



La-Net

AGE 206

TEACHING VOCATIONAL AGRICULTURE IN SCHOOLS



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Course code: AGE 206

Course title: Teaching Vocational Agriculture in Schools

Course credit load: 2 Units

Series 1: Philosophy, Units, and Methods of Teaching Vocational Agriculture

- **Part 1.1: Philosophy of Vocational Agriculture Education**
 - Sub Part 1.1.1: Definition and rationale of vocational agriculture education
 - Sub Part 1.1.2: Historical development and policy framework in Nigeria
 - Sub Part 1.1.3: Goals and objectives of vocational agriculture education
- **Part 1.2: Teaching Units and Sequences**
 - Sub Part 1.2.1: The teaching unit: concept and structure
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- **Part 1.3: Methods of Teaching Vocational Agriculture**
 - Sub Part 1.3.1: Lecture and discussion techniques
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Introduction

Vocational agriculture education is more than the teaching of farming skills. It is a deliberate educational programme grounded in a philosophy that connects agricultural knowledge to national development, food security, and rural livelihood improvement. Understanding this philosophy is the starting point for every teacher of agriculture, because it determines what is taught, how it is taught, and why it matters. Without a clear philosophical foundation, agricultural teaching becomes a collection of unrelated techniques rather than a coherent educational enterprise.

The aim of this Series is to introduce the philosophy underlying vocational agriculture education, the structure of teaching units and sequences, the major instructional methods used in the agriculture classroom, and the strategies for managing diverse learners and evaluating student performance. We shall begin with the definition and rationale of vocational agriculture education, move through unit and lesson planning, cover the main teaching methods, and conclude with planning for diverse students and assessment.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 1.1** define vocational agriculture education and explain its rationale in the Nigerian context (Linked to Part 1.1),
- **SLO 1.2** describe the historical development and policy framework of vocational agriculture education in Nigeria (Linked to Part 1.1),
- **SLO 1.3** state the goals and objectives of vocational agriculture education at the secondary and post-secondary levels (Linked to Part 1.1),
- **SLO 1.4** define a teaching unit and describe its major components (Linked to Part 1.2),
- **SLO 1.5** develop a teaching sequence and a lesson plan for an agriculture topic (Linked to Part 1.2),
- **SLO 1.6** describe the lecture, discussion, demonstration, laboratory, and project methods of teaching and state when each is most appropriate (Linked to Part 1.3),



- **SLO 1.7** explain supervised agricultural experience (SAE) and its role in vocational agriculture education (Linked to Part 1.3),
- **SLO 1.8** develop a teaching plan for students with special learning needs (Linked to Part 1.4), and
- **SLO 1.9** construct valid tests and explain the principles of grading in agricultural education (Linked to Part 1.4).

1.1 Philosophy of Vocational Agriculture Education

1.1.1 Definition and rationale of vocational agriculture education

Vocational agriculture education is a planned programme of instruction designed to develop in students the knowledge, skills, attitudes, and values needed for employment and self-employment in agriculture and agribusiness. It differs from academic agricultural science in its deliberate emphasis on practical competence and occupational readiness. The learner acquires not only theoretical understanding but also the manipulative skills, problem-solving ability, and entrepreneurial orientation needed to function productively in agricultural enterprises.

The rationale for vocational agriculture education in Nigeria rests on three pillars: economic necessity (agriculture contributes approximately 25 per cent of GDP and employs over 70 per cent of the rural workforce, yet suffers from a severe skills deficit among practitioners), food security (the country remains a net importer of several staple foods that could be produced domestically with a better-trained agricultural workforce), and rural development (equipping young people with agricultural skills and enterprise knowledge creates productive employment in rural communities and reduces rural-to-urban migration).

Fill in the blank: Vocational agriculture education develops _____, skills, attitudes, and values for employment and self-employment in agriculture, distinguishing it from purely academic agricultural science.



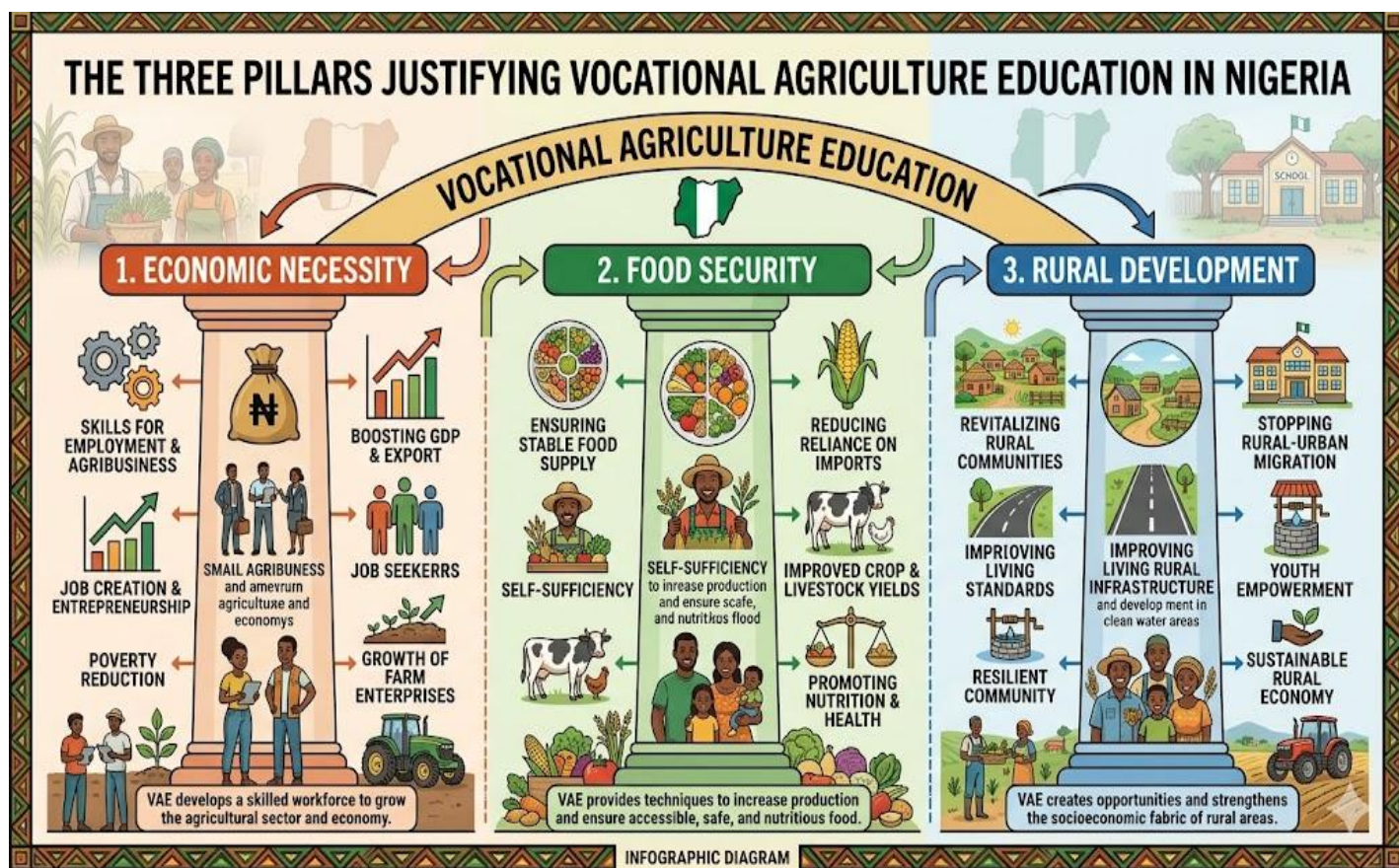


Figure 1.1: Diagram showing the three pillars of the rationale for vocational agriculture education in Nigeria

1.1.2 Historical development and policy framework in Nigeria

Formal agricultural education in Nigeria began in the colonial period with farm schools established in the 1920s and 1930s to produce agricultural assistants and junior extension workers. The post-independence period saw agricultural science introduced into secondary school curricula through the West African Examinations Council syllabus. The National Policy on Education (NPE) of 1977, revised in 1981 and subsequently, formalised vocational and technical education as a distinct stream, recommending that 60 per cent of secondary school enrolment should be in vocational and technical subjects, including agriculture.

Current policy is guided by the Nigerian Educational Research and Development Council (NERDC) curriculum for Basic Education and Senior Secondary School, the Universal Basic Education (UBE) Act of 2004, and the National Board for Technical Education (NBTE)



standards for vocational and technical colleges. The 6-3-3-4 system (six years primary, three years junior secondary, three years senior secondary, four years tertiary) placed agriculture in the core curriculum of junior secondary school and as an elective in senior secondary. Agriculture teachers are now required to hold the Nigeria Certificate in Education (NCE) or a bachelor's degree with agricultural education specialisation.

Fill in the blank: The National Policy on Education of _____ formalised vocational and technical education in Nigeria, recommending that 60 per cent of secondary school enrolment should be in vocational and technical subjects.

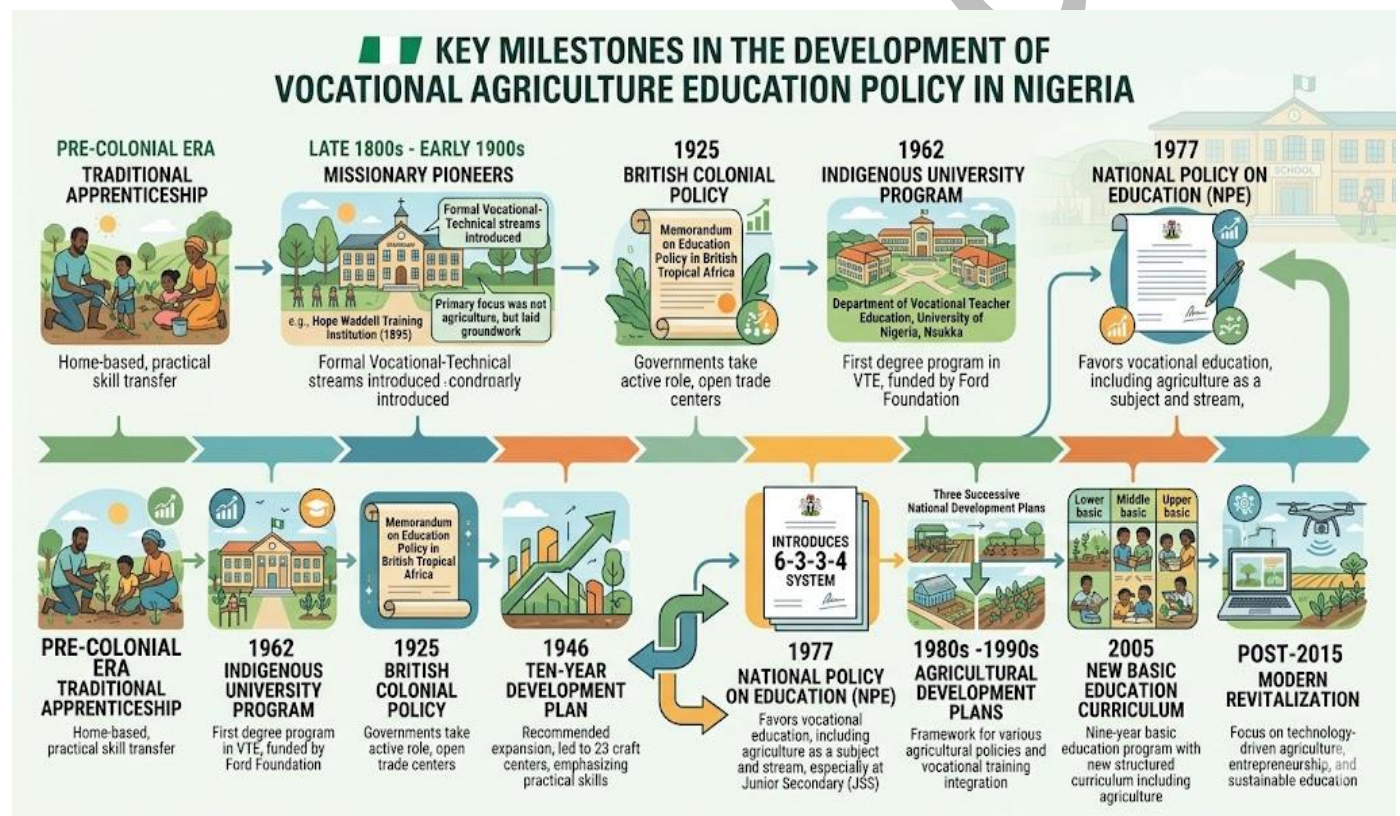


Figure 1.2: Timeline of the development of vocational agriculture education policy in Nigeria

1.1.3 Goals and objectives of vocational agriculture education

The overarching goal of vocational agriculture education is to produce graduates who are occupationally competent, economically productive, and capable of contributing to agricultural development at the individual, community, and national levels. Specific goals include:



developing practical competence in crop and animal production, agribusiness management, and farm mechanisation; fostering entrepreneurial attitudes and the willingness to engage in farming as a dignified and profitable occupation; and preparing students for further education in agriculture at the post-secondary and tertiary levels.

At the secondary level, the objectives of agricultural science are to enable students to acquire basic knowledge and skills in food and fibre production, understand the importance of agriculture in the national economy, and develop positive attitudes toward farming. At the vocational and technical college level, the objectives extend to producing competent technicians capable of immediate employment in agricultural enterprises and agribusinesses. The NBTE and NERDC specify competency-based objectives that define the minimum standard of performance expected of graduates at each level.

Fill in the blank: The overarching goal of vocational agriculture education is to produce graduates who are occupationally _____, economically productive, and capable of contributing to agricultural development.



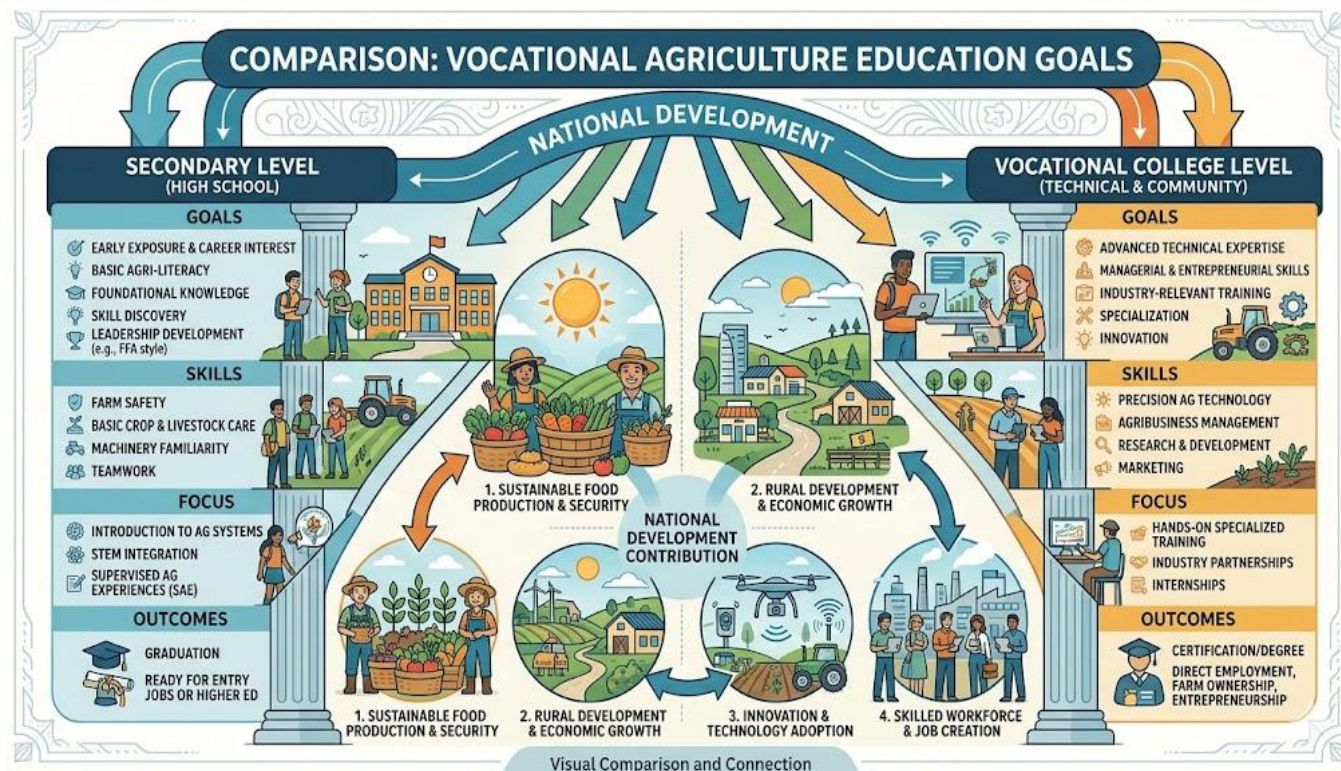


Figure 1.3: Diagram showing the goals of vocational agriculture education at secondary and vocational college levels

Pilot questions 1.1

1. Define vocational agriculture education and explain how it differs from academic agricultural science.
2. State the three pillars of the rationale for vocational agriculture education in Nigeria.
3. Describe two milestones in the historical development of vocational agriculture education in Nigeria.
4. State three goals of vocational agriculture education at the secondary school level.
5. Explain the role of NERDC and NBTE in vocational agriculture education in Nigeria.



1.2 Teaching Units and Sequences

1.2.1 The teaching unit: concept and structure

A teaching unit is a comprehensive plan for teaching a major topic or theme over a period of several lessons. It provides the structural framework within which individual lessons are organised to achieve a coherent set of learning outcomes. The major components of a teaching unit are: the unit title (identifying the topic), objectives (what students will know, do, or value by the end of the unit), content outline (the subject matter to be covered), instructional methods (how the content will be taught), materials and resources (textbooks, charts, specimens, tools), time allocation, and evaluation plan (how achievement will be assessed).

Teaching units in vocational agriculture should be designed around competencies, that is, the specific tasks or skills that students must demonstrate at an acceptable level of performance. A competency-based unit for crop production, for example, might include competencies such as soil preparation, seed selection, planting, fertiliser application, pest management, and harvesting, each with its own performance criteria. Units should be logically sequenced so that prerequisite knowledge and skills are acquired before more advanced competencies are introduced.

Fill in the blank: A teaching _____ is a comprehensive plan for teaching a major topic over several lessons, comprising objectives, content outline, instructional methods, resources, time allocation, and evaluation plan.



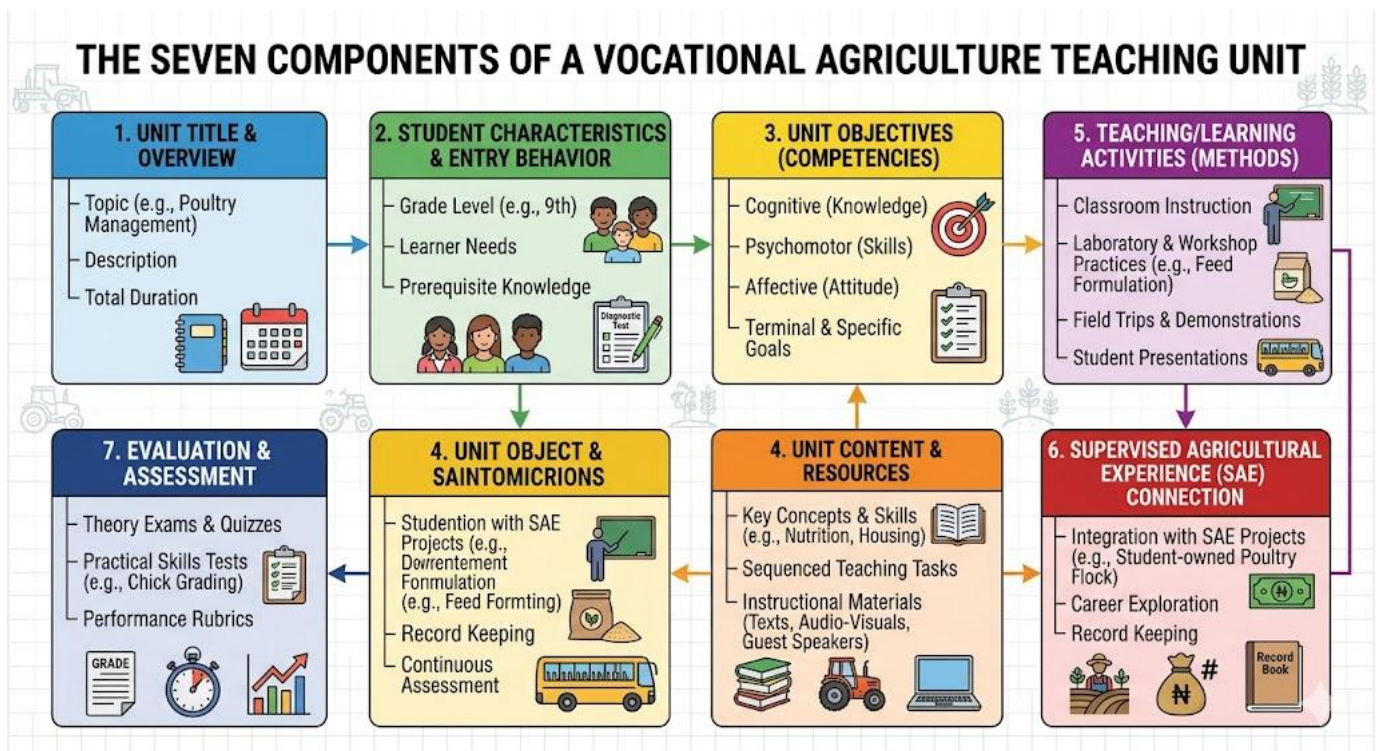


Figure 1.4: Diagram showing the components of a teaching unit in vocational agriculture

1.2.2 Teaching sequence and lesson planning

A teaching sequence is the ordered arrangement of topics and lessons within a unit to achieve logical, progressive learning. The sequence should move from simple to complex, from known to unknown, and from concrete to abstract. In vocational agriculture, effective sequences often mirror the natural production cycle: a unit on poultry production, for example, might sequence lessons from housing design through stock selection, feeding, health management, to marketing, following the logical order of a production enterprise.

A lesson plan is the detailed plan for a single teaching period (typically 40 to 60 minutes). A standard lesson plan includes: the lesson topic, class level, date and duration, learning objectives (specific, measurable outcomes for the lesson), entry behaviour (what students already know that connects to the new lesson), presentation steps (how the teacher introduces and develops the topic), student activities, summary and conclusion, assignment, and evaluation. Every vocational agriculture lesson should include an application activity that connects the classroom content to a practical skill or farm operation.



Fill in the blank: A lesson plan is the detailed plan for a single teaching period; it must include the learning _____, entry behaviour, presentation steps, student activities, and evaluation.

VOCATIONAL AGRICULTURE LESSON PLAN TEMPLATE

Teacher Name: _____ Date: _____

Course/Subject: Introduction to Agribusiness

Unit Title: _____ Grade Level(s): _____

Lesson Title: Principles of Farm Safety Time Allotted: 60 minutes

Key Concepts/Topic:
Understanding potential hazards and safe operating procedures in a farm environment.

Rationale/Context:
Explaining why this lesson is important in vocational agriculture.

Learning Objectives (measurable & specific)
1. _____
2. _____
3. _____

Standards & Competencies (State/National/AFNR):

Required Materials & Equipment:
• Projector
• safety goggles
• example tools
• safety worksheets

Vocabulary/Key Terms:
• PPE
• Hazard
• MSDS
• Lockout/Tagout

Procedure (detailed steps):
• Introduction/Anticipatory Set (5-10 mins): _____

• Instructional Input/Modeling (15-20 mins): _____

Procedure (detailed steps):
• Introduction/Anticipatory Set (5-10 mins): _____

• Instructional Input/Modeling (15-20 mins): _____

Instructional Input/Modeling (15-20 mins):
Instructional Input/Modeling _____

Guided Practice (15-20 mins):
Guided Practice practice _____

Independent Practice/Application (10-15 mins):
Students complete safety hazard identification worksheets or participate in a simulated tool inspection. _____

Closure (5 mins): _____

Assessment/Evaluation (Formative & Summative):
• Exit tickets during lesson; completed worksheets graded; observational checklist during practice. _____

Differentiation Strategies (for diverse learners):

Notes/Reflections/Modifications for Future Lessons:

Figure 1.5: Template of a standard lesson plan for vocational agriculture

1.2.3 Developing units of instruction for agriculture topics

Developing a unit of instruction begins with a task analysis of the agricultural enterprise or topic being taught. Task analysis identifies all the knowledge, skills, and attitudes required for competent performance of the enterprise, which become the basis of the unit's competency objectives. Sources for task analysis include the NERDC syllabus, employer and farmer surveys, competency lists from agricultural training institutions, and the teacher's own professional experience. The identified competencies are then organised into a logical teaching sequence and each lesson is planned in detail.



A complete unit of instruction for an agriculture topic such as fish pond management would include: an overview of the enterprise, safety considerations, tools and materials required, step-by-step procedures for each competency (pond construction, water management, stocking, feeding, disease management, harvesting), demonstration activities, laboratory or field exercises for each competency, evaluation criteria, and reference materials. The teacher should pilot-test the unit with students and revise it based on their performance and feedback before finalising it for repeated use.

Fill in the blank: Developing a unit of instruction begins with a _____ analysis that identifies all knowledge, skills, and attitudes required for competent performance of the agricultural enterprise being taught.

<u>Step</u>	Description
<u>1. Select the topic</u>	Identify a relevant agriculture subject area for instruction.
<u>2. Conduct task analysis</u>	Break down the topic into specific tasks and skills required.
<u>3. Write competency objectives</u>	Define measurable learning outcomes for students.
<u>4. Organise into teaching sequence</u>	Arrange tasks and objectives in logical instructional order.
<u>5. Plan individual lessons</u>	Develop lesson plans aligned with objectives and sequence.
<u>6. Select methods and resources</u>	Choose teaching strategies, tools, and materials to support learning.
<u>7. Develop evaluation tools</u>	Create assessments to measure student achievement of objectives.
<u>8. Pilot-test and revise</u>	Implement the unit, gather feedback, and refine for improvement.

Box 1.1: Steps in developing a unit of instruction for an agriculture topic

Pilot questions 1.2

1. Name the seven components of a teaching unit.
2. Explain what a competency-based teaching unit is and give one example from crop production.
3. Describe the principle of sequencing in a teaching sequence and give an example from animal production.



4. List the components of a standard lesson plan for vocational agriculture.
5. Outline the steps in developing a unit of instruction for a vocational agriculture topic.

1.3 Methods of Teaching Vocational Agriculture

1.3.1 Lecture and discussion techniques

The lecture method is the most widely used teaching method in Nigerian secondary schools. The teacher presents information verbally while students listen and take notes. Its advantages are that it can cover large amounts of content efficiently and suits large classes. Its limitations are that it is passive for students, reduces retention and application of knowledge, and is inappropriate for developing practical skills. In vocational agriculture, the pure lecture should be supplemented with questions, visual aids, and practical follow-up activities to improve student engagement.

Discussion techniques transform the teacher from an information transmitter into a facilitator of student thinking. In guided discussion, the teacher poses carefully prepared questions that lead students to discover or construct knowledge; this is particularly effective for topics where students have relevant experience (for example, discussing pest management practices they have observed on their own farms). Panel discussions, brainstorming, and case study analysis are variations of the discussion method that develop critical thinking, communication skills, and the ability to apply knowledge to real agricultural problems.

Fill in the blank: In guided _____, the teacher poses carefully prepared questions that lead students to construct or discover knowledge rather than simply receiving it through lecture.

<u>Aspect</u>	<u>Lecture method</u>	<u>Discussion method</u>
<u>Teacher role</u>	Primary source of information; structured delivery	Facilitator; guides and moderates student input
<u>Student role</u>	Passive listeners; note-taking	Active participants; share ideas, ask questions
<u>Content coverage</u>	Broad coverage in limited time	Narrower coverage, but deeper understanding



<u>Practical skill</u>	Limited skill development; mainly theoretical	Stronger skill development through interaction and problem-solving
<u>Class size</u>	Suitable for large groups	Best for small to medium groups
<u>Example topics</u>	Soil science principles, livestock anatomy	Farm management problems, animal health case studies

Table 1.1: Comparison of lecture and discussion methods in vocational agriculture teaching

1.3.2 Demonstration and laboratory experience

The demonstration method is among the most appropriate and widely recommended methods for vocational agriculture because it shows students exactly how a skill or procedure is performed before they attempt it themselves. An effective demonstration follows four steps: preparation (teacher prepares all materials and rehearses the procedure), presentation (teacher performs the skill slowly while explaining each step), student practice (students attempt the skill themselves under supervision), and evaluation (teacher assesses student performance). The SHOW-HOW-DO sequence (teacher shows, explains how, students do) is the practical formulation of this method.

Laboratory experience provides students with hands-on practice in a controlled setting. In vocational agriculture, the laboratory may be a greenhouse, a school farm plot, an animal husbandry facility, or a soil testing laboratory. Laboratory sessions allow students to practise skills such as seed germination testing, soil pH measurement, artificial insemination demonstration, pesticide mixing, and feed formulation. Effective laboratory management requires clear pre-lab instructions, safety precautions, adequate materials for all students, and a structured record-keeping requirement so that students document their observations and results.

Fill in the blank: An effective demonstration follows the _____ sequence: the teacher shows how a skill is performed, explains the steps, and students then practise the skill under supervision.



FOUR STEPS OF AN EFFECTIVE DEMONSTRATION IN VOCATIONAL AGRICULTURE

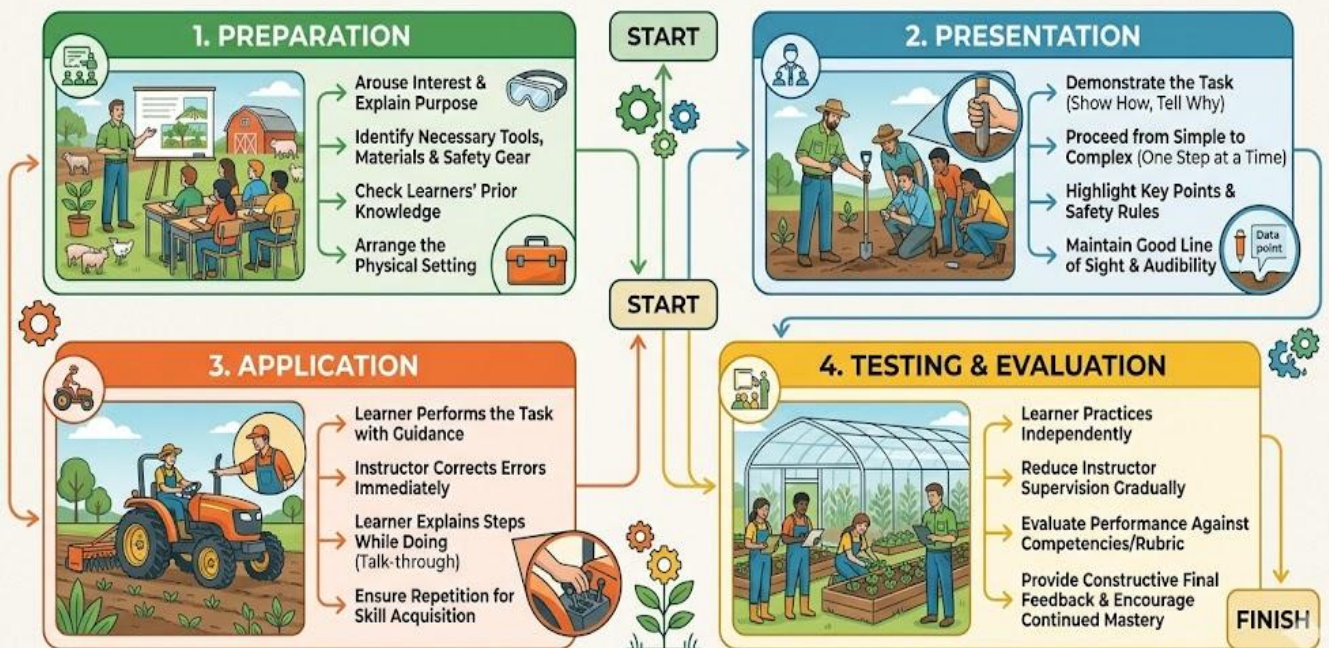


Figure 1.6: Diagram showing the four steps of an effective demonstration in vocational agriculture

1.3.3 Project method and supervised agricultural experience

The project method engages students in carrying out a complete, meaningful agricultural enterprise from planning through production to marketing and evaluation. It develops initiative, decision-making, and enterprise management skills that cannot be acquired through classroom methods alone. Projects may be carried out on the school farm, at the student's home, or on a cooperating commercial farm. Types of projects include production projects (growing a crop or raising animals for sale), improvement projects (constructing farm structures or improving a farm practice), and supplementary farm practice (assisting on a family farm while applying classroom knowledge).

