THE REPUBLIC OF UGANDA

Ministry of Education and Sports

Lower Secondary Curriculum

AGRICULTURE SYLLABUS

NCDC
NATIONAL CURRICULUM DEVELOPMENT CENTRE

CONTENTS

INTRODUCTION

The UNESCO Education Strategy (2014 – 2021) advocates for a humanistic and holistic vision of education as a fundamental human right that is essential to personal and socio-economic development. UNESCO further recommends, societies that are just, inclusive, peaceful and sustainable by 2030. The Uganda Vision 2040 aims to transform Uganda into a modern and prosperous country, while the NDP recognises the existing weaknesses in education, including the low efficiency and variable quality at the secondary level. The Sustainable Development Goal 4 advocates for inclusive and quality education, while the National Development Plan II focuses on enhancement of human capital, development, strengthening mechanisms for quality, effective efficient service delivery and improvement of quality and relevance of skills development. The NRM Manifesto (2016-2021), emphasises continuous assessment examination systems , strengthening soft skills, which promote self-esteem, conscientiousness and a generally positive attitude to work, promoting e-learning and computer literacy in order to enhance learning outcomes. All these are lacking and where they exist it is at a minimum level.

In alignment with the above, the Education and Sports Sector Strategic plan (2017/20) advocates for delivery of equitable, relevant and quality education for all. The current secondary school curriculum of Uganda, although highly regarded by some, is focused on the needs of a tiny academically oriented elite yet the needs of the majority of learners need to be the focus. The Ministry of Education and Sports (MoES) through the National Curriculum Development Centre (NCDC) therefore, undertook a review of the Lower Secondary Curriculum, aimed at providing a learning environment, opportunities, interactions, tasks and instructions that foster deep learning by putting the learner at the centre of the learning experience. This is in line with aims of secondary education in Uganda as outlined opposite.

The aims of secondary education in Uganda are to:

- Instill and promote national unity, an understanding of the social and civic responsibilities, strong love and care for others and respect for public property, as well as an appreciation of international relations and beneficial international co-operation;
- Promote an appreciation and understanding of the cultural heritage of Uganda including its languages;
- Impart and promote a sense of self discipline, ethical and spiritual values, personal and collective responsibility and initiative;

- Enable individuals to acquire and develop knowledge and an understanding of emerging needs of society and the economy;
- Provide up-date and comprehensive knowledge in theoretical and practical aspects of innovative production, modern management methods in the field of commerce and industry and their application in the context of socio-economic development of Uganda;
- Enable individuals to develop basic scientific, technological, technical, agricultural and commercial skills required for self-employment;
- Enable individuals to develop personal skills of problem solving, information gathering and interpretation, independent reading and writing, self improvement through learning and development of social, physical and leadership skills such as are obtained through games, sports, societies and clubs;
- Lay the foundation for further education;
- Enable the individual to apply acquired skills in solving problems of community, and to develop a strong sense of constructive and beneficial belonging to that community;
- Instill positive attitudes towards productive work and strong respect for the dignity of labour and those who engage in productive labour activities;
- Develop a positive attitude towards learning as a lifelong process.

BACKGROUND TO THE NEW CURRICULUM

The reform was based on the Education Sector Strategic Plan (ESSP), 2009 – 2018) which set out strategies to improve the quality and relevance of secondary education. The ESSP's sub-objective 2.2 was to ensure that "Post-primary students [are] prepared to enter the workforce and higher education". This is also in line with the current strategic plan of 2017-2020. To achieve this objective, one of the Ministry's strategies was to revise the curriculum and improve instruction and assessment by eliminating the short comings in the current curriculum.

The review focused on: producing a secondary school graduate who has the competences that are required in the 21st century; promoting values and attitudes; effective learning and acquisition of skills in order to reduce unemployment among school graduates.

The reform also aimed at reducing the content overload and contact hours in the classroom so as to create time for: research and project work; talent development and creativity; allowing for emerging fields of knowledge across all subjects and doing away with obsolete information. There was a need to address the social and economic needs of the country like the mining sector, tourism, services provision, science and technology development and to ensure rigorous career guidance programme to expose learners to the related subjects. This will enable learners to make informed choices as they transit and to equip them with knowledge and skills that will enhance their competitiveness in the global value chain.

To meet these requirements, the reforms are based on:

- The development of a holistic education for personal and national development based on clear shared values
- A commitment to higher standards, deeper understanding and greater opportunities for learners to succeed
- A focus on the key skills that are essential to work, to learning, and to life, and which will promote life-long learning
- An integrated and inclusive approach that will develop the ability to apply learning in practical situations.

The ESSP further outlines what the reforms imply:

"This reform will necessitate a sweeping revision of the general secondary curriculum, away from strictly academic learning objectives that are thought to prepare students for erudite higher education and towards a set of competencies that serve both those who continue their education after S4 and those who choose to enter the workforce. The new curriculum will enable learners to acquire specific vocational skills that they can use once they enter the world of work. The new curriculum will help learners make informed decisions as citizens and family members, and it will give those who continue with their education, either immediately in S5 or later in life, the learning skills they need to think critically and study efficiently."

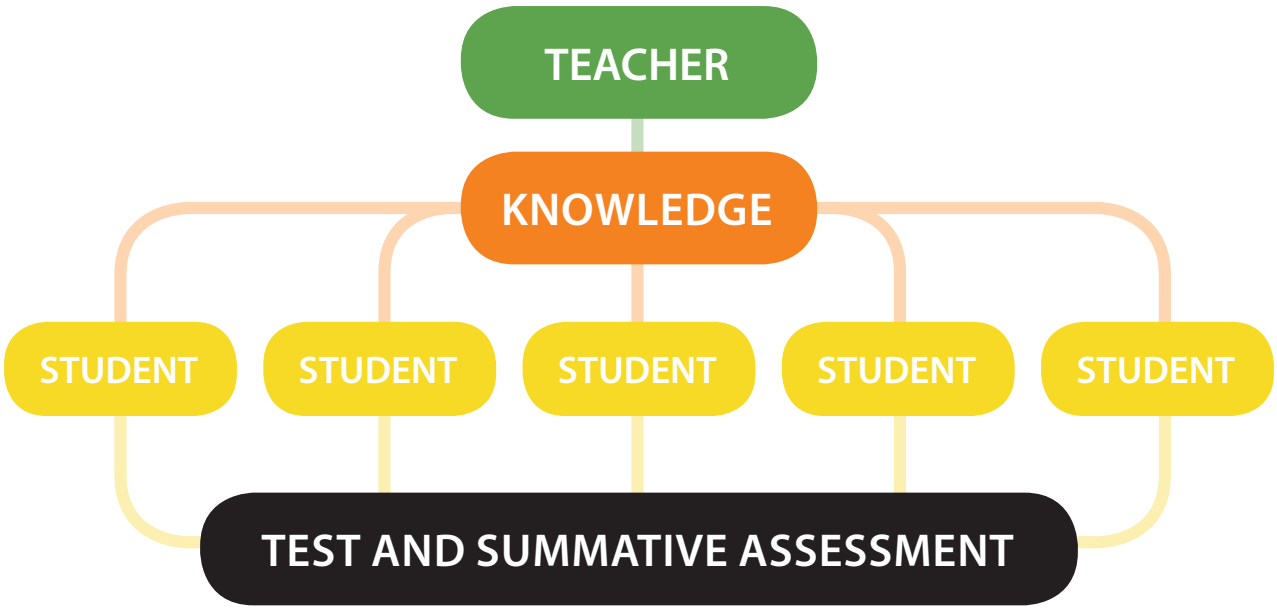
KEY CHANGES

The key change in the new curriculum is a move from a knowledge-based curriculum to a competence and skill-based curriculum. It is no longer sufficient to accumulate large amounts of knowledge. Young people need to develop the ability to apply their learning with confidence in a range of situations. They need to be able to use knowledge creatively. A level of competence is the ability to use knowledge rather than just to acquire it. This requires an active, learner-centred rather than passive, teacher-centred approach.

This approach to teaching and learning is in support of the Sustainable Development Goals (SDG's), otherwise known as the Global Goals. These are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The key changes in the curriculum will ensure that Uganda is making good progress towards SDG 4 in particular which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

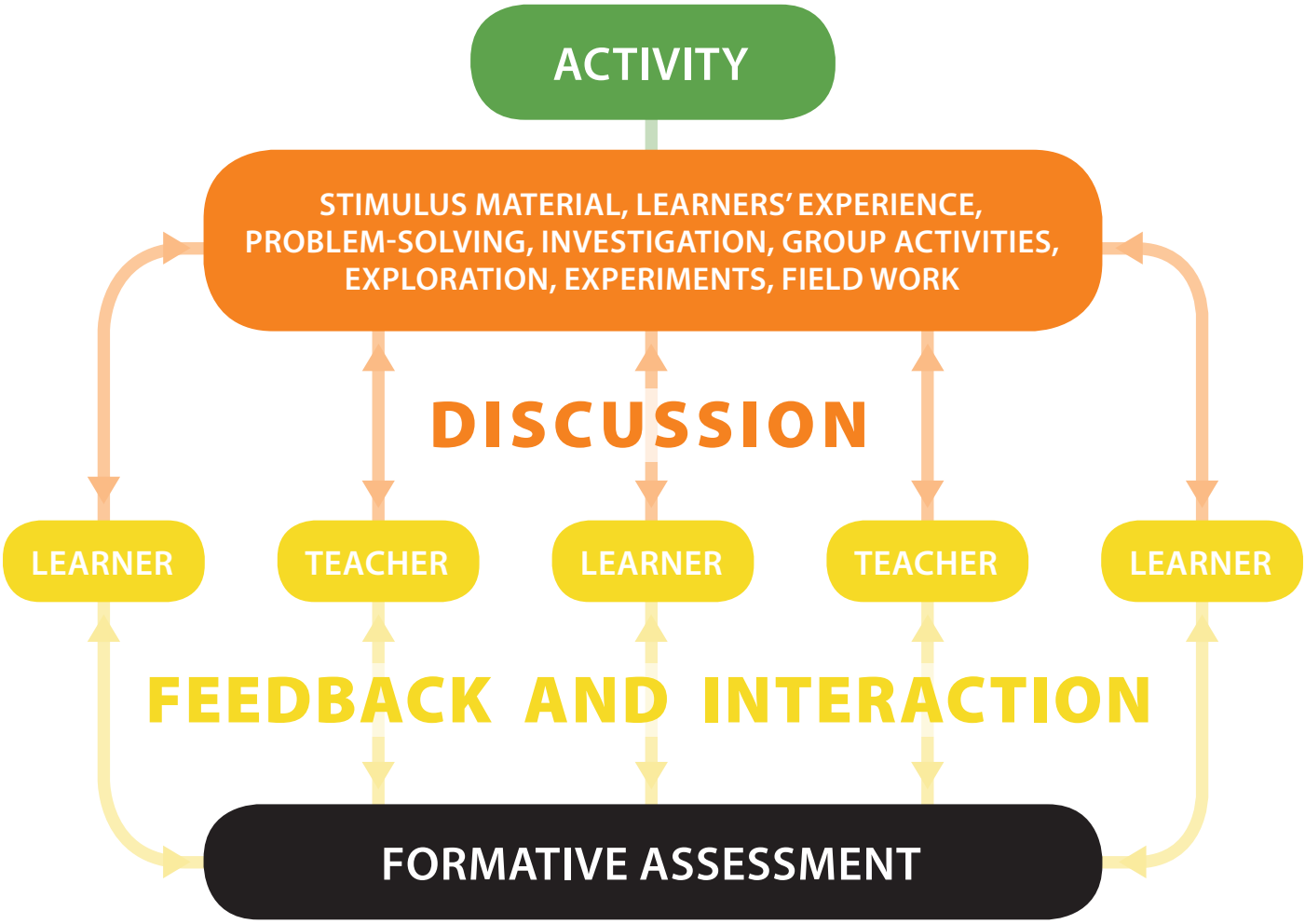
The change can be summarised in the following diagrams.

PREVIOUS KNOWLEDGE-BASED CURRICULUM



Knowledge-based teaching was based on transferring knowledge from the teacher to the students. The teacher had knowledge and transferred this knowledge to the students by lecturing, talking, asking them to read the text book or writing notes on the board for the students to copy and learn. Students acquired the knowledge, often without fully understanding it, and were tested at the end of a unit, term or school course to see if they had remembered it. The knowledge was based mainly on the knowledge in the subjects traditionally taught at University, and little attempt was made to make it relevant to young people's own lives. The whole education system was seen by many people as a preparation for University, but the vast majority of learners never reach university. The new curriculum will cater for this majority as well as those who later go on to University.

