muwehe had largest numbers of patients suffering from Malaria and bowel related infections like Dysentery and Cholera.

- Most of the people went sick during the rainy season.
- The two villages were found with less pit latrines compared to the others. They also had lots of bushes and swampy surroundings.
- It was also established that weekly numbers of patients registered by the Health Surveillance Assistant were much higher than those found in the hospital registers.

Questions

1 Why do you think weekly numbers of patients registered by the Health Surveillance Assistant from each of the two villages differed from those found at the hospital?
2 Suggest what should be done to solve the problem?
3 What effects do the diseases have on the development of the two villages?
4 Explain interventions that should be put in place to improve the health of people in the two villages?

Activity 2 Discussing reasons why it is important for learners to learn about common infectious diseases

1 Using primary school instructional materials, find out what learners should learn about common infectious diseases.
2 Discuss the justification for teaching learners about common infectious diseases.
3 Report your findings using author's chair.

Tip
A group should research on one infectious disease

Task 2 Demonstrating different teaching strategies in the teaching of common infectious diseases

Effective teaching requires good choice of strategies and resources. These make learning easy. In this task student teachers will be involved in identifying different strategies and develop lessons plans for teaching the topic.

Activity 1 Discussing how the topic can be linked to learners' prior knowledge of common infectious diseases

1 In groups, discuss how you can link the topic 'common infectious diseases' to learners' prior knowledge.
2 Report your findings using a gallery walk.

Activity 2 Analysing different strategies of teaching common infectious diseases

1 Brainstorm various activities and local resources you can use to engage learners in learning about the topic 'common infectious diseases'.
2 Explore appropriate strategies that can be used to teach the topic and reasons why they are appropriate.
3 Present your findings in plenary.

Activity 3 Preparing lesson plans for teaching infectious diseases

1 In groups, prepare a 10 minutes lesson plan using word processing packages on any component of common infectious diseases.
2 Conduct a micro teaching session using a PowerPoint presentation.
3 Record a video of the presentation for reflection.
4 Evaluate your lessons using 'pen in the middle' method, focussing on the use of ICT, strategies used and content mastery.

Tip
Ensure that each group has chosen a different component of the topic 'common infectious diseases' to develop a lesson plan

Task 3 Assessing learners' performance on the common infectious diseases

To measure learners' understanding of the content, there is need to assess their performance in different concepts using different ways. In this task student teachers will be involved in analysing different ways of assessment, critiquing assessment items and developing assessment items and how to evaluate their effectiveness.

Activity 1 Analysing different ways of assessing learners

1 Describe different methods that can be used to assess learners' understanding of the topic.
2 From the methods described above choose the best methods and explain why they are the best.
3 Present your discussions using one stay three astray method.

Activity 2 Critiquing assessment items from the demonstration school

1 Collect assessment items from a demonstration school.
2 Analyse the assessment items according to content coverage and levels of Blooms taxonomy
3 Present your findings in plenary for discussion

Activity 3 Developing assessment items on the teaching of infectious diseases

1 Develop assessment items of all levels of blooms taxonomy without repeating the ones collected from the demonstration school.
2 Evaluate the effectiveness of the developed assessment items using blooms of taxonomy.

Summary of key concepts

- Infectious diseases are diseases which can spread from one person to another.
- The four main organisms causing Infectious diseases are fungi, virus, bacteria and protozoa.
- The organisms can be transmitted through contaminated air, water, food, entry through skin and direct contact.
- Infectious diseases are recognised by observing signs and symptoms.
- Different strategies can be used to teach the topic.
- Different ways of assessment should be used to assess learners understanding of the topic.

Reflection and assessment

1 Why are field trips or education visits ideal for teaching common infectious diseases?
2 Explain the difference between infection and disease
3 Explain how the knowledge and skills gained in learning about common infectious diseases can be applied in everyday life.
4 Describe at least four practical activities you can engage learners in when teaching concepts of common infectious diseases.
5 Design a checklist of at least five items which can effectively be used to assess learners' understanding of common infectious diseases.

Glossary

Infectious disease: any disease that can pass from one person to another

Vector: an organism that passively carries a disease causing organism

References

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TOPIC 7 Teaching of sexually transmitted infections

Time 4 hours

Introduction

Sexually transmitted infections (STIs) are diseases transmitted through sexual contact. These diseases lead to serious body complications. It is important for student teachers to understand the cause, mode of transmission, signs and symptoms and how the diseases can be prevented so that they teach them effectively in primary schools. The knowledge will help learners to understand the diseases and avoid risky behaviour.

Success criteria

By the end of this topic student teachers must be able to:

- describe sexually transmitted infections
- demonstrate different strategies on teaching of sexually transmitted infections
- assess learners' knowledge of sexually transmitted infections.

Background information

STIs are diseases that are spread through unprotected sexual intercourse or genital contact. The most common ones are syphilis, gonorrhoea, HIV and AIDS, candidiasis, herpes genitalis, chlamydia, trichomoniasis, chancroid and genital warts. The STIs are health threats because they have a lot of complications such as bad odour, itching, infertility, sterility, blindness, mental disorder and death. The infections are caused by different micro-organisms like bacteria, virus or protozoa. Many of them have clear signs and symptoms while others do not. After infection there is an incubation period before signs become clear. Some people do not show signs and symptoms when they are infected and this increases the risk of spreading the infection.

