



ZIMBABWE

MINISTRY OF PRIMARY AND SECONDARY EDUCATION

CURRICULUM DEVELOPMENT AND TECHNICAL SERVICES

SCIENCE AND TECHNOLOGY

JUNIOR
(GRADE 3-7)

2015 - 2022

TEACHER'S GUIDE

Curriculum Development and
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1.0 ORGANISATION OF THE GUIDE

This is a document intended for you to realise the recommended expected conduct towards the fulfilment of the new curriculum demands in Science and Technology learning area. It guides you to understand and engage in the participation to implement the new curriculum.

This teachers' guide is divided into two parts. Part A focuses on the critical documents you must have as a teacher. Part B deals with the content, objectives, methodology, instructional materials, class management and assessment.

THE CRITICAL DOCUMENTS

As a teacher it is important for you to have the critical documents for effective curriculum implementation.

Objectives

By the end of this part you should be able to

- a) Identify the critical documents
- b) Apply the critical documents

You should have the following critical documents:

- Curriculum Framework
- National Syllabus
- School syllabus
- Scheme cum plan or Schemes of Work and lesson plans
- Learner Profile
- Progress Records

- Register of Attendance

Curriculum Framework for Zimbabwe Primary and Secondary Education 2015-2022

Curriculum Framework for Zimbabwe Primary and Secondary Education 2015-2022

This is a policy document that outlines the underpinning national philosophy, principles, learning areas, the description and expectations of Ministry of Primary and Secondary education (MoPSE) at policy level. It prescribes what the government expects you to deliver as you go about your duties.

National Syllabus

It is a policy document that outlines and specifies the Learning area philosophy, aims and objectives, Learning/teaching concepts and content, suggested methodology and assessment criteria at every grade level. As a teacher, you should always have it to guide you in your day to day teaching and learning activities.

School Syllabus

This must be drawn at school level from the National Syllabus by reorganising content taking into account local factors. (see section on Syllabus Interpretation)

Scheme cum Plans or schemes of work

This is a document that you as a teacher should draw from the national and school

syllabus. You should outline the objectives activities, content, methodologies (see schemes of work/scheme cum plan template on page 11). You should draw your scheme of work/scheme cum plans at least two weeks ahead of lesson delivery date. (Use of ICT tools in drawing the documents is encouraged avoiding the temptation to copy ready made documents but ensuring to make a document that speaks to your learners)

Lesson Plans

This is a detailed daily plan of what you intend to deliver during the lesson. This is to be used in the event of you having drawn a scheme of work rather than a scheme cum plan. (See Detailed Lesson Plan Template on page 12)

Learner Profiles

Profile assessment is a quality assessment tool designed for a variety of learners to determine their strengths and identify areas of improvement. As a teacher, you should carry out profiling to track learner behaviour, knowledge, attitudes, aptitudes, skills, values and performances on an on-going basis. This assessment informs teaching and learning process and contributes to learner profile.

Progress Record

You should have a progress record to capture learner performances. This is a document that requires high levels of professionalism and efficacy as its contents will be used to come up with the continuous assessment component hence it has to be treated with care to avoid biases and unfair practices.

Attendance Register

This is a critical document you should have as a teacher to track and record your learner's lesson attendance. It links with progress record as it may bring out explanations on performance of attendees and absentees.

SECTION B

1.0 PREAMBLE

You are required to gain an indepth understanding of the preamble and be guided in the development of the school based syllabus as it leads learning to the achievement of the national philosophy, competencies exhibited through learner exit profiles.

1.1 INTRODUCTION

Junior Science and Technology syllabus is designed for Junior Learners (Grade 3-7). It is a five year course that seeks to promote learners' development of psychomotor skills, cognitive and practical techniques. It ensures that learners develop socially, physically, emotionally and cognitively. The overall intention is to produce a morally upright dedicated scientists with acceptable behaviours and values (unhu/Ubuntu/vumunhu). The syllabus serves as a firm foundation for entry into Secondary School Science Education but we encourage each level to have a meaningful exit package for each learner.

1.2 RATIONALE

Science and Technology plays an important role in the total development of the learner.

Through Science Education, learners become innovative and adaptable as they select, use relevant scientific facts and technologies, process information and create tangible functional products.