NEW COMPETENCE BASED CURRICULUM



In the new competence-based approach, the "student" becomes a "learner". The new Learning Outcomes can only be achieved through active engagement in the learning process rather than simply absorbing knowledge given by the teacher.

The teacher needs to build on the learners' own knowledge and experience and create Learning Activities through which learners can explore the meaning of what is being learned and understand how it is applied in practical situations.

Teaching and learning becomes a two way process of dialogue between the Teacher and Learners. Learners also learn from each other through discussion. Assessment also becomes a two way process of formative assessment; not just to give grades but to find out problems the learners may be having and help to solve them.

THE NEW CURRICULUM

The new curriculum focuses on four "Key Learning Outcomes" of: self – assured individuals; responsible and patriotic citizens; lifelong learners; positive contributors to society. The curriculum emphasises knowledge, application and behavioural change. It is based on a clear set of values which must be imparted to learners during the learning process.

At the heart of every subject there are generic skills that allow development into life-long learners. Besides, there are also cross cutting challenges that are embedded across subjects to enable learners understand the connections between the subjects and complexities of life.

Key Learning Outcomes

The new curriculum sets out 'Key Learning Outcomes' that sum up the expectations of the curriculum as a whole, and set out clearly the qualities that young people will develop.

By the end of the educational process, young people will become:

Self-assured individuals who:

- Demonstrate self- motivation, self-management and self-esteem
- Know their own preferences, strengths and limitations
- Adjust their behaviour and language appropriately to different social situations
- Relate well to a range of personality types

Responsible and patriotic citizens who:

- Cherish the values promoted in the curriculum
- Promote the development of indigenous cultures and languages and appreciate diversity, equity and inclusiveness
- Apply environmental and health awareness when making decisions for themselves and their community
- Are positive in their own identity as individuals and global citizens
- Are motivated to contribute to the wellbeing of themselves, their community and the nation

Lifelong learners who:

- Can plan, reflect and direct their own learning
- Actively seek lifelong learning opportunities for personal and professional development

Positive contributors to society who:

- Have acquired and can apply the Generic Skills
- Demonstrate knowledge and understanding of the emerging needs of society and the economy
- Understand how to design, make and critically evaluate products and processes to address needs
- Appreciate the physical, biological and technological world and make informed decisions about sustainable development and its impact on people and the environment.

Values

The new curriculum is based on a clear set of values. These values underpin the whole curriculum and the work of schools. They are also the values on which learners need to base their lives as citizens of Uganda.

- Peace and harmony
- Integrity and honesty
- Patriotism
- Positive attitude towards work
- Respect for human rights
- Self-Control

These values are not taught directly in lessons, nor will they be assessed, but they will inform and shape all teaching and learning.

Generic Skills

The generic skills lie at the heart of every Subject. They are the skills that enable the learner to access and deepen learning across the whole curriculum. They are the same skills that are sought by employers and which will unlock the world of work. They are the skills that allow young people to develop into lifelong learners who can adapt to change and cope with the challenges of life in the 21st Century.

Young people need to be able to think critically and solve problems, both at school and at work. They need to be creative and innovative in their approach to learning and life. They need to be able to communicate well in all forms, co-operate with others and also work independently. They need to be able to use functional mathematics and ICT effectively.

Critical thinking and problem-solving

- Plan and carry out investigations
- Sort and analyse information
- Identify problems and ways forward
- Predict outcomes and make reasoned decisions
- Evaluate different solutions

Creativity and innovation

- Use imaginations to explore possibilities
- Work with others to generate ideas
- Suggest and develop new solutions
- Try out innovative alternatives
- Look for patterns and make generalisations

Communication

- Listen attentively and with comprehension
- Talk confidently and explain things clearly
- Read accurately and fluently
- Write and present coherently
- Use a range of media to communicate idea

Co-operation and Learning

- Work effectively in diverse teams
- Interact effectively with others
- Take responsibility for own learning
- Work independently with persistence
- Manage goals and time

Calculation and ICT

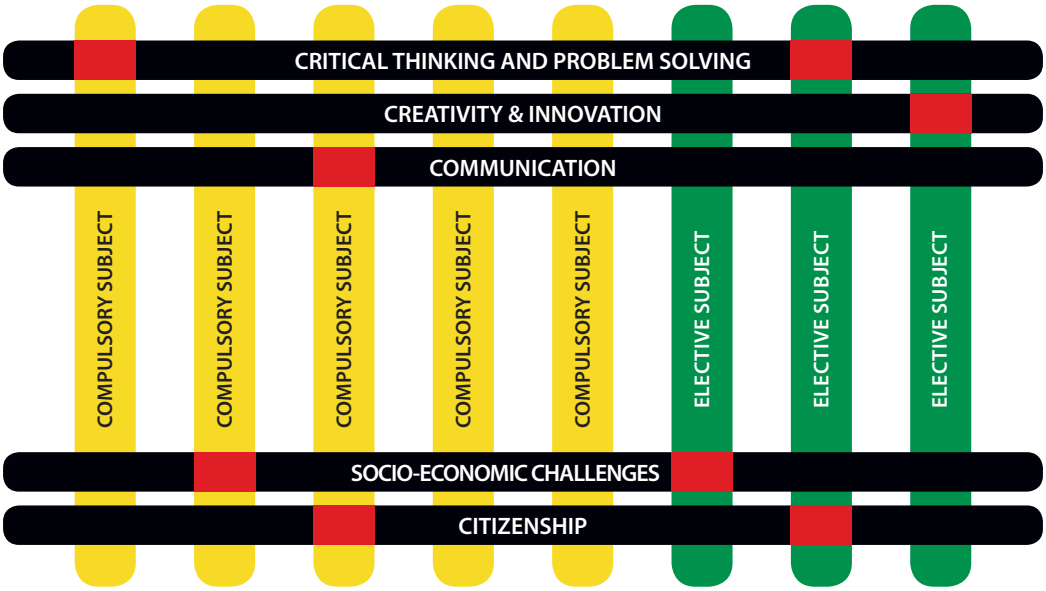
- Use numbers and measurements accurately
- Interpret and interrogate mathematical data
- Use mathematics to justify and support decisions
- Use technology to create, manipulate and process information
- Use technology to collaborate, communicate and refine their work

GENERIC SKILLS WITHIN AGRICULTURE

These skills are not separate subjects in themselves; they are developed within the subjects of the curriculum. They also help learning within those subjects. It is when these generic skills are deployed that learning is most effective.

The generic skills are a key part of the new curriculum. They have been built into the syllabuses for each of the Subjects, and these Subjects provide the context for the skills to be developed. Agriculture is a rich context for learners to communicate, co-operate, and to think critically about the vital role that food production plays in all our lives.

The Subjects also provide the contexts for progression within the skills. The same skill definitions apply to all year groups, and skills progression is provided by the increasing complexity of the subject matter within each Subject. For example, within 'critical thinking', learners begin thinking critically about the relatively simple subject matter in Senior 1 and then progress to thinking about the much more complex matters in Senior 4. Thus the progression is in the increasing complexity of the matters being thought about.



Cross-cutting Challenges

There are some issues that young people need to learn about, but which are not confined to one Subject. These are the 'Cross-cutting Challenges' and they need to be studied across the Subjects. These issues develop learners' understanding of the connections between the Subjects, and so of the complexities of life.

The Cross-cutting Challenges identified in the curriculum are:

- Environmental awareness
- Health awareness
- Diversity and inclusion
- Socio-economic challenges
- Citizenship

These have been built into the syllabuses of each Subject. The way in which they operate within the Subject is very similar to the generic skills model above. Environmental and health awareness and socio economic challenges are key components of agriculture.

AGRICULTURE WITHIN THE NEW CURRICULUM

Agriculture is a compulsory subject in Senior 1 & 2 and an elective subject in Senior 3 & 4.

Time allocation

AGRICULTURE	SENIOR 1 & 2	SENIOR 3 & 4
	2 periods a week	4 periods a week

Rationale

In Uganda to-day we have 40 million acres of land under agriculture production. This is a huge increase on the 8 million acres that were under use in 1997. More than 70% of the population is directly involved in agricultural production, more that half of these in the subsistence agriculture sector. This workforce is involved in employment related to agricultural production, processing or marketing. This contributes to over 25% of the Gross Domestic Product.

Agriculture is the most basic and essential enterprise of our society. As a country this is where we have comparative advantage. It is agriculture that converts natural resources into the food that nourishes us and keeps us healthy. If we understand how to manage these resources properly they will sustain us forever.

Uganda aspires to transform the agriculture sector from subsistence farming to commercial agriculture (Uganda Vision 2040). This will make agriculture profitable, competitive and sustainable to provide food and income security to all the people of Uganda. It will also create employment opportunities along the entire commodity value chain of production, processing and marketing. Specific emphasis will be put on promotion of aqua culture and livestock farming. Education will play a key part in this development.

Building an essential agriculture literacy is the purpose this Lower Secondary Agriculture Syllabus which has been selected to develop skills and understanding of;

- Land management and food production
- Producing a competitive product or service for a profit
- Modern methods of production
- Sustainable development
- Having graduates who are adaptable and flexible to be a perfect fit in the ever changing
- Delivering competitive products that can enable enterprises and industry to make profit

The emphasis is on learning from real life enterprise and industry on the market now and in future

Teaching and Learning: Agriculture

The thrust of the new syllabuses is experiential and towards deeper understanding. The focus in Agriculture is on the practical skills and understanding of land management and food production.

The new syllabuses provide learners with a wide range of contexts in which to develop this understanding, and these contexts are designed to engage the interest of the learner and to provide opportunities to build life-related knowledge, experience and skills. Teachers are encouraged to go beyond the textbooks and provide as many meaningful contexts as possible. The generic skills have been integrated throughout the curriculum and can only be acquired through active approaches.

The role of the teacher is to build on learners' existing knowledge and experience, but to extend that creating opportunities for first-hand experiences in agriculture. Learners should be encouraged to think about their own ideas in the light of these experiences and so add new knowledge and skills.

Learners need to interact with real situations inside and outside the classroom. They need to look at pictures or diagrams, examine statistics, or read texts from a range of sources. They need to find out knowledge and ideas for themselves. They should then be expected to express these in their own words, not those of the teacher, and so demonstrate that they have understood what they have learnt.

In this approach, learners are encouraged to:

- Be responsible for their own learning
- Think for themselves and form their own ideas and opinions
- Become critical thinkers, ready to face new challenges and situations for themselves

THE AGRICULTURE SYLLABUS

Programme Planner

SENIOR 1	TOPIC	DURATION (NUMBER OF PERIODS)
Term 1	Introduction to agriculture	24
Term 2	Farm tools, implements and equipment	24
Term 3	Soil science	12
	Vegetable growing	12
	Total	**72**

SENIOR 2	TOPIC	DURATION (NUMBER OF PERIODS)
Term 1	Cereal growing	12
	Root and stem tuber growing **OR** Legume and oil seed growing	12
Term 2	Domestic animal rearing The school chooses one of the following to study: 1. Poultry rearing 2. Fish Farming and aquaponics 3. Rabbit rearing 4. Goat rearing	24
Term 3	Perennial crop production The school chooses one of the following to study 1. Beverage (coffee/tea/cocoa) 2. Fruits 3. Agroforestry/water shade crops/perm culture	24
	Total	**72**

SENIOR 3	TOPIC	DURATION (NUMBER OF PERIODS)
Term 1	Cattle production	48
Term 2	Livestock feed making	24
	The school choose **EITHER** Pasture management and conservation **OR** Hydroponic farming	24
Term 3	Financial services and money in agriculture	24
	Farm buildings and farm structures	24
	Total	**144**

SENIOR 4	TOPIC	DURATION (NUMBER OF PERIODS)
Term 1	Processing domestic milk products Processing domestic meat products	24
	Biotechnology and Bio safety in agriculture	24
Term 2	Land tenure system	24
	Cooperatives and self help groups	24
Term 3	Agro wastes and by-products manufacturing	24
	EITHER Vegetable processing **OR** Fruit processing	24
	Total	**144**

The syllabus details for all subjects are set out in three columns:

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT ACTIVITIES
The knowledge, understanding or skills expected top be learned by the end of the topic	The sort of learning activities that include the generic skills and that will help learners achieve the Learning Outcomes.	Opportunities for assessment within the learning

Teachers should base their lesson plans on the Learning Outcomes using the Suggested Learning Activities as a guide. These are not the only possible learning activities, and teachers are encouraged to extend these and devise their own that are appropriate to the needs of their class.