Students teachers must understand the effects of the STIs on the health of the individual and how such infection retard economic development. They should use appropriate strategies, resources and assessment to ensure that learners understand the topic.

Tasks

Task 1 Describing sexually transmitted infections

Student teachers need to be familiar with the content on sexually transmitted infections for them to teach effectively. In this task, they will research on the sexually transmitted infections and ARVS.

Activity 1 Researching on the sexually transmitted infections

In groups:

1 Research on the STIs in books, internet and hospital to find information about causes, modes of transmission, signs and symptoms and prevention.
2 Using group presentation present your findings for discussion.

Case study on sexually transmitted diseases

A research carried in ten Health Centres of each of the three districts of Mayawo, Masani and Muhaso revealed the following information about sexually transmitted infections:

- 35% of all cases treated at the health facilities per month are sexually transmitted infections.
- 90% of all STI patients treated are youth.
- The prevalence rate of STI is higher in health centres situated in urban/semi-urban centres and near education institutions.
- 10% of all patients treated have revealed to parents, friends, guardians and spouses about their being infected and expressing need for seeking medical help.

Questions

1 What do the figures reveal about sexually transmitted infections in the area?
2 What is the future of the country considering the percentage of youth infected?
3 If such figures of infected people are registered, what can you say about condom use among people in the areas?
4 Why don't many people want to reveal that they are infected by STIs?
5 What danger is posed on the patient, spouse and society when you consider that only 10% of infected people reveal their status?
6 If the results of this research represent the situation in the whole country, what measures should be put in place to reverse the situation?

Activity 2 Researching on ARVs (use, effects and accessibility)

In groups,

1 Research on the use, effects and accessibility of ARVs.
2 Report your findings in plenary

Tips

- Different groups should research on different STIs
- Ensure that the students get the information about the research in time
- Prepare letter of introduction for the students to take to the hospitals

Task 2 Demonstrating different strategies on teaching of sexually transmitted infections

Teachers must find appropriate strategies and resources for

teaching the topic STIs for learners to understand the concepts.

In this task, student teachers will discuss different strategies for teaching STIs, explore challenges when teaching STIs and micro-teach lessons on STIs.

Activity 1 Discussing on different strategies for the teaching of sexually transmitted infections

1 Individually, reflect on strategies that your teacher used to teach sexually transmitted infections. State the strategies you liked and why.
2 Share your answer in pairs.
3 In groups, come up with appropriate strategies that you can use when teaching the topic STIs.
4 Exchange your list with another group to write in challenges of using those methods, suggest solutions on the challenges.
5 Report your list to the class using authors chair for discussion.

Case study on inclusive teaching and learning

A number of Standard 7 learners of Phoso School are HIV positive.

Some are on ARVs while others are not. A number of them look sick and uncomfortable due to the HIV infection, others due to reactions to ARVs they take. Ofcourse some learners look sickly due to other diseases and bad weather changes.

According to their teacher's understanding, anybody who looks sickly and is inactive is HIV positive. He also assumes that any learner who is usually absent is frequently sick and is on ARVs.

The teacher makes a lot of negative comments during lessons in the class.

1 If you were a learner in that class, how would the negative remarks affect your learning?
2 What strategies would be used to handle the class so that teaching and learning takes place properly?
3 If the headteacher of the school appointed you to take over the class, how would you handle the learners already affected?

Activity 2 Exploring challenges when teaching about STIs and HIV

1 In pairs, list misconceptions learners have about STIs, write them on a piece of paper.
2 List challenges you think a teachers will face when teaching the topic, Sexually Transmitted infections and how they can be overcome.
3 Exchange your two lists with two different groups for comments.
4 Report the observations and comments to the class for discussion.

Activity 3 Micro-teaching lessons on sexually transmitted infections

1 Prepare a micro lesson on sexually transmitted infections.
2 Micro-teach the lesson using the methods you generated in Activity 1.
3 Evaluate the lesson on effectiveness of the methods used.

Tips

- Ensure that ethics and moral standards are observed when teaching the topic.
- Handle students comments and question professionally

Task 3 Assessing learners' knowledge of sexually transmitted infections

Assessment is important during teaching and learning. In this task, student teachers will formulate assessment tools and items to be used in checking learners understanding on the topic Sexually Transmitted infections.

Activity 1 Developing tools for assessing learners' knowledge on sexually transmitted infections.

1 Develop assessment tools for assessing learners knowledge on sexually transmitted infections.
2 Compare your assessment tools with other student teachers.
3 Report your observation in class for discussions.

Activity 2 Developing assessment items

1 Collect assessment items from the demonstration school on sexually transmitted infections and evaluate them using Blooms Taxonomy.
2 Develop your own assessment items.
3 Exchange the items with another group and evaluate them using Blooms Taxonomy.

Tip

- Collect the assessment items from the demonstration school in advance.