Supervised agricultural experience (SAE) is the structured programme through which students apply and extend their classroom learning through planned practical agricultural activities under



the joint supervision of the agriculture teacher and an adult cooperator (parent, farmer, or employer). SAE provides authentic, real-world learning that reinforces classroom instruction, develops entrepreneurial skills, and may generate income for the student. In the United States, the FFA (Future Farmers of America) model has formalised SAE as a core pillar of agricultural education; the equivalent in Nigeria is the Junior Farmers Club or similar school agricultural society.

Fill in the blank: Supervised agricultural experience (SAE) is the structured programme through which students apply classroom learning through planned practical activities under the joint supervision of the teacher and an adult _____.

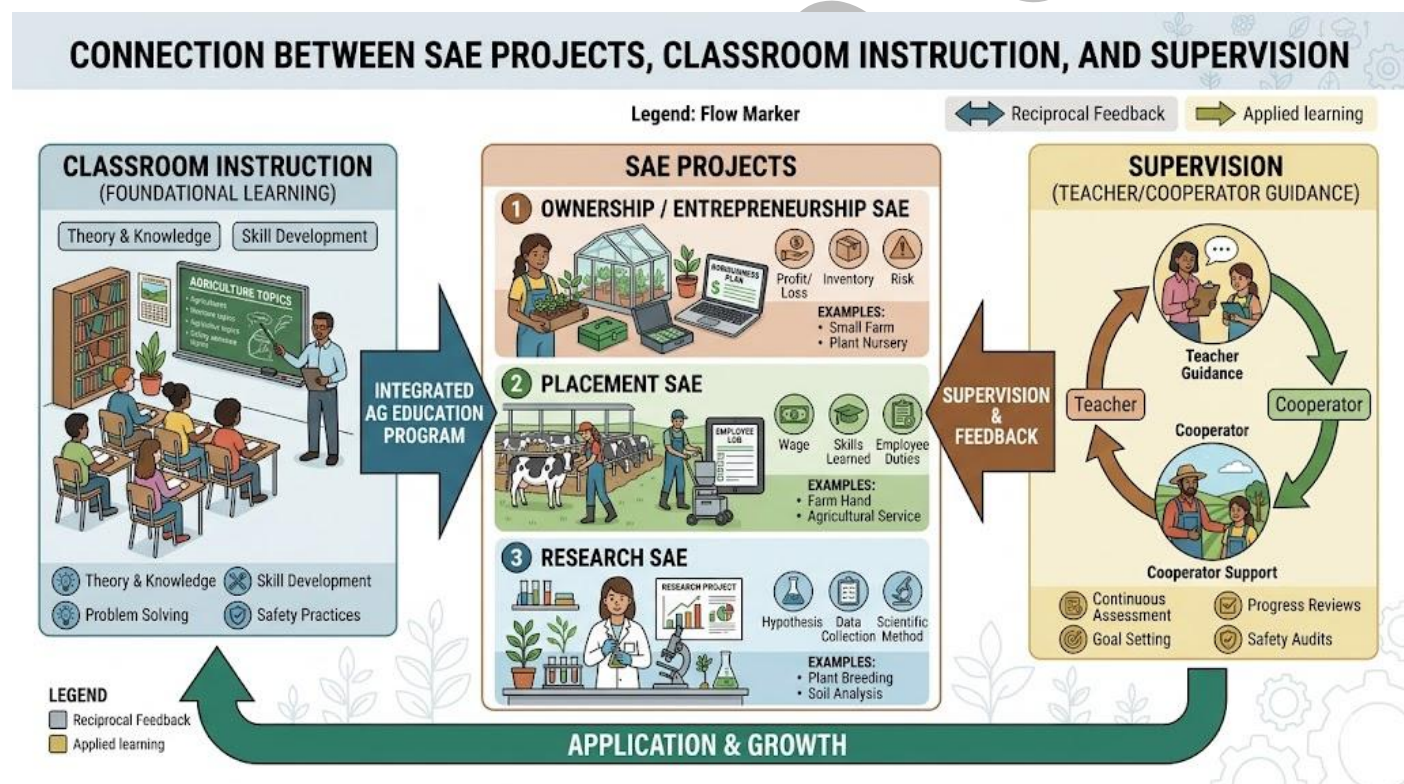


Figure 1.7: Diagram showing the three types of SAE projects and their relationship to classroom instruction

Pilot questions 1.3

1. State two advantages and two limitations of the lecture method for teaching vocational agriculture.



2. Explain how guided discussion differs from lecture and give one example from an agriculture topic.
3. Describe the four steps of an effective demonstration in vocational agriculture.
4. State three types of laboratory activities appropriate for a secondary school vocational agriculture class.
5. Define supervised agricultural experience (SAE) and name three types of SAE projects.

1.4 Instructional Strategies for Diverse Learners

1.4.1 Teaching plans for traditional and special needs students

A standard teaching plan is designed for the majority of students who learn at a typical pace and have no significant physical, sensory, or cognitive impairments. For students with special learning needs, the teacher must modify the standard plan through a process called differentiated instruction, which adjusts the content, process, product, or learning environment to match the learner's individual needs without compromising the educational objectives. In vocational agriculture, modifications may include simplified written instructions for students with reading difficulties, physical adaptations of tools for students with motor impairments, and extended time for students who process information more slowly.

An Individualised Education Plan (IEP) is a documented plan developed for a student with a diagnosed disability that specifies learning objectives, instructional strategies, support services, and assessment accommodations. While full IEP processes require specialist involvement, the vocational agriculture teacher must be aware of the needs of students with physical disabilities (mobility, vision, hearing impairments), intellectual disabilities, and learning disorders such as dyslexia and dyscalculia, and must adapt instructional materials and activities accordingly. Every student in vocational agriculture, regardless of ability, should have access to meaningful practical learning experiences.

Fill in the blank: _____ instruction adjusts the content, process, product, or environment of teaching to match individual learner needs without compromising educational objectives.



<u>Student need</u>	Instructional modifications
<u>Reading difficulty</u>	Use visual aids, diagrams, and demonstrations; provide audio recordings; simplify written materials; pair with peer tutors.
<u>Motor impairment</u>	Adapt tools and equipment (ergonomic handles, assistive devices); allow extra time for practical tasks; emphasize observation and oral responses; provide alternative assignments.
<u>Hearing impairment</u>	Use written instructions, visual cues, and sign language support; ensure good classroom acoustics; provide captioned videos; seat student close to teacher.
<u>Intellectual disability</u>	Break tasks into smaller steps; use repetition and hands-on practice; provide clear, simple instructions; focus on functional skills relevant to agriculture.

Table 1.2: Examples of instructional modifications for students with different special learning needs in vocational agriculture

1.4.2 Managing a diverse classroom population

Effective classroom management in vocational agriculture creates a learning environment in which all students can participate safely and productively. Key management strategies include: establishing clear rules and routines at the start of the school year (particularly important for practical sessions where safety is a priority), using seating arrangements that facilitate both teacher-directed and student-centred activities, setting up cooperative learning groups that leverage the diverse skills and backgrounds of students, and building positive teacher-student relationships based on mutual respect and high expectations for all learners.

Managing a diverse class in practical agriculture sessions requires additional planning. The teacher must ensure that all students, including those with physical limitations, have access to practical activities; that group sizes allow meaningful participation by every member; that safety briefings are clear and understood by all students including those with language or cognitive differences; and that evaluation of practical work accounts for effort and process rather than only the final product, giving students with different abilities the opportunity to demonstrate their learning. Peer teaching, in which more capable students assist peers, can be highly effective in vocational agriculture classes.



Fill in the blank: Effective classroom management in practical agriculture sessions requires that all students have access to activities, that group sizes allow participation by _____ member, and that safety briefings are understood by all.

<u>Strategy</u>	Key details
<u>Establish clear rules</u>	Define expectations for behavior, attendance, tool use, and respect; post visibly in classroom and workshop.
<u>Effective grouping</u>	Organize students into small teams for projects; balance skill levels to encourage peer learning.
<u>Safety briefings</u>	Begin practical sessions with reminders on equipment handling, protective gear, and emergency procedures.
<u>Peer assistance</u>	Pair stronger students with those needing support; encourage cooperative problem-solving and mentoring.

Box 1.2: Practical classroom management strategies for vocational agriculture teachers

1.4.3 Evaluating and grading students in agricultural education

Evaluation in vocational agriculture serves two purposes: formative evaluation (ongoing assessment during instruction to provide feedback and guide learning) and summative evaluation (end-of-unit or end-of-term assessment to measure achievement and assign grades). Both types are essential. Formative tools include oral questioning during class, observation checklists for practical skills, and brief written quizzes. Summative tools include end-of-unit tests, practical skill performance tests, and portfolio assessment of project work and SAE records.

A valid test for vocational agriculture measures what it claims to measure. Tests should cover both theoretical knowledge (multiple-choice, short-answer, essay questions) and practical competence (performance tests using rating scales or checklists). Grading should be criterion-referenced (comparing student performance against a defined standard of competency) rather than norm-referenced (comparing students against each other), because vocational education aims to produce all graduates who meet the competency standard, not just those who outperform their classmates. Continuous assessment, weighted at 40 per cent in the Nigerian secondary school system, should include project work and practical tests alongside written tests.



Fill in the blank: _____ evaluation is ongoing assessment during instruction that provides feedback and guides learning, while summative evaluation measures achievement at the end of a unit or term.

<u>Evaluation tool</u>	Type	What it measures	When used
<u>Quizzes</u>	Formative	Knowledge of key concepts and terminology	During lessons to check understanding
<u>Practical demonstrations</u>	Formative	Skill performance in handling tools, animals, or crops	Mid-unit or after specific skill instruction
<u>Assignments/projects</u>	Formative	Application of knowledge to real-world agricultural tasks	Throughout the unit for continuous assessment
<u>Written exams</u>	Summative	Comprehensive knowledge of theory and principles	At the end of a unit or term
<u>Performance tests</u>	Summative	Mastery of practical skills (e.g., planting, animal care)	At the end of training modules
<u>Portfolios</u>	Summative	Collection of student work showing progress and competency	End of course or program
<u>Oral questioning</u>	Formative	Immediate recall and comprehension	During class discussions or practical sessions
<u>Observation checklists</u>	Formative	Behavior, participation, and adherence to safety	Ongoing during practical activities

Table 1.3: Types of evaluation tools and their uses in vocational agriculture assessment

Pilot questions 1.4

1. Define differentiated instruction and give two examples of modifications for vocational agriculture students with special needs.
2. Explain what an Individualised Education Plan (IEP) is and state what it should contain.
3. Describe three strategies for managing a diverse class during practical agriculture sessions.
4. Distinguish between formative and summative evaluation and give one example of each in vocational agriculture.



5. Explain why criterion-referenced grading is more appropriate than norm-referenced grading in vocational agriculture.

Series Summary

This Series established the philosophical, planning, and methodological foundations of vocational agriculture teaching. We began with the definition of vocational agriculture education and its rationale on three pillars: economic necessity, food security, and rural development. We traced its historical development from colonial farm schools through the National Policy on Education and current NERDC and NBTE frameworks. We stated the goals and objectives of vocational agriculture education at secondary and vocational college levels.

We then covered the teaching unit and its seven components, the principles of teaching sequencing, and the structure of a standard lesson plan. We described the major instructional methods: lecture, guided discussion, demonstration, laboratory experience, the project method, and supervised agricultural experience. Finally, we addressed strategies for diverse learners including differentiated instruction and IEPs, practical classroom management for mixed-ability groups, and the principles of valid, criterion-referenced evaluation. By completing this Series, you should be able to achieve all nine Series Learning Outcomes (SLO 1.1 to SLO 1.9).

Glossary of Terms

- **Competency-based instruction:** a teaching approach in which the curriculum is organised around specific, measurable tasks or skills that students must demonstrate at an acceptable performance standard.
- **Continuous assessment:** an ongoing system of student evaluation spread across the school term or year, including tests, projects, and practical work; weighted at 40 per cent in the Nigerian secondary school system.



- **Criterion-referenced grading:** a grading system that compares student performance against a defined competency standard rather than against the performance of other students.
- **Demonstration method:** a teaching method in which the teacher performs a skill or procedure while students observe, before students practise the skill themselves under supervision.
- **Differentiated instruction:** the adaptation of content, process, product, or learning environment to match the individual learning needs of students without compromising educational objectives.
- **Discussion technique:** a teaching approach in which the teacher facilitates student thinking through guided questions, case studies, or group dialogue rather than direct information transmission.
- **Formative evaluation:** ongoing assessment during instruction designed to provide feedback to teachers and students and to guide learning; does not contribute to final grades.
- **Guided discussion:** a structured form of classroom discussion in which the teacher uses carefully prepared questions to lead students to construct or discover knowledge.
- **Individualised Education Plan (IEP):** a documented instructional plan for a student with a diagnosed disability, specifying objectives, strategies, support services, and assessment accommodations.
- **Laboratory experience:** hands-on practical activities conducted in a school farm, greenhouse, or specialist facility where students apply agricultural skills in a controlled setting.
- **Lesson plan:** a detailed plan for a single teaching period specifying the topic, objectives, entry behaviour, presentation steps, student activities, and evaluation.
- **NBTE (National Board for Technical Education):** the Nigerian federal agency responsible for setting standards for technical and vocational education and training, including vocational agriculture at the non-degree level.
- **NERDC (Nigerian Educational Research and Development Council):** the federal agency responsible for developing and reviewing curricula for basic and senior secondary education in Nigeria, including agricultural science.
- **Norm-referenced grading:** a grading system that compares student performance against the performance of peers in the same cohort; less appropriate for vocational education than criterion-referenced grading.



- **Project method:** a teaching approach in which students carry out a complete, meaningful agricultural enterprise from planning through production to evaluation, developing initiative and enterprise skills.
- **Summative evaluation:** end-of-unit or end-of-term assessment that measures student achievement and contributes to formal grades; includes examinations, performance tests, and portfolios.
- **Supervised agricultural experience (SAE):** a structured programme through which students apply classroom learning in practical agricultural activities under the joint supervision of the agriculture teacher and an adult cooperator.
- **Task analysis:** a systematic process of identifying all knowledge, skills, and attitudes required for competent performance of an agricultural enterprise, used as the basis for developing units of instruction.
- **Teaching sequence:** the ordered arrangement of topics and lessons within a unit to achieve logical, progressive learning, moving from simple to complex and from known to unknown.
- **Teaching unit:** a comprehensive plan for teaching a major topic over several lessons, comprising objectives, content outline, instructional methods, resources, time allocation, and evaluation plan.
- **Vocational agriculture education:** a planned programme of instruction that develops knowledge, skills, attitudes, and values for employment and self-employment in agriculture and agribusiness.



Concept Check Questions [Series 1]

Objective Questions

1. Vocational agriculture education develops knowledge, _____, attitudes, and values for employment and self-employment in agriculture. (Linked to SLO 1.1)
2. The National Policy on Education of _____ formalised vocational and technical education in Nigeria. (Linked to SLO 1.2)
3. A teaching unit is a comprehensive plan for teaching a major topic and must include objectives, content outline, methods, resources, time allocation, and an _____ plan. (Linked to SLO 1.4)
4. An effective demonstration follows the _____ sequence: the teacher shows, explains how, and students practise. (Linked to SLO 1.6)
5. _____ evaluation is ongoing assessment during instruction that provides feedback and guides learning. (Linked to SLO 1.9)

Short-Answer Questions

6. State the three pillars of the rationale for vocational agriculture education in Nigeria. (Linked to SLO 1.1)
7. Describe the principle of sequencing in a teaching unit and explain why it is important. (Linked to SLO 1.5)
8. Compare the lecture and demonstration methods for teaching a skill such as grafting in crop production. (Linked to SLO 1.6)
9. Define supervised agricultural experience (SAE) and name three types of SAE projects. (Linked to SLO 1.7)
10. Explain criterion-referenced grading and state why it is preferred over norm-referenced grading in vocational education. (Linked to SLO 1.9)

Long-Answer Questions



11. Analyse the philosophy of vocational agriculture education in Nigeria, explaining its definition, rationale, historical development, and goals at secondary and vocational college levels. (Linked to SLOs 1.1, 1.2, 1.3)
12. Describe the major methods of teaching vocational agriculture, comparing the lecture, discussion, demonstration, laboratory, project, and SAE methods in terms of their suitability for developing different types of agricultural learning outcomes. (Linked to SLOs 1.6, 1.7)
13. Evaluate the strategies for teaching diverse students in vocational agriculture, explaining differentiated instruction and IEPs, classroom management in practical sessions, and the principles of valid, criterion-referenced evaluation and continuous assessment. (Linked to SLOs 1.8, 1.9)

Answers to Concept Check Questions [Series 1]

Objective Questions

1. Skills.
2. 1977.
3. Evaluation.
4. SHOW-HOW-DO.
5. Formative.

Short-Answer Questions

6. Economic necessity (agriculture contributes approximately 25% of GDP and employs over 70% of the rural workforce but suffers from a severe skills deficit); food security (Nigeria imports several staple foods that could be produced domestically with a better-trained workforce); rural development (equipping young people with agricultural skills creates productive rural employment and reduces urban migration).
7. Sequencing is the ordering of topics and lessons to achieve progressive, logical learning, moving from simple to complex, from known to unknown, and from concrete to abstract. It is important because students cannot master advanced competencies without the prerequisite knowledge and



skills; poor sequencing creates gaps in understanding and demotivates learners who encounter concepts they are not prepared for.

8. Lecture: the teacher verbally explains the steps of grafting while students listen; covers information quickly but students remain passive and gain no practical skill. Demonstration: the teacher performs the grafting procedure step-by-step while students observe, then students practise under supervision; directly develops the manipulative skill, transfers knowledge into practical competence, and is far more effective for a practical task such as grafting. Demonstration is clearly more appropriate for a skill-based topic.
9. SAE is the structured programme through which students apply classroom learning in planned practical agricultural activities under the joint supervision of the agriculture teacher and an adult cooperator. Three types of SAE projects: production projects (student produces a crop or raises livestock for sale, developing enterprise skills); improvement projects (student constructs a farm structure or improves a farming practice); supplementary farm practice (student assists on a family or cooperating farm while applying classroom knowledge).
10. Criterion-referenced grading compares student performance against a defined competency standard (for example, a student must correctly identify five common crop diseases to pass the practical assessment). It is preferred in vocational education because the purpose of the programme is to ensure that every graduate meets the competency standard required for employment; norm-referenced grading (which ranks students against each other) could result in a class "pass" even if no student has met the employment-readiness standard.

Long-Answer Questions

11. Definition: planned programme developing knowledge, skills, attitudes, and values for agricultural employment and self-employment; differs from academic agricultural science in emphasis on practical competence. Rationale: economic necessity (25% GDP, 70% rural employment, skills deficit), food security (net food importer, better-trained workforce could increase domestic production), rural development (creates rural employment, reduces urban migration). History: colonial farm schools 1920s-1930s, WAEC agricultural science syllabus post-independence, National Policy on Education 1977 (60% vocational enrolment target), 6-3-3-4 system placing agriculture in core and elective curriculum, UBE Act 2004, current NERDC and NBTE frameworks. Goals: secondary level (practical knowledge and skills in food production, positive attitude to farming, understanding of agriculture in national economy); vocational college



level (occupational competence, technician standard, entrepreneurship, readiness for employment).

12. Lecture: efficient content delivery, suits large classes, passive for students, inappropriate for skill development; best for introducing concepts and theoretical background. Guided discussion: teacher facilitates student thinking through prepared questions; develops critical thinking and application; best for topics where students have relevant experience. Demonstration: teacher performs skill while explaining, students observe then practise; the most appropriate method for developing practical agricultural skills (grafting, soil testing, artificial insemination, pesticide mixing); follows SHOW-HOW-DO sequence. Laboratory experience: students practise skills in school farm or specialist facility under supervision; reinforces demonstration; develops manipulative competence. Project method: students carry out a complete enterprise (crop production, poultry raising) from planning to marketing; develops initiative, decision-making, enterprise management. SAE: structured real-world practice under teacher and cooperator supervision; production, improvement, or supplementary practice types; reinforces all classroom learning in authentic contexts.
13. Differentiated instruction: adjusts content (simplified materials), process (extended time, peer support), product (alternative assessment formats), or environment (seating, tool adaptations) to match individual needs without reducing objectives. IEP: documented plan for students with diagnosed disabilities; specifies objectives, strategies, services, and assessment accommodations; requires specialist input but teacher must implement. Practical class management: clear rules and safety routines, cooperative groups with assigned roles, access for all including physically limited students, peer teaching pairs, immediate feedback during practical work. Valid criterion-referenced evaluation: tests should cover both theory (MCQ, short answer, essay) and practical competence (performance tests with rating scales or checklists); criterion-referenced means comparing performance against the competency standard, not against peers; ensures all graduates are employment-ready. Continuous assessment: 40% of final grade in Nigerian secondary system; should include project work, practical tests, and SAE records alongside written tests; provides ongoing feedback and reduces dependence on end-of-term examinations.

Answers to Pilot Questions [Series 1]

Part 1.1: Philosophy of Vocational Agriculture Education



1. Vocational agriculture education is a planned programme of instruction designed to develop knowledge, skills, attitudes, and values needed for employment and self-employment in agriculture and agribusiness. It differs from academic agricultural science in its deliberate emphasis on practical competence and occupational readiness: while academic agricultural science focuses on understanding biological and scientific principles, vocational agriculture education ensures that students can actually perform agricultural tasks at an employable standard.
2. Economic necessity (agriculture contributes approximately 25 per cent of GDP and employs over 70 per cent of the rural workforce but suffers from a severe skills deficit among practitioners); food security (Nigeria imports several staple foods that a better-trained agricultural workforce could produce domestically); rural development (equipping young people with agricultural skills and enterprise knowledge creates productive rural employment and reduces rural-to-urban migration).
3. Any two: colonial farm schools in the 1920s and 1930s established by the colonial government to produce agricultural assistants and junior extension workers, providing the first formal agricultural education in Nigeria. National Policy on Education of 1977, which formalised vocational and technical education as a distinct stream, recommended 60 per cent of secondary school enrolment in vocational and technical subjects, and placed agriculture centrally in the secondary curriculum.
4. Any three: to develop in students practical competence in crop and animal production, agribusiness management, and farm mechanisation; to foster entrepreneurial attitudes and the willingness to engage in farming as a dignified and profitable occupation; to prepare students for further education in agriculture at post-secondary and tertiary levels; to enable students to understand the importance of agriculture in the national economy.
5. NERDC (Nigerian Educational Research and Development Council) develops and reviews the curricula for basic and senior secondary education in Nigeria, including the agricultural science syllabuses that define what must be taught at each level. NBTE (National Board for Technical Education) sets standards for technical and vocational colleges including vocational agriculture programmes at the non-degree level, specifying the competency outcomes that graduates must achieve for their qualifications to be nationally recognised.

Part 1.2: Teaching Units and Sequences



1. Unit title, objectives, content outline, instructional methods, materials and resources, time allocation, and evaluation plan.
2. A competency-based teaching unit is one in which the curriculum is organised around specific, measurable tasks or skills that students must demonstrate at an acceptable performance standard, rather than around topics for knowledge transmission alone. Example from crop production: a unit on maize production might include competencies such as soil preparation to the required tilth, seed selection at a germination rate above 85 per cent, correct spacing and depth of planting, calculation and application of the appropriate fertiliser rate, identification and management of common maize pests, and harvesting at physiological maturity, each with defined performance criteria.
3. The principle of sequencing requires that topics and lessons within a teaching unit are arranged in a logical, progressive order, moving from simple to complex, from known to unknown, and from concrete to abstract, so that each lesson builds on what was learned in the previous one. Example from animal production: a unit on layer poultry management might sequence lessons as follows: housing design and construction (concrete and observable), then selection of point-of-lay pullets, then feed and water management, then health and disease management, then egg collection and grading, then marketing and financial records; this follows the actual logical progression of a poultry enterprise.
4. Lesson topic, class level, date and duration, learning objectives (specific and measurable), entry behaviour (what students already know connecting to the new lesson), presentation steps (introduction, development, conclusion), student activities, assignment, and evaluation.
5. (1) Select the topic and confirm it is in the curriculum. (2) Conduct a task analysis to identify all knowledge, skills, and attitudes needed for competent performance of the enterprise. (3) Write competency-based objectives for each identified task. (4) Organise the objectives into a logical teaching sequence. (5) Plan individual lessons for each objective or group of related objectives. (6) Select appropriate instructional methods and resources for each lesson. (7) Develop evaluation tools (checklists, performance tests, written tests) for each competency. (8) Pilot-test the unit with students and revise based on performance and feedback.

Part 1.3: Methods of Teaching Vocational Agriculture

1. Two advantages: can cover large amounts of content efficiently in a single teaching period; is familiar to most students and teachers and requires minimal additional resources. Two



limitations: students remain passive, reducing engagement, retention, and application; it is entirely inappropriate for developing practical agricultural skills that require hands-on practice.

2. In lecture the teacher transmits information directly and students receive it passively with little opportunity to think critically or apply knowledge. In guided discussion the teacher prepares carefully sequenced questions that require students to think, recall, reason, and connect ideas, guiding them to construct or discover knowledge themselves. Example from agriculture: a teacher wishing to develop understanding of integrated pest management could lecture on the definition and components of IPM, or could guide a discussion by asking: "What problems have you observed from using only chemical pesticides on your farm? What other methods have you seen used? How could these methods be combined?" leading students to construct the concept of integration themselves.
3. (1) Preparation: the teacher gathers all materials and equipment, arranges the demonstration space so all students can observe, and rehearses the procedure to ensure it can be performed correctly and clearly. (2) Presentation: the teacher performs the skill slowly and deliberately while explaining each step verbally, pausing to check student understanding and repeating steps as needed. (3) Student practice: students attempt the skill themselves under the teacher's supervision; the teacher circulates, observing each student and providing immediate corrective feedback. (4) Evaluation: the teacher assesses each student's performance against a checklist or rating scale of the key steps of the procedure.
4. Any three: soil pH measurement using a field soil testing kit; seed germination testing (counting germination percentage over seven to ten days); pest identification using collected specimens and identification keys; pesticide calculation and mixing (calculating the correct dilution ratio and mixing in a knapsack sprayer with water); or compost-making (constructing a compost heap, recording temperature and moisture, and turning at the correct intervals).
5. SAE is the structured programme through which students apply and extend classroom learning in planned practical agricultural activities under the joint supervision of the agriculture teacher and an adult cooperator such as a parent, farmer, or employer. Three types: production projects (student independently plans, manages, and markets a crop or livestock enterprise, developing full enterprise management experience); improvement projects (student constructs a farm structure such as a brooder or irrigates a garden plot, or improves an existing farming practice); supplementary farm practice (student works on a family farm or cooperating commercial farm under supervision, applying classroom skills to real farm operations).



Part 1.4: Instructional Strategies for Diverse Learners

1. Differentiated instruction is the systematic adaptation of content, process, product, or learning environment to match individual student learning needs without reducing educational objectives. Two examples in vocational agriculture: (1) for a student with reading difficulties, the teacher provides pictorial instruction cards showing each step of a grafting procedure with simple captions rather than written paragraphs, enabling the student to follow the practical activity independently; (2) for a student with a motor impairment affecting hand strength, the teacher provides adapted tools (a grafting knife with a built-up grip) and assigns the student the observation, recording, and reporting role within a cooperative group so that the student participates fully in the learning activity.
2. An Individualised Education Plan (IEP) is a documented instructional plan developed for a student with a diagnosed disability that guides teachers in providing appropriate educational support. It should contain: the student's current level of performance, specific educational goals for the academic year, measurable short-term objectives for each goal, instructional strategies and support services to be provided, assessment accommodations (such as extended time, oral rather than written tests), the personnel responsible for each service, evaluation criteria and review dates, and the degree to which the student will participate in regular classroom activities.
3. Any three: establish clear safety rules and practical routines at the start of the year and enforce them consistently so that all students know what is expected before each practical session; use cooperative learning groups with assigned roles (performer, observer, recorder, reporter) so that every student, regardless of ability or physical capacity, has a meaningful contribution to the group's work; conduct a structured safety briefing before every practical session and check comprehension by asking specific students to repeat the safety instructions in their own words; use peer teaching by pairing more capable students with those who need additional support, benefiting both the tutor and the tutee.
4. Formative evaluation is ongoing assessment during instruction designed to provide feedback to teachers and students and to guide learning; example in vocational agriculture: the teacher observes students during a practical soil testing activity using a checklist of correct procedures and provides immediate verbal feedback on errors before the session ends, allowing students to correct their technique. Summative evaluation is end-of-unit or end-of-term assessment measuring achievement that contributes to formal grades: example: an end-of-unit performance test in which each student independently performs the complete procedure for soil sample



collection and pH measurement, rated against a standard checklist, and contributing to the continuous assessment grade.

5. Criterion-referenced grading compares student performance against a defined competency standard (for example, a student must correctly identify and describe the management of at least four common poultry diseases to achieve a pass in that competency). In vocational education the purpose is to certify that every graduate is occupationally competent, so the relevant question is not "did this student outperform others?" but "does this student meet the employment-readiness standard?" Norm-referenced grading could certify a student as "above average" even if the whole class failed to reach the competency standard; criterion-referenced grading prevents this by ensuring that every student who passes has actually demonstrated the required competence.

References and Attributions [Series 1]

Textual References (Books and External Sources)

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Figures, Plates, Tables, and Boxes

- Figure 1.1: Three pillars of vocational agriculture rationale Attribution: AI generated. Suggested OER search string: "vocational agriculture education rationale pillars Nigeria OER diagram".