1.3 SUMMARY OF CONTENT

The syllabus is intended to provide a foundational course in science and technology which fosters the development of Intellectual and manipulative skills. It is also designed to introduce learners to fundamental concepts and technological skills in Mathematics, Science, Health, Technical Graphics, Art Textiles, Metal, Wood, Building and Food Technology.

1.4 ASSUMPTIONS

The syllabus assumes that learners have:

- innate desire to explore and experiment
- exposure to some scientific and technological tools and materials
- certain experiences in various scientific and technological practices
- some scientific and technological skills for indigenous knowledge systems
- ability to make decisions for themselves
- potential to manipulate objects practical work
- an ability to communicate and work with others to achieve a common goal

1.5 CROSS-CUTTING THEMES

- The Science and Technology as a learning area will encompass Teamwork as learners interact and collaborate in the learning process Learning area will develop an appreciation of Safety in using scientific equipment and apparatus as well as the design process, Health issues, Food security, Technology, Environmental issues, Disaster risk management, Enterprise, Sexuality, HIV and AIDS, Heritage and gender equity. It will equip learners with skills to deal with disaster risk management. Learners should be able to integrate indigenous knowledge with new technology to deal with emerging environmental challenges.

Objectives:

- After reading this guide you should be able to:
 - interpret the syllabuses correctly
 - use teaching methods appropriate to the science learning area
 - prepare engaging and appropriate teaching aids
 - design appropriate strategies for problem solving
 - manage your class effectively
 - be resourceful
 - Manage your class effectively
 - Resourceful
 - Draw up and maintain comprehensive records

- Guide learners to study effectively on their own
- Objectively evaluate your own teaching and the learners' progress
- Acquire teaching techniques
- Use ICT tools effectively

The guide covers the following aspects:

- Syllabus interpretation
- Content
- Methodology
- Teaching-learning materials
- Class management
- Record keeping
- Assessment
- Evaluation

UNIT 1

SYLLABUS INTERPRETATION

- SYLLABUSES ARE KEY DOCUMENTS TO EVERY TEACHER
- TWO TYPES OF SYLLABUSES:

NATIONAL SYLLABUS and SCHOOL SYLLABUS

UNIT 1A: NATIONAL SYLLABUS

As a teacher you should be able to interpret the national and school syllabus understanding the following components

- aims
- content
- assessment objectives
- methodology and
- assessment format:

Aims: general direction in which you should be guiding your learners (long term)

Objectives: learner behavior after treatment

Assessment objectives: examination oriented (what is to be tested), it covers continuous and summative (refer to assessment guide)

Content: topics or aspects to be covered

Methodology: teaching approaches to achieve desired learning outcomes
Learner-centred approaches allow learners to practice skills learnt

Assessment format: how learners will be assessed

UNIT 1B

SCHOOL SYLLABUS (A BREAKDOWN OF THE NATIONAL/OFFICIAL SYLLABUS)

- Drafted at the school

- Influenced by:
 - Level of learner performance (knowledge they already have)
 - Facilities and available resources
 - Time allocation in the official syllabus
 - Local conditions that affect the choice and sequencing of topics
 - Education technology
 - Community influences

● **STRUCTURE OF SCHOOL SYLLABUS**

Aims: broad indication of what the learners should learn

Objectives: learner behaviour at the end of the teaching-learning experience
(competencies)

● **TOPICS/ACTIVITIES (CONTENT)**

● **METHODOLOGY (N.B. learner – centred)**

● **INSTRUCTIONAL OR TEACHING MATERIALS**

● **ASSESSMENT**

UNIT 2

SCHEMES OF WORK

By the end of this unit, you should be able to:

- describe the essential components of a scheme-cum plan
- develop a scheme-cum plan
- explain the advantages of writing down your plan
- realise the merits of planning your lessons well in advance

GRADE 3(format applies from grade 3 to 7)

Science and Technology Scheme

Aims

- appreciate the role and impact of S&T as they apply to self, work and society
- select and use a wide range of materials and components in the environment
- develop the creative, technical and practical expertise to participate in a scientific and technological world
- demonstrate innate talent that lead to originality and innovativeness
- enhance scientific and technological designs, through the use of Information and Communication Technology
- manipulate materials and equipment to enhance creativity
- develop critical evaluation skills in technical, aesthetic, economic, environmental, social and cultural contexts
- explore opportunities that promote a sense of self-reliance, enterprising and community development