DETAILED SYLLABUS FOR AGRICULTURE

SENIOR 1: TERM 1

TOPIC 1.1: INTRODUCTION TO AGRICULTURE — 24 PERIODS

Competency: The learner should have a good understanding of the sector and of the opportunities in agriculture for making a living in Uganda

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a) understand the historical background of agriculture in terms of animal herding, the nomadic way of life, food gathering and hunting (k, u) b) understand the value of agriculture to human beings and to society as a whole, and the importance of the farm as a production unit (k, u) c) understand the value of various farming systems and their socioeconomic impact in Uganda (u, k) d) understand the importance of keeping records in agriculture (u, k) e) understand the requirements of a career in agriculture and key principles of the Labour Act on the living conditions of farm workers (k, u)	• In pairs, learners complete a table to compare agriculture and nomadism | | Definition | Information | Examples | | Agriculture | | | | | Nomadism | | | | • Investigate the value of agriculture to the population as follows: a. Individually, write down the names and occupations of about five family members within their local area, indicating how what they do for their income and livelihood directly or indirectly relates to agriculture b. In groups, collect pictures/labels/ samples and make posters showing the food and other products people get from crops and animals • In groups, research the different farming systems in Uganda, noting and reporting to the class on a. the reasons for different systems in different regions b. their socioeconomic impact at local and national levels • In pairs, draw a map of Uganda, research and indicate the areas of crop production and animal production. • In groups, prepare and present a role play of a conversation between two farmers, one who recognises the importance of keeping records and one who does not. Whole class discussion then considers which is likely to be more productive and why.	• Observe learners carrying out the activities and intervene as necessary to ensure they are on track to achieve learning outcomes • Listen to group and pair discussions and ask questions to promote critical and creative thinking and to deepen learning • Evaluate quality of learning by assessing products: tables, lists, posters, reports, maps, role plays, charts, mind-maps, presentations

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	• In groups, visit local shops or a market and identify at least six products imported into Uganda. Find out why these commodities are not produced and processed in Uganda and produce a chart or mind-map to explain findings • In groups, investigate and prepare a presentation on: a. different agricultural careers and the appeal of each b. the working conditions of farm workers in relation to the provision of basic necessities provided within the agricultural sector	

SENIOR 1: TERM 2

TOPIC 1.2: FARM TOOLS, EQUIPMENT AND IMPLEMENTS — 24 PERIODS

Competency: The learner should be able to use measurement tools, farm tools, equipment and implements properly and safely in agricultural activities

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. identify tools used on the farm, including garden tools, woodworking tools, metal tools, and the basic tools used for fencing, mechanics and other farming activities (k, u) b. demonstrate skills of using farm tools and implements correctly for better production (s) c. show skill in using common measurement tools for length, volume, time and mass/weight (k, u, s) d. show skills in handling conversion of agricultural measurements into SI units (u, k, s) e. demonstrate basic occupational safety and health standards in agriculture (u, s) f. show skills in applying the steps in giving first aid on the farm and during agricultural activities (k, u, s)	• In pairs, categorise different farm and measurement tools according to their uses in: the garden; the workshop; animal husbandry; crop husbandry and building. Discuss how each tool is used and prepare a report to present conclusions. • In groups, as a project, design and construct low cost tools like a sprayer, rake, mallet, dibber, using locally available materials. • In pairs, practise converting different measurements in agriculture into the standard units (SI units) • In groups, review the basic occupational safety and health standards that apply to agriculture and develop a procedure for community members to follow. • In groups, research First Aid and the basic occupational safety and health standards in agriculture by listening to an invited speaker or using the Internet or other resources. Present the group's conclusions about what all agriculture workers should know and be able to do with respect to paying attention to health and safety and carrying out First Aid. • In groups, demonstrate to the rest of the class how to use farm tools and equipment safely and how to minimise risk during agricultural activities.	• Observe learners using tools, equipment and implements to check they are used effectively and safely • Observe learners carrying out first aid operations and check understanding of key principles and routines • Listen to learners' discussions and intervene to correct misunderstandings and ensure progress towards achievement of learning outcomes • Evaluate products to gauge learning of groups and individuals: reports on safe and effective use of tools, tool designs and tools constructed, unit conversions, safety procedures, presentations on safety and first aid, demonstrations on safe use of tools

SENIOR 1: TERM 3

TOPIC 1.3: SOIL SCIENCE — 12 PERIODS

Competency: The learner should be able to understand how soil is formed from rocks through the process of weathering.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. show skills in analysing soil and identifying the different components (s) b. understand various types of weathering processes and factors influencing soil formation (u, k, s) c. show skills in distinguishing between the different soil particles, soil textures, soil structures, soil profile horizons and types of soils as used for agricultural purposes (u, s) d. show skills in soil sampling (u, s) e. understand the importance of plant nutrients and soil pH (u, s) f. demonstrate soil improvement practices and understand their effects on plant growth (u, s)	• In groups or pairs, analyse soil composition by means of experiments to determine the presence of organic matter, air, water, mineral salts and living organisms Groups report conclusions to the class, relating to the components of soil and techniques used to identify the components • In groups, research and use the different methods of carrying out soil sampling, highlighting the main steps and reasons why in a report • In pairs or groups, learners carry out mechanical analysis of soil, analysis by sedimentation and investigations of water holding capacity and drainage, and produce reports on the techniques and their findings • In groups, learners employ a running dictation to discuss and share information about types of weathering that lead to soil formation Groups produce diagrams to explain how soil is formed • In groups, leaners determine pH of soil samples using a soil testing kit (containing materials like test tubes, indicators, soil samples, droppers, barium sulphate, Munsell chart) and recommend appropriate action to improve soils • In groups, learners research soil fertility, then dig a soil profile and prepare compost manure for use in a farmer's garden • As a class, collaboratively explore and prepare a report on the main functions of the following plant nutrients: nitrogen, phosphorus and potassium	• Observe how learners carry out scientific experiments of soil composition, mechanical analysis or sedimentation, soil pH, soil sampling, water holding capacity and drainage to find out if they are making progress towards learning outcomes, and intervene to deepen learning • Listen to pair and group discussions and offer guidance to ensure all individuals engage and develop skills and understanding • Evaluate learning through quality of products: reports on soil components and analysis techniques, reports on soil sampling, soil formation diagrams, recommendations re improving soil pH, soil profiles and compost prepared, reports on effects of NPK on plants

SENIOR 1: TERM 4

TOPIC 1.4: VEGETABLE GROWING — 12 PERIODS

Competency: The learner should be able to select a suitable vegetable for a locality and to carry out all of the processes required in order to grow and market the vegetable

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know a range of vegetables grown locally and understand their value in both nutritional and financial terms (k, u) b. understand how to select an appropriate vegetable for growing locally (k, u) c. Establish a nursery, apply good practice for vegetable growing (k, u, s) d. show skills in preparing bio pesticides and plant derivatives (k, u, s) e. Handle vegetables during and after harvest in order to maintain quality (s) f. Market vegetables effectively (s) g. Follow food safety guideline for harvested fresh vegetables (u, s)	• Using think-pair-share, learners identify the common vegetables in their locality and discuss the value of vegetables in the diet and as a commodity, presenting conclusions in drawings and/or a written report. • As a class, select and use a method of gathering information and design a survey tool to use in collecting data on vegetable growing in the locality. Collect findings in a whole class report. • In groups, develop and conduct a survey, including interviews with appropriate groups of people, to collect data on vegetables so as to select one for growing • As a class, develop and document a budget for constructing a nursery bed, procuring materials, establishing a nursery bed and raising vegetable seedlings • In pairs or small groups, learners grow, care for and manage vegetables through to maturity • In groups, prepare bio pesticides and plant derivatives from locally available materials like tephrosia, Black Jack, neem tree, tick berry leaves, hot pepper/chili, pawpaw leaves and seeds, and research the uses of each. Apply as appropriate to growing vegetables. • In pairs, learners develop and apply a marketing strategy for their vegetables • In pairs, learners research and brainstorm the food safety guidelines for harvested fresh vegetables and design a set of criteria to explain the guidelines to the community	• Observe learners as they plan and carry out the survey on vegetable growing, focusing on planning activities, how they gather and record information, how they build rapport with respondents and their debrief of each group • Observe learners establishing a nursery bed, transplanting seedlings, caring for developing plants, harvesting and marketing of vegetables to check on skills development, understanding of procedures, safe practice and food safety guidelines • Listen to learners' conversations and offer prompts or ask questions to deepen learning and guide learners towards achievement of learning outcomes • Evaluate learning through quality of products: drawings/written reports, survey reports, conclusions about vegetable selection, budget reports, progress of vegetables at each stage of development, preparation of bio-pesticides and plant derivatives and their application to plants, marketing strategies, reports on plant nutrients and their effects

SENIOR 2: TERM 1

TOPIC 2.1: CEREAL GROWING — 12 PERIODS

Competency: The learner should be able to understand the basic parts of a plant and their functions, and should appreciate the growth requirements of crop plants and be able to grow cereals successfully.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. explain the ways in which crops are important to humans (k, u)
b. understand the structures and functions of the basic parts of a plant (u)
c. understand the structures and functions of the parts of the reproductive system of a plant (k, u)
d. understand the factors that influence plant growth and crop production (k, u, s)
e. show skills in classifying crops as annual, biennial and perennial (u, s)
f. understand the value of cereals both in nutritional terms and as a commodity (k, u)
g. understand how to select appropriate planting material for the cereal chosen for growing (k, u)
h. show skills in growing cereals (s)
i. show skill in maintaining soil fertility in cereals (k, u, s)
j. show skills in handling cereals during and after harvest (s)
k. understand the various methods for storing cereals (k, u)
	• In groups or as a class, brainstorm and record the ways in which crops are important to humans and the value of cereals, both in terms of nutrition and as a commodity
	• In groups, examine and draw the different basic parts of plants, including the reproductive system. Research and annotate diagrams to explain the functions of each part.
	• In groups, learners research, discuss and prepare a presentation on:
	  • the meaning of annual, biennial and perennial plants
	  • examples of crop plants that are annuals, biennials and perennials
	  • the propagation methods that are used for each
	• In groups, learners plan, carry out and record the outcome of an investigation into the effect of wind/temperature on plants by conducting a simple experiment: using two identical well-watered pot plants, a fan/a heater or cooler, a thermometer and weighing scales
	• Individually or in pairs, learners conduct an investigation to compare the growth of plants in different conditions in the outdoor environment, considering factors such as rainfall, light, temperature and humidity
	• In groups or as a class practical, learners select which cereal to grow, select and sow seeds or other planting material, care for and manage the growing crop, maintain soil fertility, harvest the crop, select and use appropriate techniques for storing the seeds.
	Individuals keep records at each stage in the process and produce a report.
		• Observe learners carrying out activities and intervene as necessary to ensure learning is taking place by, e.g., offering groups guidance with research strategies; supporting groups to ensure use of scientific techniques in investigations; checking all individuals understand key points from presentations; highlighting and demonstrating good practice in terms of use of tools, care for crops, etc
		• Listen to pair and group discussions, asking probing questions and offering guidance to ensure all individuals think critically and develop skills and understanding
		• Evaluate learning through quality of products: reports on importance of crops and value of cereals; annotated diagrams of plant parts and their functions; presentations on plant life cycles and propagation of examples; investigation reports; crop yield (quality and quantity) and reports on process

EITHER

TOPIC 2.2A: ROOT AND STEM TUBER GROWING — 12 PERIODS

Competency: The learner should be able to grow and process root and stem tubers for the market .