- Figure 1.2: Vocational agriculture education policy timeline Nigeria Attribution: AI generated. Suggested OER search string: "vocational agriculture education history policy Nigeria timeline OER".
- Figure 1.3: Goals of vocational agriculture education Attribution: AI generated. Suggested OER search string: "vocational agriculture education goals secondary college Nigeria OER".
- Figure 1.4: Teaching unit components diagram Attribution: AI generated. Suggested OER search string: "teaching unit components vocational agriculture objectives evaluation OER".
- Figure 1.5: Lesson plan template Attribution: AI generated. Suggested OER search string: "lesson plan template vocational agriculture components objectives OER".
- Box 1.1: Steps in developing a unit of instruction Attribution: AI generated. Suggested OER search string: "developing unit of instruction vocational agriculture steps task analysis OER".
- Table 1.1: Lecture vs discussion method comparison Attribution: AI generated. Suggested OER search string: "lecture discussion methods vocational agriculture comparison table OER".
- Figure 1.6: Four steps of effective demonstration Attribution: AI generated. Suggested OER search string: "demonstration method vocational agriculture four steps flowchart OER".
- Figure 1.7: SAE types and classroom instruction Attribution: AI generated. Suggested OER search string: "supervised agricultural experience SAE types production improvement OER".
- Table 1.2: Instructional modifications for special needs students Attribution: AI generated. Suggested OER search string: "differentiated instruction special needs vocational agriculture modifications OER table".
- Box 1.2: Classroom management strategies Attribution: AI generated. Suggested OER search string: "classroom management strategies vocational agriculture practical sessions OER".
- Table 1.3: Evaluation tools for vocational agriculture Attribution: AI generated. Suggested OER search string: "evaluation tools vocational agriculture formative summative assessment OER table".



Course code: AGE 206

Course title: Teaching Vocational Agriculture in Schools

Course credit load: 2 Units

Series 2: Instructional Modules in Crop and Animal Production

- **Part 2.1: Concept and Structure of Instructional Modules**
 - Sub Part 2.1.1: Definition and characteristics of an instructional module
 - Sub Part 2.1.2: Components of an instructional module
 - Sub Part 2.1.3: Advantages of modular instruction in vocational agriculture
- **Part 2.2: Developing Modules for Crop Production**
 - Sub Part 2.2.1: Selecting and organising crop production content
 - Sub Part 2.2.2: Writing objectives and content for crop production modules
 - Sub Part 2.2.3: Practical activities and assessment in crop modules
- **Part 2.3: Developing Modules for Animal Production**
 - Sub Part 2.3.1: Selecting and organising animal production content
 - Sub Part 2.3.2: Writing objectives and content for animal production modules
 - Sub Part 2.3.3: Practical activities and assessment in animal modules
- **Part 2.4: Implementing and Evaluating Instructional Modules**
 - Sub Part 2.4.1: Delivering a module in the classroom and school farm
 - Sub Part 2.4.2: Evaluating module effectiveness
 - Sub Part 2.4.3: Revising and improving modules



Introduction

An instructional module is a self-contained unit of learning that focuses on a specific competency or skill. In vocational agriculture, modules allow teachers to organise instruction around the actual tasks of farming, matching what is taught in the classroom to what students will do on the farm. Modules for crop production and animal production are the most commonly developed in Nigerian secondary schools and vocational colleges.

This Series explains what an instructional module is, how it differs from a teaching unit, and how to develop, deliver, and evaluate modules for crop and animal production. We shall begin with the concept and components of an instructional module, then cover module development for crop production and animal production, and conclude with strategies for delivering, evaluating, and improving modules.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 2.1** define an instructional module and state its distinguishing characteristics (Linked to Part 2.1),
- **SLO 2.2** identify and describe the components of an instructional module (Linked to Part 2.1),
- **SLO 2.3** explain the advantages of modular instruction over traditional unit-based teaching (Linked to Part 2.1),
- **SLO 2.4** select and organise content for a crop production instructional module (Linked to Part 2.2),
- **SLO 2.5** write performance objectives and content pages for a crop production module (Linked to Part 2.2),
- **SLO 2.6** design practical activities and assessment tools for a crop production module (Linked to Part 2.2),
- **SLO 2.7** develop an instructional module for a specified animal production enterprise (Linked to Part 2.3),



- **SLO 2.8** describe strategies for delivering modules in the classroom and school farm (Linked to Part 2.4), and
- **SLO 2.9** explain how to evaluate and revise an instructional module after use (Linked to Part 2.4).

2.1 Concept and Structure of Instructional Modules

2.1.1 Definition and characteristics of an instructional module

An instructional module is a self-contained, self-paced package of learning materials designed to help a student achieve one or more specific competencies. It is focused on a single topic or task, complete in itself (the student does not need to refer to other materials to complete it), and written directly to the student. Unlike a teaching unit, which is a plan for the teacher, a module is designed for use by the student independently or with minimal teacher direction.

The key characteristics of an instructional module are: specificity (one competency or closely related set of competencies per module), self-containment (all necessary information, instructions, and activities are included), self-pacing (students progress at their own rate), performance orientation (the objective is stated in terms of what the student will do, not what the teacher will teach), and student-directed learning (the student reads, practises, and self-assesses using the module).

Fill in the blank: An instructional module is a _____ package of learning materials designed for a student to achieve specific competencies, with all necessary information and activities included.



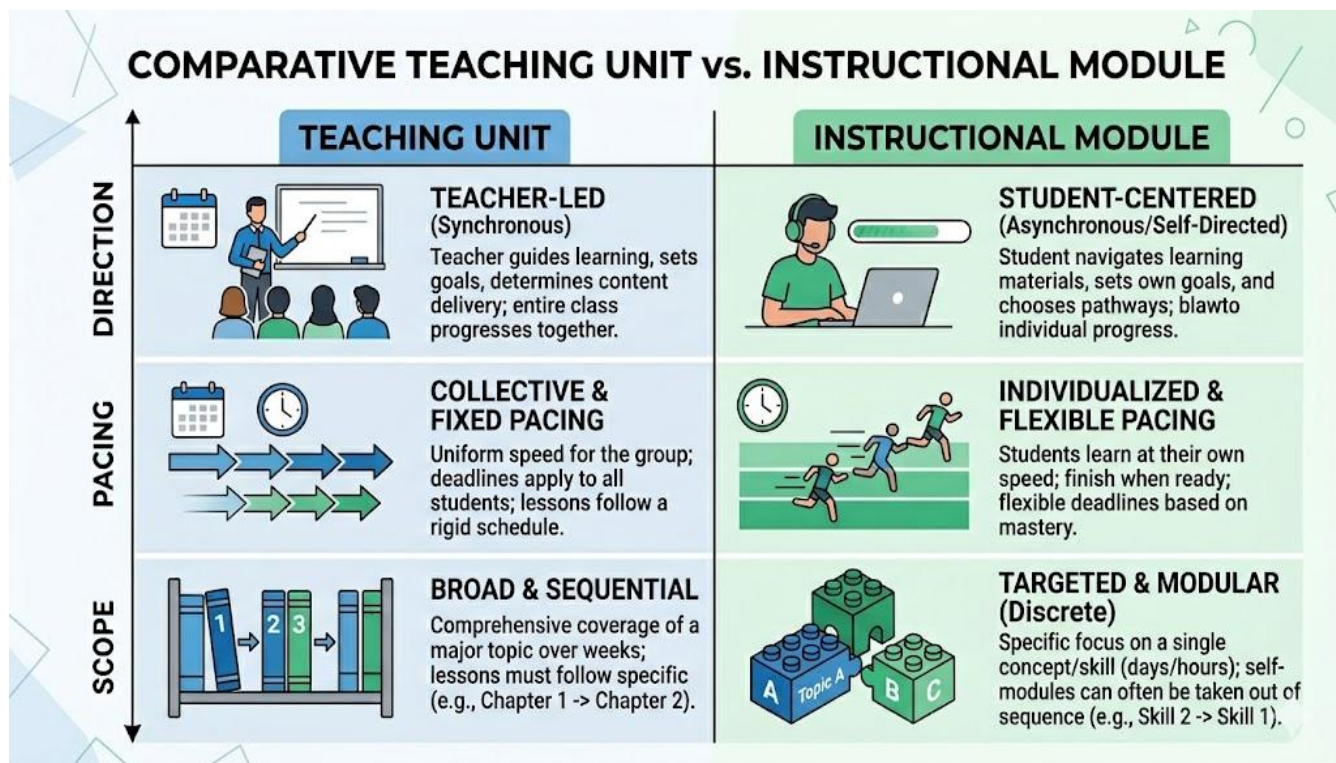


Figure 2.1: Diagram comparing a teaching unit and an instructional module

2.1.2 Components of an instructional module

A standard instructional module contains the following components: (1) Module title and code (identifying the topic and its place in the curriculum sequence). (2) Introduction (a brief statement motivating the student and explaining why the competency is important). (3) Performance objectives (measurable statements of what the student will be able to do on completing the module). (4) Pre-test (a short assessment to determine whether the student already has the knowledge or skill; students who pass the pre-test may skip the module). (5) Content pages (the subject matter, written in simple language with diagrams and illustrations).

The remaining components are: (6) Learning activities (structured tasks, exercises, and self-assessment questions that guide the student through the content). (7) Practical activities (hands-on tasks to be performed in the school farm, laboratory, or at home). (8) Post-test (a formal assessment to determine whether the student has achieved the module objectives; must be completed before the student moves to the next module). (9) References (sources of additional



reading). Every component must be present for the module to function as a self-contained learning package.

Fill in the blank: The _____ is a short assessment at the start of a module that determines whether the student already has the knowledge or skill; students who pass it may skip the module.

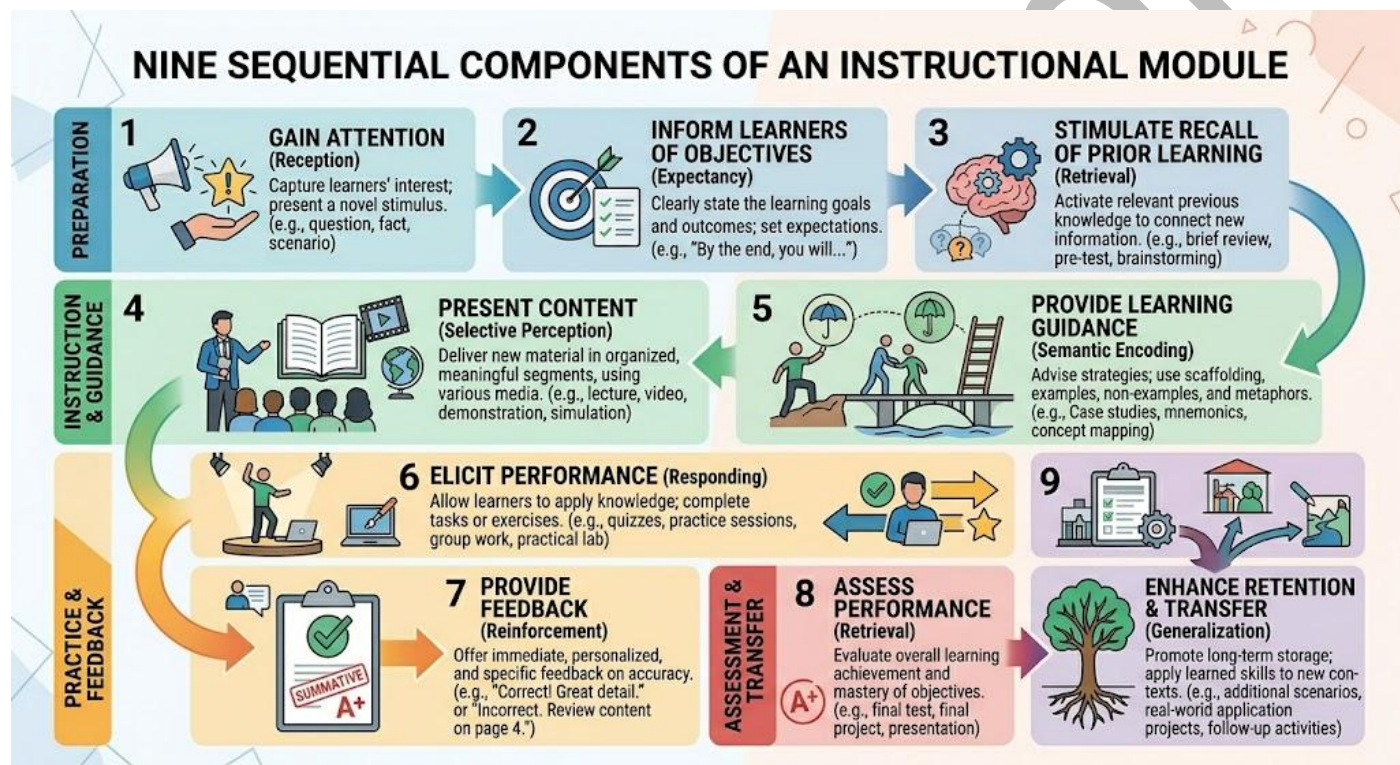


Figure 2.2: Diagram showing the nine components of an instructional module in sequence

2.1.3 Advantages of modular instruction in vocational agriculture

Modular instruction offers several advantages over conventional teacher-directed teaching.

Students work at their own pace, so fast learners are not held back and slow learners are not left behind. A student who has already mastered a competency can skip that module (using the pre-test) and move to the next, making better use of learning time. Modules can be used for remediation: a student who fails a post-test repeats only the module for the missed competency, not the entire course.



For the teacher, modules reduce the burden of repeated explanation because the information is in the module; the teacher becomes a facilitator and supervisor of practice rather than a sole information source. Modules also make the curriculum transparent and portable: other teachers can use the same module without intensive preparation. In schools with large classes or high teacher absenteeism rates, as is common in Nigeria, modules enable learning to continue even without constant teacher presence.

Fill in the blank: Modular instruction allows students who have already mastered a competency to _____ that module using the pre-test result, saving learning time.

<u>Advantage</u>	Key details
<u>Flexibility</u>	Learners progress at their own pace, accommodating diverse abilities and schedules.
<u>Practical orientation</u>	Modules emphasize hands-on skills relevant to agriculture, improving employability.
<u>Clear objectives</u>	Each module has defined competencies, making learning outcomes measurable.
<u>Adaptability</u>	Modules can be updated or replaced to reflect new agricultural practices and technologies.
<u>Accessibility</u>	Short, focused modules make training more accessible to rural learners and adult farmers.
<u>Motivation</u>	Completion of modules provides a sense of achievement, encouraging continued learning.
<u>Resource efficiency</u>	Allows targeted use of teaching materials and facilities, reducing waste.
<u>Certification opportunities</u>	Learners can earn certificates for completed modules, building credentials step by step.

Box 2.1: Advantages of modular instruction for Nigerian vocational agriculture

Pilot questions 2.1

1. Define an instructional module and state three characteristics that distinguish it from a teaching unit.
2. List the nine components of an instructional module.



3. Explain the purpose of the pre-test in an instructional module.
4. State three advantages of modular instruction for students in a Nigerian vocational agriculture class.
5. Explain how a module supports targeted remediation.

2.2 Developing Modules for Crop Production

2.2.1 Selecting and organising crop production content

Content for a crop production module is selected on the basis of a task analysis of the crop enterprise. For a maize production module, the tasks include land preparation, seed selection, planting, fertilisation, pest and disease management, harvesting, and storage. Each major task becomes either a separate module or a sub-section of a module, depending on its complexity. The tasks are then organised in the natural sequence of production, from land preparation to post-harvest handling.

Content should be drawn from the NERDC curriculum, standard agronomy texts, and locally validated best practices. It must be relevant to Nigerian growing conditions, use locally available inputs and varieties, and reflect the scale of production appropriate to the school farm or home garden. Illustrations, diagrams, and photographs should depict Nigerian farm conditions rather than images from foreign textbooks, to ensure that students can relate the module content to their own environment.

Fill in the blank: Content for a crop production module is selected through a _____ analysis of the crop enterprise that identifies all the tasks students must learn to perform.



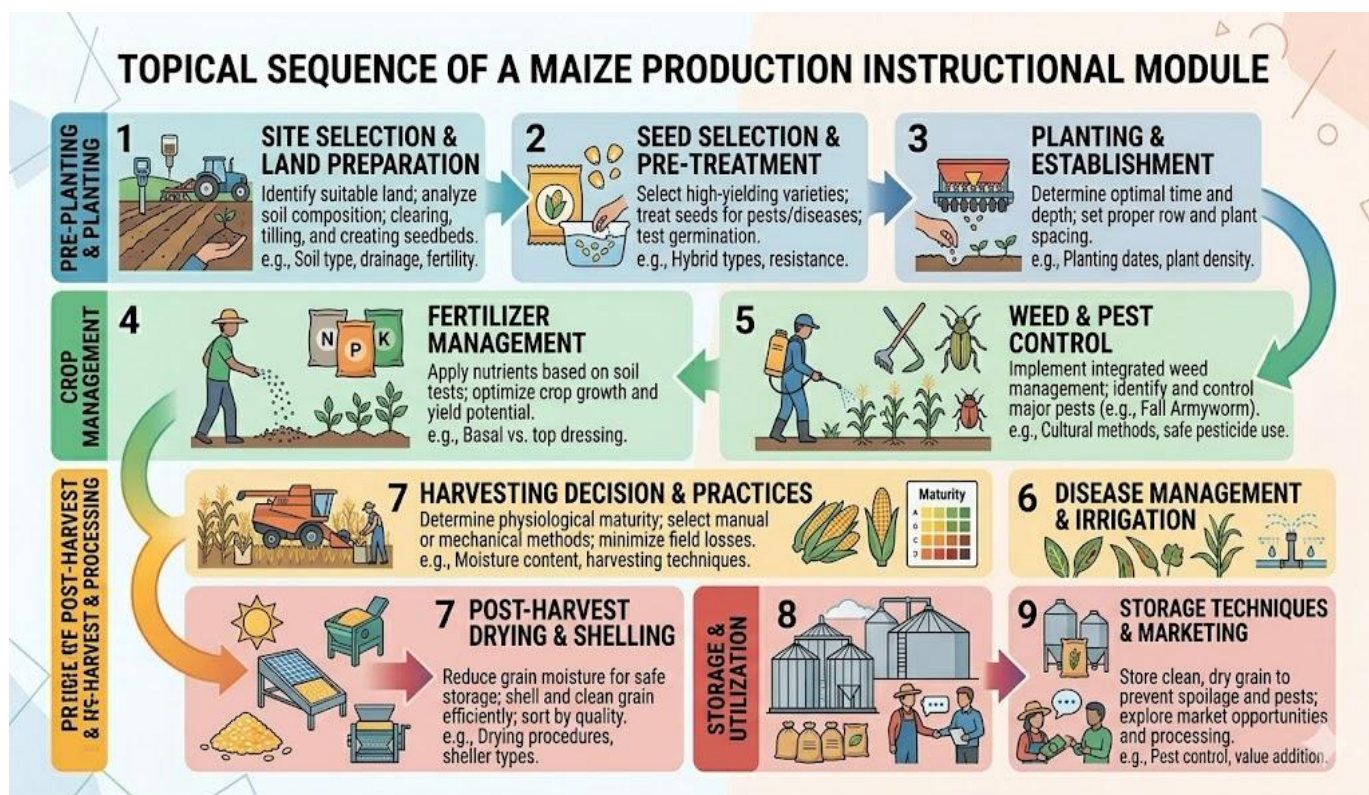


Figure 2.3: Flowchart showing the sequence of tasks in a maize production module

2.2.2 Writing objectives and content for crop production modules

Performance objectives for a crop production module must be written in behavioural terms: they state what the student will do, under what conditions, and to what standard. For example: "Given a one-hectare plot, the student will be able to prepare a seedbed for maize by ploughing, harrowing, and ridging, producing a tilth with clod size not exceeding 5 cm, within one working day." Each objective should address a single observable task and use action verbs such as identify, prepare, apply, calculate, or demonstrate.

Content pages should be written in simple, direct language at the appropriate reading level for the students. Each page should cover one idea or step and include a diagram or illustration where possible. Technical terms must be defined the first time they appear. Content should include safety warnings for hazardous operations (pesticide handling, machinery operation), worked examples for calculations (fertiliser rate, seed rate), and reference to local crop varieties, common pests, and recommended practices from national agricultural extension services.



Fill in the blank: Performance objectives for a crop production module must be written in _____ terms, stating what the student will do, under what conditions, and to what standard.

<u>Performance objective</u>	Key details
<u>Land preparation</u>	By the end of the module, students will be able to demonstrate proper land clearing, plowing, and leveling techniques for rice fields.
<u>Seed selection & planting</u>	Students will correctly identify improved rice seed varieties and perform accurate planting at recommended spacing and depth.
<u>Water & weed management</u>	Learners will apply appropriate irrigation practices and demonstrate effective weed control methods during rice growth stages.

Box 2.2: Example performance objectives for a rice production module

2.2.3 Practical activities and assessment in crop modules

Practical activities in a crop production module connect the written content to real farm operations. Each practical activity should specify the location (school farm plot, home garden), the materials and tools required, the step-by-step procedure, safety precautions, and the record sheet the student must complete. Examples include: laying out a nursery bed, conducting a germination test on a seed sample, making and applying compost, identifying five common crop pests from specimens or photographs, and calculating the amount of fertiliser needed for a given plot area.

Assessment in crop modules includes the pre-test and post-test (written), a practical performance test (the student demonstrates a skill against a checklist), and a project component where the student manages a small crop plot and submits a production record. The post-test should include both knowledge questions (multiple choice, short answer) and application questions (calculations, problem-solving). A pass mark of 70 to 80 per cent is typical for vocational competency-based modules, ensuring that students who complete a module genuinely meet the standard before progressing.



Fill in the blank: A practical performance test in a crop production module requires the student to demonstrate a skill against a _____, ensuring that the assessment reflects actual farm competence.

<u>Assessment component</u>	<u>Method</u>	<u>Weighting</u>
<u>Class participation</u>	Observation of engagement in discussions, attendance, and contribution	10%
<u>Quizzes</u>	Short written tests on crop science concepts and terminology	15%
<u>Practical fieldwork</u>	Hands-on tasks such as land preparation, planting, and crop care	30%
<u>Project/assignment</u>	Written or oral report on a vegetable production topic	15%
<u>Midterm exam</u>	Written test covering theory and applied knowledge	10%
<u>Final exam</u>	Comprehensive written and practical evaluation	20%

Table 2.1: Example assessment plan for a vegetable production module

Pilot questions 2.2

1. State two criteria for selecting content for a crop production instructional module.
2. Write one correctly stated performance objective for a cassava production module.
3. State three features that content pages of a crop module should have.
4. Describe two practical activities suitable for a maize production module.
5. Explain how the post-test for a crop production module should be structured.

2.3 Developing Modules for Animal Production

2.3.1 Selecting and organising animal production content

Animal production modules are developed for specific enterprises: layer poultry, broiler production, pig production, goat or sheep production, catfish farming, or dairy cattle management. Content is selected by task analysis of the enterprise. For a broiler production module, the tasks include house construction and preparation, chick selection and procurement,



feeding and watering management, health and vaccination management, litter management, and marketing. The tasks are sequenced in the order they occur in a production cycle.

Content must reflect conditions in Nigerian animal production: locally available feeds (maize, soyabean cake, palm kernel cake), common disease challenges (Newcastle disease, Marek's disease in poultry; African swine fever in pigs; peste des petits ruminants in small ruminants), appropriate housing designs for the Nigerian climate, and commercially available vaccines and drugs. The module should specify breed or strain recommendations relevant to smallholder Nigerian producers.

Fill in the blank: Animal production module content must reflect Nigerian conditions, including locally available _____, common disease challenges, appropriate housing designs, and commercially available vaccines.

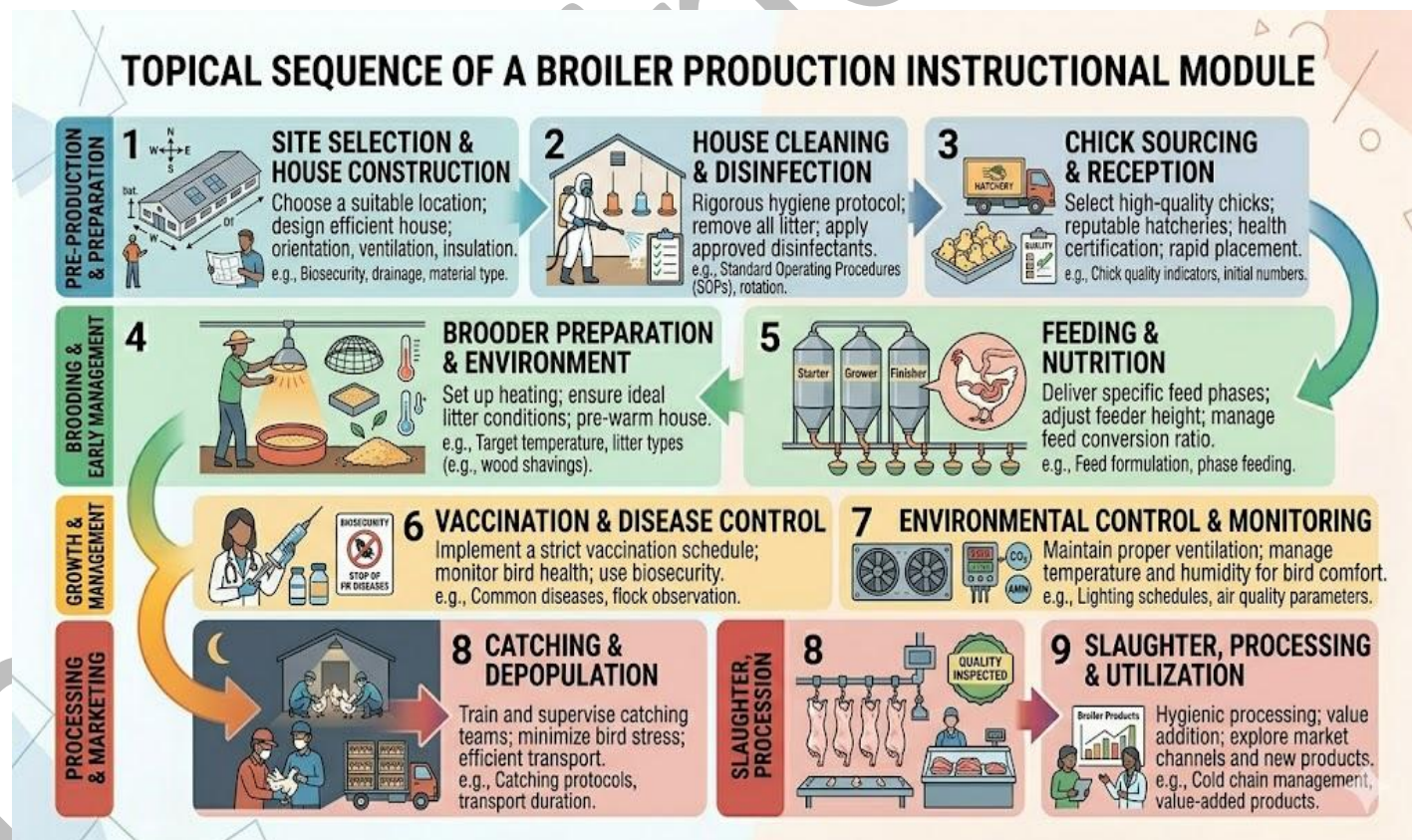


Figure 2.4: Sequence of tasks in a broiler production module



2.3.2 Writing objectives and content for animal production modules

Performance objectives for animal production modules follow the same behavioural format as crop modules. Examples for a layer poultry module: "Given a batch of 100 point-of-lay pullets, the student will calculate the daily feed requirement and prepare and present the feed correctly"; "The student will identify the clinical signs of Newcastle disease from photographs and state the appropriate response." Objectives should cover all major husbandry tasks of the enterprise.

Content pages for animal modules should include: descriptions of the animal's biological needs (space, temperature, feed, water requirements), housing specifications with labelled diagrams, a feeding programme with a ration formulation example, a health calendar showing vaccination and treatment schedules, production records the student must learn to maintain, and common problems with their causes and remedies. Worked examples, simple tables, and photographs of actual Nigerian farm conditions improve student understanding and relevance.

Fill in the blank: Content pages for animal production modules should include housing specifications, a _____ programme with ration formulation, a health calendar, and production record formats.

<u>Performance objective</u>	Key details
<u>Housing & management</u>	By the end of the module, students will be able to design and maintain appropriate housing systems for layer poultry, ensuring ventilation, hygiene, and stocking density standards.
<u>Feeding & nutrition</u>	Learners will correctly formulate and administer balanced layer rations to optimize egg production and bird health.
<u>Health & egg collection</u>	Students will demonstrate effective disease prevention practices and proper techniques for handling, collecting, and storing eggs.

Box 2.3: Example performance objectives for a layer poultry production module



2.3.3 Practical activities and assessment in animal modules

Practical activities in animal modules must be conducted on live animals or in realistic simulation. Examples include: preparing a brooder for day-old chicks (checking temperature, bedding, and water); calculating and mixing a feed ration from available ingredients using a Pearson square; vaccinating poultry against Newcastle disease (using water-administration or eye-drop method); identifying common poultry diseases from preserved specimens or photographs; and completing a one-week production record for a poultry or fish enterprise.

Assessment in animal modules includes: written pre-test and post-test covering knowledge of husbandry principles, a practical performance test (the student demonstrates a specific husbandry task such as vaccinating birds, mixing feed, or recording daily production), and a production project component where the student manages a small enterprise and presents a project report. As with crop modules, a minimum competency standard of 70 to 80 per cent on the post-test is required before progressing.

Fill in the blank: Practical activities in animal production modules must be conducted on _____ animals or in realistic simulation to ensure that students develop genuine husbandry competencies.

<u>Assessment component</u>	<u>Method</u>	<u>Weighting</u>
<u>Class participation</u>	Observation of engagement in discussions, attendance, and contribution	10%
<u>Quizzes</u>	Short written tests on poultry science concepts and terminology	15%
<u>Practical fieldwork</u>	Hands-on tasks such as brooder setup, feeding, and health checks	30%
<u>Project/assignment</u>	Written or oral report on broiler management practices	15%
<u>Midterm exam</u>	Written test covering theory and applied knowledge	10%
<u>Final exam</u>	Comprehensive written and practical evaluation	20%

Table 2.2: Example assessment plan for a broiler production module



1. Name five animal production enterprises for which instructional modules can be developed.
2. Write one correctly stated performance objective for a pig production module.
3. State three items that should appear in the content pages of an animal production module.
4. Describe two practical activities for a layer poultry production module.
5. Explain how the practical performance test is used in animal module assessment.

2.4 Implementing and Evaluating Instructional Modules

2.4.1 Delivering a module in the classroom and school farm

When delivering a module, the teacher first orients students to how a module works (how to use the pre-test, proceed through content pages, complete activities, and take the post-test). Students then work through the module at their own pace, with the teacher circulating to answer questions and supervise practical activities. Practical sessions are scheduled in blocks on the school farm; the teacher prepares all materials in advance and ensures that all students have access to the necessary tools, animals, or crop plots.

For modules with laboratory or farm components, the teacher prepares a practical schedule that allows groups to rotate through practical stations so that all students perform the practical activities within the allotted module time. The teacher records each student's progress through the module, noting which students have passed the pre-test (and may skip), which are on track, and which need additional support. Students who complete a module early may assist slower peers or begin the next module.

Fill in the blank: When delivering a module, the teacher circulates to answer questions and supervise _____ activities, while students work through the content pages and activities at their own pace.