OBJECTIVES

By the end of the learning area learners should be able to:

- identify tools and materials used in science and technology
- design and modify technological devices using local and other materials
- select, use and store appropriately scientific and technological tools when designing and constructing artefacts

- apply scientific and technological concepts and skills for environmental sustainability
- investigate how people, environment and economic issues influence and are influenced by Science and Technology
- explore scientific and technological ideas to develop innovations through ICT
- apply indigenous knowledge systems and understand Scientific and Technological concepts.
- relate moral and ethical approaches to the use of scientific principles and technology (Unhu/Ubuntu/Vumunhu)
- debate consequences of the outcomes of scientific and technological processes
- collect and record relevant data and information through scientific research
- demonstrate enterprise skills that are relevant to the market, recognising constraints of time, cost and accessibility of resources
- demonstrate an appreciation of the role of designers, craftsmen, scientists and technologists in industry and society
- explain the scientific relationship between plants, animals and their environment

WEEK ENDING	CONTENT/ TOPIC	OBJECTIVES	COMPETENCIES/ SKILLS/ KNOWLEDGE	SOM	FACILITY /EQUIPMENT	METHODS/ ACTIVITIES	Evaluation
22/04/16	Sustainable Resource Management <ul style="list-style-type: none"> • Our resources • Natural and man-made resources 	By the end of the week pupils should be able to: <ul style="list-style-type: none"> -distinguish between natural and man-made materials -list examples of natural and manmade materials 	-Decision making <ul style="list-style-type: none"> -classifying into groups • Natural materials • Man-made materials 	Junior Science and technology (grade 3-7) National Syllabus page 22 http://www.slideshare.net/AnniePau/natural-and-manmade-materials	Stones Bottles Papers Twigs Grass Lollipop sticks Tins	<ul style="list-style-type: none"> • METHODS • Demonstration, Command, Practice, Guided Discovery, Group Work, Pair work, Tasking • ACTIVITIES • Collecting materials • Classifying materials into natural and man-made • Computer game on classification • Describing natural and man-made materials 	

DETAILED LESSON PLAN

Date: 22 April 2016
Grade: Grade 3
Time: 11.30 -12.30
Learning Area: Science and Technology
Topic/Content: Sustainable resource management
Sub-Topic: Natural and man-made materials
S.O.M: -science and technology Assessment
Manual page 45&75
- Science and Technology(gr3-7) National Syllabuspage 40

Equipment: Stones, Bottles, Papers, Twigs, Grass, Lollipop, sticks, Tins, Balls, Bean, Tins, Ropes, bags

Number of students: 25

Assumed Knowledge: Learners know what is meant by materials

Lesson Objectives

By the end of the lesson, learners should be able to:

- -distinguish between natural and man-made materials
- -list examples of natural and manmade materials

STAGE	CONTENT	ORGANISATION	COACHING POINTS
<p>Introduction 5min</p>	<ul style="list-style-type: none"> - selected pupils introduces the lesson by impromptu speech on the word materials. - Learners identify materials near and around them 	<ul style="list-style-type: none"> - Horse shoe 	
<p>Lesson development 10 mins</p>	<p>Collection of materials observing safety precautions</p>	<ul style="list-style-type: none"> - Safety check of the field 	
<p>Skill Development 20 mins</p>	<ul style="list-style-type: none"> - grouping materials into man-made and natural 	<ul style="list-style-type: none"> - in groups of fives pupils discuss to decide on what is manmade and natural from their collections. Justify their classification with reasons answering a question such as (who made it and where is it made or found) 	<ul style="list-style-type: none"> -correct classifying -identifying who made it -teacher ascertain all pupils are participating in their groups -safety
<p>Application 20 mins</p>	<ul style="list-style-type: none"> - discussion feedbacks 	<ul style="list-style-type: none"> - group leaders report back on findings. - groups send representatives to score marks as they classify objects on computer display. 	<ul style="list-style-type: none"> - classification - reasons for that classification. - use of mouse to drag objects and drop under the two classes
<p>Summary 10 mins</p>	<ul style="list-style-type: none"> - defining man-made and natural materials - listing examples under each 	<ul style="list-style-type: none"> - pupils with guide of teacher construct definitions for man-made and natural materials List materials 	<ul style="list-style-type: none"> - definitions - lists
<p>Conclusion 5 mins</p>	<ul style="list-style-type: none"> - exercise in their books 	<p>feedback by learners</p>	

LESSON EVALUATION:

Strength:

.....
.....
.....