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. understand the meanings and the value of roots and stem tubers, both in terms of nutrition and as a commodity (u) b. understand how to select appropriate planting material for the crop chosen for growing (k, u) c. show skills in growing roots/stem tubers (s) d. show skill in handling roots/stem tubers during and after harvest (s) e. show skill in processing and solar drying of roots/stem tubers (k, s)	• As a class or in groups, learners brainstorm, research and report on the meaning of tubers, both root and stem, giving examples of each and their value in the diet and as marketable commodities. • Groups use their findings to select a root or stem tuber to grow and harvest, reporting the reasons for their choice verbally or in writing. • In groups or as a whole class practical, learners select appropriate planting material for their chosen crop, plant the crop, care for and manage the crop as it grows, maintain soil fertility, harvest the crop, select and use appropriate methods for processing the crop, using solar drying accordingly. Individuals keep records at each stage in the process and produce a report. • As a group, learners select, design and construct a solar dryer for proper processing (sorting, cleaning and washing) of root and stem tubers, presenting their product to the class.	• Observe learners as they carry out the activities, intervening if required to ensure they are on track with research and that they understand how to use tools and equipment effectively and safely. Observe as they select, design, construct and operate a solar dryer, focusing on: participation, collaboration, time management, creativity, adhering to standard measurements and justification for actions • Listen to learners' conversations and contribute as necessary to guide and ensure all make progress towards achievement of learning outcomes. • Evaluate products: reports on root and stem tubers, examples and their value; explanations of choice of tuber to grow and reasons; crop yield (quality and quantity); effectiveness of processing after harvest and of solar dryers

OR

TOPIC 2.2B: LEGUME AND OIL SEED GROWING — 12 PERIODS

Competency: The learner is able to grow and store legumes and oil seeds for the market

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know the structure of a seed and understand the functions of each part (k, u) b. show skills in breaking seed dormancy in crops and optimising germination (s, u) c. understand the value of legumes and oil seeds in both nutritional and financial terms (k, u) d. understand how to select appropriate seeds for growing a chosen crop (u, k, s) e. show skills in growing legumes and oil seeds (s) f. show skill in handling legumes and oil seeds during and after harvest (s) g. know, understand and apply the skills involved in the various methods of storing legumes and oil seeds (k, u, s)	• In pairs, learners: a. examine, discover and draw the internal structure of a seed b. research the functions of each part of the seed and the types of seed dormancy c. complete a report on seed structure, functions and dormancy • In groups, learners: a. brainstorm the meanings and think of examples of legumes and oil seeds b. research the nutritional and financial value of legumes and oil seeds c. complete a chart on legumes and oil seeds, giving important examples and explaining their value • In groups, learners select appropriate seeds for growing a chosen crop through an experiment using, e.g., a seed viability test (Tetrazolium salt and potassium permanganate), and calculate the germination percentage and report on their findings verbally and/or in writing • In groups, learners prepare the ground, plant seeds, grow, care for and manage a legume or an oil seed crop through to harvest, recording lessons learned throughout the process • In groups, learners research, put into practice and report upon hygienic methods of drying and storing harvested legumes and oil seeds	• Observe pairs and groups, monitoring learning and intervening as appropriate to ensure all learners are fully engaged and making progress towards success in terms of learning outcomes • Listen carefully to learners' discussions, asking questions to prompt critical thinking and creative solutions to challenges. Guide learners to help them overcome barriers to learning • Evaluate quality of learning through the quality of the products: drawings and reports on seeds, legume/oil seed charts, seed viability reports, crop yield (quality and quantity), seed drying and storage reports

SENIOR 2: TERM 2

TOPIC 2.3: DOMESTIC ANIMAL REARING — 24 PERIODS

(Choose one of the following domestic animals to rear: poultry, goats, fish or rabbits)
Competency: The learner should be able to rear and market a domestic animal profitably.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. identify different types of farm/farmed animals and their purpose (k, u) b. understand the value of rearing domestic animals both in terms of their contribution to the human diet and as a commodity through which farmers make a living (k) c. understand how to select an animal to rear (u, s) d. understand the basics of caring for domestic animals, including the nutrient and feed requirements and provision of water (k, u) e. show skills needed to keep farm animals in healthy state (u, s) f. understand the types of housing for different animals and the reasons for the designs, and show skills in constructing an animal house (u, s) g. understand the digestive and reproductive system of ruminants and non-ruminant animals h. understand the significance of animal feeding programs (u) i. know how to conserve and use feeding resources (k, s) j. understand how to prepare fodder grass and crops for feeding animals (u, s) k. understand the importance of planned animal breeding and selection (k, u)	• As a class, learners visit a nearby farm to observe the different species and breeds of available farm animals, taking note of their characteristics and how their needs are provided on the farm. • In groups, learners discuss with the farmer the different methods of caring for these animals, the challenges faced and the value of the animals in financial and nutritional terms. Individually, learners complete a report on the animals seen and the advantages and disadvantages of rearing each. • In pairs, learners discuss their thoughts on which would be the best animal to rear and why, and share their ideas with the rest of the class. • In pairs, learners practise and demonstrate skills in aspects of caring for animals (depending on the animals chosen/available), such as: selecting a breed for breeding; feeding; watering; catching and bringing down larger animals; leading larger animals; exhibiting for a show; calculating age; checking health; dosing with medicines; immunising; dehorning; ear tagging; castrating male animals • In groups, learners research the characteristics of good quality animal housing and practice and demonstrate practical skills in construction • In groups, learners dissect a domestic animal, such as a goat, a rabbit or a hen, displaying and labelling the main parts of the digestive and reproductive systems and giving the main functions of each • In groups, learners research the source of feeds, nutrient composition, how to formulate a ration, how to store feeds safely and how to prepare fodder grass and other crops for feeding animals. Groups present findings in a table or poster chart. • In groups, learners research the meaning and importance of selective breeding. Groups prepare a presentation for the class to explain how selective breeding could improve yields from a farmed animal of their choice.	• Observe learners as they carry out the activities, intervening if required to ensure they are on track with research and that they understand how to use tools and equipment effectively and safely. Observe as they select, design, construct and operate a solar dryer, focusing on: participation, collaboration, time management, creativity, adhering to standard measurements and justification for actions • Listen to learners' conversations and contribute as necessary to guide and ensure all make progress towards achievement of learning outcomes. • Evaluate products: reports on root and stem tubers, examples and their value; explanations of choice of tuber to grow and reasons; crop yield (quality and quantity); effectiveness of processing after harvest and of solar dryers

TOPIC 2.3.1: POULTRY REARING (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. understand and identify the important breeds of poultry reared in Uganda and their place in supplying the market (u, s) b. understand how eggs are hatched and ways of raising chickens (u, s) c. know how to care for the health of poultry and understand the role of veterinary services (k, u) d. demonstrate knowledge of diseases and pests affecting poultry (k, s) e. demonstrate the use of tools and equipment for controlling diseases and pests in poultry f. show skill in handling poultry and its products (s) g. understand how to market animal products (u, s) h. understand the importance of and demonstrate entrepreneurial skills in marketing poultry (u, s) i. apply knowledge and skills related to the marketing of animals and products (k, s)	• In groups or as a class, learners brainstorm and research the different breeds and their commercial importance in supplying the demand for eggs and poultry meat in Uganda. Individuals record conclusions. • In groups, learners watch a video clip, visit a poultry farm or use other resources to research how eggs are hatched and chickens are reared commercially for meat and for egg laying, reporting their findings to the class. • In groups, learners apply their skills and understanding in practice, from egg incubation through to marketing both meat and eggs. This includes incubating eggs, hatching, brooding, growing birds, debeaking, vaccinating, feeding rations, finishing off for the market, weighing animals, slaughtering, grading, branding and packaging cut carcasses; caring for layers, egg collection, washing, grading and marketing. Individuals keep learning logs and record lessons learned throughout the process. • As a class or in groups, learners research common pests and diseases, their causes, symptoms and treatment. These conditions include: Newcastle disease, fowl pox, fowl typhoid, salmonella, Marek's disease, coccidiosis, mites, lice, fleas, worms. Then learners present findings in a table • Individually, learners practise using tools and equipment such as a drenching gun for controlling diseases and pests in poultry. As a class, learners discuss and record conclusions on the role of farmers in prevention and treatment of pests and diseases and circumstances in which veterinary services need to be involved. • In groups, learners collect, research, identify and draw the different kinds of endo-parasites and ecto-parasites that affect poultry.	• Observe learners as they carry out the activities, intervening if required to ensure they are on track with research and that they understand how to use tools and equipment effectively and safely. Observe as they select, design, construct and operate a solar dryer, focusing on: participation, collaboration, time management, creativity, adhering to standard measurements and justification for actions • Listen to learners' conversations and contribute as necessary to guide and ensure all make progress towards achievement of learning outcomes. • Evaluate products: reports on root and stem tubers, examples and their value; explanations of choice of tuber to grow and reasons; crop yield (quality and quantity); effectiveness of processing after harvest and of solar dryers

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	• As a class, learners observe a demonstration of the slaughtering and dressing of chickens (poultry) for sale, practise as appropriate, and write a summary of the process • In groups, learners research the marketing policies and rules that apply to animals and animal products and then develop a plan for marketing their animals and animal products. • As a class, learners discuss and explore the different entrepreneurial skills needed in poultry farming and write a list of the characteristics of an ideal poultry farmer.	

TOPIC 2.3.2: FISH AND AQUAPONICS FARMING (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know and understand terminology relating to fish farming and aquaponics (k, u) b. understand why fish farming is important in Uganda and the value of fish, both in nutritional terms and as a commercial product (u, k) c. know how to select appropriate fish for rearing (k, s) d. understand how a fish pond is constructed and how to determine whether the soil in a given area is suitable for a pond e. be able to construct a fixed pond or a mobile pond/aquaponic system or an aquarium (u, s) f. understand how to, and show skills in, stocking and managing a fish pond and/or an aquaponic system (u, s) g. recognise and understand how to deal with different diseases, parasites and predators (k, u) h. understand methods of harvesting fish and apply learning in practice (k, u, s)	• In groups, learners research and discuss fish farming and aquaponics, the terminology, and the importance of farmed fish to the national diet and to the economy of Uganda. Groups share findings with the class and individuals record conclusions. • In groups, learners research the characteristics of fresh water fish such as tilapia, carp, trout and other species and record the advantages and disadvantages of each as a commercial species, suggesting which they would choose and why. • In pairs, learners investigate local soil and report, giving reasons, verbally or in writing, whether it is suitable for pond construction. • In groups, learners construct a fish pond, a portable fish pond/aquaponics system, or an aquarium at school, and research the principles for rearing fish in them. Individuals produce a brief guide to successful commercial fish rearing.	• Observe learners' developing practical skills in relation to rearing fish for the market, and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to class discussion, leading them to further develop their thinking and deepen understanding. • Evaluate the quality of learning through products: reports on terminology and the importance of farmed fish to the diet and the economy; comparisons of different fish species and reasons for choosing one; reports on suitability of soil for pond construction; guides to commercial fish rearing; conclusions re stocking; characteristics of a good pond; disease, parasites and predators; learning logs about the rearing process; harvesting and preservation.

TOPIC 2.3.3: RABBIT REARING (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know the most important breeds of rabbits, their characteristics, their importance in commercial farming and their value in nutritional and financial terms
b. show skills in constructing a rabbit house
c. understand the safety 'Dos and Don'ts' of rabbit-keeping
d. show skills in feeding, managing and rearing of rabbits
e. show skills in carrying out rabbit health checks
f. demonstrate skills of treating diseases and pests in rabbits
g. show skills in processing and marketing of rabbits and rabbit products
h. show entrepreneurial skills in rabbit rearing
	• In groups, learners brainstorm and research:
	  • the important breeds of rabbit and their three commercial uses (meat: Californian, New Zealand, Satin; wool: Jersey, Angora, American; pets: Netherland dwarf, Dutch, Lop)
	  • their value in nutritional and financial terms
	Groups share findings with the class and individuals record conclusions.
	• In groups, learners plan, budget, procure materials and construct a rabbit house
	• In groups, explore, brainstorm, research and record a list of safety 'Dos and Don'ts' for rabbits
	• In pairs, learners manage and rear rabbits, ensuring healthy practice in relation to feeding, watering, housing, grooming and all aspects of care, keeping individual learning logs of the process
	• In groups, learners research characteristics of a healthy rabbit and demonstrate to the class how to carry out a health check when acquiring a rabbit for rearing (ears clean; eyes no discharge/cloudiness; nose clean and dry; teeth lined up straight; front/hind feet have five/four toenails clean at the bottom; stomach no abscesses/discharges; tail straight; body condition clean, smooth and firm)
	Individuals record a health checklist
	• In groups, learners demonstrate and present to class on treatment of diseases and pests (e.g. mites, snuffles, abscesses)
	• In pairs or individually, learners present a marketing campaign, then proceed to market rabbits and rabbit products
	• As a class, learners discuss the different entrepreneurial skills needed in rabbit rearing and write a list of the characteristics of an ideal rabbit farmer.
	Individuals self-assess against the list
		• Observe learners' developing practical skills in relation to rearing rabbits commercially, while providing support to ensure they make good progress and achieve learning outcomes.
		• Listen to learners' conversations and contributions to class, group and pair discussions, leading them to further develop their skills, their thinking and to deepen their understanding.
		• Evaluate the quality of learning through products: conclusions regarding breeds, their importance in the market and their commercial and nutritional value; rabbit houses; Do and don't lists; learning logs; health checklists; presentations about treatment of pests and diseases; marketing campaigns

TOPIC 2.3.4: GOAT REARING (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. identify the breeds of goats reared in Uganda and understand their qualities and the value of goat products in financial and nutritional terms (k, u) b. understand how to choose a goat breed for rearing (u) c. understand the different systems for mating and breeding goats (u) d. show skills in caring for goats, male and female, and kids (u, s) e. show skills in producing and conserving pastures for goats (k, s) f. understand the importance of weaning kids and how to rear kids (u, s) g. show skills in processing and marketing of goats and goat products h. show entrepreneurial skills in goat rearing (s)	• In groups, learners brainstorm and research the different breeds of goats, their characteristics, their suitability for different products (meat, milk, cheese, skins) and the value of these products in financial and nutritional terms. Groups share findings with the class and individuals record conclusions. • In groups, use the information to decide an appropriate breed for rearing in the locality and record the reasons for the agreed choice. • In groups, learners manage and rear goats ensuring healthy practice in relation to all aspects of care, and in management of pasture, keeping individual learning logs of the process • In groups discuss and report on the advantages and disadvantages of different mating and breeding systems for goats, focusing particularly on cross-breeding and pure breeding; assertive mating and random mating • In groups, research and formulate a breeding calendar, record and be able to tell the age at first mating, including the signs of heat (shaking the tail, mounting, seeking female goats, continuous bleating, mucous discharge at the vulva). • In groups, research and develop a programme for rearing kids, including how and when to wean as well as care post-weaning. Individuals complete a report or learning log. • As a class, research, plan and put into practice a strategy for preparing and conserving hay and silage for goats. Individuals complete a learning log. • In pairs or individually, learners present a marketing campaign, then proceed to market goats and goat products • As a class, learners discuss the different entrepreneurial skills needed in goat rearing and write a list of the characteristics of an ideal goat farmer. Individuals self-assess against the list.	• Observe learners' developing practical skills in relation to rearing goats commercially, and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to class, group and pair discussions, asking questions as appropriate to further develop their thinking and deepen understanding. • Evaluate the quality of learning through products: conclusions regarding breeds, their importance in the market and their commercial and nutritional value; breed selections; learning logs; breeding calendars; kid rearing programmes; hay and silage strategies and quality of products; marketing campaigns; lists and self-assessments of entrepreneurial skills.