Summary of key concepts

- STIs are transmitted through sexual intercourse.
- STIs include syphilis, gonorrhoea, chancroid and candidiasis among others.
- It is important for students to understand the use, effects and accessibility of ARVs.
- The teacher should use a variety of teaching methods and resources to teach the topic.
- Assessment items and tools should cater for all diverse needs of learners.

Assessment and reflection

1 Explain the relationship between STIs and HIV and AIDS.
2 a. Prepare a lesson plan on signs and symptoms of HIV and AIDS and Gonorrhoea.

b. Explain advantages of using the methods in the lesson plan.

3 Develop any two assessment items of higher order to assess learners' understanding on STIs.

Glossary

Genitals: a person's external organ of reproduction

Incubation period: a time between being exposed to infection and showing first symptoms

Infertility: in ability to conceive

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Further reading

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http://www.who.int/mediacentre/factsheets/fs110/en/

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TOPIC 8 Teaching of simple machines

Time 6 hours

Introduction

Machines form part of the environment. People use them to accomplish many tasks. For instance, a bicycle is a machine which carries loads but it has limitations in terms of how much load one bike can carry. In the course of learning, learners must be provided with opportunities to identify problems that require machines to address them. In addition; learners can also look at existing machines and design modifications to improve their operations and efficiency.

Success criteria

Student teachers must be able to:

- explain the concepts of design process and simple machines
- design activities to enable learners to experiment in using different materials to make simple machines
- demonstrate different strategies in the teaching of design processes and simple machines
- use appropriate assessment strategies to evaluate learners' engagement in the design and production of simple machines

Background information

Man has developed a number of machines to make work easier. Some of them are traps, bow and arrow, pair of scissors, a wheel barrow, a knife etc. These machines are put into six groups known as the "six simple machines": the wheel and axle, the lever, the inclined plane, the pulley, the screw and the wedge.

Simple machines are the basis for all mechanical systems, no matter how complex they are becoming. The production of machines involves designing. The basic design process involves identifying a situation for design, researching on the situation, developing a design brief, investigating possible solutions, developing solutions, making prototypes and mockups using locally available resources and testing the solutions. It will therefore be appropriate to involve learners in designing and carrying out experiments or tasks using various types of simple machines. This will enable learners to develop a practical understanding of how machines make work easier.

Student teachers should investigate how the topic, simple machines can be taught to primary school learners by surfing the internet and also reading engineering design and technology books.

Tasks

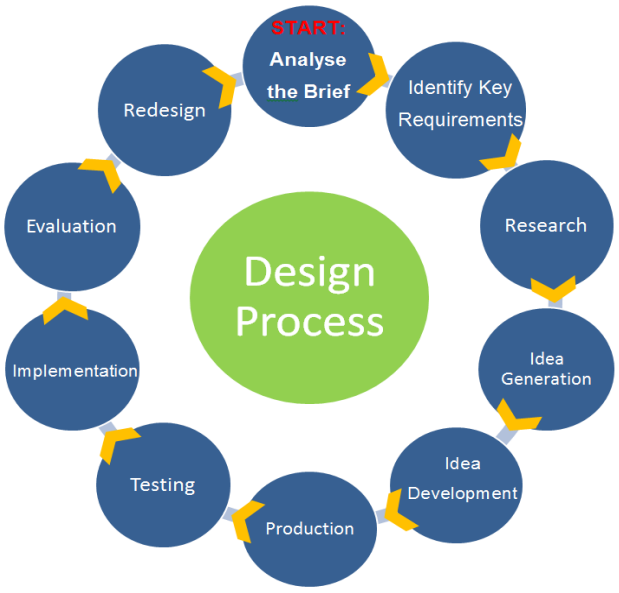
Task 1 Explaining the concepts of design process and simple machines

The design process is a series of stages engineers use when they are trying to solve a problem or develop a solution for a project. In this task, student teachers will research the design process and solution on simple machines.

Activity 1 Researching the design process and solutions

1 Visit http:// www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml and read about the engineering design process.

2 Study the following engineering design process:



3 Use the design process and information on http:// www.sciencebuddies.org/engineering-design-process/engineering-design-process-steps.shtml to create an engineering design process.

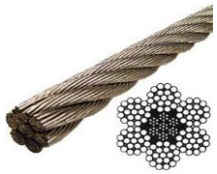
4 Develop a poster about the engineering design process.

5 Present during plenary by explaining what happens at each stage of the engineering design process.

Activity 2 Researching simple machines and how they work

1 Collect the following materials

Steel wire



Bottles of coke

Fire wood

Tyre punctual

2 First cut the steel wire with bare hands, open the bottles of coke with bare hands chop firewood with bare hands and lift the car to remove the punctured tyre of the car.
3 Record the results in the following table.

Table of results and conclusion

Resource	**Action**	**Observations results**
Steel wire	Open with bare hands	
Bottles of coke		Failed to open
Fire wood	Chop with bare hands	
Car tyre puncture		

4 Draw a conclusion from the results
5 Explore what kind of tools to use in order to do the jobs in 2.
6 Use the tools suggested and record the findings in a table.