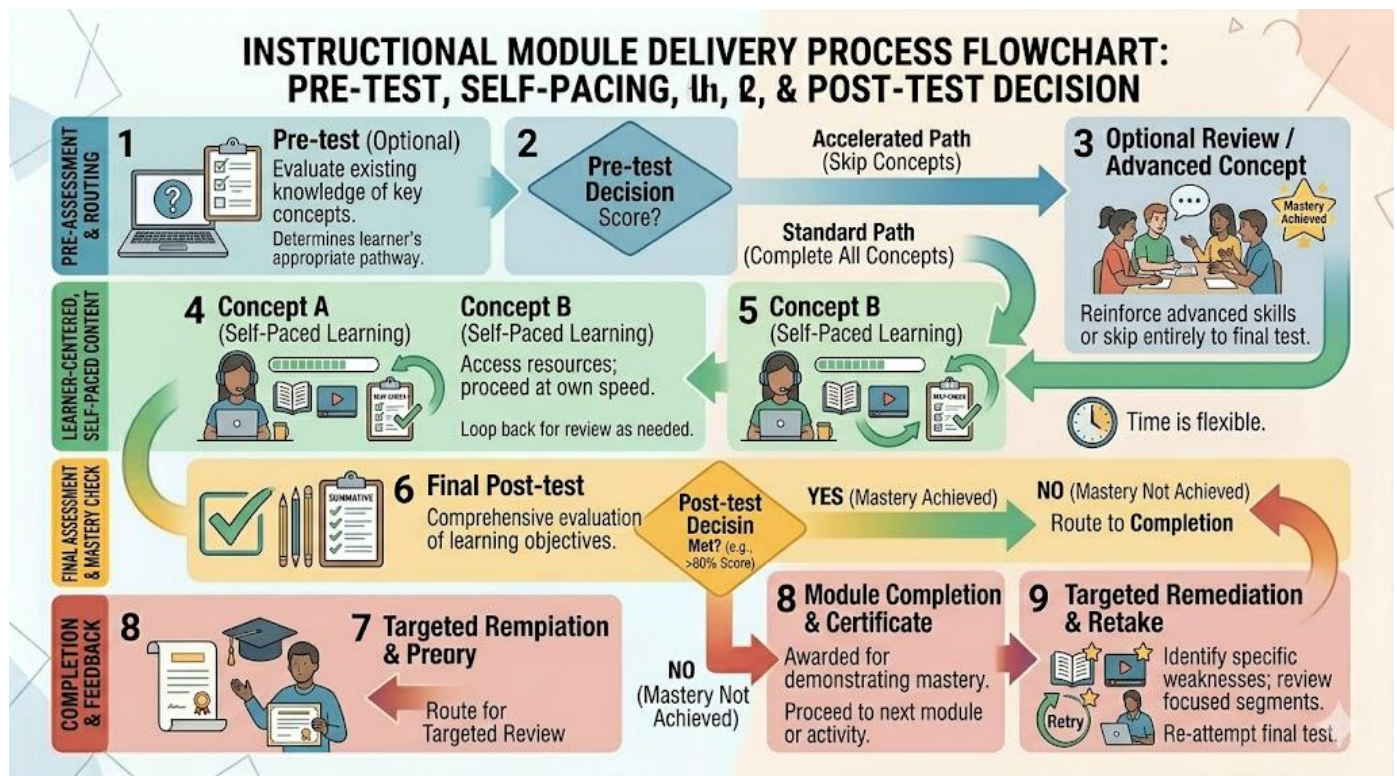


Figure 2.5: Flowchart showing the delivery process for an instructional module

2.4.2 Evaluating module effectiveness

After a module has been used, the teacher evaluates its effectiveness by examining three types of evidence: student performance data (post-test scores, practical test results, and project grades), student feedback (a brief questionnaire asking whether the instructions were clear, the activities were practical, and the content was relevant), and teacher observation notes (difficulties students encountered during learning activities and practical sessions). A module is considered effective if at least 80 per cent of students achieve the pass standard on the first attempt.

The teacher also evaluates the time efficiency of the module: if the majority of students take significantly longer or shorter than the estimated time to complete the module, the time allocation and content volume should be adjusted. Cost-effectiveness is another consideration: if practical activities require materials that the school cannot consistently supply, alternative activities using locally available substitutes should be developed. Module evaluation should be systematic and conducted every time the module is used.



Fill in the blank: A module is considered effective if at least _____ per cent of students achieve the pass standard on the first attempt at the post-test.

<u>Criterion</u>	Key details
<u>Relevance</u>	Content aligns with agricultural practices and local industry needs.
<u>Clarity of objectives</u>	Competency goals are specific, measurable, and understandable.
<u>Content coverage</u>	Module adequately addresses both theory and practical skills.
<u>Instructional methods</u>	Teaching strategies are appropriate, engaging, and inclusive.
<u>Resource adequacy</u>	Availability of tools, materials, and facilities supports learning.
<u>Student engagement</u>	Learners actively participate and apply knowledge in practice.
<u>Assessment effectiveness</u>	Evaluation tools measure competencies accurately and fairly.
<u>Adaptability</u>	Module can be revised to reflect new technologies or practices.
<u>Impact on performance</u>	Students demonstrate improved skills, productivity, and employability.

Box 2.4: Module evaluation checklist for vocational agriculture teachers

2.4.3 Revising and improving modules

Module revision is guided by the evaluation findings. If many students failed specific post-test questions, the content pages covering those topics should be rewritten with clearer explanations, more examples, or additional diagrams. If students found practical activities unclear, the step-by-step instructions should be simplified or broken into smaller steps. If the module took too long, content should be condensed or the module split into two shorter modules.

A revised module should be reviewed by a colleague or subject specialist before re-use to check for accuracy of content, clarity of language, and appropriateness of objectives. After a major revision, the module should be pilot-tested again with a small group of students before being used with the full class. A module improvement log should be kept recording what was changed, why it was changed, and the effect on student performance in subsequent uses. Good modules improve with each cycle of use and revision.

Fill in the blank: A revised module should be reviewed by a colleague or subject _____ before re-use to check accuracy, clarity of language, and appropriateness of objectives.



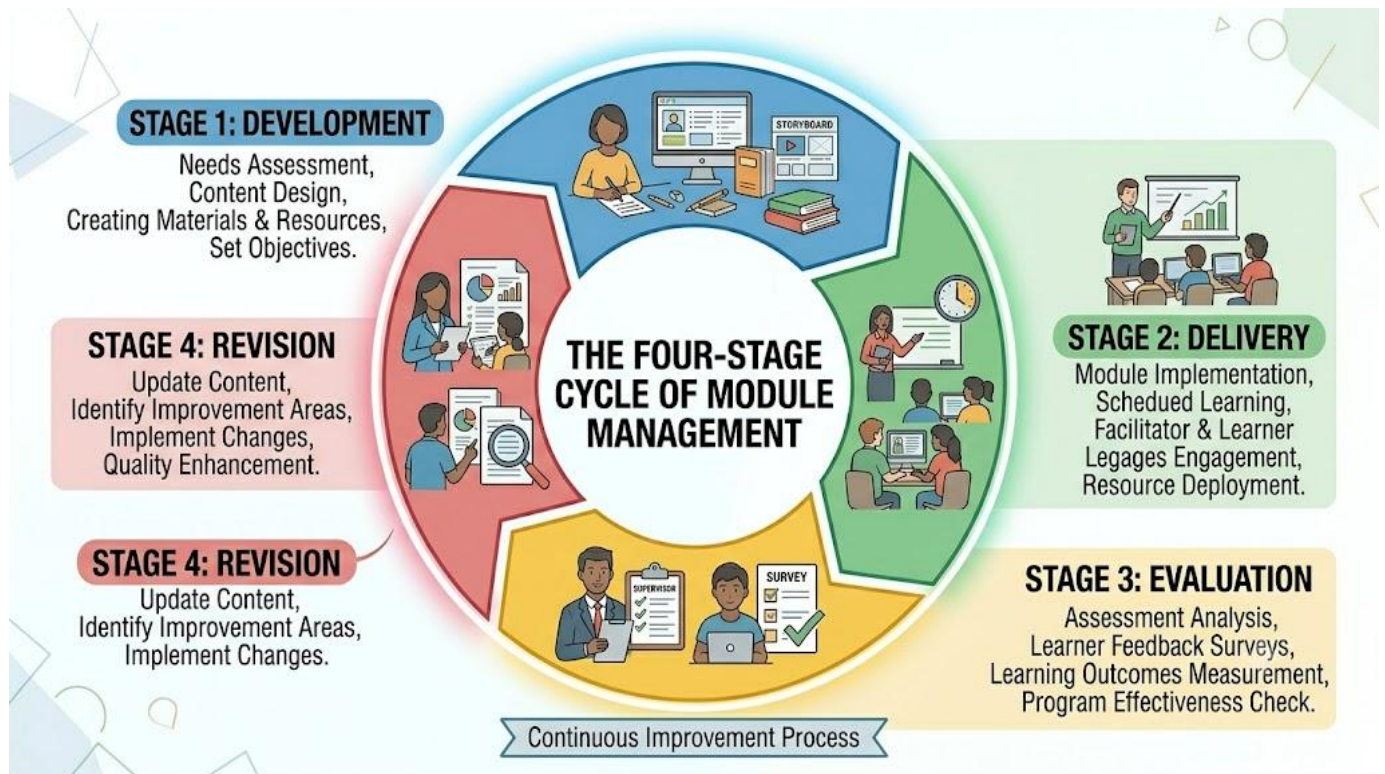


Figure 2.6: Cycle of module development, delivery, evaluation, and revision

Pilot questions 2.4

1. Describe how a teacher orients students to use an instructional module for the first time.
2. Explain what a teacher does when a student passes the pre-test of a module.
3. State three types of evidence used to evaluate the effectiveness of an instructional module.
4. State the target post-test pass rate used to judge module effectiveness.
5. Describe two actions a teacher should take if many students fail a specific post-test question.



Series Summary

This Series covered instructional modules as the primary delivery format for vocational agriculture education. We defined a module as a self-contained, self-paced learning package with nine components from title and pre-test to post-test and references. We explained the advantages of modular instruction including self-pacing, skipping, and targeted remediation. We then covered module development for crop production (task analysis, behavioural objectives, content pages, practical activities, and assessment) and animal production (same framework applied to enterprises such as layer poultry, broilers, pigs, and fish).

Finally, we described the module delivery process (student orientation, pre-test routing, self-paced work, practical sessions, post-test), the evaluation of module effectiveness (post-test pass rate, student feedback, teacher observations, time efficiency), and the revision cycle (rewrite weak content, simplify activities, split long modules, peer review, pilot-test). By completing this Series, you should be able to achieve all nine Series Learning Outcomes (SLO 2.1 to SLO 2.9).

Glossary of Terms

- **Behavioural objective:** a performance objective written in observable, measurable terms stating what the student will do, under what conditions, and to what standard.
- **Competency:** a specific, observable agricultural task or skill that a student must be able to perform at an acceptable standard.
- **Instructional module:** a self-contained, self-paced learning package covering one competency or closely related set of competencies, written directly for student use.
- **Module improvement log:** a record kept by the teacher documenting changes made to a module, the reasons for the changes, and their effect on subsequent student performance.
- **Pearson square:** a graphical method for calculating the proportions of two feed ingredients needed to achieve a desired protein level in a livestock ration.
- **Performance objective:** see behavioural objective; an objective specifying what the student will do, the conditions under which the task is performed, and the standard of acceptable performance.



- **Post-test:** a formal assessment at the end of an instructional module that determines whether the student has achieved the module objectives; must be passed before progressing to the next module.
- **Practical performance test:** an assessment in which the student demonstrates a skill or procedure against a checklist or rating scale under observed conditions.
- **Pre-test:** a short diagnostic assessment at the start of a module that determines whether the student already has the knowledge or skill; students who pass may skip the module.
- **Remediation:** targeted re-teaching or additional practice focused on the specific competency a student failed to achieve, without repeating the entire course or unit.
- **Self-contained:** a characteristic of an instructional module meaning that all information, instructions, activities, and assessments needed to achieve the module objective are included within the module itself.
- **Self-paced:** a characteristic of modular instruction allowing each student to progress through the module at their own rate, finishing earlier or taking longer than classmates as needed.
- **Task analysis:** a systematic process of identifying all knowledge, skills, and attitudes required for competent performance of an agricultural enterprise.



Concept Check Questions [Series 2]

Objective Questions

1. An instructional module is a self-contained, _____ package of learning materials designed to help a student achieve specific competencies. (Linked to SLO 2.1)
2. The _____ is the short assessment at the start of a module that allows students who already have the competency to skip the module. (Linked to SLO 2.2)
3. Content for a crop production module is selected through a _____ analysis of the crop enterprise. (Linked to SLO 2.4)
4. Performance objectives for animal production modules must be written in _____ terms stating what the student will do, conditions, and standard. (Linked to SLO 2.7)
5. A module is judged effective if at least _____ per cent of students pass the post-test on the first attempt. (Linked to SLO 2.9)

Short-Answer Questions

1. List six components of an instructional module. (Linked to SLO 2.2)
2. State three advantages of modular instruction for students in a Nigerian vocational agriculture class. (Linked to SLO 2.3)
3. Write one correctly stated performance objective for a maize production module. (Linked to SLO 2.5)
4. Describe two practical activities suitable for a layer poultry module. (Linked to SLO 2.7)
5. State three types of evidence a teacher uses to evaluate a module after use. (Linked to SLO 2.9)

Long-Answer Questions

1. Describe the concept of an instructional module, its nine components, and the advantages of modular instruction over conventional teaching in vocational agriculture. (Linked to SLOs 2.1, 2.2, 2.3)
2. Explain the process of developing an instructional module for either a crop or animal production enterprise, covering content selection, objective writing, content pages, practical activities, and assessment. (Linked to SLOs 2.4, 2.5, 2.6 or 2.7)



3. Describe the process of delivering, evaluating, and revising an instructional module in a Nigerian vocational agriculture programme. (Linked to SLOs 2.8, 2.9)

Answers to Concept Check Questions [Series 2]

Objective Questions

1. Self-paced.
2. Pre-test.
3. Task.
4. Behavioural.
5. 80.

Short-Answer Questions

1. Title and code; introduction; performance objectives; pre-test; content pages; learning activities; practical activities; post-test; references. (Any six of the nine are acceptable.)
2. Students work at their own pace so fast learners are not held back. Students who pass the pre-test can skip modules they have already mastered. Students who fail a post-test repeat only the module for the missed competency, not the entire course.
3. Example: "Given a measured plot of 0.1 hectare, the student will calculate the correct seed rate, plant maize at the recommended spacing of 75 cm x 25 cm, and achieve a stand count within 10 per cent of the target population."
4. Any two: preparing a brooder for day-old chicks (checking temperature, bedding depth, and waterer position); calculating and mixing a layer feed ration from maize, soyabean cake, and fishmeal using the Pearson square method; recording daily egg production, feed intake, and mortality in a production record sheet.
5. Student performance data (post-test scores and practical test results); student feedback (questionnaire on clarity of instructions, practicality of activities, and content relevance); teacher observation notes (difficulties students encountered during activities and practical sessions).



Long-Answer Questions

1. Definition: self-contained, self-paced package for achieving one competency; student-directed, not teacher-directed. Nine components: title/code, introduction, performance objectives, pre-test, content pages, learning activities, practical activities, post-test, references. Advantages: self-pacing (fast learners not held back), skipping (pre-test bypass for mastered competencies), targeted remediation (repeat only failed module), reduced teacher explanation burden, curriculum transparency, and continued learning without constant teacher presence.
2. Crop module development: task analysis of enterprise (e.g. maize: land prep, planting, fertilising, pest control, harvesting); select content from NERDC curriculum and local agronomic practices; write behavioural objectives for each task; write content pages in simple language with diagrams; design practical activities on school farm plot (germination test, compost making, pest identification, fertiliser calculation); design assessment (pre-test, self-checks, practical performance checklist, post-test at 70 to 80% pass mark). Animal module development: same framework applied to enterprises such as layer poultry, broilers, pigs, catfish; content must reflect Nigerian feeds, diseases, vaccines; practical activities on live animals (brooder prep, feed mixing, vaccination); assessment includes production record project.
3. Delivery: orient students to module format; administer pre-test (pass: next module, fail: begin module); students self-pace through content and activities; teacher circulates to supervise; practical sessions scheduled in farm blocks with rotation; teacher records progress and supports struggling students. Evaluation: examine post-test pass rate (target 80%), student feedback questionnaire, teacher observation notes, time on task vs estimate. Revision: rewrite content pages where many students failed; simplify practical instructions; split long modules; have colleague review for accuracy; pilot-test revision with small group; record changes in module improvement log.

Answers to Pilot Questions [Series 2]

Part 2.1: Concept and Structure of Instructional Modules



1. An instructional module is a self-contained, self-paced package of learning materials designed for a student to achieve one or more specific competencies. Three distinguishing characteristics: it is written directly to the student (not a plan for the teacher); it contains all necessary information and activities within itself; and it allows each student to progress at their own rate rather than at the pace set by the teacher.
2. Title and code; introduction; performance objectives; pre-test; content pages; learning activities; practical activities; post-test; references.
3. The pre-test is a short diagnostic assessment that determines whether the student already has the knowledge or skill the module is designed to teach. Students who pass the pre-test have already mastered the competency and are allowed to skip the module and move directly to the next one, saving learning time and avoiding boredom from reviewing material they already know.
4. Any three: self-pacing allows fast learners to complete modules quickly without waiting for classmates; pre-test skipping allows students who already have a competency to bypass the module; targeted remediation means a student who fails a post-test repeats only the failed module rather than the entire course or unit.
5. A module supports targeted remediation by requiring the student to take the post-test before progressing; if the student fails, only the specific module covering the unachieved competency is repeated, not the whole course. This focuses extra learning time precisely on the gap, rather than wasting time on competencies the student has already mastered.

Part 2.2: Developing Modules for Crop Production

1. Any two: content must be based on a task analysis of the crop enterprise that identifies what students must actually do; content must be relevant to Nigerian growing conditions, using locally available inputs, varieties, and best practices validated for the local environment.
2. Example: "Given a 0.25 hectare plot, the student will take three representative soil samples, air-dry them, and test their pH using a field soil testing kit, recording the result to one decimal place."
3. Any three: written in simple language at the appropriate reading level; one idea or step per page with a supporting diagram; technical terms defined on first use; safety warnings for hazardous operations; worked examples for calculations.



4. Any two: conducting a seed germination test (placing 100 seeds on damp filter paper, counting germination percentage at day seven and day ten); making and applying compost (constructing a compost heap, recording temperature, turning at the correct interval).
5. The post-test should include both knowledge questions (multiple choice and short answer on the theory behind the competency) and application questions (calculations, problem-solving, or interpretation of data relevant to the crop enterprise); a pass mark of 70 to 80 per cent should be required before the student progresses to the next module.

Part 2.3: Developing Modules for Animal Production

1. Layer poultry, broiler production, pig production, goat or sheep production, catfish farming.
2. Example: "Given a group of ten weaner pigs and the available feed ingredients, the student will formulate a grower ration at 16 per cent crude protein using the Pearson square method and present the mixed feed correctly."
3. Any three: housing specifications with labelled diagrams; feeding programme with a ration formulation example; health calendar showing vaccination and treatment schedules; production record formats the student must learn to maintain; common problems with causes and remedies.
4. Any two: preparing a brooder for day-old chicks (checking temperature, bedding, water, and feed presentation); vaccinating a small flock of pullets against Newcastle disease using the eye-drop method and recording the vaccination in the flock health card.
5. In the practical performance test, the student independently performs a specific husbandry task (such as preparing a brooder, mixing a feed ration, or vaccinating birds) in front of the teacher or assessor, who rates the student's performance against a standard checklist of the required steps; the score on the checklist contributes to the module grade.

Part 2.4: Implementing and Evaluating Instructional Modules

1. The teacher introduces the class to the module format by explaining each component: how to read the introduction and objectives, how to take the pre-test and interpret the result (pass: proceed to next module; fail: begin this module), how to work through the content pages and self-assessment activities, how to schedule the practical session, and how to take the post-test. The teacher



demonstrates with a sample module page so students are comfortable before working independently.

2. If a student passes the pre-test, the teacher records the pass in the student progress register and directs the student to begin the next module in the sequence. The student does not complete the content pages, activities, or post-test of the skipped module, because the pre-test has confirmed that the competency is already achieved.
3. Student performance data (post-test scores, practical test results, and project grades); student feedback from a questionnaire on clarity, practicality, and content relevance; teacher observation notes on difficulties encountered during activities and practical sessions.
4. A module is judged effective when at least 80 per cent of students achieve the required pass mark (typically 70 to 80 per cent) on the post-test at their first attempt.
5. Any two: rewrite the content pages covering the topics tested by those questions, adding clearer explanations, additional examples, or better diagrams; add a supplementary learning activity or self-check question specifically targeting the concept students found difficult, before the post-test question that covers it.



References and Attributions [Series 2]

Textual References (Books and External Sources)

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Figures, Plates, Tables, and Boxes

- Figure 2.1: Teaching unit vs instructional module comparison Attribution: AI generated. Suggested OER search string: "teaching unit vs instructional module comparison diagram vocational agriculture OER".
- Figure 2.2: Nine components of an instructional module Attribution: AI generated. Suggested OER search string: "instructional module components sequence flowchart vocational agriculture OER".
- Box 2.1: Advantages of modular instruction Attribution: AI generated. Suggested OER search string: "modular instruction advantages vocational agriculture Nigeria self-pacing OER box".
- Figure 2.3: Maize production module topic sequence Attribution: AI generated. Suggested OER search string: "maize production module sequence flowchart vocational agriculture OER".
- Box 2.2: Rice production module performance objectives Attribution: AI generated. Suggested OER search string: "rice production module performance objectives vocational agriculture OER box".
- Table 2.1: Vegetable production module assessment plan Attribution: AI generated. Suggested OER search string: "vegetable production module assessment plan components vocational agriculture OER table".



- Figure 2.4: Broiler production module topic sequence Attribution: AI generated. Suggested OER search string: "broiler production module topic sequence flowchart vocational agriculture OER".
- Box 2.3: Layer poultry module performance objectives Attribution: AI generated. Suggested OER search string: "layer poultry production module objectives vocational agriculture Nigeria OER box".
- Table 2.2: Broiler production module assessment plan Attribution: AI generated. Suggested OER search string: "broiler production module assessment plan components OER table".
- Figure 2.5: Module delivery process flowchart Attribution: AI generated. Suggested OER search string: "instructional module delivery process flowchart vocational agriculture OER".
- Box 2.4: Module evaluation checklist Attribution: AI generated. Suggested OER search string: "instructional module evaluation checklist vocational agriculture OER box".
- Figure 2.6: Module development cycle diagram Attribution: AI generated. Suggested OER search string: "module development delivery evaluation revision cycle vocational agriculture OER".



Course code: AGE 206

Course title: Teaching Vocational Agriculture in Schools

Course credit load: 2 Units

Series 3: Young and Adult Farmer Courses: Organisation and Content Development

- **Part 3.1: Objectives and Types of Young and Adult Farmer Courses**

- Sub Part 3.1.1: Rationale and objectives of young farmer courses
- Sub Part 3.1.2: Rationale and objectives of adult farmer courses
- Sub Part 3.1.3: Types of courses and their target audiences

- **Part 3.2: Organising Young and Adult Farmer Courses**

- Sub Part 3.2.1: Planning and scheduling young farmer courses
- Sub Part 3.2.2: Planning and scheduling adult farmer courses
- Sub Part 3.2.3: Resource requirements and logistics

- **Part 3.3: Developing Course Content**

- Sub Part 3.3.1: Identifying and prioritising content for young farmers
- Sub Part 3.3.2: Identifying and prioritising content for adult farmers
- Sub Part 3.3.3: Selecting appropriate instructional methods

- **Part 3.4: Implementation and Evaluation of Farmer Courses**

- Sub Part 3.4.1: Conducting a young or adult farmer course
- Sub Part 3.4.2: Evaluating farmer course outcomes
- Sub Part 3.4.3: Records and follow-up



Introduction

Young and adult farmer courses are organised non-formal education programmes that bring agricultural knowledge and skills directly to farmers and prospective farmers outside the conventional school system. The agriculture teacher in Nigeria is often expected to organise or contribute to these courses as part of community outreach, making this a core professional competency. These courses differ from classroom instruction in their audience, setting, scheduling, and content emphasis.

This Series covers the rationale, objectives, types, organisation, content development, delivery, and evaluation of young and adult farmer courses. We begin with the objectives and types of these courses, cover how to plan and organise them, explain content development, and conclude with delivery and evaluation strategies. All aspects are grounded in the Nigerian agricultural education context.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 3.1** explain the rationale and objectives of young farmer courses in Nigeria (Linked to Part 3.1),
- **SLO 3.2** explain the rationale and objectives of adult farmer courses in Nigeria (Linked to Part 3.1),
- **SLO 3.3** describe the types of young and adult farmer courses and their target audiences (Linked to Part 3.1),
- **SLO 3.4** plan and schedule a young farmer course (Linked to Part 3.2),
- **SLO 3.5** plan and schedule an adult farmer course (Linked to Part 3.2),
- **SLO 3.6** identify and prioritise content for young and adult farmer courses (Linked to Part 3.3),
- **SLO 3.7** select appropriate instructional methods for farmer courses (Linked to Part 3.3),
- **SLO 3.8** describe the steps in conducting a young or adult farmer course (Linked to Part 3.4), and
- **SLO 3.9** evaluate the outcomes of a farmer course and maintain appropriate records (Linked to Part 3.4).



3.1 Objectives and Types of Young and Adult Farmer Courses

3.1.1 Rationale and objectives of young farmer courses

Young farmer courses target school-age youth (typically 14 to 25 years) who are in school or have recently left school and are interested in farming as a livelihood. The rationale is that many rural youth possess land and labour but lack the technical knowledge to farm profitably, resulting in underproduction and disinterest in agriculture. Young farmer courses bridge this gap by providing practical training that complements formal schooling or equips school leavers with marketable skills.

The objectives of young farmer courses are to develop practical competence in at least one agricultural enterprise, to instil positive attitudes toward farming as a business, to link young farmers to input suppliers, extension services, and markets, and to develop basic farm management and record-keeping skills. In Nigeria, young farmer courses are often organised through the school farm, Junior Farmers Clubs, or in cooperation with the Agricultural Development Programmes (ADPs).

Fill in the blank: Young farmer courses target youth aged 14 to 25 who lack technical knowledge to farm profitably; the courses develop practical competence, positive _____ toward farming, and basic management skills.



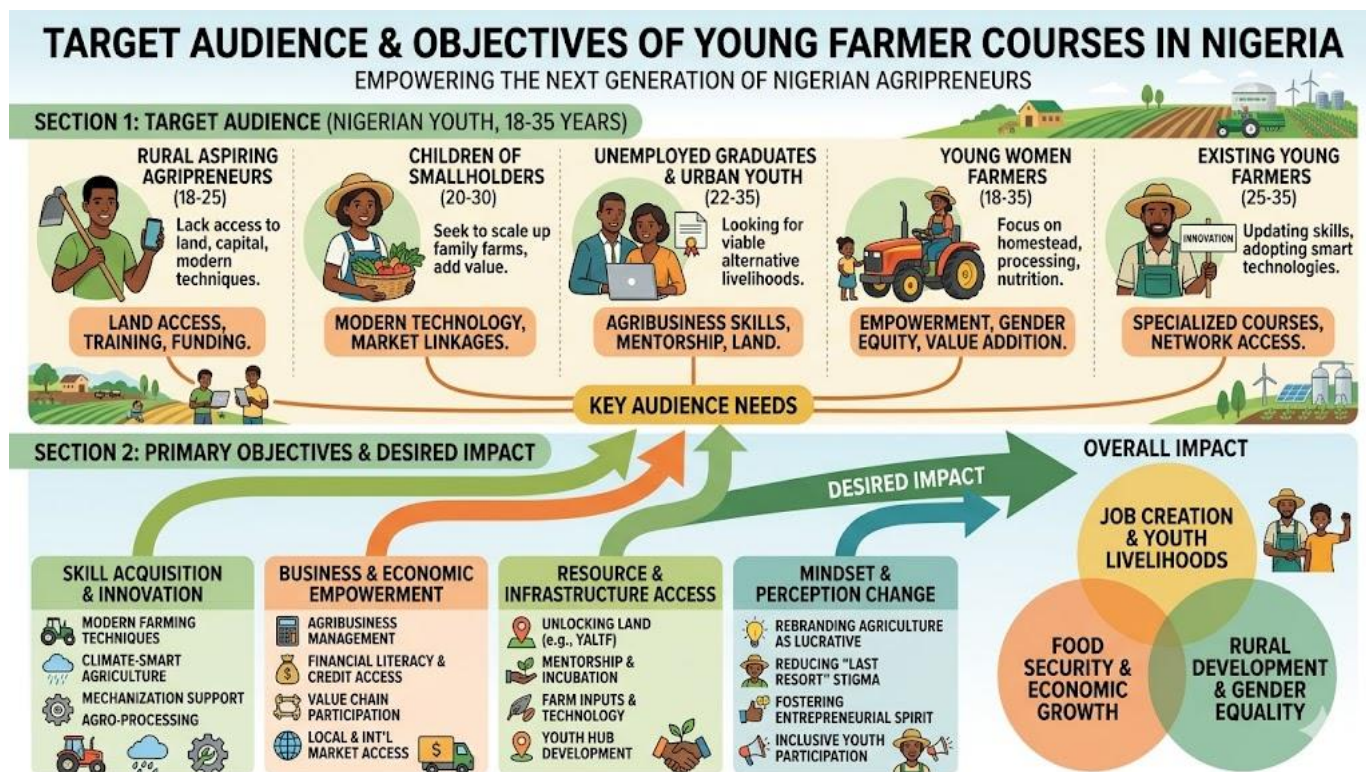


Figure 3.1: Diagram showing the target audience and objectives of young farmer courses in Nigeria

3.1.2 Rationale and objectives of adult farmer courses

Adult farmer courses serve practising farmers, farm family members, and rural community members above school age. The rationale is that most Nigerian farmers use traditional practices with low productivity, and many cannot access or benefit from written extension materials due to low literacy. Adult farmer courses deliver practical, problem-centred instruction in settings and at times convenient to farmers, using demonstrations and discussions adapted to adult learning principles.

The objectives of adult farmer courses are to improve productivity and profitability of existing farm enterprises, to introduce improved varieties, inputs, and practices, to develop farm management and business skills, and to promote soil and water conservation. Adult farmer courses are also used to introduce specific government or development programme interventions (new seed varieties, subsidised input packages, credit schemes) to farming communities. They



are typically organised by the school in partnership with ADPs, NGOs, or local government agricultural departments.

Fill in the blank: Adult farmer courses serve practising farmers and use _____ and discussions adapted to adult learning principles because many participants cannot access written extension materials.