Weaknesses:

.....
.....
.....

Way Forward

.....
.....
.....

UNIT 5

METHODOLOGY

- As a teacher it is important for you to use problem-solving and learner-centred approaches:
- You are the facilitator
- The learner is the doer

OBJECTIVES

By the end of this unit, you should be able to:

- select appropriate teaching methods for your lessons
- use a variety of learner-centred approaches
- plan and organise study tours
- help pupils carry-out projects or experiments
- Q/A
- Lecture
- Demonstration
- Observation
- Simulation
- Role play
- Experimentation
- Project
- Field trips
- Choice of method is influenced by:
 - your personality
 - learner`s level of development (cognitive, affective and psychomotor)
 - Content to be covered
 - Competencies to be developed

UNIT 6

INSTRUCTIONAL (TEACHING-LEARNING) AIDS

- help learners to learn better and faster
- capture learners` interest
- create virtual reality

OBJECTIVES

By the end of this unit, you should be able to:

- select appropriate instructional aids
- make good quality aids from available resources
- use instructional aids --effectively
- Design meaningful and effective instructional aids

TYPES: charts, chalkboard, whiteboard, computers, powerpoint slides, films, videos, flannel graph, textbooks

UNIT 7

INSTRUCTIONAL (TEACHING-LEARNING) AIDS

UNIT 7: CLASS MANAGEMENT

Process of planning, organising, leading and controlling class activities to facilitate learning

OBJECTIVES

By the end of this unit, you should be able to:

- create an effective learning environment
- motivate the learners
- maintain discipline
- supervise class activities

ORGANISATIONAL SKILLS FOR EFFECTIVE LEARNING

Classroom organisation which covers:

- physical environment
- emotional environment
- grouping the learners
- class control and discipline
- supervision

PHYSICAL ENVIRONMENT

- Classroom to be clean, tidy and airy
- Safety considerations when arranging furniture/equipment
- Teaching aids to be visible to learners

EMOTIONAL ENVIRONMENT

- Be firm, warm and pleasant
- Set the right tone
- Tell learners what behavior you expect

GROUPING

- Learners may be grouped according to needs, abilities, problems but not sex
- Promote sharing of ideas among learners

CLASS CONTROL AND DISCIPLINE

- Know the schools policy on discipline
- Be firm and fair
- Punishment should be corrective
- Acknowledge good behavior
- Make use of prefects and class monitors
- Create an atmosphere of trust and honesty
- Aim for intrinsic discipline

MOTIVATION

- Make learners feel important

- Recognise and reward excellence
- Be a role model in terms of your demeanor

SUPERVISION

- Check learners` work in order to guide and correct them
- Areas that require supervision include practical work, written work, discussions, group work and field trips

Knowledge	Skills	Attitudes
<ul style="list-style-type: none"> ● Identifying human body parts 	<ul style="list-style-type: none"> ● Handling tools and equipment properly 	<ul style="list-style-type: none"> ● Resolving differences of opinion
<ul style="list-style-type: none"> ● Right and left orientation 	<ul style="list-style-type: none"> ● Drawing ● Modelling ● Manipulative ● Fixing the jig-saw puzzle 	<ul style="list-style-type: none"> ● Collaborating and contributing to team results

UNIT 8: RECORD - KEEPING

Records are critical documents about the teaching – learning process which you must keep as a teacher

They include:

- Syllabuses (National and School)
- Staff and pupil details
- Examination documents
- Mark lists
- Stock control registers

OBJECTIVES

By the end of this unit, you should be able to:

- identify the various records you are expected to keep
- prepare accurate records
- Interpret information from records to promote learning
- Maintain and keep records safely
- Appreciate the need to update records regularly

TYPES OF RECORDS

- Official syllabuses
- School syllabuses
- Records of staff details
- Records of learner details
- Supervision records
- Files, circulars, handouts, past exam papers
- Minutes of meetings
- Inventory of resource materials
- Stock control registers