SENIOR 2: TERM 3

TOPIC 2.4: PERENNIAL CROP PRODUCTION — 24 PERIODS

Competency: The learner should be able to produce and market perennial crops profitably

TOPIC 2.4.1: BEVERAGE PRODUCTION (OPTIONAL AND YOU CHOOSE ONE OF COFFEE, TEA OR COCOA)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know the value of coffee/tea / cocoa to the Ugandan economy, and the key markets for these products (k) b. understand the general geographical areas in which coffee/tea/cocoa is grown in Uganda, and the soil and climatic requirements for propagating and growing (k, u) d. understand how to establish and manage a coffee/tea/cocoa nursery and coffee garden (u, s) e. show skills in applying financial management principles to coffee/tea/ cocoa production (k, s) f. show skills in the preparation of the soil for growing coffee/tea/cocoa seedlings (s) g. show skills in transplanting coffee/tea/ cocoa seedlings into the garden h. show skills in managing coffee/tea/cocoa plants until harvesting i. be able to harvest and process coffee/tea/ cocoa for the market j. be able roast/cure, grind and serve coffee/ tea/cocoa k. understand the importance of taste, and be able to recognise and describe the differences in taste and smell as functions in cupping speciality coffees/teas and cocoa m. show entrepreneurial skills in coffee/tea/ cocoa production (s)	• As a class, learners brainstorm and research the uses and importance of coffee/tea/cocoa to the Ugandan economy, and the balance between export destinations and home consumption, recording class conclusions in notes • In pairs, learners carry out research using the library, Internet or other resources, and draw maps showing the geographical locations of where coffee/tea/cocoa is grown in Uganda and the world • In pairs, learners explore and make notes on the soil and climatic requirement for propagating and growing coffee/tea/ cocoa, and then annotate their maps to explain why the crops are grown in the areas shown • In groups, learners research (using farm visits, interviews, Internet, library) how to establish and manage a coffee/tea/cocoa nursery and coffee garden and share conclusions with the class • As a class, learners put the conclusions into practice, preparing the ground, planting and caring for a coffee/tea/cocoa crop to maximise the harvest. Individuals keep a learning log throughout the process. • In pairs, learners roast/cure, grind and serve coffee/tea/cocoa for the best quality taste and aroma. Individuals further add key learning points to their learning logs. • As a class, learners discuss the different entrepreneurial skills needed in producing coffee/tea/cocoa, and write a list of the characteristics of an ideal coffee/tea/ cocoa farmer. Individuals self-assess against the list.	• Observe learners' developing practical skills in relation to planting and growing coffee/tea/cocoa commercially; intervene and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking and deepen understanding. • Evaluate the quality of learning through products: conclusions regarding uses and importance of coffee/tea/cocoa crops; maps of growing areas and annotation about climate and soil; conclusions regarding establishment and management of nurseries/gardens; quality of crops harvested; quality of crops after roasting/curing, grinding and quality of drinks served; lists and self-assessments of entrepreneurial skills

TOPIC 2.4.2: FRUIT CROP PRODUCTION (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know the varieties and value of fruit crops grown in Uganda (k) b. understand how to select an appropriate fruit crop for growing (u) c. show skills in the methods of planting fruit trees (u, s) d. understand the soil and climatic requirements for propagating a selected fruit tree (k, u) e. be able to propagate fruit tree crops (s) f. show skills in the preparation of the soil for growing selected fruit trees (s) g. show skills needed in the planting of seeds and seedlings/cuttings (s) h. understand and apply the principles of good management of fruit trees (u, s) i. be able to carry out basic fruit tree nursery tending operations (s) j. show skills in applying financial management principles to fruit production (k, s) k. be able to establish and harvest fruit tree crops in the field (s) l. be able to perform vegetative propagation in fruit trees (k, s) m. be able to exercise disease and pest control (u, s) n. know how to market fruits products (k, s) p. show entrepreneurial skills in fruit growing (s)	• In groups, learners brainstorm, research and report on the types of fruit grown, their uses and importance to the Ugandan economy and diet • In pairs, learners carry out research (library, Internet, local observation/interviews) to select the most appropriate fruit to grow in the locality, reporting their conclusions to the class. • In groups, learners explore and make notes on the soil and climatic requirement for propagating and growing the fruit selected. • In groups, learners carry out research and visit farmers or processing units to find out about the conditions required to ensure a good quality harvest, recording their conclusions. • As a class, learners establish and manage a fruit nursery, growing and caring for the fruit and following appropriate procedures. Individuals keep learning logs of the process. • In pairs, learners research and record correct methods of grafting, budding, pollarding and pruning fruit trees. Individuals practise and demonstrate skills in each technique • In pairs, learners read case studies, discuss and write reports on the correct time and methods of harvesting and marketing fruits such as pawpaws, banana (sweet/cooking), passion fruits, apples, guava, gooseberry and temperate fruits • As a class, learners discuss the different entrepreneurial skills needed in fruit growing and write a list of the characteristics of an ideal fruit farmer. Individuals self-assess against the list.	• Observe learners' developing practical skills in relation to planting and growing fruits commercially. Intervene and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking and deepen understanding. • Evaluate the quality of learning through products: conclusions regarding types, uses and importance of fruit crops; conclusions regarding appropriate fruit for the locality and suitable climate and soil; conclusions regarding establishment and management of fruit nurseries; learning logs; outcomes of learners' application of skills in grafting, budding, pollarding and pruning; reports on harvesting and marketing; lists and self-assessments of entrepreneurial skills

TOPIC 2.4.3: AGRO FORESTRY / WATERSHED / PERMACULTURE PRODUCTION (OPTIONAL)

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know the meaning of the terms: agroforestry, watershed, and permaculture; understand their importance to the environment and value to the Ugandan economy (k, u)
b. understand the rationale for eco-friendly farming techniques in managing and caring for the environment and natural resources, and show appropriate skills in agroforestry, watershed and permaculture development (u, s)
c. be able to design an agroforestry, a watershed and a permaculture model plan for the area (s)
d. understand how to select appropriate tree species and crops for an agroforestry garden, a watershed development area and a permaculture garden (u, s)
e. understand how to establish and manage an agroforestry garden, a watershed development area and a permaculture garden (u, s)
f. show skills in applying financial management principles to planning an agroforestry garden, a watershed development area and a permaculture garden (k, s)
g. know how to harvest and process the products of agroforestry, watershed and permaculture (k)
h. know how to market agroforestry, watershed and permaculture (k)
i. show entrepreneurial skills required to make a success of agroforestry, watershed and permaculture (s)
	• In groups, learners brainstorm and research the meaning, uses and importance of agroforestry, watershed, and permaculture to the Ugandan economy and environment, sharing their thoughts with the class; whole class discusses appropriate areas in the locality for agroforestry, watershed and permaculture projects in the area; individuals record conclusions
	• In pairs, learners:
	  • carry out research (library, Internet, other resources) and select the most appropriate trees and crops for agroforestry, watershed or permaculture projects in the area
	  • design a model plan, explaining the reasons for decisions about what to plant where
	  • develop a management plan detailing how to care for both the crops and the environment
	• As a class, learners grow and care for some selected trees and crops included in the model plan, following appropriate procedures.
	Individuals keep a learning log.
	• In groups, learners visit agroforestry farms and/or farms using eco-friendly watershed/permaculture approaches and interview them about management required to ensure a good quality harvest and conservation of the natural environment (If no local examples, theoretical research will be required)
	Individuals add to learning logs.
	• In pairs, learners research, read a case study, discuss and report on how to harvest and market products of agroforestry, watershed areas and permaculture gardens
	• As a class, learners discuss the different entrepreneurial and other skills needed in agroforestry, watershed and permaculture, and then write a list of the characteristics of an ideal farmer.
	Individuals self-assess against the list.
		• Observe learners' developing practical skills in relation to planting and growing trees and crops suitable for agroforestry, watershed and permaculture. Intervene, ask questions and provide support to ensure they make good progress and achieve learning outcomes.
		• Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking and deepen understanding.
		• Evaluate the quality of learning through products: conclusions regarding the meaning and uses of agroforestry, watershed and permaculture and suitable locations for projects; model plans and management plans; learning logs; reports on harvesting and marketing of products; lists and self-assessments of entrepreneurship characteristics and other skills.

NB: Due to the timescales required for growing trees to maturation and the scale of planting required for effective watershed and permaculture systems, the learning activities involved in this unit focus on aspects of practice rather than the whole cycle from planting to harvest (agroforestry), or significant levels of environment-friendly planting (watershed and permaculture).

SENIOR 3: TERM 1

TOPIC 3.1: CATTLE PRODUCTION — 48 PERIODS

(Choose one of the following domestic animals to rear: poultry, goats, fish or rabbits)
Competency: The learner should be able to select desirable cattle for production and breeding and to carry out all processes involved in their rearing

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. be able to distinguish different breeds of cattle and describe their characteristics (k, u)
b. understand the physical characteristics of cattle with potential for rearing profitably, and show skills in selecting the best breed for rearing (u, s)
c. understand the internal organs and outline their functions, particularly the digestive system and related physiological processes (u, s)
d. understand female and male reproductive systems (u)
e. understand and outline the different breeding and selection systems used in cattle (u, s)
f. be able to apply artificial insemination in rearing of cattle (u, s)
g. understand the significance of good nutrition in rearing of cattle, and be able to prepare a balanced ration and various feeds required by dairy cattle at different stages from locally available foodstuff (u, s)
h. be able make efficient use of high-quality roughage in rearing cattle (u, s)
i. distinguish between and evaluate different cattle management systems (u, s)
j. show skills in prevention and control of diseases and parasites affecting cattle (k, u, s,)
k. be able to detect milk abnormalities using a strip cup
l. be able to keep records of breeding, management and production (k, u, s)
m. be able to carry out identification, dehorning and castration in cattle (u, s)
n. understand the importance of milking techniques and clean milk/meat production (u)
o. show skills in handling cattle products and bi-products (s)
	• As a class, learners visit a farm to observe and identify the characteristics of the most important breeds of cattle (Ankole, Sanga, Zebu, Boran, Friesian, Jersey, Guernsey) and to witness different stages in the process of rearing, breeding and marketing products.
	Individuals record conclusions in a learning log.
	• In groups, learners carry out research and review learning from farm visit to select a breed of cattle to rear; present and discuss conclusions with the class, record decisions and reasons in learning logs
	• As class or group, learners carry out or view a dissection to identify, draw and state the functions of main parts of the digestive and reproductive systems
	• In groups, learners research and discuss and report on different breeding systems (inbreeding, line breeding, cross breeding and upgrading) and selection systems, and their advantages and disadvantages
	• In groups, research and report to the class on the nutritional requirements of cattle at different stages, the meaning of a balanced ration; suitable, locally-available foodstuffs; the value of high quality roughage
	• As a group, learners explore, discuss and report on the suitability of different cattle management systems for dairy and beef cattle
	• In pairs, using case studies and other sources, learners compare extensive, semi-extensive and intensive management systems
	• In groups, learners discuss and present to the class on
	  • the symptoms and causes of the most important diseases and parasites such as red water, heart water, foot and mouth disease, anthrax, roundworm and ticks
	  • how to prevent and control diseases and parasites
	  • legislation on animal diseases with specific reference to notifiable diseases and animal movements
		• Observe learners' developing practical skills in relation to selecting and caring for cattle, intervening and providing support to ensure they make good progress and achieve learning outcomes. Observe pair and group interactions and ensure all are participating and making best use of learning opportunities.
		• Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking and deepen their understanding.
		• Evaluate the quality of learning through products: learning logs; dissection drawings and functions; reports on breeding systems, nutritional requirements and cattle management systems; comparisons of extensive and intensive systems; presentations on diseases and parasites: quality of practical work on prevention and treatment of diseases and parasites, artificial insemination, milk testing, record-keeping, dehorning, castration; reports on products and marketing