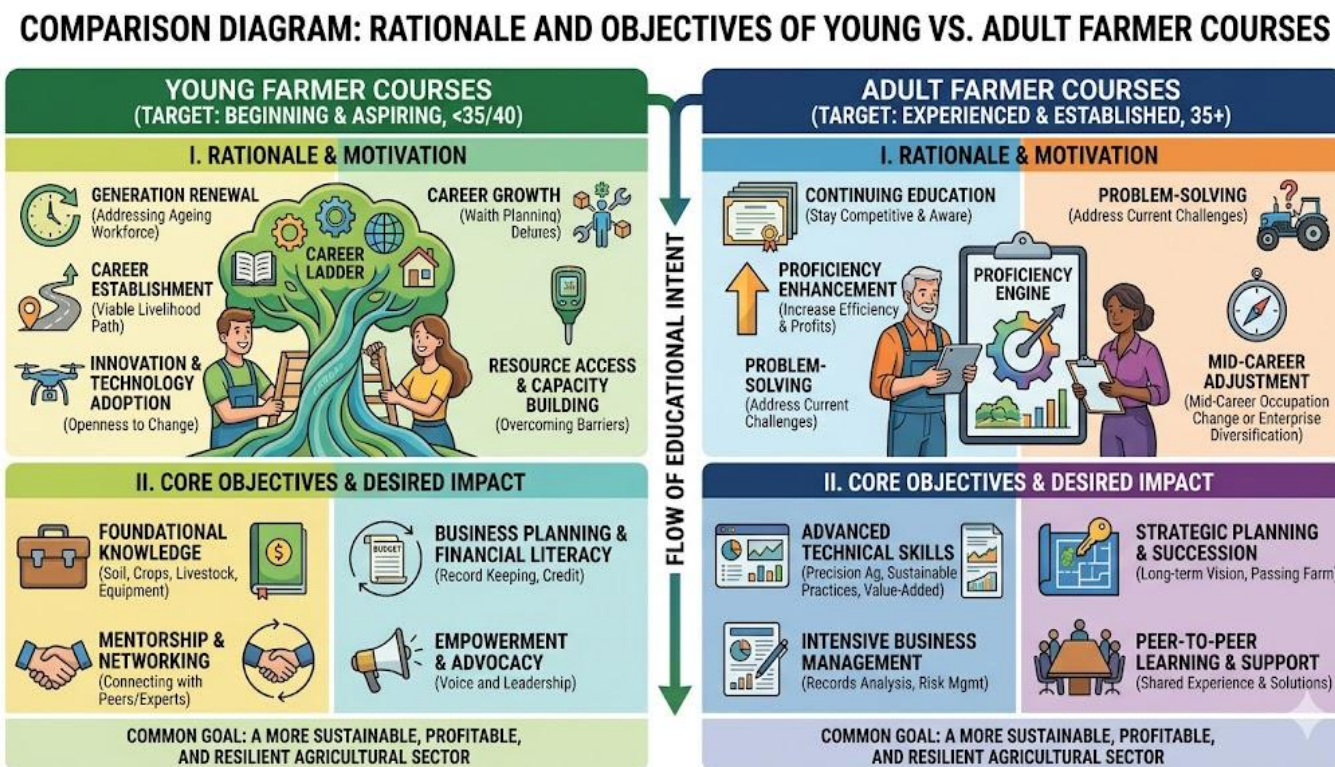


Figure 3.2: Diagram comparing the rationale and objectives of young and adult farmer courses

3.1.3 Types of courses and their target audiences

Young farmer courses include: short-term practical training courses (two to four weeks, intensive, school farm-based), seasonal field courses (conducted during the farming season on actual plots), enterprise development courses (focused on one enterprise such as vegetable production or poultry, leading to a specific product), and club-based courses (conducted through Junior Farmers Clubs meeting weekly during term time). Each type suits a different level of commitment and availability of the young farmer.



Adult farmer courses include: evening classes (one to two hours, two to three times per week, covering specific topics such as fertiliser use or pest management), short residential courses (three to five days, conducted at the school or an ADP training centre), demonstration courses (conducted at a farmer's field to demonstrate an improved practice), and cooperative group courses (targeting members of a cooperative or farmers' group who share a common enterprise). The type selected depends on the target audience's availability, literacy level, and geographic accessibility.

Fill in the blank: Adult farmer evening classes cover specific topics such as fertiliser use or pest management in sessions of one to two hours, two to _____ times per week.

<u>Course type</u>	<u>Duration</u>	<u>Setting</u>	<u>Target audience</u>
<u>Young farmer short course</u>	2–4 weeks	School-based or training centers	Secondary school students, agricultural trainees
<u>Young farmer club programme</u>	Ongoing (weekly/monthly activities)	Schools, community farms	Youths interested in agriculture, ages 12–20
<u>Adult farmer field school</u>	Seasonal (aligned with crop cycles, 3–6 months)	On-farm demonstration plots	Practicing farmers seeking improved techniques
<u>Adult farmer extension course</u>	1–2 weeks	Community centers, extension offices	Adult farmers needing refresher training
<u>Vocational certificate course</u>	6–12 months	Agricultural colleges or vocational institutes	Young adults preparing for agricultural careers
<u>Specialized adult training</u>	Variable (1–3 months)	Workshops, cooperative societies	Adult farmers focusing on specific enterprises (e.g., poultry, aquaculture)

Table 3.1: Types of young and adult farmer courses with their duration, setting, and target audience

Pilot questions 3.1

1. State three objectives of young farmer courses in Nigeria.



2. Explain why demonstration and discussion are preferred over lecture in adult farmer courses.
3. Name four types of young farmer courses.
4. Name four types of adult farmer courses.
5. State two factors that influence the choice of course type for an adult farmer programme.

3.2 Organising Young and Adult Farmer Courses

3.2.1 Planning and scheduling young farmer courses

Planning a young farmer course begins with a needs assessment: the teacher identifies the agricultural enterprises in the community, the knowledge and skill gaps of the target youth, and the resources available for training. The needs assessment is conducted through interviews with young farmers and their parents, observation of community farming practices, and consultation with local extension agents. The results determine the enterprise focus, the content scope, and the duration of the course.

Scheduling must match the availability of young farmers. School-based young farmer courses are best scheduled during school holidays or after school hours so that in-school youth can attend. Seasonal field courses should be timed to coincide with the planting or harvesting season, when the content is most immediately applicable. The schedule should specify dates, times, duration of each session, location, and the facilitator for each session. A written course schedule should be shared with participants at the start of the course.

Fill in the blank: Planning a young farmer course begins with a _____ assessment that identifies the agricultural enterprises, knowledge gaps, and available resources in the community.

<u>Step</u>	Key details
<u>1. Conduct needs assessment</u>	Identify training gaps and agricultural priorities in the community.
<u>2. Define target audience & enrolment</u>	Specify age group, background, and expected number of participants.
<u>3. Select enterprise focus</u>	Choose a relevant agricultural enterprise (e.g., poultry, crop production).



<u>4. Develop content outline</u>	Prepare topics and competencies to be covered in the course.
<u>5. Prepare schedule</u>	Organize sessions into a logical timetable with duration for each.
<u>6. Arrange venue & materials</u>	Secure training location and ensure tools, inputs, and teaching aids are available.
<u>7. Recruit participants</u>	Mobilize and register interested youths through schools or community groups.
<u>8. Open course</u>	Conduct orientation and formally launch the training programme.
<u>9. Conduct sessions</u>	Deliver lessons and practical demonstrations according to the schedule.
<u>10. Evaluate & close</u>	Assess learning outcomes, gather feedback, and formally conclude the course.

Box 3.1: Steps in planning a young farmer course

3.2.2 Planning and scheduling adult farmer courses

Adult farmer courses require additional planning considerations because the participants are busy farmers with household and farm responsibilities. The most important scheduling rule is to consult farmers about their preferred days and times before finalising the schedule; sessions held during peak farm labour periods will have poor attendance. Evening classes should be held at a well-lit community venue accessible on foot; day courses should avoid market days; residential courses require accommodation and catering arrangements.

The course plan should specify: the number and duration of sessions, the content of each session, the facilitators (the agriculture teacher, ADP staff, a specialist, or an experienced lead farmer), the venue, the materials and equipment needed, and the budget. A simple course announcement (written in simple English or the local language) should be distributed to the community at least two weeks before the course. Enrolment should be recorded so that attendance can be tracked and certificates issued to completers.

Fill in the blank: Adult farmer course sessions should avoid _____ days and peak farm labour periods to ensure good attendance from practising farmers.



<u>Planning consideration</u>	Key details
<u>Needs assessment</u>	Identify local agricultural challenges and training gaps to ensure relevance.
<u>Target audience</u>	Define participant profile (e.g., crop farmers, livestock keepers, cooperative members).
<u>Course objectives</u>	Establish clear, measurable competencies aligned with agricultural productivity goals.
<u>Enterprise focus</u>	Select specific enterprises (e.g., poultry, rice, vegetable farming) based on community needs.
<u>Duration & schedule</u>	Plan flexible timing (weekends, evenings, seasonal cycles) to suit adult learners.
<u>Venue & resources</u>	Secure accessible training sites and provide tools, inputs, and teaching aids.
<u>Instructional methods</u>	Use participatory approaches—demonstrations, field visits, and group discussions.
<u>Safety & logistics</u>	Ensure safe handling of equipment, proper facilities, and transport arrangements.
<u>Evaluation & feedback</u>	Assess learning outcomes, gather participant feedback, and revise future courses.

Box 3.2: Key planning considerations for adult farmer courses

3.2.3 Resource requirements and logistics

Every farmer course requires physical resources: a suitable venue (school classroom, community hall, or farmer's field), demonstration materials (seeds, fertilisers, tools, specimens, charts), handout materials (illustrated fact sheets in simple language), and audio-visual equipment if available. The school farm is an ideal venue for practical sessions because it provides the space and equipment for demonstration and hands-on practice. The agriculture teacher should prepare a resource checklist and confirm availability at least one week before the course begins.

Human resources include the agriculture teacher as lead facilitator, co-facilitators from the ADP or NGO, and lead farmers as community resource persons who share their own experience with the group. Financial resources for farmer courses are often obtained through school budgets, ADP subventions, community contributions, or small participant fees. A simple course budget



covering venue hire (if any), printing costs, transport, demonstration materials, and refreshments should be prepared and approved before the course.

Fill in the blank: The school farm is an ideal venue for the _____ sessions of farmer courses because it provides space, tools, and demonstration plots for hands-on learning.

<u>Resource category</u>	Key details
<u>Venue</u>	Accessible training hall, classroom, or demonstration farm; adequate seating, ventilation, and safety facilities.
<u>Materials</u>	Teaching aids (charts, manuals, projectors), farm tools, seeds/inputs, protective gear, stationery.
<u>Human resources</u>	Trainers/extension officers, technical assistants, facilitators, guest experts, support staff.
<u>Finance needs</u>	Budget for venue rental, materials procurement, trainer honoraria, transport, feeding, and contingency funds.

Table 3.2: Resource checklist for a farmer training course

Pilot questions 3.2

1. Explain what a needs assessment is and why it is the first step in planning a farmer course.
2. State two scheduling rules for adult farmer evening classes.
3. Name four items that should be included in an adult farmer course plan.
4. State two sources of financial support for young or adult farmer courses in Nigeria.
5. Explain the role of a lead farmer as a co-facilitator in an adult farmer course.

3.3 Developing Course Content

3.3.1 Identifying and prioritising content for young farmers

Content for young farmer courses is identified through the needs assessment conducted during planning. The content should focus on the most important competencies for profitable production



of the chosen enterprise, presented in the sequence of the production cycle. For a vegetable production course for young farmers, content topics might include: market survey and enterprise selection, soil preparation and nursery management, transplanting and field management, pest and disease control, harvesting and post-harvest handling, and marketing and financial records.

Content must be prioritised based on time available and the critical knowledge gaps identified. Topics that directly affect productivity and profitability (varietal selection, fertilisation, pest management) should be given more time than background information topics. For young farmer courses lasting two to four weeks, the content outline should specify approximately two to three topics per day for intensive courses, with each topic supported by a practical activity. Content should be locally relevant and use examples from the immediate farming environment.

Fill in the blank: Content for young farmer courses should be _____ based on its direct impact on productivity; topics on varietal selection, fertilisation, and pest management take priority over background information.

<u>Day(s)</u>	<u>Topic</u>	Key details
<u>Days 1–2</u>	Market survey & enterprise selection	Identify market demand, choose suitable vegetable enterprise.
<u>Days 3–4</u>	Soil preparation & nursery management	Land clearing, soil fertility improvement, nursery bed establishment.
<u>Days 5–7</u>	Transplanting & field management	Transplant seedlings, spacing, irrigation, and weeding practices.
<u>Days 8–9</u>	Pest & disease control	Identify common pests/diseases, apply integrated pest management.
<u>Day 10</u>	Harvesting & post-harvest	Proper harvesting techniques, handling, and storage methods.
<u>Days 11–12</u>	Marketing & records	Develop marketing strategies, maintain farm records for accountability.
<u>Days 13–14</u>	Project presentations & evaluation	Learners present projects, receive feedback, and course evaluation conducted.

Box 3.3: Example content outline for a two-week young farmer course on vegetable production



3.3.2 Identifying and prioritising content for adult farmers

Content for adult farmer courses is identified by surveying the farmers' current practices, identifying where those practices fall short of recommended standards, and selecting the topics that will have the greatest impact on productivity. A rapid rural appraisal (RRA) or participatory rural appraisal (PRA) can be used to identify priority problems. Common priority topics for Nigerian adult farmers include: improved seed varieties, correct fertiliser types and rates, integrated pest and disease management, post-harvest loss reduction, and market access.

Adult farmer course content should be practical and problem-centred: each session should address a real problem the farmers face and provide an immediately applicable solution. Content should be sequenced to move from the most urgent or familiar problem to less immediate ones. Sessions should not exceed one to two hours for evening classes; each session should cover only one or two topics with ample time for questions and discussion. Written handouts in simple language or diagrams support recall between sessions.

Fill in the blank: Adult farmer course content should be practical and _____ centred, addressing a real farming problem in each session and providing an immediately applicable solution.

<u>Session</u>	<u>Topic</u>	<u>Key details</u>
<u>Session 1</u>	Improved maize varieties & seed selection	Identify high-yielding, disease-resistant varieties; proper seed handling.
<u>Session 2</u>	Soil preparation & correct planting date	Land clearing, tillage, soil fertility management, and timing of planting.
<u>Session 3</u>	Fertiliser types, rates & application method	Understand fertiliser options, calculate correct rates, and apply effectively.
<u>Session 4</u>	Weed management	Identify common weeds, apply cultural and chemical control methods.
<u>Session 5</u>	Pest & disease identification & control	Recognize major maize pests/diseases and apply integrated control measures.
<u>Session 6</u>	Harvesting, storage & marketing	Proper harvesting techniques, post-harvest handling, storage, and market strategies.



Box 3.4: Example content outline for a six-session adult farmer evening course on maize production

3.3.3 Selecting appropriate instructional methods

The most effective methods for farmer courses are the demonstration method and the discussion method, used together. Demonstration shows farmers how an improved practice is performed; discussion allows them to ask questions, share their own experience, and decide whether and how to adopt the practice. The project or plot demonstration method (conducting a demonstration on a farmer's own field or the school farm plot) is particularly powerful because farmers observe results in their own environment.

Other effective methods include farmer field schools (groups of farmers who observe, experiment, and discuss in weekly sessions throughout the season), exchange visits (farmers visit a successful model farm or demonstration site), and role-playing or problem-solving exercises for topics such as market negotiation or credit management. The lecture method should be used sparingly and kept brief in farmer courses; adult learners respond better to active, participatory methods than to passive listening.

Fill in the blank: Farmer field schools allow groups of farmers to _____, experiment, and discuss in weekly sessions throughout the season, making them one of the most effective methods for adult farmer education.

<u>Instructional method</u>	<u>Advantages</u>	<u>Limitations</u>
<u>Lecture</u>	Easy to deliver to large groups; covers theory quickly; low cost.	Passive learning; limited practical engagement; may not suit low-literacy participants.
<u>Demonstration</u>	Shows practical skills directly; highly effective for hands-on learning.	Requires materials and setup; time-consuming for large groups.
<u>Field visit</u>	Real-world exposure; motivates learners; connects theory to practice.	Logistical challenges; weather-dependent; can be costly.



<u>Group discussion</u>	Encourages participation; shares local knowledge; builds confidence.	May go off-topic; requires skilled facilitation; time management issues.
<u>Role play</u>	Builds problem-solving and communication skills; interactive.	Some participants may feel shy; requires preparation and guidance.
<u>Project work</u>	Promotes independent learning; integrates multiple skills; produces tangible outcomes.	Time-intensive; requires resources and supervision.
<u>Audio-visual aids</u>	Enhances understanding; appeals to multiple senses; useful for low-literacy learners.	Needs equipment and electricity; may not be available in rural settings.
<u>Peer teaching</u>	Builds collaboration; learners explain concepts to each other; reinforces knowledge.	Quality depends on peer competence; may spread misconceptions if not guided.

Table 3.3: Instructional methods suitable for young and adult farmer courses with their advantages and limitations

Pilot questions 3.3

1. State two sources used to identify content for a young farmer course.
2. Explain what a rapid rural appraisal (RRA) is and how it helps in content selection for adult farmer courses.
3. State two criteria for prioritising content in an adult farmer evening course.
4. Explain why demonstration and discussion are used together in farmer courses.
5. State two reasons why the lecture method should be used sparingly in adult farmer courses.

3.4 Implementation and Evaluation of Farmer Courses

3.4.1 Conducting a young or adult farmer course

The opening session of a farmer course is critical. The facilitator introduces the course, explains its purpose and schedule, agrees ground rules with participants, and conducts a baseline assessment of participants' current knowledge and practice. The baseline may be a brief oral



quiz, a group discussion, or a simple written pre-test (for young farmers with literacy). The results guide emphasis during the course and provide a baseline against which post-course improvement can be measured.

Each subsequent session follows a standard structure: review of the previous session, introduction of the new topic with a brief motivating statement, demonstration or discussion of the new practice, hands-on practice by participants, question and answer, and assignment for participants to try between sessions. The facilitator should encourage participation, use local examples and local language where possible, relate content to the farmers' own experience, and respond respectfully to questions. Participants should always leave each session knowing exactly what to do differently on their farm.

Fill in the blank: The opening session of a farmer course includes a _____ assessment of participants' current knowledge, which provides a baseline for measuring post-course improvement.

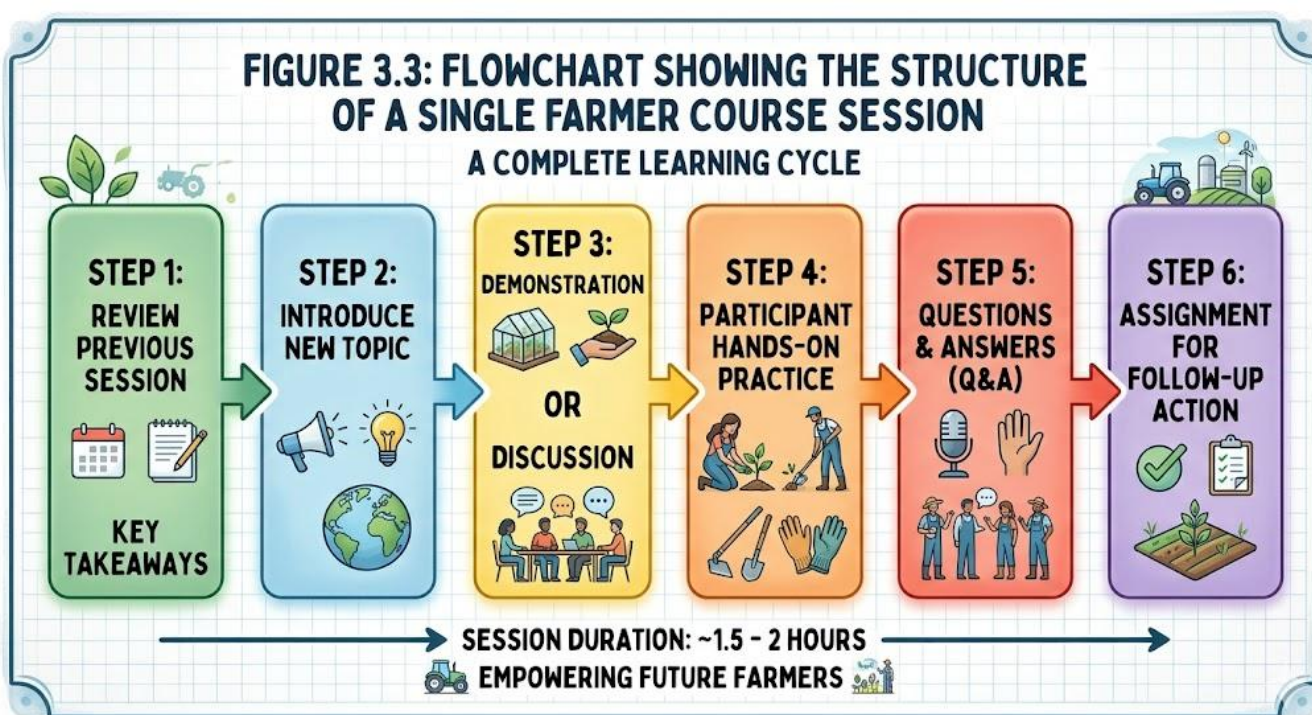


Figure 3.3: Flowchart showing the structure of a single farmer course session



3.4.2 Evaluating farmer course outcomes

Evaluation of a farmer course assesses three levels of outcome: learning (did participants gain new knowledge and skills?), behaviour change (did participants apply what they learned on their farms?), and production impact (did the new practices improve yields or income?). Learning is evaluated using a post-test or oral questioning at the end of the course, compared with the baseline assessment. Behaviour change is assessed by a follow-up visit to participants' farms two to four months after the course.

Production impact is the most important but most difficult outcome to evaluate because it requires comparing yields or income before and after training, controlling for weather and input availability. A simple pre-post comparison using farmer-recorded data is the most practical approach in the Nigerian context. Participant satisfaction is also collected via a brief end-of-course feedback form asking about the usefulness, clarity, and practical relevance of the course content and facilitation.

Fill in the blank: Evaluating a farmer course at the _____ change level requires a follow-up visit to participants' farms two to four months after the course to observe whether new practices have been adopted.

<u>Evaluation level</u>	<u>Method</u>	Key details
<u>Learning</u>	Post-test vs baseline, oral questioning	Measures knowledge gained immediately after training compared to initial baseline.
<u>Behaviour change</u>	Farm visit 2–4 months after training	Assesses adoption of new practices and changes in farmer behaviour.
<u>Production impact</u>	Yield/income comparison pre and post	Evaluates improvements in productivity and income as a result of training.
<u>Satisfaction</u>	End-of-course feedback form	Captures participant satisfaction with content, delivery, and relevance.

Box 3.5: Simple evaluation framework for a farmer training course



3.4.3 Records and follow-up

The agriculture teacher should maintain records of every farmer course conducted: participant names and contact information, attendance register, course content covered, pre-test and post-test scores, and dates and outcomes of follow-up visits. These records serve as evidence of the school's community outreach activities and provide data for improving future courses. A brief course report summarising attendance, evaluation results, and recommendations should be submitted to the school administration and relevant agricultural agencies at the end of each course.

Follow-up is essential to reinforce learning and support adoption of new practices. Follow-up actions include: farm visits to observe practice adoption and provide on-site technical guidance, group meetings to review progress and troubleshoot problems, distribution of additional reference materials, and referral of farmers to input suppliers, credit providers, or markets. Without follow-up, the adoption rate of practices taught in farmer courses drops sharply because farmers encounter practical difficulties that the course did not fully address.

Fill in the blank: Without _____ after a farmer course, the adoption rate of newly taught practices drops sharply because farmers encounter practical difficulties without ongoing support.

<u>Field</u>	<u>Description</u>
<u>Course title</u>	Name of the training programme (e.g., “Vegetable Production for Young Farmers”).
<u>Date(s)</u>	Start and end dates of the course.
<u>Venue</u>	Location where the training is conducted (school, farm, community hall).
<u>Facilitator(s)</u>	Names and roles of trainers, extension officers, or guest experts.
<u>List of participants</u>	Names and contact details of all attendees.
<u>Attendance record</u>	Daily attendance sheet showing presence/absence.
<u>Content covered per session</u>	Topics taught and activities conducted in each session.
<u>Pre-test and post-test scores</u>	Baseline and endline assessment results to measure learning.
<u>Follow-up visit dates & outcomes</u>	Records of farm visits after training, noting adoption of practices and challenges.



<u>Course report submission date</u>	Date when the final course report is compiled and submitted.
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Box 3.6: Farmer course record-keeping template

Pilot questions 3.4

1. Explain why the opening session of a farmer course should include a baseline assessment.
2. Describe the standard structure of a single session in a farmer course.
3. Name the three levels of outcome evaluated in a farmer course evaluation.
4. State two records the agriculture teacher should maintain for every farmer course.
5. Explain why follow-up visits after a farmer course are important.

Series Summary

This Series covered the organisation and content development of young and adult farmer courses. We explained the rationale and objectives of both types of courses, described the main course types and their target audiences, and outlined the planning steps including needs assessment, scheduling, and resource preparation. We then covered content development: identifying and prioritising topics through needs assessments and participatory appraisals, sequencing content logically, and selecting appropriate instructional methods with demonstration and discussion at the centre.

Finally, we described the implementation of farmer courses from the opening baseline assessment through the structured session format (review, introduction, demonstration, practice, questions, assignment) to closing evaluation. We covered the three-level evaluation framework (learning, behaviour change, production impact) and the importance of follow-up farm visits for adoption. Record-keeping and course reporting close the implementation cycle. By completing this Series, you should be able to achieve all nine Series Learning Outcomes (SLO 3.1 to SLO 3.9).



Glossary of Terms

- **Adult farmer course:** a non-formal agricultural training programme for practising farmers above school age, designed to improve the productivity and profitability of existing enterprises.
- **ADP (Agricultural Development Programme):** a state-level government programme in Nigeria responsible for agricultural extension, farmer training, and technology transfer to rural farming communities.
- **Baseline assessment:** a measurement of participants' knowledge, skills, or practices at the start of a course, used as a reference point for evaluating the course's impact on learning.
- **Behaviour change evaluation:** assessment of whether course participants have applied what they learned on their farms, conducted through follow-up farm visits two to four months after training.
- **Club-based course:** a young farmer training programme conducted through a Junior Farmers Club meeting on a regular basis during term time.
- **Cooperative group course:** an adult farmer training programme targeting members of a cooperative or farmers' group who share a common enterprise or problem.
- **Demonstration course:** a farmer training course conducted at a farmer's own field or a school farm plot to show an improved practice in a real production setting.
- **Evening class:** a type of adult farmer course held for one to two hours, two to three times per week, at a community venue accessible to farmers after their farm work.
- **Farmer field school (FFS):** a group learning method in which farmers meet weekly in their own field throughout the growing season to observe, experiment, and discuss improved practices.
- **Follow-up visit:** a post-course farm visit by the agriculture teacher or extension worker to observe practice adoption, provide technical guidance, and troubleshoot problems.
- **Junior Farmers Club:** a school-based organisation for young people interested in agriculture that provides a structured context for practical training and enterprise development.
- **Lead farmer:** an experienced and progressive farmer in the community who serves as a co-facilitator in adult farmer courses, sharing practical knowledge and serving as a role model.
- **Needs assessment:** a systematic process of identifying the knowledge, skill, and practice gaps of the target audience that a training course should address.



- **Participatory rural appraisal (PRA):** a set of methods for identifying community needs and priorities through group activities involving community members in the analysis of their own situation.
- **Production impact evaluation:** assessment of whether farmer training has improved yields or income, using pre- and post-training comparisons of farm output data.
- **Rapid rural appraisal (RRA):** a quick, structured information-gathering method used to identify the priority problems and needs of farming communities for training programme planning.
- **Short residential course:** an adult farmer training programme conducted over three to five days at a school or ADP training centre, with participants staying on-site.
- **Young farmer course:** a non-formal agricultural training programme for school-age youth and school leavers designed to develop practical competence in an agricultural enterprise.

Concept Check Questions [Series 3]

Objective Questions

1. Young farmer courses target youth aged _____ to 25 who lack technical knowledge to farm profitably. (Linked to SLO 3.1)
2. The first step in planning a farmer course is a _____ assessment to identify knowledge gaps and available resources. (Linked to SLO 3.4)
3. Content for adult farmer courses should be practical and _____ centred, addressing real farming problems. (Linked to SLO 3.6)
4. The most effective methods for farmer courses are demonstration and _____, used together. (Linked to SLO 3.7)
5. Behaviour change evaluation requires a follow-up _____ visit to observe whether new practices have been adopted on the farm. (Linked to SLO 3.9)

Short-Answer Questions

1. State three objectives of adult farmer courses in Nigeria. (Linked to SLO 3.2)



2. Name four types of adult farmer courses. (Linked to SLO 3.3)
3. State two scheduling rules for adult farmer courses. (Linked to SLO 3.5)
4. Explain why the lecture method should be used sparingly in farmer courses. (Linked to SLO 3.7)
5. Name the three levels of outcome evaluated in a farmer course. (Linked to SLO 3.9)

Long-Answer Questions

1. Describe the objectives, types, and target audiences of young and adult farmer courses in Nigeria, and explain how the choice of course type is influenced by the characteristics of the target audience. (Linked to SLOs 3.1, 3.2, 3.3)
2. Explain how to plan, organise, and develop content for either a young farmer course or an adult farmer course, covering needs assessment, scheduling, resource preparation, content identification, and instructional method selection. (Linked to SLOs 3.4, 3.5, 3.6, 3.7)
3. Describe the implementation, evaluation, and follow-up of a farmer training course, explaining the baseline assessment, session structure, three-level evaluation framework, and the importance of record-keeping and farm visits. (Linked to SLOs 3.8, 3.9)

Answers to Concept Check Questions [Series 3]

Objective Questions

1. 14.
2. Needs.
3. Problem.
4. Discussion.
5. Farm.

Short-Answer Questions

1. Any three: to improve productivity and profitability of existing enterprises; to introduce improved varieties, inputs, and practices; to develop farm management and business skills; to promote soil and water conservation; to introduce government or development programme interventions.
2. Evening class, short residential course, demonstration course (field demonstration), cooperative group course.



3. Any two: consult farmers about preferred days and times before finalising the schedule; avoid market days and peak farm labour periods; hold evening classes at a well-lit accessible venue.
4. Adult farmers are busy, experienced practitioners who learn better through active and participatory methods; they respond poorly to passive listening and can lose interest in a pure lecture; discussion and demonstration engage their existing experience and allow them to ask practical questions related to their own farms.
5. Learning (knowledge and skill gain); behaviour change (adoption of new practices on the farm); production impact (improvement in yield or income).

Long-Answer Questions

1. Young farmer courses: target in-school youth and school leavers aged 14-25; objectives: practical competence, business attitude, market linkage, record-keeping; types: short-term practical (2-4 weeks), seasonal field, enterprise development, club-based. Adult farmer courses: target practising farmers above school age; objectives: improved productivity, adoption of improved varieties and practices, farm management skills, conservation; types: evening class, short residential, demonstration, cooperative group. Choice of type depends on: availability of the audience (school-age youth: holidays or after school; adult farmers: evenings, off-season), literacy level (written materials suit literate young farmers; illustrated demonstrations suit lower-literacy adults), geographic accessibility (evening classes near community; residential courses at central facility), and duration of time participants can commit.
2. Planning: conduct needs assessment (interview farmers, observe practices, consult extension agents); define target audience and enterprise focus; develop content outline; prepare schedule (avoiding market days and peak labour for adult courses, school holidays for young); arrange venue (school farm for practical sessions, community hall for evening classes); prepare resource checklist and budget; recruit participants. Content: identify topics through needs assessment and PRA; prioritise topics with direct productivity impact; sequence logically through the production cycle; write session plans with demonstration and discussion as primary methods; prepare illustrated handouts. Methods: demonstration (show improved practice); guided discussion (draw on farmers' experience); plot demonstration (results visible in real field); farmer field school (weekly observation and discussion through season). Lecture: brief and supplementary only.
3. Implementation: opening session includes baseline assessment (oral quiz or pre-test), course introduction, ground rules; each session follows: review, topic introduction, demonstration or discussion, hands-on practice, Q&A, assignment. Facilitator uses local examples and local language, encourages participation, and ensures each session ends with clear action for farmers to



take. Evaluation: Learning (post-test vs baseline); Behaviour change (farm visit 2-4 months after course, observation of practice adoption); Production impact (yield/income comparison pre and post). Record-keeping: participant names and contacts, attendance register, content covered, test scores, follow-up visit dates and outcomes, course report. Follow-up: farm visits provide on-site guidance, troubleshoot problems, reinforce adoption; without follow-up, adoption rates drop sharply.