UNIT 9: EVALUATION

- Measuring the success of teaching in terms of teacher and learner performance
- Provides feedback on the acquisition of knowledge, skills and attitudes by learners

OBJECTIVES

By the end of this unit, you should be able to:

- evaluate both your work and that of the learners
- identify the essential evaluation methods that you can use
- prepare marking schemes for the various activities or projects

METHODS OF EVALUATION

- Tests and exercises
- Projects
- Examinations
- Assignments

UNIT 10

SYLLABUS TOPICS

- 10.1 Health and Safety
- 10.2 Materials and Structures
- 10.3 Energy and Fuels
- 10.4 Electronics
- 10.5 Forces and Magnets
- 10.6 Design and Technology
- 10.7 Water
- 10.8 Weather and Climate
- 10.9 Soil, plants and animals
- 10.10 Landforms and Maps
- 10.11 Sustainable Resource Management

Hints and guidance topic by topic using grade 3 level

TOPIC 1: HEALTH AND SAFETY

Subtopic 1: **Human Body**

OBJECTIVES

Learners should be able to

- list body parts
- describe how to take care of the body parts
- state toiletries and cosmetics used to take care of the body
- design cleaning equipment
- make cleaning equipment
- manipulate toiletries, cosmetics and equipment that are used in personal hygiene

CONTENT

- Personal hygiene
 - Teeth

- Hair
- Hands
- Ears and eyes
- Armpits and pubic area
- Toiletries and cosmetics

Cleaning equipment

METHODOLOGY (learner - centredness)

The Maths and Science teachers and learners to employ the following methods during teaching and learning:

- Group work
- Imitation
- Discovery
- Experimentation
- E-learning
- Collections of cleaning materials
- Demonstrations by teacher and pupils on how to use cleaning equipment
- Resource person(s) (nurse, dentist etc.)
- Questions and Answers

Teaching-Learning Aids

- Songs and rhymes
- Charts with human body
- Poems
- Dolls
- Mirrors
- Pictures
- Puzzles
- Clay and play dough
- Paper glue
- Educational Magazines
- Papier-Mache

- ICT and e-learning tools
- Beads
- Cloths, handkerchiefs
- Cleaning equipment such as soap, comb, towel, tooth paste, toothbrush

ACTIVITIES

- Naming body parts
- Demonstrating how to take care of body parts
- Demonstrating how to blow the nose whilst covering the mouth using a handkerchief
- Listing toiletries and cosmetics used to take care of the body
- Collecting pictures of toiletries and cosmetics used in taking care of the body
- Modelling cleaning equipment of own choice from readily available materials
- Drawing of cleaning equipment
- Matching of cleaning equipment to the body part they clean
- Singing and reciting poems

Manipulating toiletries, cosmetics and cleaning equipment

Knowledge	Skills	Attitudes
<ul style="list-style-type: none"> ● What personal hygiene entails 	<ul style="list-style-type: none"> ● Handling cleaning objects and tools ● How to brush teeth in circular motion ● General cleaning of body parts 	<ul style="list-style-type: none"> ● Maintaining hygiene

Assessment

Learners will be assessed on:

- listing body parts
- describing how to take care of the body parts
- stating toiletries and cosmetics used to take care of the body

skills to be assessed and profiled

- designing cleaning equipment
- make cleaning equipment
- manipulate toiletries, cosmetics and equipment that are used in personal hygiene

SUB TOPIC 2: NUTRITION

Sources of food

Importance of food

OBJECTIVES

Learners should be able to

- name sources of food
- classify food according to their sources
- state the importance of food to the body
- Sources of food
 - Plants
 - Animals