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

	• In pairs, learners practise skills in
	  • identifying, preventing and treating diseases and parasites
	  • artificial insemination
	  • testing for milk abnormalities using a strip cup
	  • record keeping, such as the animal register, record cards, record sheets and tagging, identification marks, plus chips, using ICT where applicable
	  • dehorning and castration
	Individuals record key learning points in learning logs
	• As a class, learners investigate the range of dairy and beef cattle products, suggest and report on ways of marketing them	

SENIOR 3: TERM 2

TOPIC 3.2: LIVESTOCK FEED MAKING — 24 PERIODS

Competency: The learner should be able to formulate animal feeds based on nutritional requirements, using feed ingredients available for maximum nutrition and optimal economic production

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know the range and types of livestock feeds (k)
b. know the ingredients and understand the technique for making livestock feeds according to specific animal requirements (k, u)
c. know how to:
  i. prepare and process a single material feed for livestock (k)
  ii. formulate air-dried livestock compound feeds (k)
  iii. make dry season livestock feed (k)
  iv. blend formulated livestock feeds (k)
d. know how to make mineral supplements (k)
	• In groups, learners brainstorm and research the range and types of feeds available for different livestock, and share conclusions with the class.
	• In groups, learners research how to formulate a compound blend of livestock feeds (e.g. calf pellet, calf weaner, sow weaner, chick and duck mash, broiler starter, broiler finisher, layer mash, rabbit pellet, fish meal) using simple mathematical calculations to ensure the right balance of nutrients in the feed.
	After class discussion, individuals record the process in learning logs.
	• In groups, learners prepare and calculate quantities of ingredients and make compound feeds (types in outcomes column) from available materials for a selected livestock.
	• In pairs, learners research and report mineral needs of different livestock and make mineral supplements for selected livestock
		• Observe learners' developing practical skills in relation to understanding and making animal feeds. Intervene and provide support to ensure they make good progress, develop skills and achieve learning outcomes.
		• Listen to learners' conversations and contributions to pair, group and class discussion. Ask probing questions to promote critical thinking, deepen understanding and improve skills.
		• Evaluate the quality of learning through products: conclusions regarding range and types of feeds; reasoning and calculations of animal feed formulations; quality of feeds produced; reports on mineral supplements and quality of supplements made

SENIOR 3: TERM 2 — EITHER

TOPIC 3.2.1: PASTURE MANAGEMENT OR CONSERVATION — 24 PERIODS

Competency: The learner should be able to identify, establish, manage and conserve nutritive pasture

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. be able to identify and describe different types of pasture (k, u, s) b. be able to evaluate the quality of natural pasture land and improve it (u, s) c. be able to select appropriate plant species to improve the botanical composition of a pasture land (u, s) d. be able to select appropriate planting material for growing pastures (u, s) e. show skills in managing and conserving pastures (u, s) f. show creativity in using available waste resources to grow irrigated crops (u, s) g. understand the causes of soil erosion and how soil can be conserved, and apply learning in practice (u, s) h. understand and apply learning in relation to the importance of the conservation of soil moisture (u, s)	• As a class, learners brainstorm and research different pastures and ways of improving a natural pasture, including its botanical composition. Individuals record class conclusions. • In pairs, learners discuss and select plant species for pastures using given criteria, reporting the reasons for their selection to the class • As a class, learners grow a pasture garden carrying out the different agronomic practices (land preparation, botanical composition selection, planting, applying fertilizer, weeding, utilising shade trees and water points) Individuals keep learning logs • In groups, learners design and present a grazing plan including pasture conservation measures to ensure pasture is harvested sustainably	• Observe learners' developing practical skills in relation to planting and managing pasture, intervening and providing support to ensure they make good progress, and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking, deepen their understanding and improve their skills. • Evaluate the quality of learning through products: conclusions regarding types of pasture and improvement strategies; reports on plant species selection; quality of pasture produced; learning logs; grazing plans; irrigation systems and reports; conclusions regarding soil and moisture conservation

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
	• In groups, learners design and create a simple drip irrigation system which can supply enough water to a 5m x 2m garden using: pole stands/hangers; plastic bucket; PVC pipe or rubber tubing; used pet bottles; strings; pipe fittings Groups present an evaluative report of the system's effectiveness • In groups, learners research soil and moisture conservation measures in pasture areas and present their conclusions to the class	

SENIOR 3: TERM 2 OR

TOPIC 3.2.2: HYDROPONICS FARMING 24 PERIODS

Competency: The learner should be able to establish, manage and produce crops using hydroponic systems.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know the meaning and understand the principles of hydroponics (k, u) b. be able to distinguish between and explain open and closed hydroponic systems (u, s) c. understand how to select an appropriate hydroponic system and media to suit the requirements of different plants (u, s) d. understand and apply the practical steps involved in growing crops in the hydroponic farming system (u, s) e. be able to budget and estimate the construction costs of a selected hydroponic farming system (u, s) f. know how to apply agrochemicals in the hydroponic garden for increased production (k) g. understand how to market crops produced in hydroponic farming system (u)	• In groups, learners brainstorm and research the meaning, principles, models and advantages of hydroponic farming systems and share conclusions with the class. • In groups, learners discuss and select the crop(s) to grow, the hydroponic system to adopt and the appropriate media to use. Individuals report their conclusions and the reasons for them • In pairs, learners research and read case studies regarding how to set up and manage hydroponic farming systems and produce a plan for their hydroponic garden • In groups, learners develop a budget for their hydroponic unit and procure the materials required to establish the garden • In pairs, learners set up and manage a hydroponic farming unit, keeping proper records and learning logs • In pairs, develop, implement and report a marketing plan for the crops produced	• Observe learners' developing practical skills in relation to planning and operating a hydroponic system. Intervene and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion, asking probing questions and leading them to further develop their thinking, deepen their understanding and improve skills. • Evaluate the quality of learning through products: conclusions regarding meaning, principles, types and advantages of hydroponics; conclusions on selection of crops and systems; plans for, budgets for and actual hydroponic system set-ups; marketing plans

SENIOR 3: TERM 3

TOPIC 3.4: FINANCIAL SERVICES AND MONEY IN AGRICULTURE — 24 PERIODS

Competency: The learner should understand the importance of prudent financial management and be able to use knowledge and skills to manage financial resources effectively.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. understand the difference between needs and wants (u) b. be able to explain the five core pillars of financial literacy c. know the difference between investment and saving (k) d. understand the importance of the saving culture (u, s) e. know the different types of banks and bank accounts (k) f. demonstrate the ability to open a bank account (s) g. show skills in budgeting using spreadsheets/Excel, or books and calculators (s)	• In groups, learners plan and present a role play to show a conversation between two young farmers, one who appreciates the need for careful budget management and one who does not, followed by a whole class discussion to draw conclusions. • In groups, learners study pictures of common items used in the home and sort them into wants and needs (e.g. radio, matooke, shoes, a ball, water, Coke/Pepsi drink, fish, sunglasses, ice cream, cake, plate, school uniform, medical care, mobile phone, hair oil). Groups suggest examples of needs and wants of a farmer. • In groups or pairs, learners discuss and record the meaning and importance of the core pillars of financial literacy (earning, saving, spending, budgeting, borrowing) • In groups, learners brainstorm on saving and investment: meanings of saving and investment; reasons for saving/investing; methods of saving or investing money; saving and investment plans; reasons why farmers may want to save or invest, and the risks of doing so and of not doing so. Individuals report on conclusions. • In groups, learners research, read case studies and complete a report on the functions of different types of banks and bank accounts • Individually, learners use templates and dummies from a financial institution to imitate opening a bank account with the school bursar's office • In pairs, learners practise budgeting (for a farming initiative), using a spreadsheet or a book and calculator	• Observe learners as they engage in learning activities. Intervene and provide support to ensure they make good progress, improve their understanding, develop skills and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion. Ask probing questions to promote critical thinking, deepen understanding and improve skills. • Evaluate the quality of learning through products: role plays on the need for budget management in farming; conclusions regarding wants and needs; understanding of the pillars of financial literacy; reports on saving and investment; mock applications for bank accounts; budgeting skills shown in spreadsheets/accounts books

TOPIC 3.5: FARM BUILDINGS AND FARM STRUCTURES — 24 PERIODS

Competency: The learner should be able to establish a cost effective and functional farm building and farm structure.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. show skills in handling building tools correctly and safely (k, u, s) b. understand and perform the processes of concrete mixing, mortar mixing, brick making, plastering and painting of farm structures and farm building (u, s) c. know appropriate types of housing for different animals (k, u) d. be able to budget and procure materials for establishing farm buildings and farm structures (k, u) e. show skills in constructing farm building and structures (s) f. know how to use locally available materials for roofing (k, s)	• In pairs or individually, learners practise and demonstrate proper use of the following tools: spirit level, builder's square, spot board, claw hammer, bar line, trowel, tape measure, wheelbarrow, shovel • As a class or in groups, learners practise and demonstrate the process of mixing concrete or mortar using the correct ratio of materials • In groups, learners practise making bricks using locally available materials: sun dried mud bricks, soil cement bricks, fire-baked bricks • Individually or in pairs, learners demonstrate building skills including brick laying, plastering and painting of farm buildings and structures • In groups, learners identify and source locally available roofing materials and demonstrate how to use them • In groups, learners research appropriate farm buildings for different animals and plan a farm building or structure accordingly, using an Excel/spreadsheet or books and a calculator to develop a budget for it.	• Observe learners' developing practical skills in relation to farm buildings and structures. Intervene and provide support to ensure they make good progress, develop their skills and achieve learning outcomes. • Listen to learners' conversations and contributions to pair and group discussions. Ask probing questions to sharpen techniques, promote critical thinking, deepen understanding and improve individuals' skills. • Evaluate the quality of learning through products: demonstrations of use of tools; quality of mixed mortar and concrete; quality of bricks made; quality of brick-laying, plastering and painting; quality of materials and roofing; conclusions about appropriate farm buildings for different animals; quality of budgeting

SENIOR 4: TERM 1

TOPIC 4.1: PROCESSING DOMESTIC MILK PRODUCTS — 12 PERIODS

Competency: The learner should be able to demonstrate hygienic milk handling, processing and milk safety.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. understand and be able to carry out the following processes: i. pasteurisation of milk (k, s) ii. homogenisation of milk (u, s) b. demonstrate skills in processing fermented and other milk products (s) c. be able to process flavoured milk and sweetened condensed milk (s) d. be able to handle, collect, test and quality control milk (k, s)	• In groups, learners research and develop a plan for each of the following steps and then put the plan into action: prepare milk by filtration; homogenise milk; pasteurise milk; processing milk to make fermented and non-fermented products; prepare a starter culture and inoculate milk; causing milk to form curds; apply principles of introducing additives; brand, pack, label and offer products for sale Individuals keep learning logs of all stages • In groups, learners research and develop a plan for each of the following steps and then put the plan into action: use a recipe to make flavoured milk and sweetened condensed milk; brand, pack, label and offer the product for sale. Individuals add to their learning logs • In pairs, learners research and then practise the following: hygienic collection and handling of milk for testing; grading; basic milk quality testing (sight, smell, alcohol, clot on boiling and use of lactometer); storage before processing. Individuals produce reports	• Observe learners' developing practical skills in relation to treating milk, processing milk to make other products, and marketing milk and products. Intervene, ask questions and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair and group discussion, asking probing questions and leading them to further develop their thinking, deepen understanding and improve their skills. • Evaluate the quality of learning through products: plans for treating milk and producing milk products; quality of products; learning logs; reports on testing and quality control

TOPIC 4.2: PROCESSING DOMESTIC MEAT PRODUCTS — 12 PERIODS

Competency: The learner should be able to understand and follow safe and hygienic procedures when handling and processing meat