Resource	**Action**	**Tools**	**Observations**	**Results**
Steel wire				
Bottle of coke				
Fire wood				
Car tyre puncture				
Conclusions				

7 In which situation is it easy to do the work-with bare hands or with simple tools.
8 What name is given to such tools?
9 Provide the students with the following simple machines:

Pliers

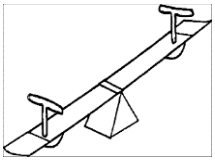
Pairs of scissors

A hoe

Screws

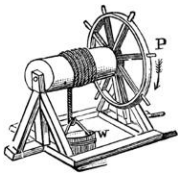
Tongs

See saw

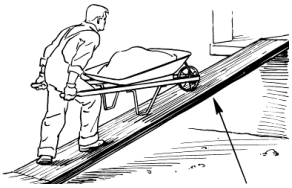


Pulley

Wheel & axel



Inclined plane



Axe

Nails

A Shovel

a zipper

Wheel burrow

A mouse trap

A needle

Finger Nail Cutter

Car Jack

Incisor Teeth

Wheel & axel

10 Use the machines to do work which they are meant for while observing how they are simplifying the work.

- First do the work without the machine.

11 Consolidate the observations by following the link: http://

indianapublicmedia.org/amomentofscience/ode-to-the-zipper/ and https:// www. vexrobotics. com/vexiq/education/iq-curriculum/simple- machines-and-motion/six-types-of-simple-machines to further find out how different machines simplify work.

12 Record your findings in the following table:

Table 1.2. Results

Machine	Type of work	How the machine is simplifying work
1 Screws		
2 Wheel and axle		
3 Pulley		
4 Bottle opener		
5 Fishing line		
6 Pair of scissors		
7 A claw hammer		
8 A hoe		
9 A shovel		
10 Wheel burrow		
11 Finger nail cutter		
12 Car jack		
13 Pliers		
14 Tongs		
15 Seesaw		
16 Inclined plane		
17 Incisor teeth		
18 An axe		
19 A nail		
20 A zipper		
21 Needle		
22 Mouse trapper		

13 Use the findings in table 8.3 to classify machines according to similarities in terms of the position of the fulcrum and differences in doing work.

14 In groups generate the classes of machines

15 Visit http:// www2. mbusd. org/staff/pware/labs/LeversBody.pdf to supplement to the list you have generated by focusing on machines in the human musculoskeletal system

16 Prepare a chart on which the machines in the human musculoskeletal system is written.

17 Display the chart on the wall and conduct a gallery walk.

18 Summarize during plenary by focusing on the six simple machines, their examples and a description of how they make work easier.

Activity 3 Reflecting on prior knowledge about simple machines

1 Imagine that you have just come from the teaching practice. One of the topics taught was, 'simple machines'
2 Reflect on what prior knowledge that the learners had on the teaching of machines.
3 Use quick write to generate a list of prior knowledge that learners had.
4 Using author's chair, report the prior knowledge that learners had.
5 Develop a lesson plan on how to use the prior knowledge to teach simple machines.
6 Develop a checklist to be used to focus on the use prior knowledge to teach simple machines.
7 Teach the micro lesson.
8 Conduct a post –conference discussion.

Activity 4 Identifying situations for design within their local contexts

1 Research in the local environment to identify situations for design of machines.
2 Record the findings in the table:

Situation	Design	Name of machine

3 Present the results of the research findings using the table.

Tips

- The production of machines should follow the engineering design process
- Teach the six basic machines using context and resources

Task 2 Designing activities to enable learners to experiment in using different materials to make simple machines

In the quest to develop a better understanding of machines, it is important to get involved in the designing of what machines to make. In this task, student teachers will research on materials for production of simple machines and they will also make simple machines using the materials.

Activity 1 Researching on materials, including recyclable materials, for production and their properties (metal, wood, plastic, clay, paper)

1 Refer to the list of situations and design and name of machines from Activity 4.2.
2 Use the list in 4.2 to research on materials that can be used to produce different machines, (recyclable and properties of materials).
3 Use discussion web to present the findings.

Activity 2 Investigating a range of suitable problems for learners to explore in the classroom on the materials to make simple machines

1 Survey the classroom to identify problems on which to use the materials in Activity 1 to make the simple machines.
2 Develop a reporting format to include problems, materials to use and the name of the simple machine to make.
3 Report your findings using the format.

Activity 3 Developing tasks to enable learners to make simple machines to address the problems.

1 Retain the list of Activity 2
2 Develop tasks to make simple machines to address the problems using Bloom Taxonomy
3 Trial tests the developed tasks to ascertain whether they address the problems.
4 Modify the developed tasks in light of the efficiency during trial testing.

Activity 4 Evaluating the appropriateness of the tasks

1 Retain the tasks developed in Activity 3.
2 Develop an evaluation tool to determine the appropriateness of the tasks in terms of appropriateness of the materials and whether the task addresses the problems.
3 Use the tasks to make simple machines to address the problems.
4 Trial test the machines produced following the task
5 Modify the machines in light of trial testing.
6 Evaluate the tasks in the context of producing the machines
7 Display the simple machines with the corresponding problems produced to ascertain whether the tasks were appropriate.