SUB TOPIC 3: DISEASES

- Disease causing organisms

OBJECTIVES

Learners should be able to

- identify causes of sickness
- list organisms that cause sickness
- discuss diseases caused by organisms
 - demonstrate how germs can be prevented from spreading
- Diarrhoea
 - discuss the causes of diarrhea

suggest ways of preventing diarrhea

The oral rehydration solution

describe preparation of ORS treatment

SUB TOPIC 4: SAFETY

Accidents

Safety in the laboratory

OBJECTIVES

Learners should be able to

- state accidents that occur in the laboratory
- identify objects that cause accidents in the laboratory
- describe substances that cause accidents in the laboratory

list laboratory safety rules

Topic 2: MATERIALS AND STRUCTURES

Sub topic 1: Characteristics of materials

- Natural materials
- Man-made materials

OBJECTIVES

Learners should be able to

- distinguish between natural and man-made materials

Sub topic 2: Elements, Mixtures and Compounds

- Pure and impure materials
- Purifying water

OBJECTIVES

Learners should be able to

- differentiate pure and impure materials
- demonstrate how to purify water

Sub topic 3:Tools

- Classification of tools according to their uses

OBJECTIVES

Learners should be able to

- classify tools from home
- Tool design and models
- design tools of own choice
- construct an artefact from sketches of tools

Structures

Structures at home

OBJECTIVES

Learners should be able to

- Identify structures at home

ENERGY AND FUELS

- Energy
- Energy and energy use

OBJECTIVES

Learners should be able to

- explain the meaning of energy
- identify uses of energy
- Fuels
- Forms of fuel

OBJECTIVES

Learners should be able to

- identify forms of fuel
- demonstrate characteristics of fuels

- classify fuels as renewable and non-renewable

Electricity and ELECTRONICS

- Electronics

OBJECTIVES

Learners should be able to

- Identify electronic devices
- Use the devices correctly
- recognize sources of electricity in Zimbabwe
- identify dangers of electricity
- Suggest safety precautions when using electricity
- identify conductors and insulators

- Electronic devices

- TV
- Radio
- Cellphone
- Alarms
- Toys
- Sensor lights
- computer

FORCES AND MAGNETS

Magnets

- Magnetic materials
- Non magnetic materials

OBJECTIVES

Learners should be able to

- Identify devices with magnets
- Illustrate magnetic force
- Explain action of magnets as force at a distance

DESIGN AND TECHNOLOGY

Design and Technology

- Principles and elements of design

OBJECTIVES

Learners should be able to

- appreciate elements of design
- manipulate materials such as clay or papiermarche to make artefacts
 - models
 - Decoration

WATER

- Properties of water
 - Water flows
 - Water infiltration

OBJECTIVES

Learners should be able to

- identify properties of water
 - predict where water will flow to in the local environment
 - demonstrate water flowing from a higher to a lower place
 - describe water infiltration
 - observe water infiltration
 - design a model of a water filter
-
- **Sources of water**
 - Natural sources of water

- Man-made sources of water

OBJECTIVES

Learners should be able to

- list natural sources of water
- describe natural water sources
- identify man-made sources of water
- compare man-made to natural sources of water
- design models of man-made sources of water

Water and the Environment

- Floods

OBJECTIVES

Learners should be able to

- identify water hazards caused by floods
- Discuss effects of floods
- discuss safety precautions

demonstrate safety precautions

WEATHER AND CLIMATE

- Weather and climate
- Weather elements

OBJECTIVES

Learners should be able to

- identify weather elements

Seasons

Seasons in Zimbabwe

Weather and climate hazards

Weather and climate hazards

OBJECTIVES

Learners should be able to

discuss the effects of weather and climate hazards

SOIL, PLANTS AND ANIMALS

- Soil
- Soil formation
- Types of soil
- Soil properties

Pottery

OBJECTIVES

Learners should be able to

describe soil formation

- identify soil types found in the local environment
- distinguish soil types
- Explain soil properties
- demonstrate how to make a clay body
- create models from clay body

Plants

- Plant parts and their functions

OBJECTIVES

Learners should be able to

- identify plant parts
- relate plant parts to their functions

Animals

- Animal Kingdom
- Characteristics of invertebrates
- Useful and harmful insects

OBJECTIVES

Learners should be able to

- classify animals
- Outline characteristics of invertebrates
- State examples of invertebrates
- Identify useful and harmful insects

LANDFORMS AND MAPS

- Land forms and Maps
- Land forms in the local environment

OBJECTIVES

Learners should be able to

- identify landforms
- demonstrate models of landforms

SUSTAINABLE RESOURCE MANAGEMENT

- Sustainable Resource Management

OBJECTIVES

Learners should be able to

- identify resources
- classify resources

Our resources

Natural and man-made resources

- Sources of waste

OBJECTIVES

Learners should be able to

state sources of waste