Answers to Pilot Questions [Series 3]

Part 3.1: Objectives and Types

1. Any three: to develop practical competence in at least one agricultural enterprise; to instil a positive attitude toward farming as a business; to link young farmers to input suppliers, extension services, and markets; to develop basic farm management and record-keeping skills.
2. Demonstration shows farmers exactly how a practice is performed; discussion allows them to ask questions, share experience, and decide on adoption. Together they are more effective than either alone because demonstration provides the visual model and discussion addresses the farmers' specific concerns and context. Lecture is avoided because adult learners are experienced practitioners who learn through doing and dialogue, not passive listening; they often have low patience for theoretical presentations.
3. Short-term practical training (2-4 weeks); seasonal field course; enterprise development course; club-based course.
4. Evening class; short residential course (3-5 days); demonstration course (field demonstration); cooperative group course.
5. Any two: availability of the target audience (peak farm periods, market days); literacy level of participants (written materials vs illustrated demonstrations).

Part 3.2: Organising Farmer Courses

1. A needs assessment is a systematic process of identifying the knowledge, skill, and practice gaps of the target audience. It is the first step in planning because it determines what the course should



teach, ensuring that the content addresses real problems rather than topics selected by the teacher without reference to what farmers actually need.

2. Any two: consult farmers on preferred days and times before finalising the schedule; avoid market days; avoid peak farm labour periods (planting, weeding, harvesting); hold sessions at a time of day when farmers are free.
3. Any four: number and duration of sessions; content of each session; facilitators and their responsibilities; venue; materials and equipment needed; budget.
4. Any two: ADP subventions; school budget allocation; community contributions; small participant fees; NGO or development project funding.
5. A lead farmer is an experienced and progressive farmer in the community who serves as a co-facilitator by sharing practical knowledge from their own farm experience, demonstrating improved practices on their own land, and serving as a locally credible role model for other farmers; their involvement increases the trust and relevance of the course content.

Part 3.3: Developing Course Content

1. Any two: needs assessment findings (interviews with young farmers and parents, observation of community practices); the NERDC curriculum for agricultural science; consultation with local extension agents.
2. A rapid rural appraisal (RRA) is a quick, structured information-gathering method using interviews, observation, and group discussions with community members to identify their priority farming problems and training needs. It helps in content selection by revealing which problems are most widespread and most damaging to productivity, allowing the course planner to prioritise those topics and ensure the course content addresses the farmers' most urgent needs rather than a standard curriculum.
3. Any two: direct impact on productivity (topics with the greatest yield or income effect take priority); urgency (topics addressing a current-season problem take priority over future-season topics); farmers' existing knowledge gap (topics where current practice is most divergent from the recommendation take priority).
4. Demonstration provides the visual model of the improved practice; discussion allows farmers to ask questions, relate the practice to their own experience, and agree on whether and how to adopt it on their own farms. Using both together bridges the gap between seeing what to do and deciding to do it, which is essential for adoption of new practices.



5. Any two: adult learners are experienced practitioners with their own knowledge and opinions; they become restless and disengaged when required to sit passively and listen; a lecture does not allow them to ask questions, share experience, or practise the new skill; adult learning principles (andragogy) require active, problem-centred, participatory methods.

Part 3.4: Implementation and Evaluation

1. A baseline assessment measures what participants already know and can do before the course begins. This is important because it shows the facilitator where participants are starting from (avoiding teaching what they already know), guides emphasis during the course, and provides a reference point against which post-course improvement can be measured to evaluate whether the training was effective.
 - (1) Review the previous session briefly; (2) introduce the new topic with a brief motivating statement; (3) conduct a demonstration or guided discussion of the new practice; (4) participants practise the skill hands-on; (5) questions and answers; (6) give participants an assignment to try between sessions.
2. Learning (knowledge and skill gain, measured by post-test compared with baseline); behaviour change (adoption of new practices on the farm, assessed by follow-up visit 2-4 months after training); production impact (improvement in yield or income, compared pre and post training).
3. Any two: participant names and contact information with attendance register; content covered in each session; pre-test and post-test scores; dates and outcomes of follow-up farm visits.
4. Without follow-up, farmers who attempt to apply new practices often encounter problems (soil conditions different from the demonstration site, unavailability of inputs, uncertainty about timing) that they cannot resolve alone, and they revert to traditional practices. Follow-up farm visits provide on-site technical guidance, troubleshoot specific problems, and reinforce the adoption of the practice in the farmer's actual conditions.



References and Attributions [Series 3]

Textual References (Books and External Sources)

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Figures, Plates, Tables, and Boxes

- Figure 3.1: Young farmer course target and objectives Attribution: AI generated. Suggested OER search string: "young farmer courses objectives target audience Nigeria OER diagram".
- Figure 3.2: Young vs adult farmer course comparison Attribution: AI generated. Suggested OER search string: "young adult farmer courses comparison rationale objectives OER diagram".
- Table 3.1: Types of farmer courses Attribution: AI generated. Suggested OER search string: "types young adult farmer courses duration setting audience OER table".
- Box 3.1: Steps in planning a young farmer course Attribution: AI generated. Suggested OER search string: "planning young farmer course steps needs assessment schedule OER box".
- Box 3.2: Planning considerations for adult farmer courses Attribution: AI generated. Suggested OER search string: "adult farmer course planning considerations timing venue language OER box".
- Table 3.2: Resource checklist for farmer courses Attribution: AI generated. Suggested OER search string: "farmer training course resource checklist venue materials finance OER table".
- Box 3.3: Content outline for young farmer vegetable course Attribution: AI generated. Suggested OER search string: "young farmer course vegetable production content schedule OER box".
- Box 3.4: Content outline for adult farmer maize course Attribution: AI generated. Suggested OER search string: "adult farmer evening course maize production content outline OER box".



- Table 3.3: Instructional methods for farmer courses Attribution: AI generated. Suggested OER search string: "farmer course instructional methods demonstration discussion field school OER table".
- Figure 3.3: Farmer course session structure Attribution: AI generated. Suggested OER search string: "farmer course session structure flowchart review demonstration practice OER".
- Box 3.5: Three-level evaluation framework Attribution: AI generated. Suggested OER search string: "farmer course evaluation framework learning behaviour change production OER box".
- Box 3.6: Farmer course record-keeping template Attribution: AI generated. Suggested OER search string: "farmer course record keeping template attendance evaluation OER box".



Course code: AGE 206

Course title: Teaching Vocational Agriculture in Schools

Course credit load: 2 Units

Series 4: School Farm Organisation, Supervision, and Practical Teaching

- **Part 4.1: Organisation of the School Farm**
 - Sub Part 4.1.1: Purpose and functions of the school farm
 - Sub Part 4.1.2: Planning and layout of the school farm
 - Sub Part 4.1.3: School farm management structure
- **Part 4.2: Management of the School Farm**
 - Sub Part 4.2.1: Production planning and enterprise selection
 - Sub Part 4.2.2: Supervision of farm operations
 - Sub Part 4.2.3: Responsibilities of the farm supervisor
- **Part 4.3: Practical Teaching on the Land Laboratory**
 - Sub Part 4.3.1: The school farm as a land laboratory
 - Sub Part 4.3.2: Conducting an agriculture class on the farm
 - Sub Part 4.3.3: Developing manipulative skills through farm work
- **Part 4.4: Record Keeping in the School Farm**
 - Sub Part 4.4.1: Types and importance of farm records
 - Sub Part 4.4.2: Maintaining farm records
 - Sub Part 4.4.3: Using farm records to improve management



Introduction

The school farm is the most important physical resource of the agriculture teacher. It is the setting in which classroom theory becomes practical competence, where students move from knowing about agriculture to actually doing it. A well-organised, productively managed school farm serves simultaneously as a teaching laboratory, a demonstration site, a source of income for the school, and a model of good agricultural practice for the surrounding community.

This Series covers the organisation, management, and supervisory functions of the school farm, practical teaching methods on the farm, and the record-keeping systems that underpin effective farm management and student assessment. We begin with the purpose, layout, and management structure of the school farm, move through production planning and supervision, cover practical teaching on the farm, and conclude with farm record keeping.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 4.1** explain the purpose and functions of the school farm (Linked to Part 4.1),
- **SLO 4.2** describe the planning and layout of a school farm (Linked to Part 4.1),
- **SLO 4.3** describe the management structure of a school farm (Linked to Part 4.1),
- **SLO 4.4** explain how to plan production and select enterprises for the school farm (Linked to Part 4.2),
- **SLO 4.5** describe effective supervision of school farm operations (Linked to Part 4.2),
- **SLO 4.6** state the responsibilities of the school farm supervisor (Linked to Part 4.2),
- **SLO 4.7** explain how the school farm functions as a land laboratory for practical teaching (Linked to Part 4.3),
- **SLO 4.8** describe how to conduct an agriculture class on the school farm (Linked to Part 4.3), and
- **SLO 4.9** describe the types of farm records, explain their importance, and explain how they are used to improve management (Linked to Part 4.4).



4.1 Organisation of the School Farm

4.1.1 Purpose and functions of the school farm

The school farm serves four main purposes. As a teaching laboratory it provides the setting for students to practise and master agricultural skills. As a demonstration site it shows students and the community what good agricultural practice looks like in the local environment. As a source of school income it generates revenue from the sale of farm produce that can supplement the school's agricultural programme budget. As a community model it demonstrates improved practices that can be adopted by surrounding farmers.

The educational function must always take priority over the commercial function. A school farm managed solely for profit, where students are used as free labour without structured learning objectives, fails its primary educational purpose. Every farm operation on the school farm should be a planned instructional activity with defined learning outcomes, appropriate supervision, and a record-keeping requirement that contributes to student assessment.

Fill in the blank: The four main purposes of the school farm are teaching laboratory, demonstration site, source of school _____, and community model of good agricultural practice.



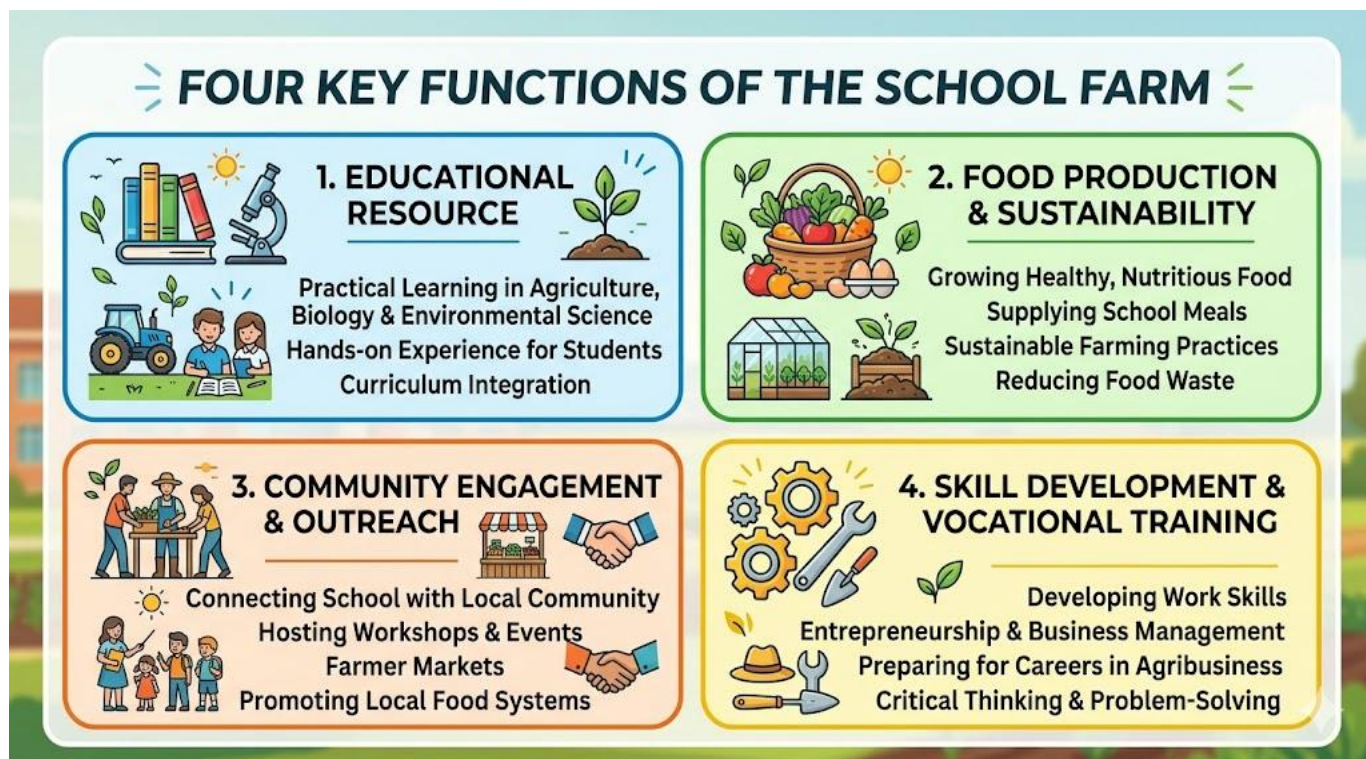


Figure 4.1: Diagram showing the four functions of the school farm

4.1.2 Planning and layout of the school farm

Planning the school farm layout requires consideration of: available land area, soil type and topography, water sources for irrigation, access roads, proximity to the classroom block, and the enterprises to be undertaken. The layout should designate separate zones for: crop production plots (further subdivided by crop type or class group), animal production units (poultry house, piggery, fish pond, small ruminant pen), the school garden (for vegetables and demonstration plots), storage and processing facilities, and a tool store.

A simple farm map drawn to scale is an essential planning document. It shows the boundaries of each enterprise zone, the location of water sources and access paths, the position of structures, and the direction of water drainage. The crop production area should be subdivided into plots of equal size (typically 0.02 to 0.05 hectares) so that each class group or student team has a clearly demarcated practical area. Plot boundaries should be marked with pegs, furrows, or low hedges.



Fill in the blank: A school farm map drawn to _____ shows enterprise zones, water sources, access paths, structures, and drainage direction, and is an essential planning document.

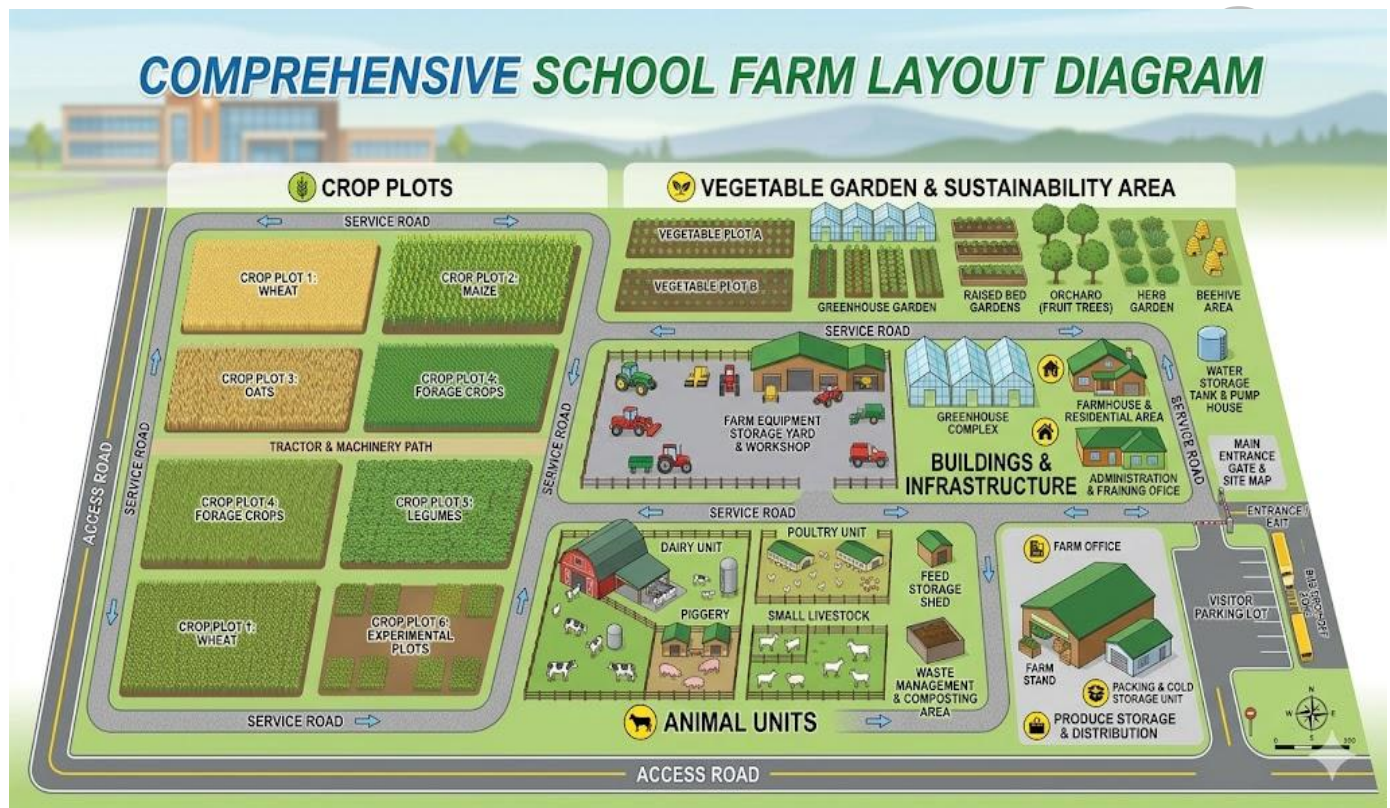


Figure 4.2: Example school farm layout diagram showing enterprise zones

4.1.3 School farm management structure

The school farm management structure defines who is responsible for what. The principal or head teacher holds overall accountability for the school farm. The agriculture teacher is the farm manager responsible for planning, supervising, and recording all farm activities and for integrating farm work with the curriculum. The farm supervisor (where one is employed) manages day-to-day operations and ensures continuity of farm work during school holidays.

Students are organised into farm work groups or teams, each assigned a specific plot or enterprise. A student farm captain may be appointed per group to record attendance, distribute tools, and report to the teacher. The school farm committee (comprising the principal, agriculture teacher, farm supervisor, and student representatives) meets regularly to review production



performance, resolve resource problems, and plan the next season. A written farm policy document should specify the rules for student farm work, tool use, produce handling, and income management.

Fill in the blank: The agriculture teacher serves as the school farm _____, responsible for planning, supervising, and recording all farm activities and for integrating farm work with the curriculum.

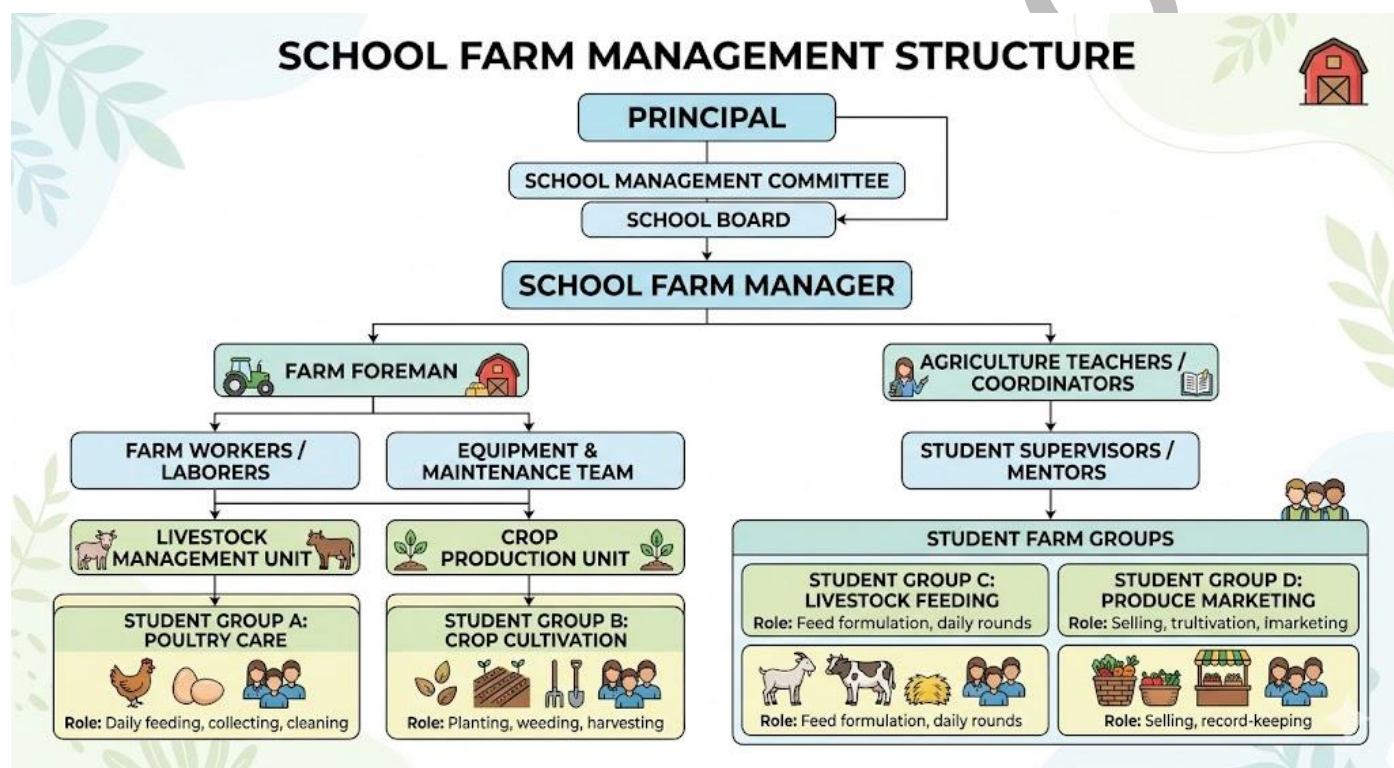


Figure 4.3: Organogram of the school farm management structure

Pilot questions 4.1

1. State the four main purposes of the school farm.
2. Explain why the educational function must take priority over the commercial function of the school farm.
3. Name five zones that should be designated in a school farm layout.
4. Describe the role of the agriculture teacher in school farm management.
5. Explain the purpose of the school farm committee.



4.2 Management of the School Farm

4.2.1 Production planning and enterprise selection

Production planning for the school farm begins with enterprise selection: choosing which crops and livestock the farm will produce each season. Enterprise selection should be guided by four criteria: educational value (does the enterprise provide learning experiences that match the curriculum?), local relevance (are the enterprises representative of farming in the school's community?), economic viability (will the enterprise generate reasonable returns to support the farm budget?), and resource compatibility (can the school provide the land, labour, inputs, and management the enterprise requires?).

Once enterprises are selected, a seasonal production plan is drawn up specifying: the enterprise, the area or number of animals, the planting or stocking date, the input requirements and their cost, the expected yield and revenue, and the student work schedule that integrates farm operations with the teaching timetable. The production plan should be prepared at the start of each school term and submitted to the school administration for approval. It serves as both a management guide and a budgeting document.

Fill in the blank: Enterprise selection for the school farm is guided by four criteria: educational value, local relevance, economic _____, and resource compatibility.

<u>Enterprise</u>	<u>Area</u>	<u>Dates</u>	<u>Inputs</u>	<u>Expected yield</u>	<u>Revenue</u>
<u>Maize</u>	1 ha	March–June	Improved seeds, fertilizer, herbicides	3 tons	₦1,200,000
<u>Vegetables</u>	0.5 ha	April–May	Seedlings, manure, irrigation tools	2 tons assorted	₦800,000
<u>Rice</u>	1 ha	June–October	Certified seeds, fertilizer, pesticides	4 tons	₦1,600,000
<u>Cassava</u>	1 ha	May– December	Stem cuttings, fertilizer	20 tons roots	₦1,000,000



Poultry	200 birds	Year-round	Day-old chicks, feed, vaccines	180 broilers	₹900,000
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Table 4.1: Example seasonal production plan for a school farm

4.2.2 Supervision of farm operations

Effective supervision of school farm operations ensures that farm work is conducted safely, correctly, and in alignment with both the production plan and the teaching objectives. The agriculture teacher or farm supervisor should be present during all student farm sessions. Before each session, the teacher briefs students on the tasks to be completed, the correct procedures, safety precautions, and the quality standards expected. During the session, the teacher circulates to observe, demonstrate where needed, and correct errors promptly.

Supervision should also cover tool allocation and return, material use, waste management, and plot cleanliness. A daily farm work log records the tasks completed, the number of students involved, inputs used, and any problems encountered. Students should be held accountable for the condition of their plots: poorly maintained plots should be documented and followed up, as farm performance can be included in continuous assessment scores. Good supervision converts routine farm work into structured, purposeful learning.

Fill in the blank: Before each farm session the teacher briefs students on tasks, correct _____, safety precautions, and quality standards, and circulates during the session to observe and correct errors.

Checklist item	Description
Crop inspection	Check plant health, growth stage, and signs of pests or diseases.
Livestock monitoring	Observe feeding, water supply, housing conditions, and animal health.
Tool & equipment check	Ensure farm tools are available, functional, and safely stored.
Water supply	Confirm irrigation systems or water points are working properly.
Labour supervision	Monitor student or worker activities, ensuring tasks are done correctly.
Record keeping	Update logs on attendance, inputs used, and daily farm activities.
Safety check	Verify safe handling of tools, chemicals, and adherence to safety rules.



<u>Input inventory</u>	Track seeds, fertilizers, feed, and other materials to avoid shortages.
<u>Progress reporting</u>	Document observations and report issues to school administration.

Box 4.1: Daily farm supervision checklist for the agriculture teacher

4.2.3 Responsibilities of the farm supervisor

The farm supervisor (also called the farm attendant or farm hand) is the non-teaching staff member responsible for the day-to-day continuity of farm operations. Key responsibilities include: maintaining farm structures and equipment in working order, carrying out routine farm operations (irrigation, feeding of animals, weeding) between student sessions and during school holidays, securing the farm and its produce, and reporting daily to the agriculture teacher on the condition of crops, animals, and facilities.

The farm supervisor must keep a daily farm diary recording all operations performed, quantities of inputs used, observations on crop or animal condition, and any incidents or problems. The farm supervisor should not make management decisions independently but should implement the production plan prepared by the agriculture teacher and refer any unusual situations to the teacher promptly. Regular performance appraisal of the farm supervisor by the agriculture teacher and school management ensures accountability and continuous improvement of farm operations.

Fill in the blank: The farm supervisor keeps a daily farm _____ recording all operations performed, inputs used, observations on crop and animal condition, and any incidents or problems.

<u>Responsibility</u>	<u>Description</u>
<u>Farm planning</u>	Develop seasonal production plans, allocate land, and schedule farming activities.
<u>Resource management</u>	Ensure availability and proper use of inputs, tools, and equipment.
<u>Supervision of activities</u>	Oversee daily student and worker tasks, ensuring correct farming practices.



<u>Training & guidance</u>	Provide instruction and demonstrations to students on crop and livestock management.
<u>Record keeping</u>	Maintain logs of attendance, inputs, outputs, and farm operations.
<u>Monitoring & evaluation</u>	Track crop growth, livestock performance, and assess outcomes against targets.
<u>Safety enforcement</u>	Ensure safe handling of tools, chemicals, and adherence to farm safety rules.
<u>Reporting</u>	Prepare periodic reports on farm activities, challenges, and achievements for school administration.

Box 4.2: Responsibilities of the school farm supervisor

Pilot questions 4.2

1. State the four criteria for enterprise selection in school farm production planning.
2. Name five items that should appear in a seasonal production plan for the school farm.
3. Describe three actions a teacher takes during supervision of a school farm session.
4. State three responsibilities of the school farm supervisor.
5. Explain why the farm supervisor should not make management decisions independently.

4.3 Practical Teaching on the Land Laboratory

4.3.1 The school farm as a land laboratory

The term land laboratory emphasises the school farm's role as a controlled environment for practical learning, analogous to the science laboratory for physics or chemistry. Like a science laboratory, the land laboratory provides the space, materials, and conditions for students to conduct experiments, practise skills, observe biological processes, and record data. Unlike the science lab, the land laboratory is a living, changing environment whose conditions cannot be precisely controlled, requiring students to observe, adapt, and respond to real agricultural variability.

The land laboratory extends the agriculture curriculum beyond the classroom by providing authentic contexts for applying theoretical knowledge. A student who has learned about nitrogen



deficiency in the classroom can observe it on a plot with no nitrogen fertiliser and compare it with an adjacent fertilised plot. A student who has learned about poultry vaccination can practise the skill on the school farm flock under teacher supervision. The land laboratory makes abstract concepts concrete and assessment of practical competence possible.

Fill in the blank: The land _____ provides the space, materials, and conditions for students to practise skills, observe biological processes, and record data in an authentic agricultural environment.

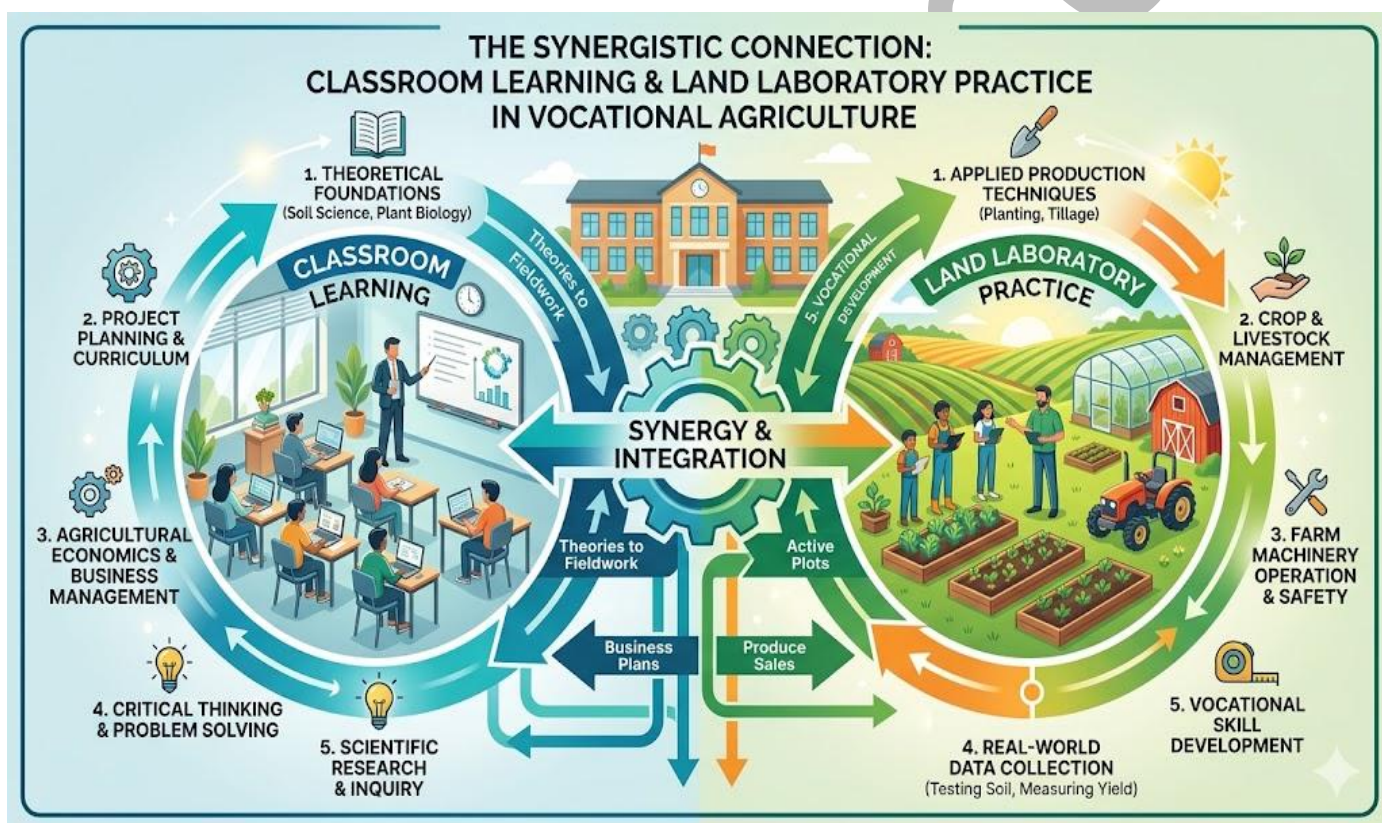


Figure 4.4: Diagram showing the relationship between classroom learning and land laboratory practice

4.3.2 Conducting an agriculture class on the farm

A farm class is a structured lesson conducted on the school farm. It follows the same lesson plan structure as a classroom lesson but the content, activities, and assessment are farm-based. Before the farm class, the teacher prepares the practical site (ensuring the plot, tools, animals, and



materials are ready), distributes the lesson plan to students or writes objectives on the farm notice board, and conducts a brief classroom introduction linking the farm activity to the relevant theory.