Tips

- Students should be familiar with the six basic machines and how the make work easier.
- To achieve design perfection involve learners in hands-on activities

Task 3 Demonstrating different strategies in the teaching of design processes and simple machines

The teaching of design process and simple machines is important. This process leads to the production of machines that are aimed at solving the problem. In this task, student teachers will design strategies for teaching design processes and micro-teach lessons on design processes.

Activity 1 Designing strategies on how to teach design processes and simple machines

1 Imagine that you have come back from the teaching practice school or from the demonstration school. One of the topics that you taught was simple machines. Use quick write to list the strategies that would use to teach simple machines.

2 Use authors chair to report your findings.

3 Display the design process cycle and machines as in this illustration:

or log on to https:// sites. google.com/a/patana.ac.th/ib_ dt/home/core-topic1-the-design-process. Familiarize with each stage of the cycle.

Log on to https:// www. sciencedirect.com/science/article/pii/S2095263517300183 and read an article about 'Appropriate teaching and learning strategies for the architectural design process in pedagogic design studios'

5 Summarize the article by listing the methods used to teach the design process.

6 Adapt the strategies in the article above to design strategies on how to teach design processes and simple machines.

7 Present design strategies for class discussion and retain the designed strategies.

Activity 2 Micro- teaching lessons on design process and simple machines

1 Plan a micro lesson to incorporate the strategies designed in Activity 1 to teach lessons on design process and simple machines.

2 Develop a check list to be used to check the use and the effectiveness of the designed strategies.

3 Teach the micro lesson.

4 Conduct a post-conference discussion focussing on the effectiveness of the strategies.

Task 4 Using appropriate assessment strategies to evaluate learners' engagement in the design and production of simple machines

It is important to use assessment for learning when teaching especially when teaching about this concept. This ensures the grounding of engineering design process in learners. In this task, student teachers will discuss different ways of assessing learners, develop assessment items and evaluate their effectiveness.

Activity 1 Discussing varied ways on assessing learners on the design of simple machines taking into account of large classes.

1 Use foundation studies module 2, pages 42-49 and read about varied or different assessment strategies.
2 Use quick write to list the varied or different assessment strategies that can be used to assess learners on the design of simple machines taking into account of large classes.
3 Use discussion web to present your findings.

Activity 2 Developing items to assess learners understanding of simple machines

1 Collaborate with a demonstration school teacher to determine the extent of coverage of the topic , 'Simple machines'.
2 Develop items to assess learners understanding of simple machines using Blooms table of specifications.
3 Use analytical teams to refine the items.
4 Present the items for class discussion.
5 Retain the items developed.

Activity 3 Evaluating the effectiveness of the assessment items

1 Pre-test the assessment items developed in activity 2 in a nearby primary school other than the demonstration school.
2 Mark the assessment items.
3 Modify the assessment items.
4 Keep the assessment items in the item bank.

Activity 4 Observing learners to evaluate their competence in following steps in the design process

1 Identify any problem in the classroom like broken chair, cracked wall etc.
2 Identify the machines that can be used to solve the problems.
3 Identify the materials for producing the machines.
4 Produce the machines following the steps in the design process.
5 Determine the learners' competence in following the steps in the design process.
6

Tips

- Consider various forms of assessment and use differentiation to assess learners.
- make sure the assessment items are administers to learners who have gone through the concepts.

Summary of key concepts

- The six basic simple machines are lever, pulleys, wedges, screws, inclined plane wheel and axle. They are all used to simplify work.
- An engineering design process is used in the production of simple machines.
- Prior knowledge of machines is important in the teaching and learning of simple machines.
- It is important to identify situations for the design of the simple machines within their local contexts.
- Choice of materials for the production of machines is important to ensure efficiency of the machines.
- Develop appropriate tasks to enable learners make simple machines to address the problems.
- Appropriate strategies for teaching design technologies should be designed.
- Assessment items and tools developed should cover all levels of blooms taxonomy.

Assessment and reflection

1 Explain the stages in the design process and solution.

2 State how machines simplify work.

3 In your primary, secondary school days and now college, you learnt about machines and how they simplify work. What methods can be used to teach in the primary school in order to enable learners understand that machines give a mechanical advantage.

4 Imagine you have used the engineering design process to produce a lever machine, using power point, explain how you use the design brief to develop the lever machines.

5 Identify any four situations learners can use to develop simple machines to solve the problem.

6 Get a progress record from the demonstration school teacher. Use the assessment scores for term one and enter them on a spread sheet. Use excel to calculate average score.

Glossary

Force: a push or pull

Fulcrum: the fixed point about which a lever moves

Lever: a simple machine characterised by fulcrum or pivot load and effort

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TOPIC 9 Teaching of technologies

Time 6 hours

Introduction

Technology has always played a very important role in our society.

Today technology is the engine for social economic growth and sustainable development. Without the use of technologies in medicine life expectancy would not have improved, in communication; we would not have cell phones, in nutrition; the nutritional status of people would not have improved, in climate change times; we would not mitigate its impact on our daily lives. In this regard, it is imperative that children develop a better understanding of modern and indigenous technologies and their impact on their everyday life.