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know the different sources of meat for processing and the meat products made (k)
b. be able to select, handle and process meat safely and hygienically (u, s)
c. be able to demonstrate basic practical skills such as the use of relevant tools in meat processing (u, s)
d. show skill in meat processing different animals (s)
e. know how to smoke meat (s)
f. be able to market processed meat (u, s)
	• In groups, learners discuss criteria and apply them in choosing meat (beef, game, pork, chicken, rabbit, lamb, goat, mutton) to use in making sausages and minced meat, documenting reasons for choices made.
	• In groups, learners use a recipe and spreadsheet (or book and calculator) to predict the amount of product (sausages or sausage meat) after processing
	• In groups, learners discuss the food safety regulations relating to meat, their importance and what they mean in practice, and produce a good practice guide
	• In groups, learners research:
	  • and practise the basic skills in processing meat from a range of animals
	  • different methods of smoking meat
	  • present a step-by-step guide for smoking meat and storage of smoked meat
	• In groups, learners discuss, develop and draw a process flow chart for marketing meat products
		• Observe learners' developing practical skills in relation to handling and processing meat from a range of animals. Intervene, ask questions and provide support to ensure they make good progress and achieve learning outcomes.
		• Listen to learners' conversations and contributions to group discussions. Ask probing questions to promote critical thinking, to deepen their understanding and to improve their skills.
		• Evaluate the quality of learning through products: conclusions regarding how to select meat for processing; calculations of quantity of product; good practice safety guides; products of processing; smoking guides; smoking flow charts

TOPIC 4.3: BIOTECHNOLOGY AND BIOSAFETY IN AGRICULTURE — 24 PERIODS

Competency: The learner should be able to appreciate the emerging trends in agriculture production and their implications

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know the meaning of biotechnology, bioengineering and biosafety (k)
b. understand how genetic engineering is carried out in crops and animals (u)
c. be able to understand and put the case for the use and development of biotechnology in agricultural production (u, s)
d. be able to research and understand emerging trends in biotechnology, bioengineering and biosafety (s)
	• In groups, learners
	  • brainstorm and research (Internet, library, other sources) issues associated with the use of biotechnology in agriculture today, finding out its origin, impact, benefits and challenges
	  • investigate and research the use of biotechnology and bioenginering in Uganda and its influence on agricultural productivity
	  • present the findings to the class
	• As a class, learners discuss biosafety and debate how positively we should regard genetically modified crops and animals.
	Individuals record their conclusions
	• In pairs, learners research and discuss guidelines and reasons for carrying out genetic engineering in crops and animals, and share findings with the class
	• In pairs, learners design and create a presentation for the community to explain the significance of biotechnology for agricultural purposes
		• Observe learners interacting as they engage in the learning activities. Ensure all are participating and making a positive contribution so that they make good progress and achieve learning outcomes.
		• Listen to learners' conversations and contributions to pair, group and class discussion. Ask probing questions to deepen their thinking and understanding.
		• Evaluate the quality of learning through products: presentations to the class; conclusions in relation to biosafety; conclusions about genetic engineering guidelines; community presentations on biotechnology

SENIOR 4: TERM 2

TOPIC 4.4: LAND TENURE SYSTEM — 24 PERIODS

Competency: The learner should be able to appreciate land reforms in Uganda

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know and understand the land tenure system, tenure types and land legislation of Uganda (k, u)
b. be able to obtain information from land tenure documents and maps (s)
c. be able to distinguish between land reform and land registration (u, s)
d. be able to promote land reforms (s)
	• In groups, learners investigate:
	  • the system of land tenure in the locality and in Uganda in general
	  • how the system influences agricultural productivity
	Groups present findings to inform class discussion, after which individuals record conclusions
	• In pairs, learners read case studies on the different land tenure systems and land reforms, including land fragmentation and land reclamation, noting issues, challenges and benefits of existing systems and reforms that have taken place
	• In pairs, learners suggest how land can be reclaimed and how further land reforms can be carried out for agricultural purposes
		• Observe learners participating in activities and intervene to ensure all are fully engaged and all achieve learning outcomes.
		• Listen to learners' contributions to pair, group and class discussion. Ask questions, leading them to think critically and creatively, deepening their understanding and improving their skills.
		• Evaluate the quality of learning through products: presentations on tenure systems; conclusions recorded by individuals; suggestions regarding land reclamation and reforms

TOPIC 4.5: COOPERATIVES AND SELF-HELP GROUPS IN AGRICULTURE — 24 PERIODS

Competency: The learner should be able to organise and participate in farmers' organisations

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know the different types of farmers' organisations in Uganda and understand their purposes (k) b. be able to explain the principles that govern cooperatives and self-help groups c. understand how to participate in a meeting following parliamentary procedures	• In groups, learners research and discuss the types of farming organisations, cooperatives and self-help groups (Village Saving and Loan Association-VSLA, Saving and Credit Cooperative Society -SACCOS), the reasons for their formation and why farmers engage with them. Then they report to the class • In pairs, learners research (Internet, case studies, other sources) to identify the principles and structures that govern cooperatives or self-help groups for presentation to the class • As a class, learners organise and role play a meeting (class decides farming issues to be discussed) to demonstrate and practise parliamentary procedures and public speaking	• Observe learners involved in activities and monitor effectiveness of participation and developing skills in public speaking and parliamentary practice. Intervene to provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussion and debate. Asking probing questions to further develop thinking, deepen understanding and improve skills. • Evaluate the quality of learning through products: reports on farmers' organisations; presentations on principles and structures; quality of and participation in debate

SENIOR 4: TERM3

TOPIC 4.6: AGRO WASTES AND BY-PRODUCTS MANUFACTURING — 24 PERIODS

Competency: The learner should be able to manufacture biofuels and handmade paper to preserve the environment

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. know materials used in making paper, biogas and briquettes (k) b. show creativity and skills in utilising domestic animal wastes (k, s, u) c. be able to make uncarbonised and carbonised briquettes from crop and animal domestic waste d. understand how handmade paper is manufactured	• In groups, learners brainstorm, research and report on the 'waste' materials that are available for making handmade paper, biogas and briquettes (cassava, banana stems, animal dung/droppings, bagasse, maize/rice/wheat husks, banana/cassava/ sweet potato peelings, sawdust, brewers' grain) After class discussion, individuals record conclusions • In pairs, learners research and report with annotated designs and notes on the requirements for making a bio-gas digester/briquette mould/handmade paper-making press • Group project 1: Groups plan and construct either a bio-gas digester, a briquette mould or a handmade paper press in school • In groups or as a class, learners establish a system for collection and transport of appropriate crop/animal waste to the school for use in making biogas, briquettes and/or paper • Group project 2: Learners plan and implement a system for making bio gas/briquettes (carbonised and uncarbonised)/handmade paper, using the equipment they have designed and material collected, applying good, safe manufacturing practices in the process and reporting on their projects to other groups	• Observe learners' developing practical skills in relation to designing and making equipment and manufacturing biofuels/ paper. Intervene, ask questions and provide support to ensure they make good progress and achieve learning outcomes. • Listen to learners' conversations and contributions to pair, group and class discussions, asking probing questions to steer groups, deepen understanding and improve skills. • Evaluate the quality of learning through products: reports and conclusions; designs and equipment made; waste collection systems; biogas, briquettes, paper; project reports

EITHER

TOPIC 4.7: VEGETABLE PROCESSING — 24 PERIODS

Competency: The learner should be able to process vegetables for sale

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

a. know how to find information on vegetable processing (k)
b. understand the principles of, and show skills in using, different methods of drying vegetables (u, s)
c. understand the principles of, and demonstrate methods of, preserving vegetables with acids, salt and sugar (k, u, s)
d. be able to market processed vegetable products (s)
	• In pairs, research (Internet, library, other sources):
	  • the reasons for preserving rather than selling all vegetables fresh
	  • different methods of processing vegetables
	Pairs draw a process flow chart for each method of preserving, annotated with information supporting each step
	• Group project, learners:
	  • develop preservation plans
	  • process vegetables by one or more methods: drying, preserving with acids, salt and sugar
	  • research and develop marketing plans and market their products in the community
	  • report on their methods and the success of their projects to the class
		• Observe pairs and groups as they engage in the activities. Intervene and ask questions to ensure groups remain on track, make good progress and achieve learning outcomes.
		• Listen to learners' conversations and contributions to pair and group discussion. Offer guidance when necessary to avoid misconceptions and ensure every individual understands and develops skills.
		• Evaluate the quality of learning through products: preservation method flow charts; group preservation plans; quality of preserved vegetables; marketing plans; project reports

OR

TOPIC 4.8: FRUIT PROCESSING — 24 PERIODS

Competency: The learner should be able to process and market quality fruit products

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY
a. show skills in planning and budgeting (using Excel/spreadsheets or books and calculators) for a recipe, and purchasing (s) b. know and understand the requirements regarding quality of water to use in processing fruit, and apply basic methods of water treatment (k, u, s) c. be able to plan and prepare processing premises, taking account of the importance of premises hygiene (k, u, s) d. know the different types of fruit beverages and their specifications (s)	• In groups, learners prepare a plan and a budget for the materials needed in processing fruits in a selected recipe and procure them from the market • In groups, learners brainstorm and discuss with the class and report on the qualities of safe drinking water for use in processing fruits • In groups, learners plan how to treat water for safe use in processing fruits, taking account of uses of hygiene-promoting facilities such as: rubbish pits, waste recycling collection points, toilets or pit latrines, drainage points, sheds and other storage facilities	• Observe pairs and groups as they engage in the activities and develop their skills and understanding. Intervene to help learners overcome any barriers to learning and ensure all participate and achieve learning outcomes. • Listen to learners' discussions and contributions to the pair or group. Ask questions to promote critical thinking and ensure no learning opportunities are missed and all develop skills.

LEARNING OUTCOMES The learner should be able to:	SUGGESTED LEARNING ACTIVITIES	SAMPLE ASSESSMENT STRATEGY

e. show skills in juice and pulp extraction, processing and preservation, taking account of good manufacturing practices (s)
f. understand the principles of, and demonstrate methods of, preserving fruit with acids, salt and sugar (k, u, s)
g. know how to advertise and market processed fruits (u, s)
	Groups process water accordingly
	Individuals record key points in learning logs
	• In pairs, learners practise using measuring tools: e.g., refractometer, thermometer and scales, to ensure compliance with specifications and quality when processing fruits
	Individuals record notes on correct use in learning logs
	• In groups, learners:
	  • research and read case studies to identify the technical methods used to reduce food deterioration in fruits, and share conclusions with class
	  • prepare and process fruits by extracting and preserving juice or pulp, while applying good manufacturing practices (GMP); e.g., use of recommended chemical preservatives
	• In pairs, learners use sugar and acid to preserve fruits including making jam, jellies and marmalades
	• Group project: construct one type of solar dryer for drying fruits using locally available materials (or revisit if a solar drier was made earlier in the course)
	• In groups, learners apply different recipes in treating and preparing fruits for drying
	• In pairs or groups, learners design a brand and label for advertising/displaying bottled beverages, preserved fruits or fruit products for sale
	Individuals report in learning logs
		• Evaluate the quality of learning through products: budgets and materials purchased; reports on water safety; plans and processes for water treatment; learning logs; reports on use of measuring tools; preserved fruits/fruit products; solar driers; dried fruits; marketing campaigns

ASSESSING AGRICULTURE

This section should be considered alongside the Assessment Guidelines.

Assessing the new expectations for learning

The new curriculum sets new expectations for learning, with a shift from Learning Outcomes that focus mainly on knowledge to those that focus on skills and deeper understanding. These new Learning Outcomes require a different approach to assessment.

The "Learning Outcomes" in the syllabuses are set out in terms of Knowledge, Understanding, Skills, and Attitudes. This is what is referred to by the letters k,u,s & a.

It is not possible to assess attitudes in the same way as knowledge, understanding and skills because they are more personal and variable and are long-term aspirations. This does not mean that attitudes are not important. It means that we must value things that we cannot easily assess.

So this guidance booklet focuses on knowledge, skills and understanding. Each has its own implications for learning and assessment.

Knowledge	The retention of information
Understanding	Putting knowledge into a framework of meaning – the development of a 'concept'.
Skill	The ability to perform a physical or mental act or operation

To assess knowledge, skills and understanding we need to look for different things. Knowledge can be assessed to some extent through written tests, but the assessment of skills and deeper understanding requires different approaches. Because of this, the role of the teacher in assessment becomes much more important.

Knowledge

Knowledge is the easiest to assess because it is fairly straightforward to find out whether or not a learner has retained some information: a simple question can usually find this out. We ask them to name something, or state something, or label a diagram.