On the farm, the teacher first demonstrates the skill or operation, then students practise it in their assigned groups under supervision. The teacher uses guided questions during the session to assess understanding and connect what students observe to classroom concepts. At the end of the session, students record their observations and results in a farm practical notebook and the teacher summarises the key learning points. The farm practical notebook entry is reviewed and scored, contributing to the student's continuous assessment grade.

Fill in the blank: At the end of a farm class, students record observations and results in a farm practical _____, which the teacher reviews and scores as part of continuous assessment.

<u>Step</u>	<u>Description</u>
<u>1. Classroom introduction</u>	Link theory to practice, state objectives, and prepare learners for the activity.
<u>2. Prepare practical site & distribute tools</u>	Organize the farm site, arrange materials, and hand out tools to students.
<u>3. Teacher demonstration</u>	Instructor shows correct procedures step by step.
<u>4. Student practice in supervised groups</u>	Learners perform tasks in small groups under teacher guidance.
<u>5. Teacher questioning & observation</u>	Ask probing questions, monitor performance, and correct errors.
<u>6. Students record in practical notebook</u>	Learners document procedures, observations, and results.
<u>7. Teacher summary & assessment</u>	Review key points, assess performance, and provide feedback.

Box 4.3: Structure of a farm class session

4.3.3 Developing manipulative skills through farm work

Manipulative skills are the physical skills of agriculture: planting, budding, grafting, pruning, soil sampling, pesticide mixing and application, animal restraint, injection, feed mixing, and



harvesting. They cannot be developed through classroom instruction or reading alone; they require repeated supervised practice until the correct technique becomes habitual. The school farm provides the context for this deliberate practice. Each manipulative skill should be introduced by demonstration, followed by supervised practice, and assessed by a practical performance test.

A skill development schedule should be prepared at the start of the year listing all the manipulative skills to be developed by each class, the term in which each skill will be introduced, and the number of practice opportunities each student will have. Students should practise each skill at least three times before being assessed. The practical performance test uses a checklist of the key steps of the skill; a student who fails the first assessment must practise again before re-assessment. Skill mastery is documented in the student's practical record.

Fill in the blank: Manipulative skills require repeated supervised _____ until the correct technique becomes habitual; the school farm provides the context for this deliberate practice.

<u>Skill</u>	<u>Term</u>	<u>Practice sessions</u>	<u>Assessment</u>
<u>Soil preparation</u>	First term	3 sessions (land clearing, tillage, manure application)	Practical test on soil preparation techniques
<u>Nursery management</u>	First term	2 sessions (bed preparation, seed sowing)	Observation checklist and notebook records
<u>Transplanting</u>	Second term	2 sessions (spacing, watering, mulching)	Teacher evaluation during field practice
<u>Livestock feeding</u>	Second term	3 sessions (ration preparation, feeding schedules)	Oral questioning and supervised feeding demonstration
<u>Pest & disease control</u>	Third term	2 sessions (identification, application of control measures)	Written test plus field observation
<u>Harvesting & record keeping</u>	Third term	2 sessions (harvest methods, farm records)	Submission of farm record book and teacher review

Table 4.2: Example skill development schedule for a Junior Secondary School agriculture class



1. Explain what is meant by the school farm as a land laboratory.
2. Describe three ways in which the land laboratory extends the agriculture curriculum beyond the classroom.
3. Describe the structure of a farm class session from preparation to closing.
4. Explain what manipulative skills are in agriculture and give three examples.
5. Explain how manipulative skills should be assessed in a school farm setting.

4.4 Record Keeping in the School Farm

4.4.1 Types and importance of farm records

Farm records are written accounts of all activities, inputs, outputs, and financial transactions on the school farm. The main types of farm records are: production records (planting dates, quantities planted, input applications, observations on growth and health, yields harvested), financial records (all income received from sale of produce and all expenditure on inputs, labour, equipment, and services), inventory records (list of all tools, equipment, and materials with their condition and location), and student performance records (practical notebook scores, skill assessments, and farm attendance).

Farm records are important for five reasons: they provide the data needed to evaluate production performance; they support budgeting and financial management; they serve as legal and accountability documents for school administration; they provide the information students need to analyse farm accounts and learn business management; and they demonstrate the productivity and educational value of the school farm to the principal, parents, and external stakeholders. A school farm without records cannot be managed effectively or improved systematically.

Fill in the blank: The four main types of school farm records are production records, financial records, _____ records, and student performance records.



<u>Record type</u>	<u>Contents</u>	<u>Management purpose</u>
<u>Production record</u>	Details of crops planted, livestock raised, inputs used, and outputs harvested.	Tracks farm activities and measures productivity.
<u>Financial record</u>	Income, expenses, sales, purchases, and budget allocations.	Ensures accountability, supports financial planning, and evaluates profitability.
<u>Inventory record</u>	Tools, equipment, seeds, fertilizers, chemicals, and livestock numbers.	Monitors resource availability and prevents shortages or losses.
<u>Attendance & labour record</u>	Student/worker attendance, tasks performed, and hours worked.	Supervises participation, ensures fair workload distribution, and supports evaluation.

Table 4.3: Types of school farm records with their contents and purpose

4.4.2 Maintaining farm records

Farm records should be maintained daily, not accumulated at the end of the week or month. The farm supervisor enters daily operations in the farm diary; the agriculture teacher reviews and countersigns weekly. Financial transactions are recorded as they occur in a cash book or income-expenditure ledger; receipts are filed and referenced. The inventory is updated whenever tools or materials are added, lost, or worn out. Student practical notebook entries are collected and scored at the end of each farm session.

Records should be kept in a secure location in the school farm office or the agriculture teacher's office. A simple filing system with separate folders for production records, financial records, inventory, and student records keeps the documents organised and accessible. At the end of each school term, the agriculture teacher prepares a term farm report summarising production performance, financial results, and student practical achievements. This report is submitted to the principal and filed as a permanent school record.

Fill in the blank: Financial transactions should be recorded as they _____ in a cash book or income-expenditure ledger, with receipts filed and referenced to the ledger entry.



<u>Folder</u>	<u>Contents</u>	<u>Purpose</u>
<u>Folder 1 – Production records</u>	Planting records, growth observations, yield records.	Track farm activities and measure productivity.
<u>Folder 2 – Financial records</u>	Cash book, receipts, term income–expenditure statement.	Ensure accountability and evaluate profitability.
<u>Folder 3 – Inventory records</u>	Tool and equipment list, update log.	Monitor resource availability and prevent shortages or losses.
<u>Folder 4 – Student records</u>	Practical notebooks, skill assessment checklists, farm attendance register.	Supervise student participation, track skill development, and support evaluation.

Box 4.4: Simple filing system for school farm records

4.4.3 Using farm records to improve management

Farm records are only valuable if they are analysed and used to make better management decisions. At the end of each season, the agriculture teacher reviews production records to compare actual yield against the plan and identify what caused any shortfall (drought, pest damage, late planting, inadequate fertilisation). Financial records are reviewed to calculate the gross margin of each enterprise (revenue minus variable costs) and identify which enterprises are profitable and which are loss-making.

Inventory records are reviewed to identify tools and equipment that need repair or replacement before the next season. Student performance records are reviewed to identify manipulative skills where many students failed, indicating a need to revise the instruction or provide additional practice opportunities. The findings from the record analysis form the basis of the next season's production plan: enterprises that performed well are retained or expanded; those that underperformed are reviewed, modified, or replaced. This cycle of records, analysis, and planning is the foundation of continuous improvement in school farm management.



Fill in the blank: At the end of each season, financial records are reviewed to calculate the _____ margin of each enterprise (revenue minus variable costs) to identify which enterprises are profitable.



Figure 4.5: Cycle of farm record keeping, analysis, and management improvement.

Figure 4.5: Cycle of farm record keeping, analysis, and management improvement

Pilot questions 4.4

1. Name the four main types of school farm records and state one item recorded in each.
2. State five reasons why farm records are important.
3. Describe how production records and financial records should be maintained.
4. Explain how the agriculture teacher uses production records to improve the next season's plan.
5. Explain what a gross margin is and how it is used to evaluate school farm enterprises.



Series Summary

This Series covered the organisation, management, practical teaching, and record keeping of the school farm. We defined the four functions of the school farm (teaching laboratory, demonstration site, income source, community model), described the planning of farm layout into enterprise zones, and outlined the management structure from principal to student farm groups. We explained production planning using four enterprise selection criteria, described daily supervision practices, and stated the responsibilities of the farm supervisor.

We then covered the school farm as a land laboratory for practical teaching, the structure of a farm class session, and the development of manipulative skills through scheduled practice and performance testing. Finally, we described the four types of farm records, the importance and maintenance of records, and the use of production records, financial records, and student performance records to improve school farm management through a continuous cycle of keeping, analysing, and acting on records. By completing this Series, you should be able to achieve all nine Series Learning Outcomes (SLO 4.1 to SLO 4.9).

Glossary of Terms

- **Cash book:** a financial record in which all income and expenditure are recorded chronologically as transactions occur; the primary financial record of the school farm.
- **Farm class:** a structured lesson conducted on the school farm following a lesson plan with farm-based objectives, demonstration, student practice, and assessment.
- **Farm diary:** a daily record maintained by the farm supervisor of all operations performed, inputs used, observations, and incidents on the school farm.
- **Farm practical notebook:** a student notebook in which observations, data, and results from each farm class session are recorded and submitted for teacher scoring.
- **Farm supervisor:** a non-teaching staff member responsible for day-to-day continuity of school farm operations, implementing the production plan prepared by the agriculture teacher.



- **Gross margin:** revenue from an enterprise minus the variable costs of production; used to evaluate the financial performance of individual school farm enterprises.
- **Inventory record:** a list of all tools, equipment, and materials on the school farm, updated whenever items are added, lost, or worn out.
- **Land laboratory:** the school farm viewed as a practical teaching facility analogous to a science laboratory, providing the setting for agricultural skill development and biological observation.
- **Manipulative skill:** a physical agricultural skill requiring hand-eye coordination and correct technique, such as planting, grafting, soil sampling, or animal injection.
- **Production plan:** a seasonal document specifying the enterprise, area, planting date, input requirements, expected yield, expected revenue, and student work schedule for the school farm.
- **Production record:** a farm record documenting planting dates, input applications, growth observations, pest incidences, and yields for each enterprise on the school farm.
- **School farm committee:** a management body comprising the principal, agriculture teacher, farm supervisor, and student representatives that reviews farm performance and resolves resource problems.
- **Skill development schedule:** a plan prepared at the start of the year listing all manipulative skills to be developed by each class, the term of introduction, and the number of practice opportunities.
- **Student farm captain:** a student appointed to lead a farm work group, responsible for recording attendance, distributing tools, and reporting to the agriculture teacher.
- **Term farm report:** a summary document prepared by the agriculture teacher at the end of each school term covering production performance, financial results, and student practical achievements.



Concept Check Questions [Series 4]

Objective Questions

1. The four main purposes of the school farm are teaching laboratory, demonstration site, income source, and community _____. (Linked to SLO 4.1)
2. Enterprise selection for the school farm is guided by educational value, local relevance, economic viability, and resource _____. (Linked to SLO 4.4)
3. The farm supervisor keeps a daily farm _____ recording all operations, inputs used, observations, and incidents. (Linked to SLO 4.6)
4. At the end of a farm class, students record their observations in a farm practical _____ that is scored as part of continuous assessment. (Linked to SLO 4.8)
5. Gross margin is calculated as revenue minus _____ costs and is used to evaluate the financial performance of school farm enterprises. (Linked to SLO 4.9)

Short-Answer Questions

1. State the four criteria for enterprise selection in school farm production planning. (Linked to SLO 4.4)
2. Describe the role of the agriculture teacher during a school farm supervision session. (Linked to SLO 4.5)
3. Explain what the land laboratory concept means for the teaching of vocational agriculture. (Linked to SLO 4.7)
4. Describe the structure of a farm class session. (Linked to SLO 4.8)
5. State four reasons why farm records are important to the school farm. (Linked to SLO 4.9)

Long-Answer Questions

1. Describe the organisation and management of a school farm, covering its four functions, farm layout planning, management structure, enterprise selection, production planning, and daily supervision of operations. (Linked to SLOs 4.1, 4.2, 4.3, 4.4, 4.5)
2. Explain how the school farm functions as a land laboratory for practical teaching, describing how to conduct a farm class, how to develop manipulative skills, and how student farm performance contributes to continuous assessment. (Linked to SLOs 4.7, 4.8)



3. Describe the farm record-keeping system of the school farm, explaining the four record types, how each is maintained, and how records are analysed at the end of the season to improve the next season's production plan. (Linked to SLO 4.9)

Answers to Concept Check Questions [Series 4]

Objective Questions

1. Model.
2. Compatibility.
3. Diary.
4. Notebook.
5. Variable.

Short-Answer Questions

1. Educational value (does the enterprise provide learning experiences matching the curriculum?); local relevance (is the enterprise representative of farming in the school's community?); economic viability (will the enterprise generate reasonable returns?); resource compatibility (can the school provide the required land, labour, inputs, and management?).
2. Before the session: brief students on tasks, correct procedures, safety precautions, and quality standards; allocate tools and inputs. During the session: circulate to observe, demonstrate correct technique where needed, correct errors promptly, check quality of work. After the session: review with students, record tasks completed and inputs used in the farm work log.
3. The land laboratory concept views the school farm as a practical teaching facility where students apply classroom theory to real agricultural situations. Like a science laboratory, it provides the conditions for skill practice, biological observation, and data collection, but in a living, variable agricultural environment. It makes abstract concepts concrete and enables assessment of practical competence.
(1) Classroom introduction linking theory to the farm activity; (2) prepare practical site and distribute tools; (3) teacher demonstration of the skill or operation; (4) students practise in supervised groups; (5) teacher questioning to assess understanding during practice; (6)



students record observations in practical notebook; (7) teacher summary and scoring of practical notebooks.

4. Any four: provide data to evaluate production performance; support budgeting and financial management; serve as accountability documents for school administration; provide information for students to learn farm business management; demonstrate the farm's productivity and educational value to stakeholders.

Long-Answer Questions

1. Functions: teaching laboratory, demonstration site, income source, community model (education first). Layout: enterprise zones (crop plots, animal units, garden, storage, tool store), farm map to scale, equal-sized student plots. Management structure: principal (accountability), agriculture teacher (farm manager), farm supervisor (day-to-day operations), student farm groups with farm captains, school farm committee. Enterprise selection: educational value, local relevance, economic viability, resource compatibility. Production plan: enterprise, area, dates, inputs and cost, expected yield and revenue, student work schedule; prepared each term, submitted for approval. Supervision: pre-session briefing on tasks, procedures, safety; circulation during session to observe, demonstrate, correct; daily farm work log; student plots included in continuous assessment.
2. Land laboratory: school farm as practical teaching facility where theory meets practice; students observe nitrogen deficiency on unfertilised plots, practise vaccination on real animals; abstract concepts become concrete; practical competence assessable. Farm class structure: classroom introduction, site preparation, teacher demonstration, supervised student practice, guided questioning, practical notebook recording, teacher summary and scoring. Manipulative skills: physical techniques (planting, grafting, soil sampling, animal injection) requiring repeated supervised practice; skill development schedule prepared at year start; each skill introduced by demonstration, practised three times minimum, assessed by performance checklist; failures require additional practice before re-assessment; mastery documented in student practical record.
3. Four record types: production records (planting dates, input applications, growth observations, yields); financial records (cash book, receipts, income-expenditure statement); inventory records (tools, equipment, materials, condition); student performance records (practical notebook scores, skill assessments, farm attendance). Maintenance: daily entries by



farm supervisor in farm diary; agriculture teacher countersigns weekly; financial transactions recorded as they occur; inventory updated at each change; student notebooks scored each session; term farm report prepared at end of term. End-of-season analysis: production records compared with plan to identify yield shortfalls and causes; financial records used to calculate gross margin per enterprise (revenue minus variable costs) to identify profitable and loss-making enterprises; inventory reviewed for repair or replacement needs; student records identify skills requiring additional practice. Findings revise the next season's production plan.

Answers to Pilot Questions [Series 4]

Part 4.1: Organisation of the School Farm

1. Teaching laboratory, demonstration site, source of school income, and community model of good agricultural practice.
2. If the commercial function dominates, students become farm labourers performing routine tasks without structured learning objectives, supervision, or assessment. This defeats the purpose of the school farm as a teaching facility. The primary justification for maintaining a school farm is educational: every farm operation must be linked to a curriculum objective and student learning.
3. Crop production plots, vegetable garden (demonstration plots), animal production units (poultry house, piggery, fish pond, small ruminant pen), storage and processing facilities, and tool store.
4. The agriculture teacher serves as the farm manager, responsible for: planning all farm enterprises and preparing the seasonal production plan; preparing farm class lesson plans and linking farm operations to curriculum objectives; supervising all student farm sessions; recording and scoring student farm performance; reviewing and countersigning the farm supervisor's diary; preparing the term farm report.
5. The school farm committee meets regularly to review production performance, resolve resource and staffing problems, plan the next season, and ensure that the farm serves both its educational and community functions. It provides collective governance and prevents the farm from being managed by the agriculture teacher alone without accountability to school leadership and students.



Part 4.2: Management of the School Farm

1. Educational value, local relevance, economic viability, and resource compatibility.
2. Any five: the enterprise, the area or number of animals, the planting or stocking date, the input requirements and their cost, the expected yield, the expected revenue, and the student work schedule.
3. Any three: brief students before the session on the tasks to be completed, correct procedures, and safety precautions; circulate during the session to observe each student's work and provide immediate corrective feedback; demonstrate the correct technique for any operation where students are struggling; record the tasks completed, inputs used, and problems encountered in the daily farm work log.
4. Any three: maintain farm structures and equipment in working order; carry out routine operations (irrigation, animal feeding, weeding) between student sessions and during school holidays; secure the farm and its produce against theft and damage; keep the daily farm diary recording all operations, inputs, observations, and incidents; report daily to the agriculture teacher.
5. The farm supervisor is not a trained agriculture teacher and may lack the knowledge to make sound management decisions about planting times, fertiliser rates, disease treatment, or enterprise changes. Independent decisions could result in production losses, misuse of school resources, or animal welfare problems. The farm supervisor's role is to implement the production plan prepared by the qualified agriculture teacher and to refer any situation outside routine operations to the teacher immediately.

Part 4.3: Practical Teaching on the Land Laboratory

1. The land laboratory is the school farm viewed as a controlled practical teaching facility analogous to a science laboratory. It provides the space, materials, and living conditions for students to practise agricultural skills, observe biological processes (plant growth, animal behaviour, pest damage), and record data in an authentic farming environment. It extends the agriculture curriculum beyond the classroom by making practical competence possible.
2. Any three: a student who has learned about nitrogen deficiency in the classroom can observe it on an unfertilised plot alongside a fertilised plot and see the visual difference; a



student who has learned about poultry vaccination can practise the skill on the school farm flock under supervision, developing actual competence; a student who has calculated fertiliser rates in class can measure and apply the correct quantity to a real plot; field observation of pests, diseases, and soil conditions reinforces identification skills taught from photographs.

- (1) Classroom introduction: teacher links the farm activity to relevant theory and states the lesson objectives; (2) site preparation: teacher ensures the plot, tools, animals, and materials are ready before students arrive; (3) teacher demonstration: teacher performs the skill or operation while students observe; (4) student practice: students perform the skill in supervised groups; (5) teacher questioning: teacher uses questions to assess understanding and connect observations to classroom concepts; (6) student recording: students enter observations and results in practical notebooks; (7) teacher closing: teacher summarises key learning points, collects practical notebooks for scoring.
3. Manipulative skills are physical agricultural skills requiring hand-eye coordination and correct technique that can only be developed through repeated practice. Three examples: soil sampling (inserting a core sampler to the correct depth at representative points and mixing the sample correctly); budding or grafting (cutting and inserting a bud or scion at the correct angle with the correct wrapping); animal injection (restraining the animal correctly, identifying the injection site, and inserting the needle at the correct angle).
4. Manipulative skills are assessed using a practical performance test in which the student independently performs the complete skill while the teacher rates each step against a standard checklist. A student who achieves the required pass mark (typically 70 to 80 per cent of steps performed correctly) is recorded as having mastered the skill. A student who fails must practise again before re-assessment. Skill mastery is documented in the student practical record and contributes to the continuous assessment grade.

Part 4.4: Record Keeping in the School Farm

1. Production records (planting dates, input applications, growth observations, yields); financial records (all income and expenditure transactions); inventory records (list of tools, equipment, and materials with condition); student performance records (practical notebook scores, skill assessments, farm attendance).



2. Any five: provide data to evaluate whether the production plan was achieved and why; support budgeting and planning for the next season; serve as accountability documents for school administration, parents, and external auditors; teach students farm business management through analysis of actual farm data; demonstrate the productivity and educational value of the school farm to stakeholders; document student practical achievement for continuous assessment and reporting.
3. Production records: the farm supervisor enters daily observations (planting, input applications, pest incidence, growth stages, yields) in the farm diary; the agriculture teacher reviews and countersigns weekly. Financial records: all income (sale of produce) and expenditure (purchase of inputs, payment of labour) are recorded in the cash book as transactions occur; receipts are filed and referenced to the cash book entry; the cash book is balanced and reviewed monthly.
4. At the end of each season the agriculture teacher compares actual yield against the planned yield for each enterprise and investigates the reasons for any shortfall (late planting, inadequate fertilisation, pest damage, drought). Enterprises that consistently underperform despite correct management are replaced with more suitable alternatives. Enterprises that exceeded the plan may be expanded. The causes of yield shortfalls also guide the selection of training topics for future farm classes (for example, if pest management was inadequate, more time is allocated to pest identification and control in the next season's teaching schedule).
5. Gross margin is the revenue earned by an enterprise in a season minus the variable costs (seeds, fertilisers, pesticides, casual labour, feeds) incurred to produce it. It shows whether the enterprise covered its operating costs and generated a surplus. An enterprise with a positive gross margin is financially viable; a negative gross margin indicates that the enterprise cost more to run than it earned, and should be reviewed or replaced. Gross margins are calculated separately for each enterprise on the farm and compared to identify which activities best support the farm's educational and financial goals.



References and Attributions [Series 4]

Textual References (Books and External Sources)

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Figures, Plates, Tables, and Boxes

- Figure 4.1: School farm four functions diagram Attribution: AI generated. Suggested OER search string: "school farm functions teaching laboratory demonstration income community OER".
- Figure 4.2: School farm layout plan Attribution: AI generated. Suggested OER search string: "school farm layout plan enterprise zones crop animal storage OER".
- Figure 4.3: School farm management organogram Attribution: AI generated. Suggested OER search string: "school farm management structure organogram teacher supervisor students OER".
- Table 4.1: Seasonal production plan table Attribution: AI generated. Suggested OER search string: "school farm seasonal production plan enterprises maize poultry OER table".
- Box 4.1: Daily farm supervision checklist Attribution: AI generated. Suggested OER search string: "school farm supervision checklist agriculture teacher daily session OER".
- Box 4.2: Farm supervisor responsibilities Attribution: AI generated. Suggested OER search string: "school farm supervisor responsibilities farm diary routine operations OER".
- Figure 4.4: Classroom-land laboratory relationship Attribution: AI generated. Suggested OER search string: "land laboratory classroom practical teaching relationship vocational agriculture OER".
- Box 4.3: Farm class session structure Attribution: AI generated. Suggested OER search string: "farm class session structure steps demonstration practical notebook OER".



- Table 4.2: Skill development schedule Attribution: AI generated. Suggested OER search string: "manipulative skill development schedule secondary school agriculture OER table".
- Table 4.3: School farm record types Attribution: AI generated. Suggested OER search string: "school farm records types production financial inventory student OER table".
- Box 4.4: Farm record filing system Attribution: AI generated. Suggested OER search string: "school farm record filing system production financial inventory student OER".
- Figure 4.5: Farm records improvement cycle Attribution: AI generated. Suggested OER search string: "school farm records analysis improvement cycle production plan OER".



Course code: AGE 206

Course title: Teaching Vocational Agriculture in Schools

Course credit load: 2 Units

Series 5: Farm Records, Accounts, and Performance Analysis

- **Part 5.1: Farm Accounts and Financial Records**
 - Sub Part 5.1.1: Definition and importance of farm accounts
 - Sub Part 5.1.2: The cash book and income-expenditure statement
 - Sub Part 5.1.3: Adjusting accounts for inter-farm comparison
- **Part 5.2: Input and Output Terms**
 - Sub Part 5.2.1: Definition of input terms
 - Sub Part 5.2.2: Definition of output terms
 - Sub Part 5.2.3: Calculating inputs, outputs, and costs
- **Part 5.3: Performance Measures and Gross Margin Analysis**
 - Sub Part 5.3.1: Calculating performance measures
 - Sub Part 5.3.2: Gross margin analysis
 - Sub Part 5.3.3: Factors affecting output level
- **Part 5.4: Using Farm Accounts in Teaching**
 - Sub Part 5.4.1: Teaching farm account analysis in the classroom
 - Sub Part 5.4.2: Using school farm accounts as teaching materials
 - Sub Part 5.4.3: Developing student business management competence



Introduction

Farm accounts and performance analysis are the tools that transform raw farm records into management information. A farmer who knows only that the season ended with a profit has less information than one who can calculate the gross margin per enterprise, identify which input drove the highest cost, and compare performance with last season or with neighbouring farms. Teaching students to analyse farm accounts is one of the most practically valuable skills in vocational agriculture education.

This Series covers farm accounts and financial records, the definitions of input and output terms, the calculation of outputs and costs, and the use of performance measures including gross margin analysis. We conclude with strategies for using farm account analysis as a classroom teaching tool. All content connects directly to the school farm records established in Series 4.

Series Learning Outcomes

Upon completing this Series, you should be able to:

- **SLO 5.1** define farm accounts and explain their importance to farm management (Linked to Part 5.1),
- **SLO 5.2** describe the cash book and income-expenditure statement and explain how they are maintained (Linked to Part 5.1),
- **SLO 5.3** explain how accounts are adjusted for inter-farm comparison (Linked to Part 5.1),
- **SLO 5.4** define the key input terms used in farm financial analysis (Linked to Part 5.2),
- **SLO 5.5** define the key output terms used in farm financial analysis (Linked to Part 5.2),
- **SLO 5.6** calculate inputs, outputs, and costs for a given farm enterprise (Linked to Part 5.2),
- **SLO 5.7** calculate and interpret performance measures for a farm enterprise (Linked to Part 5.3),
- **SLO 5.8** conduct a gross margin analysis and explain the factors affecting output level (Linked to Part 5.3), and
- **SLO 5.9** use farm accounts and school farm records as teaching materials in the vocational agriculture classroom (Linked to Part 5.4).



5.1 Farm Accounts and Financial Records

5.1.1 Definition and importance of farm accounts

Farm accounts are systematic financial records of all monetary transactions on a farm over a defined period (usually one season or one year). They record income (from sale of produce, livestock, and by-products) and expenditure (on seeds, fertilisers, pesticides, feeds, labour, equipment, and services). Farm accounts differ from general bookkeeping in that they must also capture non-cash transactions such as produce consumed on the farm, home-produced inputs used in the enterprise, and opening and closing stock values.

Farm accounts are important because they: show whether the farm made a profit or loss; identify which enterprises are most and least profitable; provide data for planning the next season's budget; support applications for credit or government support; meet legal and tax obligations; and provide authentic data for teaching students about farm business management. Without accounts, farm management decisions are based on memory and impression rather than evidence.

Fill in the blank: Farm accounts record all monetary and non-cash transactions and are important because they show whether the farm made a profit or _____ and identify which enterprises are most profitable.





Figure 5.1: Diagram showing the importance of farm accounts to farm management

5.1.2 The cash book and income-expenditure statement

The cash book is the primary day-to-day financial record of the farm. It has two columns: receipts (all cash received) and payments (all cash paid out). Every transaction is recorded with the date, a description, and the amount. The cash book is balanced periodically (weekly or monthly) by subtracting total payments from total receipts to give the closing cash balance. Receipts should be issued for all produce sold and filed with the cash book entry as supporting documents.

The income-expenditure statement (also called the profit and loss account) summarises the farm's financial performance over a full season or year. It lists all income items with their values, all expenditure items with their values, and calculates the net farm income (total income minus total expenditure). The income-expenditure statement is prepared from the cash book at the end of the season, with adjustments for opening and closing stock of inputs and produce. It is the primary tool for assessing the overall financial performance of the farm.



Fill in the blank: The _____ statement lists all income and expenditure items for a season and calculates the net farm income, providing the primary summary of overall farm financial performance.

<u>Item</u>	<u>Details</u>	<u>Amount (₦)</u>
<u>Income</u>	Sale of maize grain (3 tons @ ₦400,000/ton)	1,200,000
	Sale of maize stalks (fodder)	100,000
Total income		1,300,000
<u>Expenditure</u>	Land preparation (ploughing, ridging)	150,000
	Seed purchase (improved maize varieties)	50,000
	Fertilizer (NPK, urea)	200,000
	Herbicides & pesticides	100,000
	Labour (planting, weeding, harvesting)	250,000
	Transport & marketing	100,000
Total expenditure		850,000
<u>Net farm income</u>	Total income – Total expenditure	450,000

Table 5.1: Example income-expenditure statement for a school farm maize enterprise

5.1.3 Adjusting accounts for inter-farm comparison

Direct comparison of farm accounts between farms of different sizes is misleading without adjustment. A farm with twice the area will normally have twice the total costs and income even if its efficiency is identical. To make valid comparisons, accounts are expressed per unit of area (per hectare), per animal unit, or per unit of output (per kilogram produced). This allows farms of different sizes to be compared on efficiency rather than absolute scale.

Other adjustments include: valuing home-consumed produce and home-produced inputs at market prices so that non-cash transactions are captured; adjusting for differences in soil type or rainfall zone when comparing farms in different locations; and separating enterprise accounts when a farm runs multiple enterprises, so that each enterprise's performance can be assessed independently. Students should be taught to identify what adjustments are needed before interpreting any farm account comparison.



Fill in the blank: To compare farms of different sizes, accounts are expressed per _____ of area (such as per hectare) or per animal unit, so that efficiency rather than absolute scale is compared.