Success criteria

By the end of the topic, you must be able to:

- describe ways in which technologies have changed over time
- design activities to enable learners to undertake the technological processes using different materials
- develop strategies to teach learners how to communicate through drawing
- describe ways in which technology has impacted on peoples' lives
- demonstrate the importance of addressing gender issues in the teaching of technology
- assess learners on their technological knowledge and capabilities

Background information

Technology is the purposeful application of scientific knowledge in the design, production and utilization of goods and services and in the organization of human activities. There are two types of technologies. These are modern and indigenous technologies. Technology is a tool. As a tool, learners use it on daily basis. For example, some learners come to school by bicycle, use a shaduf to draw water from a well, use a motor and a pestle to process maize, use a cooking stick for cookingand in the past, Malawians used a grinding stone *(Mphelo)* to produce flour.

Figure 9.1 Shows a Shaduf

Fig.9.1 The Shaduf

In this regard the use of technology is fundamental and the production

process requires basic technical skills in the construction and repairing of basic metal, wood and electronic equipment.

Therefore, student teachers will have to acquire technical skills in drawing, woodwork, metalwork, building and electronics and teaching strategies for effective delivery of the content.

Tasks

Task 1 Describing the ways in which technologies have changed over time

Every technique human beings have invented, from the stone age onwards is 'technology'. Today, there are technological changes that are taking place to simplify activities for man. In this task, you will survey indigenous and modern technologies and analyse ways in which teaching has developed over the years.

Activity 1 Surveying indigenous and modern technologies

In groups:

1 Research on the internet by logging on to https:// www. researchgate. net/publication/305929698_Indigenous_knowledge_for_disaster_risk_reduction_An_African_perspective?_sg=zBMvXbpDMJ8pVuq7s8RfbVMkMvMTeBYnk9vbpNGZ-X6Wzdee6lA8hq5EsGIvZqwV13h4QINXcw read an article entitled, 'Indigenous knowledge for disaster risk reduction: An African perspective' and https://www.techquintal.com/modern-technology/ and read about ' modern technologies and their examples'
2 Use character rating to report your findings.
3 Conduct a survey in the nearby village to identify indigenous and modern technologies.
4 Generate a list of modern and indigenous technologies from the survey.
5 Compare indigenous and modern technologies.
6 Report the survey results to the class using a power point.

Activity 2 Analyzing ways in which teaching has developed

1 Research on the internet by logging on to https://www.teachthought.com/the-future-of-learning/7-ways-teaching-has-changed to identify ways in which teaching has changed.
2 Use future wheels to analyze from the article how teaching has developed over the years.
3 Report your findings in plenary.

Task 2 Designing activities to enable learners to undertake the technological processes using different materials

Designing is a very important technological step in science and technology. It is at this step that modifications might be made to a technology. The operational success of the technology depends

on how well the design is. In this task, student teachers will be involved in designing some technologies.

Activity 1 Designing some technologies to improve aspects in everyday life.

1 Analyze the following article from a local news paper, The Daily

DAILY TIMES THURSDAY AUGUST 7, 1997 LOCAL NEWS

Teacher invents flood detecting device

A SCIENCE teacher in the country has invented a device that can monitor floods.

Andrew Mchesi, a teacher at Kasungu Demonstration School during a presentation of materials made from primary school science classes at a science and technology workshop at the Malawi Institute of Education (MIE) at Domasi in Zomba, displayed a simple device, made from locally found materials.

The device can be used to alert people of an impending flood thereby saving lives and property.

The simple device made of wires, a magnet, a baloon, a bell and a light bulb is displayed in a bucket of water because it is supposed to function underwater.

"This device is meant to be placed where rivers meet which can be a very good point to read the dangerous swelling of the rivers, a good example of which is the confluence of Shire and Ruoriwers," Mchesi explained.

The device works when the water is added into the bucket, symbolising the rising of water in a river and the baloon which is coated by a light metal also rises with the water.

"At what is supposed to be a dangerous point that might signal a probable flood, the metal is attracted to the magnet which is placed at the top," he explained.

Mchesi added that when the metal gets in contact with the magnet a circuit is completed thereby setting off an electric bell and the bulb which is placed at the top of the monitoring system is lighted.

There was a loud applause from the audience, mostly teacher trainers, when the bulb lit and the bell started ringing.

"The bell will alert whoever is manning the station to inform responsible institutions of the impending danger, while the bulb that is placed at a very high point on the station's tower will alert people of the surrounding areas to get away from river banks and save their lives and property," Mchesi said.

He said the device, which just requires to be refined, can prove to be a very good medium of saving money and lives of people in the country.

He said this was a practical way of bringing aspects of science into development in our own country.

The coordinator of the project linking community science with school science, Harold Gonthi said there was a lot of science taking place in everyday life situations.

He said if the ideas were explored and researched, Malawi could produce its own materials that could help change lives of people for the better. — **Mana**

Times, Thursday, August 7, 1997 entitled, 'Teacher invents flood detecting device' in the context of designing technologies.