Understanding

Assessing deeper understanding is much more difficult, so we usually ask learners to explain, compare or outline a process. This can be done orally (in conversation) or in writing, and will give us some idea of the extent of their understanding.

Skills

Skills are the ability to perform a mental or physical operation, so we have to observe the skill being performed or look at the product, or outcome, of the skill; for example a piece of writing, a picture or diagram. Some skills, such as speaking or a physical education skill do not have a product so need to be observed.

Examinations

There will no longer be examinations or tests set at the end of every year. Instead, there will be a summing up of on-going teacher assessments made in the context of learning.

The final examination at the end of Senior 4 will be very different in nature, and will focus on the learners' ability to apply their learning in new situations, rather than on the ability to recall information.

Formative Assessment

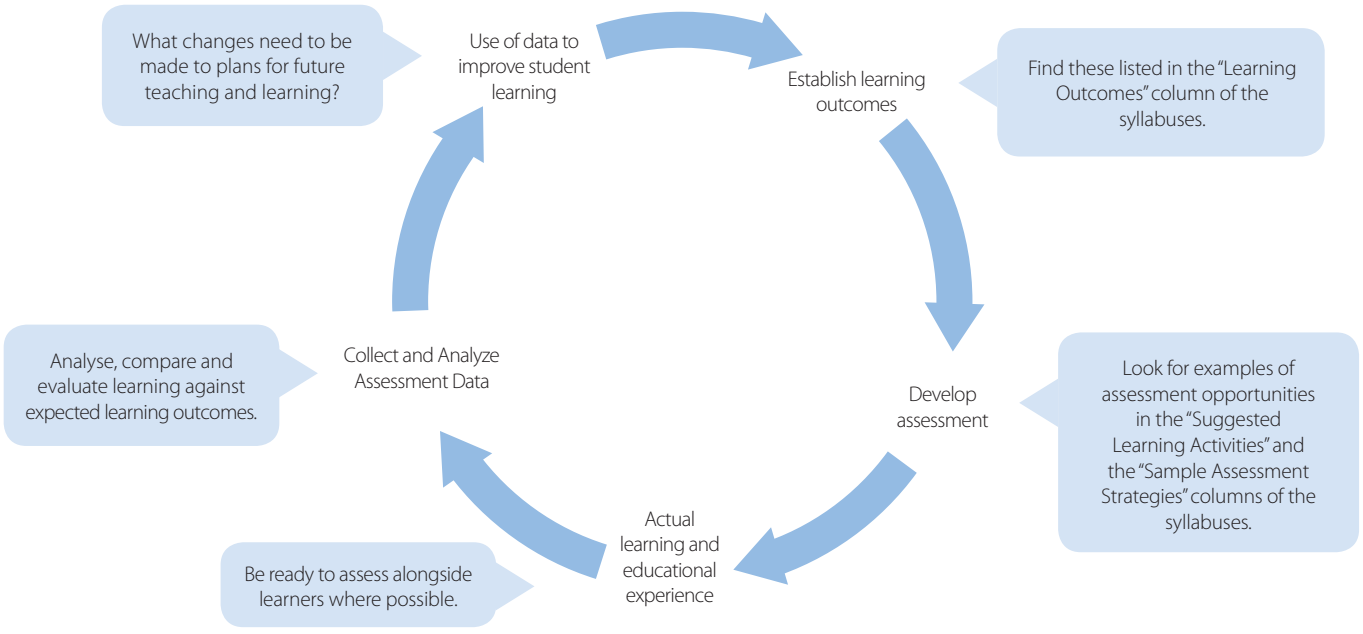
If assessment is to make a difference to teaching and learning, then teachers must use the information they gain from assessment to make some change to the teaching and learning process. This is formative assessment. If teaching and learning stay the same, there would have been no point in carrying out the assessment. The changes that can be made include decisions about:

- What needs to be learned next
- Whether an element of the syllabus needs to be taught again in a different way
- Changing teaching approaches if necessary
- Identifying learners who need more support, or who are making exceptional progress
- Enabling learners to understand what they have to do to improve

It is the use of the assessment data within this cycle to improve learning that is key to the success and impact of formative assessment.
It is this cycle that enables formative assessment to impact on learning:

- The syllabuses set out the learning outcomes
- The lessons seek to achieve these outcomes
- Assessment finds out whether or not the outcomes has been achieved
- This information guides the next steps in learning and so sets new learning outcomes

The process of teaching, making formative assessments and then changing the teaching and learning in some way can be seen as a cycle:



FORMATIVE ASSESSMENT INVOLVES USING ALL PARTS OF THE CYCLE.

ASSESSING AGRICULTURE

How do we find the opportunity to make formative assessments?

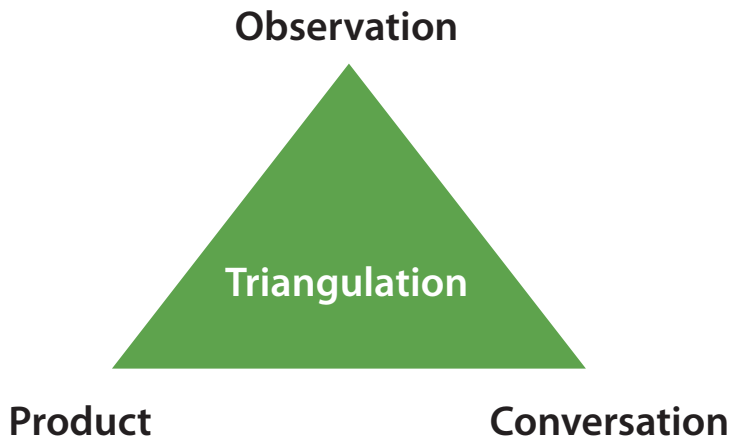
In the new curriculum, the teacher's assessment role is not to write tests for learners, but to make professional judgements about learners' learning in the course of the normal teaching and learning process. The professional judgement is about how far the learner meets the Learning Outcomes that are set out in this syllabus. To make these judgements the teacher needs to look at how well the learners are performing in terms of each Learning Outcome.

School-based formative assessment is a part of the normal teaching and learning process, and so the assessment opportunities will also occur during this normal process. It is not something that needs to be added on after learning; it is an integral part of it.

These opportunities occur in three forms and are often called:

- Observation – watching learners working (good for assessing skills)
- Conversation – asking questions and talking to learners (good for assessing knowledge and understanding)
- Product – appraising the learner's work (writing, report, translation, calculation, presentation, map, diagram, model, drawing, painting etc). In this context, a "product" is seen as something physical and permanent that the teacher can keep and look at, not something that the learner says.

When all three are used, the information from any one can be checked against the other two forms of assessment opportunity (eg evidence from "observation" can be checked against evidence from "conversation" and "product"). This is often referred to as "triangulation".



Triangulation of assessment opportunities

To find these opportunities, look at the syllabus units. These set out the learning that is expected and give 'Sample Assessment Activities", and in doing so they contain a range of opportunities for the three forms of assessment.

Generic Skills

The Generic Skills have been built into the syllabuses and are part of the Learning Outcomes. It is therefore not necessary to assess them separately. It is the increasingly complex context of the subject content that provides progression in the Generic Skills, and so they are assessed as part of the subject Learning Outcomes.

Attitudes

It is not possible to assess attitudes in the same way as knowledge, understanding and skills because they are more personal and variable and are long-term aspirations. This does not mean that attitudes are not important. It means that we must value things that we cannot easily assess.

Record keeping

Keeping detailed records of learners' individual progress is always difficult with very large numbers of pupils. For the purposes of school-based formative assessment, it is not even always necessary to keep such detailed records anyway. If feedback is give immediately and action is taken, then learning is changed and the record would soon become out of date and redundant.

Most formative class-based assessments are dynamic in that they feed straight back into the teaching and learning process. Therefore detailed records of these are not appropriate.

What is needed is record of assessments of learners' learning made in terms of each Topic or unit. This means recording the on-going summative assessments of each unit. There is no need to make separate records of each of the Learning Outcomes because this would be very time-consuming and also unnecessary. It is much more useful to make an overall assessment about whether or not each learner met the Learning Outcomes for each Topic as a whole.

Each Sub-Strand is made up of a number of Learning Outcomes. Therefore teachers need to consider all the Learning Outcomes when making an overall judgement about the Sub-Strand as a whole. It is not always necessary for every individual Learning Outcome to be achieved for the Sib-Strand as a whole to be achieved. This will vary with the Learning Area and Topic.

By looking at the Learning Outcomes within each Topic, it is possible to identify four broad groups of learners in terms of their achievements:

Descriptor
No Learning Outcome (LO) achieved
Some LOs achieved, but not sufficient for overall achievement
Most LOs achieved, enough for overall achievement
All LOs achieved – achievement with ease

ASSESSING AGRICULTURE

There is no need to set a test to find this out.

These overall assessments should be made on the basis of the many formative assessments that the teacher has made during the course of teaching the unit. If teachers have been working with the learners over the course of the unit, they will be able to make a broad judgment about which learners have achieved or have failed to achieve the unit's overall Learning Expectation. These "Authentic Assessments" will be more valid and valuable than a test set by the school.

Recording these overall assessments will be simple, manageable and yet valuable, and can be recorded on a sheet such as the one below in which the categories are indicated with a number.

Although a very simple process, these four categories will give rich data when a comparison is made between the learners in each category for different subjects and units. They will also identify easily those learners who need extra support or who may not be ready to move on to the next grade at the end of a year.

If records are kept of the learning outcomes of each syllabus unit through the year, then there will be no need for an end of year test. Teachers will already have a record of those learners who have met the learning outcomes, and those who have not done so. Therefore teachers will know if there were any learners not ready to progress to the next grade.

An overall record should be made of the individual unit assessments by subject in terms of the 4 descriptors. If numbers (0-3) are used as identifiers, then it will be possible to arrive at an overall number for a year by aggregating the identifiers for each unit.

Descriptor	Identifier
No Learning outcome achieved	0
Some LOs achieved, but not sufficient for overall achievement	1
Most LOs achieved, enough for overall achievement	2
All LOs achieved – achievement with ease	3

In the example below, the table shows the end-of-unit assessment for six learners.

	Agriculture									
	T1	**T2**	**T3**	**T4**	**T5**	**T6**	**T7**	**T8**	**T9**	**T10**
Learner A	3	3	2	3	3	3	3	2	3	3
Learner B	2	2	3	2	3	2	2	2	3	2
Learner C	1	1	2	1	1	2	2	3	2	3
Learner D	1	1	2	1	1	2	1	1	2	1
Learner E	0	1	2	1	0	1	0	1	1	1
Learner F	0	0	1	0	0	1	0	0	1	0

This method will give much more information than using a tick. For example, at a glance it can be seen that learners A & B are achieving much higher than learners E & F. It can be seen that Learner C has improved during the year. We can even see that more learners achieved success in Topic 9 than Topic 7.

All of this is very valuable assessment information and can be used to improve learning.

This summative teacher assessment will contribute to the final grade of the School Leaving Certificate.

The assessment of the practical or pre-vocational subjects at Lower Secondary level will take three forms:

i) Classroom based assessment which will be moderated and contribute 20% of the final mark

ii) Final examinations which will contribute 80%

iii) Assessment for the world of work or occupation which will lead to the award of a work pass at Level 1 in the Uganda Vocational Qualification Framework (UVQF. These assessments will occur at the end of Senior 3 and be carried out according to the specification of the Directorate of Industrial Training (DIT).

Glossary of Key Terms

TERM	DEFINITION
Competency Curriculum	One in which learners develop the ability to apply their learning with confidence in a range of situations.
Differentiation	The design or adaptation of learning experiences to suit an individual learner's needs, strengths, preferences, and abilities.
Formative Assessment	The process of judging a learner's performance, by interpreting the responses to tasks, in order to gauge progress and inform subsequent learning steps.
Generic skill	Skills which are deployed in all subjects, and which enhance the learning of those subjects. These skills also equip young people for work and for life.
Inclusion	An approach to planning learning experiences which allows each student to feel confident, respected and safe and equipped to learn at his or her full potential.
Learning Outcome	A statement which specifies what the learner should know, under-stand, or be able to do within a particular aspect of a subject.
Process Skill	A capability acquired by following the programme of study in a particular Learning Area; enables a learner to apply the knowledge and understanding of the Learning Area.
Sample Assessment Activity	An activity which gives a learner the opportunity to show the ex-tent to which s/he has achieved the Learning Outcomes. This is usually pat of the normal teaching and learning process, and not something extra at the end of a topic.
Suggested Learning Activity	An aspect of the normal teaching and learning process that will enable a formative assessment to be made.

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