2 From the article, what was the design of the device?
3 What aspect of daily life was the invention improving?
4 What problem was it trying to solve?
5 What was the cause of the problem?

6 What were the key components of the device?
7 What types of materials were used in the production process?
8 In pairs:

a) Use the following link to watch a movie about Malawi's Genius Farmer: http://observers.france24.com/…/20100326-malawi-genius-farm…
b) What lessons can you draw from the video with regard to designing?
c) Design a technology that can be used to improve aspects in everyday life
d) Make a poster presentation to explain the design.

Activity 2 Exploring ways in making prototypes of some technologies (toy cars, bird nets, nkhali yawira, tin smith) for teaching the topic technologies

The pictures shown in the following illustrations are toy cars , tin smith, nkhali yawira and bird nests:

Toy car

Tin smith

Nkhali yawira

bird nest

1 Draw the pictures in your exercise books
2 Exchange the drawings with a friend
3 Explore ways of making the prototypes of toy cars, bird nests, nkhali yawira and tin smith.
4 Use character rating to present your findings.

Task 3 Developing strategies to teach learners how to communicate through drawing

The drawing of visual representations is important for learners and scientists alike. It is important to teach learners how to communicate through drawing using appropriate strategies. In this task, student teachers will research skills in sketching of simple objects and produce drawings.

Activity 1 Developing a strategy for testing the designed technologies

Imagine you developed technologies with learners during teaching practice.

1 Reflect on how a developed strategy for testing the designed technologies was used.
2 Present your work in a tabular format as follows:

Name of technology	Developed Strategy	How it was used to assess the technology

3 Develop a rubric that will be used to assess the effectiveness of the strategies being used to assess the designed technologies.
4 Write the rubric on a chart paper.
5 Present your work for a gallery walk.

Activity 2 Identifying required steps for improving the designed technologies for teaching design

1 Identify required steps for improving the designed technologies for teaching design from the following website: https://www.inc.com/dan-ruch/six-steps-for-successfully-implementing-new-techno.html
2 list the steps as highlighted in the article
3 List the technologies you have developed in Task 2, Activity 1.
4 For each designed technology, identify required steps for improving it.
5 Present your work in a plenary.

Activity 3 Researching skills in sketching of simple objects in various projections, shapes and colours

1 Log on to https://www.google.com/search?q=Researching+skills+in+sketching+of+simple+objects+in+various+projections,+shapes+and+colours.&client=opera&hs=qFG&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwi1hKrMk93bAhUHPVAKHXYVDBsQsAQIJA&biw=1205&bih=598 and research on various researching skills in sketching of simple objects in various projections, shapes and colours.
2 Use the knowledge acquired in (1) above to identify sketching skills of simple objects in various projections, shapes and colours in the primary science and technology books from Standard 5 to 8.
3 Report the research findings using power point.

Activity 4 Producing drawings (basic engineering and architectural)

1 Log on to https://design.tutsplus.com/articles/technical-drawing-for-beginners-one-point-perspective--vector-21839 and read about Technical Drawing for Beginners: One Point Perspective.
2 Use the article to list the rules to be followed when producing drawings (basic engineering and architectural)
3 Using the rules listed in (2) above, produce the drawings (basic engineering and architectural).
4 Peer review each other's work.

Tip

- Drawing requires frequent practice. Provide that opportunity to learners

Task 4 Describing the ways in which technology have impacted on people's lives

Technologies play a big role in society because life styles change when new technologies are designed or when old ones are improved. In this task student teachers will explore the impact of technology on peoples' lives.

Activity 1 Discussing the impact of technology and its effects on sustainable development and climate change

1 Log on to https:// www. bartleby. com/essay/The-Impact-of-Technology-on-Our-Lives-P3KQHN4J8BRA and read about the impact of technology on our lives , https://www.kenyacic.org/blog/role-technology-climate-change and read about the role of technology in climate change, https:// sustainable development.un.org/content/documents/1465back_paper.pdf and https:// www. theengineer. co. uk/ issues/ august-2012-online/what-is-technologys-role-in-sustainable-development/ and read about technologies role in sustainable development.
2 In analytical teams summarize your findings in a tabular format as below:

Technology	Impact	effects on sustainable development	Effects on climate change

3 Present at your work in a plenary.

Task 5 Demonstrating the importance of addressing gender issues in the teaching of technology

There are a lot of gender stereotypes in the field of technology. Women are usually considered inferior. The activities designed with learners should promote gender equality. In this task, student teachers will discuss challenges to ensure gender equality, effects of gender bias in technology participation and plan learning activities which ensure

equal participation of boys and girls.

Activity 1 Discussing challenges in ensuring equal participation of girls and boys in technology

1 Draw from teaching practice experience and discuss the challenges in ensuring equal participation of girls and boys in technology.
2 Research on the challenges in ensuring equal participation of girls and boys in technology by logging on to http:// www. ungei. org/ files/ FAWE_GRP_ENGLISH_VERSION.pdf and read about challenges in ensuring equal participation of girls and boys and http://www.newtimes.co.rw/section/read/33567 and read, 'Schools urged to be gender responsive'
3 Relate the challenges in ensuring equal participation of girls and boys in teaching technology.
4 Report the research findings through power point
5 Generate a list of challenges in ensuring equal participation of girls and boys in technology.
6 Use a discussion web to consolidate the list of the challenges in ensuring equal participation of girls and boys in technology.

Activity 2 Discussing the effects of gender bias in technology participation

Case study

Imagine that you were teaching, 'Technologies for development.' a topic in the primary school science and technology. A lecturer observed the teaching and found out that one gender dominated in the participation of the use of technology. During the post lesson discussion, you are asked, 'What do you think are the effects of gender bias in technology participation from the perspective of the lesson?'

1 Generate a list of the effects of gender bias in technology participation according to the lesson.
2 Discuss the effects of gender bias in technology participation during the lesson according to the list.
3 Use discussion web to present the list to the class.

Activity 3 Planning learning activities which ensure equal participation of boys and girls

1 Log on to http://www.ungei.org/files/FAWE_GRP_ENGLISH_VERSION.pdf and read about How to plan learning activities which ensure equal participation of boys and girls.
2 Use author's chair to present a summary of your findings.
3 Prepare a micro-lesson on teaching of technologies to ensure equal participation of girls and boys.
4 Micro-teach the lesson.
5 Evaluate the lesson focussing on participation of boys and girls.

Task 6 Assessing learners on their technological knowledge and capabilities

Assessing learners on their technical knowledge and capabilities in producing the technologies ensures that learners acquire the necessary skills. In this task student teachers will be involved in developing assessment items and tools.

Activity 1 Explaining varied ways on assessing learners on the design of simple technology

1 Use foundation studies module 2, pages 33 to 49 and read about assessment and assessment of learners in the lower and upper primary.
2 From the readings of assessment and assessment of learner in the lower and upper primary, list varied ways on assessing learners on the design of simple technology**.**
3 Use the list to explain the varied ways identified on assessing learners on the design of simple technology.

Activity 2 Developing items to assess learners' understanding of technology

1 Collaborate with a Standard 8 demonstration school teacher to determine the extent of the work taught on the concept of 'conserving environment.' (Standard eight learners' book page 33).
2 Develop items to assess learners' understanding of technologies for 'conserving the environment'
3 Relate the items with the levels of Bloom's Taxonomy.
4 Report your work during plenary.

Activity 3 Evaluating the effectiveness of the assessment items

1 Retain the test items developed in Activity 2 above.
2 Conduct a pre-test of the test items to evaluate the effectiveness of the assessment items.
3 Mark the test.
4 Determine the effectiveness of the test items in terms of face validity, item difficult and consistency.

Activity 4 Observing learners to evaluate their competence in making prototypes ensuring equal participation of learners

Refer to task 2, Activity 2 on ways of making prototype.

1 Collect materials for making the prototype.
2 In groups, make prototypes of either toy car, tin smith, bird nest or nkhali yawira.
3 Present your prototypes to the class for discussion.
4 Imagine learners are carrying out the activity of making prototypes, how would you evaluate their competence in making prototypes.

Tip
Collecting resources and making of prototype should be done outside classroom work

Summary of key concepts

- There are two types of technologies. These are modern and indigenous.
- Technologies have been changing and have transformed mans way of living.
- Designing some technologies like cooking stick, ball sewing needle, drilling apparatus improve aspects in everyday life.
- Car toys, bird nets, nkhali yawira and tin smith can be produced using a variety of ways. This is possible because each proto-type requires different materials.
- Different strategies can be developed and used to test the designed technologies such as the toy car.
- Skills in sketching of simple objects in various projections, shapes and colours are developed and practised.
- Technology has an impact on the environment. This can be positive or negative. It can also be used as a mitigation factor to climate change.
- One factor to consider when planning for activities is to ensure that activities promote equal participation of boys and girls.
- Ensure that assessment caters for learners with diverse needs

Reflection and assessment

1 Imagine that you have come back from teaching practice. One of the problems you had when using Kabaza from the stage to the school was its limited nature in carrying load
   a) Describe how the problem was solved?
   b) Design a Kabaza that can carry more load.
2 Design and make a paper boat that can lift a mass of 200g in water.
3 Using wires, cells, a 6 Volts old radio motor, make a toy helicopter.
4 In making a toy helicopter, how can you ensure that there is equal participation of girls and boys?
5 How can you improve the cooking stick? Follow the engineering design process to come up with a new cooking stick.
6 Describe the appropriate strategies that can be used to teach technologies.
7 How would you make sure there is equal participation of girls and boys when teaching technologies.
8 Carpentry, tin smith and designing of technologies are conceived to be male dominated activities. How will you clear out the misconceptions learners have?
9 Develop a rubric that can be used to assess learners of the engineering design process.

Glossary

Architecture: is both the process and product of planning, designing and constructing buildings and other physical structures

Design: to work out a form or a structure by making a sketch or plans

Innovation: the process of introducing something new that can be applied in daily lives of people

Invention: discovery of something new

Prototype: a first or preliminary revision of a device from which other forms are developed

Technology: the application of practical or mechanical sciences to solve everyday problems.

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