<u>Rule</u>	<u>Description</u>	<u>Purpose</u>
<u>Standardize accounting period</u>	Ensure all farms use the same financial year or season for reporting.	Makes comparisons meaningful across time.
<u>Uniform valuation of assets</u>	Value land, livestock, crops, and equipment using consistent methods.	Avoids distortions from differing valuation practices.
<u>Consistent input costing</u>	Record seeds, fertilizers, chemicals, and labour at prevailing market rates.	Ensures fairness in cost comparisons.
<u>Depreciation adjustment</u>	Apply uniform depreciation methods for tools, machinery, and buildings.	Reflects true cost of asset use across farms.
<u>Exclude non-farm income</u>	Remove unrelated income sources (e.g., salaries, remittances).	Focuses comparison strictly on farm enterprise performance.
<u>Normalize labour records</u>	Convert family labour into equivalent hired labour cost.	Provides realistic labour cost estimates for comparison.
<u>Adjust for scale</u>	Express outputs and costs per hectare or per animal unit.	Allows comparison between farms of different sizes.

Box 5.1: Rules for adjusting farm accounts for inter-farm comparison

Pilot questions 5.1

1. Define farm accounts and state three items recorded as income.
2. State five reasons why farm accounts are important.
3. Describe the cash book and explain how it is balanced.
4. Explain what an income-expenditure statement is and what it shows.
5. Explain why farm accounts must be adjusted before inter-farm comparison.



5.2 Input and Output Terms

5.2.1 Definition of input terms

Farm inputs are all resources used in the production process. Fixed inputs (also called fixed costs or overhead costs) are costs that do not change with the level of production: land rent, depreciation on buildings and equipment, permanent labour, insurance, and interest on capital. They are incurred whether or not the farm produces anything in a given season. Variable inputs (also called variable costs or operating costs) change with the level of production: seeds, fertilisers, pesticides, feeds, casual labour, fuel, and packaging.

Depreciation is the annual reduction in the value of a fixed asset (tractor, building, equipment) due to age and use; it is calculated as (purchase price minus salvage value) divided by useful life in years. Land opportunity cost is the rental value of the land used, included as a cost even if the land is owned, because using it for farming foregoes other possible uses. Total cost of production = Fixed costs + Variable costs. Understanding the distinction between fixed and variable costs is essential for correct gross margin calculation.

Fill in the blank: _____ costs change with the level of production (seeds, fertiliser, labour) while fixed costs remain constant regardless of how much is produced.

<u>Cost type</u>	<u>Examples</u>	<u>Description</u>
<u>Fixed costs</u>	Land rent/lease, permanent buildings, tractors, irrigation systems, fencing.	Costs that remain constant regardless of output level; incurred even if production is low or zero.
<u>Variable costs</u>	Seeds, fertilizers, pesticides, hired labour, fuel, feed for livestock, packaging.	Costs that change directly with the level of production; increase or decrease depending on farm activity.

Table 5.2: Classification of farm inputs as fixed or variable costs with examples

5.2.2 Definition of output terms

Farm outputs are the products resulting from the production process. Gross output (also called gross revenue or total revenue) is the total value of all farm produce at farm gate prices, whether



sold or consumed on the farm. It includes: sale of crops, livestock, and livestock products; value of produce consumed by the farm household (valued at market price); closing stock value of unsold produce; and by-product values. Opening stock value of produce from the previous season is subtracted to avoid double-counting.

Net output is gross output minus the cost of purchased feedstuffs and seeds that were produced outside the farm. Enterprise output is the gross output attributable to a single enterprise (for example, the maize enterprise or the poultry enterprise), isolated from the farm's total output. Output per hectare and output per animal are the output measures used for comparing enterprise productivity across farms. These terms must be clearly understood before attempting gross margin calculations.

Fill in the blank: _____ output is the total value of all farm produce at farm gate prices including produce sold, home consumed, and closing stock, minus the opening stock from the previous season.



Figure 5.2: Diagram showing the components of gross output for a farm enterprise



5.2.3 Calculating inputs, outputs, and costs

To calculate total variable costs for an enterprise, list all variable inputs, state the quantity used and the unit price, and sum the cost column. Example for 0.5 ha of maize: seeds (5 kg at N2,000/kg = N10,000); NPK fertiliser (50 kg at N800/kg = N40,000); urea top-dressing (25 kg at N600/kg = N15,000); herbicide (1 litre at N3,500 = N3,500); casual labour for planting, weeding, and harvesting (15 person-days at N1,500/day = N22,500). Total variable cost = N91,000.

To calculate gross output, determine the quantity harvested and its farm gate price. If 0.5 ha produced 600 kg of maize sold at N250/kg: gross output = 600 x N250 = N150,000. Gross margin = Gross output minus Total variable costs = N150,000 minus N91,000 = N59,000. Gross margin per hectare = N59,000 / 0.5 = N118,000/ha. Students must practise these calculations with real or realistic data from the school farm to develop genuine competence in farm financial analysis.

Fill in the blank: Gross _____ = Gross output minus Total variable costs; it measures enterprise profitability after covering operating costs but before deducting fixed costs.

<u>Item</u>	<u>Details</u>	<u>Amount (₦)</u>
<u>Variable costs</u>	Seed (10 kg improved maize)	20,000
	Fertilizer (NPK & Urea)	60,000
	Herbicides & pesticides	30,000
	Labour (planting, weeding, harvesting)	40,000
	Transport & marketing	20,000
Total variable cost		170,000
<u>Gross output</u>	Yield: 1.5 tons maize grain @ ₦200,000/ton	300,000
<u>Gross margin</u>	Gross output – Variable cost	130,000
<u>Gross margin per hectare</u>	Gross margin ÷ 0.5 ha	260,000/ha

Table 5.3: Worked example: variable cost and gross margin calculation for 0.5 ha of maize



1. Distinguish between fixed costs and variable costs and give two examples of each.
2. Define depreciation and explain how it is calculated.
3. Define gross output and state three components that are added together to calculate it.
4. Calculate the total variable cost for a 1 ha cassava enterprise using these inputs: planting material 2,000 stems at N5 each; fertiliser 50 kg at N800/kg; herbicide 2 litres at N3,000/litre; casual labour 20 person-days at N1,500/day.
5. Calculate the gross margin if the cassava enterprise in question 4 produced 8,000 kg sold at N80/kg.

5.3 Performance Measures and Gross Margin Analysis

5.3.1 Calculating performance measures

Performance measures summarise the efficiency and profitability of a farm enterprise. The key measures are: gross margin per hectare (gross output per hectare minus variable costs per hectare), net farm income (total gross output minus total costs, including fixed costs), return on capital invested (net farm income divided by total capital employed, expressed as a percentage), labour productivity (gross output divided by total labour hours or person-days used), and land productivity (gross output per hectare).

Cost of production per unit of output is calculated by dividing total variable cost by total output: for the maize example above, $N91,000 / 600 \text{ kg} = N151.67/\text{kg}$. If the farm gate price is N250/kg, the profit margin per kg = $N250 \text{ minus } N151.67 = N98.33/\text{kg}$. These measures allow the farmer or student to assess: is the enterprise covering its costs? Is it competitive with purchased alternatives? Which input is driving the highest cost per unit of output? Performance measures should always be calculated for the actual data and compared with benchmarks.

Fill in the blank: Cost of production per unit of output is calculated by dividing total _____ cost by total output; comparing this with the market price shows the profit margin per unit.



<u>Performance measure</u>	<u>Formula</u>	<u>Units</u>	<u>Interpretation</u>
<u>Gross output</u>	Value of total farm produce sold	₹ or \$	Indicates overall revenue generated from production.
<u>Gross margin</u>	Gross output – Variable costs	₹ or \$	Shows profitability before fixed costs; higher margin means better efficiency.
<u>Net farm income</u>	Gross margin – Fixed costs	₹ or \$	Reflects true profit after accounting for all costs.
<u>Yield per hectare</u>	Total output ÷ Area cultivated	kg/ha or tons/ha	Measures productivity of land; higher yield indicates better management.
<u>Labour productivity</u>	Output ÷ Labour input	kg/person or ₹/labour-day	Shows efficiency of labour use in production.
<u>Return on investment (ROI)</u>	(Net income ÷ Total costs) × 100	%	Indicates profitability relative to costs; higher ROI means better returns.
<u>Cost–benefit ratio</u>	Gross output ÷ Total costs	Ratio	Assesses economic viability; >1 means benefits exceed costs.
<u>Income per hectare</u>	Net farm income ÷ Area cultivated	₹/ha or \$/ha	Allows comparison of profitability across farms of different sizes.

Table 5.4: Performance measures for a farm enterprise with formulae and units

5.3.2 Gross margin analysis

Gross margin analysis is the process of calculating and comparing the gross margins of different enterprises on the same farm to identify the most profitable use of land, labour, and capital. The enterprise with the highest gross margin per hectare (or per animal unit) makes the most profitable use of the farm's resources. Gross margin analysis guides enterprise selection: enterprises with consistently low or negative gross margins should be discontinued or replaced; enterprises with high gross margins should be expanded if resources permit.

Gross margin analysis can also be used to compare the same enterprise across different seasons (to assess the effect of weather, input prices, or management changes on profitability) or across different farms (after adjustment for scale as described in Part 5.1). A simple gross margin table comparing three or four enterprises on the school farm gives students a clear basis for



recommending enterprise changes and shows the direct financial consequences of management decisions. This is one of the most powerful lessons in farm business management.

Fill in the blank: Gross margin analysis compares the gross margins of different enterprises to identify the most _____ use of land, labour, and capital on the farm.

<u>Enterprise</u>	<u>Gross output</u>	<u>Variable costs</u>	<u>Gross margin</u>	<u>Gross margin per unit</u>
<u>Maize</u>	₦300,000 (1.5 tons @ ₦200,000/ton)	₦170,000	₦130,000	₦260,000/ha
<u>Vegetables</u>	₦400,000 (2 tons assorted @ ₦200,000/ton)	₦220,000	₦180,000	₦360,000/ha
<u>Layer poultry</u>	₦600,000 (eggs & culled hens)	₦400,000	₦200,000	₦1,000/bird

Table 5.5: Gross margin comparison table for three school farm enterprises

5.3.3 Factors affecting output level

Output level on a farm is determined by the interaction of five groups of factors: biological (variety or breed, health status, age of crop or animal), physical (soil quality, water availability, climate and season), managerial (timeliness of planting, input application rates and timing, quality of husbandry), economic (input prices, output prices, access to credit), and institutional (access to extension advice, availability of improved inputs in local markets, road infrastructure for marketing). Low output on the school farm or on a student's SAE project usually traces to one or more of these factors.

Teaching students to diagnose the cause of low output on a specific farm requires systematic analysis: compare the actual output with the expected output from the production plan, identify which factors deviated from the plan (late planting, underdose of fertiliser, pest outbreak, low rainfall), and quantify the likely yield penalty of each deviation. This analytical approach transforms a disappointing farm result from a simple failure into a learning opportunity. Students who can explain why output fell short are on the path to becoming competent farm managers.



Fill in the blank: Output level is affected by biological, physical, managerial, economic, and _____ factors; diagnosing which factor caused a yield shortfall is a key farm management competency.

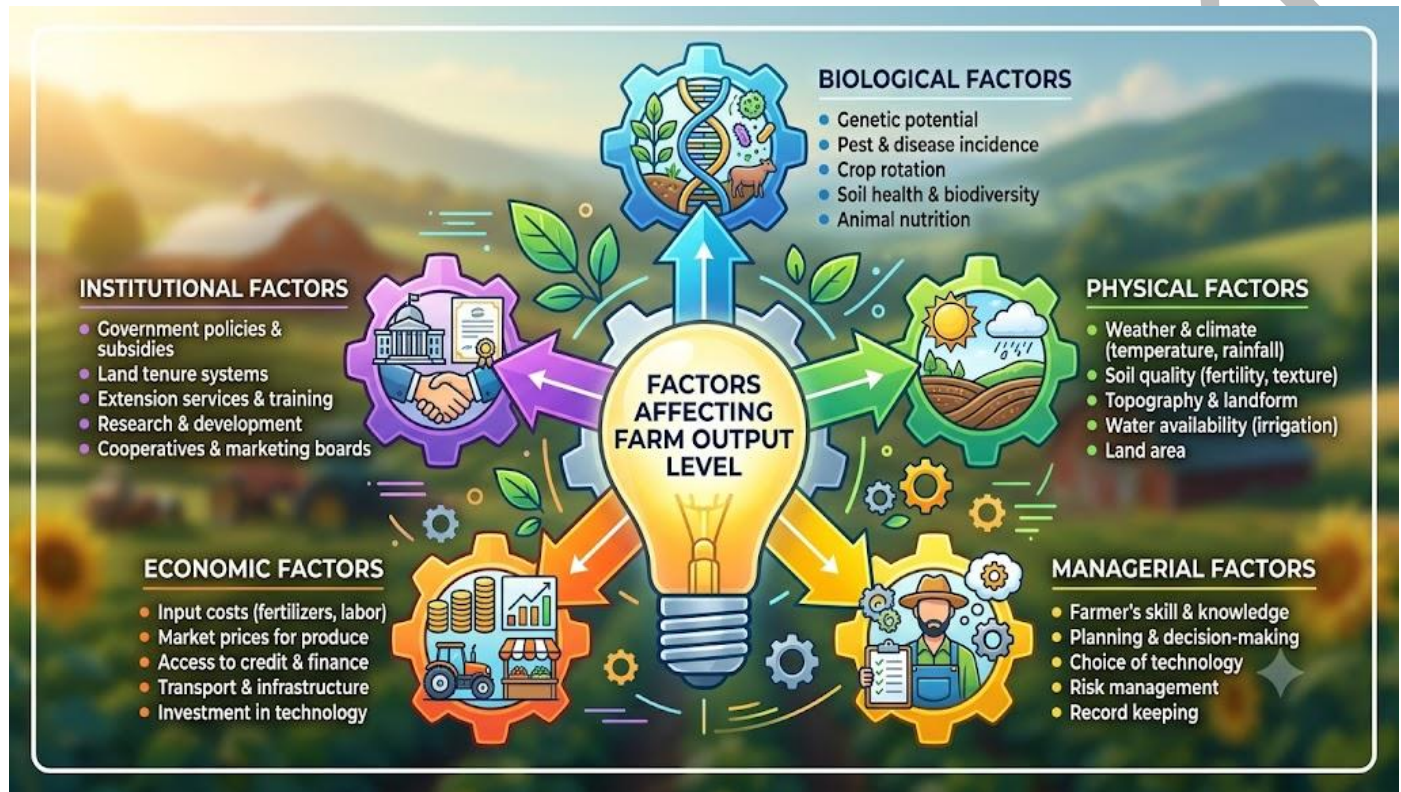


Figure 5.3: Diagram showing the five groups of factors affecting farm output level

Pilot questions 5.3

- List five performance measures used to evaluate a farm enterprise.
- Calculate the cost of production per kg of maize if total variable cost is N120,000 and yield is 800 kg/ha.
- Explain what gross margin analysis is and how it is used to guide enterprise selection.
- Name the five groups of factors affecting farm output level.
- A school farm maize plot yielded 400 kg/ha against a planned 1,200 kg/ha. Identify two possible causes and explain how you would investigate each.



5.4 Using Farm Accounts in Teaching

5.4.1 Teaching farm account analysis in the classroom

Farm account analysis is taught as a classroom topic using worked examples and case studies. The teacher presents a farm account or income-expenditure statement, asks students to calculate performance measures (gross margin, cost per unit of output, return on capital), and then discuss the management implications. Case studies based on actual Nigerian farm situations (the maize farmer who fertilised late, the poultry farmer whose feed cost exceeded income, the vegetable farmer who had no market access) make the analysis immediately relevant and engaging.

Exercises should progress from simple to complex: begin with single-enterprise accounts where all inputs and outputs are given and students only calculate; progress to accounts where students must identify missing data; and advance to case studies where students must recommend management changes based on their analysis. Group exercises in which student teams analyse different enterprises and present their findings to the class develop both analytical and communication skills. Assessment of farm account analysis should include both computation accuracy and quality of management interpretation.

Fill in the blank: Farm account analysis exercises progress from simple _____ calculations to complex case studies where students recommend management changes based on their analysis.

<u>Activity step</u>	<u>Description</u>	<u>Purpose</u>
<u>Introduction</u>	Teacher explains objectives and links farm accounting theory to practice.	Helps students understand why farm accounts matter.
<u>Case study presentation</u>	Provide students with a sample farm enterprise record (e.g., maize production).	Gives real-world context for analysis.
<u>Group work</u>	Students work in groups to calculate gross output, variable costs, and gross margin.	Encourages teamwork and problem-solving.
<u>Teacher guidance</u>	Teacher supervises, answers questions, and ensures correct application of formulas.	Reinforces accuracy and confidence in calculations.
<u>Presentation of results</u>	Each group presents their findings to the class.	Builds communication skills and peer learning.



<u>Discussion & comparison</u>	Teacher leads a discussion comparing group results and highlighting differences.	Shows how adjustments affect farm account outcomes.
<u>Conclusion & assessment</u>	Teacher summarizes lessons learned and assesses student performance.	Ensures knowledge retention and skill evaluation.

Box 5.2: Classroom activity: farm account case study analysis

5.4.2 Using school farm accounts as teaching materials

The school farm's own accounts are the most relevant and motivating teaching materials for farm account analysis. When students analyse the accounts of enterprises they worked on during the school year, they connect the abstract calculations to real experiences: they remember the pest outbreak that reduced yield, the late delivery of fertiliser, or the price they received when the crop was sold. This autobiographical connection greatly enhances understanding and retention of farm business management concepts.

The agriculture teacher should prepare a simplified version of the school farm accounts each season for use as a classroom teaching document. Sensitive financial information (staff salaries, school administration costs) should be excluded; the document should show only enterprise-level income, variable costs, gross margin, and selected physical performance data. Students compare this season's gross margins with those from previous seasons and discuss what factors caused differences, practising the diagnostic analysis described in Part 5.3.

Fill in the blank: Using the school _____ own accounts as teaching material is the most motivating approach because students can connect abstract calculations to real farm experiences they participated in.

<u>Guideline</u>	<u>Description</u>	<u>Purpose</u>
<u>Use simple formats</u>	Employ easy-to-read tables and cash books rather than complex ledgers.	Makes accounts accessible to students.
<u>Record only key items</u>	Focus on income, expenditure, inventory, and attendance records.	Avoids overwhelming learners with unnecessary details.



<u>Standardize units</u>	Record outputs in kg/tons, costs in ₦, and labour in hours/days.	Ensures consistency and comparability.
<u>Use realistic figures</u>	Apply local market prices and actual farm data.	Helps students relate accounts to real farming situations.
<u>Summarize regularly</u>	Prepare weekly or termly summaries of transactions.	Reinforces learning and supports timely evaluation.
<u>Link to class exercises</u>	Integrate account preparation with farm practicals and case studies.	Connects theory with practice for vocational learning.
<u>Teacher guidance</u>	Teacher supervises entries and explains accounting principles.	Ensures accuracy and builds student confidence.

Box 5.3: Guidelines for preparing school farm accounts as classroom teaching material

5.4.3 Developing student business management competence

The goal of teaching farm accounts in vocational agriculture is not to produce accountants but to develop business-minded farmers who can make sound financial decisions. The minimum farm business management competencies students should acquire are: the ability to keep a simple cash book, prepare an income-expenditure statement, calculate gross margin for one enterprise, identify the major cost items, and interpret the result to make at least one management recommendation. These competencies should be assessed through practical exercises using real or realistic farm data.

At a higher level, students should be able to compare gross margins across enterprises, analyse the factors that caused a yield shortfall, evaluate whether a proposed change in enterprise mix would improve overall farm income, and communicate their analysis clearly in writing. These higher-level competencies connect farm account analysis to the broader vocational agriculture curriculum and prepare students for roles as farmers, farm managers, agribusiness operators, or agriculture extension workers who must advise farmers on financial management decisions.

Fill in the blank: The minimum farm business management competencies include keeping a cash book, preparing an income-expenditure statement, calculating _____ margin, identifying major cost items, and making a management recommendation.



<u>Competency level</u>	<u>Competencies</u>	<u>Description</u>
<u>Basic competencies</u>	Record keeping, budgeting, simple gross margin analysis, resource inventory, labour supervision.	Foundational skills that help students manage small-scale farm operations and understand basic financial accountability.
<u>Advanced competencies</u>	Enterprise planning, cost–benefit analysis, investment appraisal, risk management, marketing strategies, inter-farm comparison.	Higher-level skills that prepare students to evaluate profitability, make strategic decisions, and manage farms as business enterprises.

Table 5.6: Farm business management competencies for vocational agriculture students at basic and advanced levels

Pilot questions 5.4

1. Explain how farm account case studies are used in the vocational agriculture classroom.
2. State two reasons why school farm accounts are the best teaching material for farm account analysis.
3. State the minimum farm business management competencies that vocational agriculture students should acquire.
4. Describe how you would structure a classroom exercise on gross margin analysis from simple to complex.
5. Explain the difference between the goal of farm account teaching in vocational agriculture and in an accountancy course.



Series Summary

This final Series covered farm accounts, performance analysis, and the use of financial records in teaching. We defined farm accounts and explained their importance, described the cash book and income-expenditure statement, and explained how accounts must be adjusted for valid inter-farm comparison. We defined all key input terms (fixed and variable costs, depreciation, land opportunity cost) and output terms (gross output, net output, enterprise output), and demonstrated their calculation using a maize enterprise worked example.

We then covered performance measures (gross margin per hectare, cost of production per unit, return on capital, labour and land productivity), explained gross margin analysis as the tool for comparing enterprise profitability, and identified the five groups of factors affecting output level. Finally, we covered the teaching application: using case studies and school farm accounts as classroom materials, progressing exercises from simple calculation to management recommendation, and developing the minimum farm business management competencies that every vocational agriculture student should possess. By completing this Series and the course as a whole, you should be able to achieve all nine Series Learning Outcomes (SLO 5.1 to SLO 5.9) and all seven course learning outcomes.

Glossary of Terms

- **Cash book:** a day-to-day financial record with receipts and payments columns; balanced periodically to show the closing cash balance; the primary farm financial record.
- **Cost of production per unit:** total variable cost divided by total output; shows the cost of producing one unit (kg, litre, bird) of the enterprise product.
- **Depreciation:** the annual reduction in value of a fixed asset calculated as (purchase price minus salvage value) divided by useful life in years.
- **Enterprise output:** the gross output attributable to a single farm enterprise, isolated from total farm output for individual enterprise analysis.



- **Fixed costs (overhead costs):** costs that do not change with the level of production; include land rent, depreciation, permanent labour, insurance, and interest on capital.
- **Gross margin:** gross output minus total variable costs for an enterprise; the primary indicator of enterprise profitability used in farm management analysis.
- **Gross margin analysis:** the process of calculating and comparing gross margins of different enterprises to identify the most profitable use of farm resources.
- **Gross output:** the total value of all produce from an enterprise at farm gate prices, including produce sold, home consumed, and closing stock, minus opening stock.
- **Income-expenditure statement:** a seasonal summary listing all farm income and expenditure items and calculating net farm income; prepared from the cash book at season end.
- **Labour productivity:** gross output divided by total labour input (person-days or hours); measures the output generated per unit of labour.
- **Land opportunity cost:** the rental value of owned land, included as a cost to reflect the alternative use value of the land even though no cash is paid.
- **Land productivity:** gross output per hectare; measures the output generated per unit of land area.
- **Net farm income:** total gross output minus total costs (variable plus fixed); the measure of overall farm profitability after all costs are deducted.
- **Net output:** gross output minus the cost of purchased feedstuffs and seeds produced outside the farm; used for comparing farms with different levels of self-sufficiency.
- **Return on capital:** net farm income divided by total capital employed, expressed as a percentage; measures the financial return on the investment in the farm.
- **Variable costs (operating costs):** costs that change with the level of production; include seeds, fertilisers, pesticides, feeds, casual labour, fuel, and packaging.



Concept Check Questions [Series 5]

Objective Questions

1. Farm accounts are important because they show whether the farm made a profit or _____ and identify which enterprises are most profitable. (Linked to SLO 5.1)
2. _____ costs do not change with the level of production and include land rent, depreciation, and permanent labour. (Linked to SLO 5.4)
3. Gross output is the total value of all produce at farm gate prices including sold produce, home-consumed produce, and _____ stock value. (Linked to SLO 5.5)
4. Gross margin = Gross output minus Total _____ costs. (Linked to SLO 5.7)
5. Output level is affected by biological, physical, managerial, economic, and _____ factors. (Linked to SLO 5.8)

Short-Answer Questions

1. Explain the difference between fixed and variable costs and give two examples of each. (Linked to SLO 5.4)
2. Define gross output and explain why opening stock is subtracted when calculating it. (Linked to SLO 5.5)
3. Calculate the gross margin for a 1 ha vegetable plot that had variable costs of N85,000 and produced 2,000 kg of tomatoes sold at N100/kg. (Linked to SLO 5.6)
4. Explain what gross margin analysis is and how it guides enterprise selection. (Linked to SLO 5.8)
5. State three minimum farm business management competencies for vocational agriculture students. (Linked to SLO 5.9)

Long-Answer Questions

1. Describe farm accounts and their importance, explain the cash book and income-expenditure statement, and explain how accounts are adjusted for inter-farm comparison. (Linked to SLOs 5.1, 5.2, 5.3)



2. Define all key input and output terms used in farm financial analysis, and demonstrate the calculation of variable costs, gross output, and gross margin using a worked example from a Nigerian farm enterprise. (Linked to SLOs 5.4, 5.5, 5.6)
3. Explain gross margin analysis and performance measures, identify the five groups of factors affecting output level, and describe how to use farm accounts as teaching materials in the vocational agriculture classroom. (Linked to SLOs 5.7, 5.8, 5.9)

Answers to Concept Check Questions [Series 5]

Objective Questions

1. Loss.
2. Fixed.
3. Closing.
4. Variable.
5. Institutional.

Short-Answer Questions

1. Fixed costs do not change with production level: land rent (paid whether or not the farm produces), depreciation on equipment. Variable costs change with production level: seeds (more area requires more seed), casual labour (more harvesting requires more labour days).
2. Gross output is the total value of all farm produce at farm gate prices, including produce sold, home consumed, and closing stock. Opening stock is subtracted because it was produced in a previous season and must not be counted as output of the current season; failure to subtract it would overstate the current season's output.
3. $\text{Gross output} = 2,000 \text{ kg} \times \text{N}100/\text{kg} = \text{N}200,000$. $\text{Gross margin} = \text{N}200,000 \text{ minus } \text{N}85,000 = \text{N}115,000$. $\text{Gross margin per hectare} = \text{N}115,000 / 1 \text{ ha} = \text{N}115,000/\text{ha}$.
4. Gross margin analysis calculates the gross margin (gross output minus variable costs) for each enterprise on the farm. By comparing gross margins per hectare or per animal unit across enterprises, the farmer identifies which enterprise makes the best use of resources.



Enterprises with consistently low or negative gross margins are discontinued or replaced; those with high gross margins are retained or expanded.

- Any three: keep a simple cash book; prepare an income-expenditure statement; calculate gross margin for one enterprise; identify the major cost items; interpret the result to make at least one management recommendation.

Long-Answer Questions

- Farm accounts: systematic records of all income and expenditure; include non-cash transactions (home-consumed produce, home-produced inputs) valued at market price. Importance: show profit or loss; identify profitable enterprises; support budget planning; facilitate credit applications; meet legal obligations; provide teaching material. Cash book: day-to-day record with receipts and payments columns; balanced periodically; receipts filed as supporting documents. Income-expenditure statement: seasonal summary of all income and expenditure; net farm income = total income minus total expenditure; prepared from cash book at season end, adjusted for opening and closing stock. Inter-farm comparison adjustments: express per hectare or per animal; value home-consumed produce at market price; value home-produced inputs at replacement cost; separate enterprise accounts; note differences in soil and rainfall.
- Fixed costs: do not change with production (land rent, depreciation, permanent labour, insurance, interest on capital). Depreciation = (purchase price minus salvage value) / useful life. Land opportunity cost = rental value of owned land. Variable costs: change with production (seeds, fertilisers, pesticides, feeds, casual labour, fuel, packaging). Gross output: total value of produce sold + home consumed + closing stock minus opening stock. Net output: gross output minus cost of external feeds and seeds. Worked example (0.5 ha maize): variable costs: seed N10,000 + NPK N40,000 + urea N15,000 + herbicide N3,500 + labour N22,500 = N91,000. Gross output: 600 kg x N250/kg = N150,000. Gross margin = N150,000 minus N91,000 = N59,000. Gross margin/ha = N118,000/ha.
- Performance measures: gross margin/ha (gross output/ha minus variable costs/ha); net farm income (total output minus all costs); return on capital (net income / capital x 100%); labour productivity (output / labour days); land productivity (output/ha); cost of production per unit (variable cost / total output). Gross margin analysis: compare gross margins of all enterprises; highest gross margin/ha = most profitable enterprise; guide expansion or discontinuation. Factors affecting output: biological (variety, health),



physical (soil, water, climate), managerial (timeliness, input rates), economic (prices, credit), institutional (extension, input supply, roads). Teaching application: use case studies with Nigerian farm data; progress from simple calculation to management recommendation; use school farm accounts with enterprise-level gross margins; students compare current and previous seasons; assess both calculation accuracy and interpretation quality.

Answers to Pilot Questions [Series 5]

Part 5.1: Farm Accounts and Financial Records

1. Farm accounts are systematic records of all monetary and non-cash transactions on a farm. Three income items: sale of crops, sale of livestock or livestock products, value of produce consumed by the farm household.
2. Any five: show profit or loss; identify most and least profitable enterprises; support budget planning for the next season; facilitate applications for credit or government support; meet legal and tax obligations; provide authentic data for teaching students farm business management.
3. The cash book has two columns: receipts (all money received) and payments (all money paid out). Each entry shows date, description, and amount. To balance, subtract total payments from total receipts; the difference is the closing cash balance, which should match the actual cash held.
4. An income-expenditure statement is a seasonal summary listing all income items with their values and all expenditure items with their values and calculating net farm income as total income minus total expenditure. It shows whether the farm made a profit or loss over the season and how much.
5. Direct comparison of absolute totals is misleading because a larger farm will normally have larger total costs and income even if its efficiency is the same as a smaller farm. Expressing accounts per hectare or per animal unit allows comparison of efficiency and productivity rather than scale, making the comparison valid and useful.



Part 5.2: Input and Output Terms

1. Fixed costs do not change with production level: land rent (paid whether or not the farm produces); depreciation on equipment or buildings. Variable costs change with production: seeds (more area requires more seed); casual labour (more operations require more person-days). Total cost = fixed costs + variable costs.
2. Depreciation is the annual reduction in value of a fixed asset due to age and use. It is calculated as: (purchase price minus salvage value) divided by useful life in years. Example: a water pump purchased for N120,000 with a salvage value of N20,000 and a useful life of 10 years has annual depreciation = $(N120,000 \text{ minus } N20,000) / 10 = N10,000$ per year.
3. Gross output is the total value of all farm produce at farm gate prices. Three components added: value of produce sold; value of produce consumed by the farm household (at market price); closing stock value of unsold produce (at market price). Opening stock from the previous season is subtracted to avoid double-counting.
4. Planting material: $2,000 \times N5 = N10,000$; fertiliser: $50 \text{ kg} \times N800 = N40,000$; herbicide: $2 \text{ litres} \times N3,000 = N6,000$; casual labour: $20 \times N1,500 = N30,000$. Total variable cost = $N10,000 + N40,000 + N6,000 + N30,000 = N86,000$.
5. Gross output = $8,000 \text{ kg} \times N80/\text{kg} = N640,000$. Gross margin = $N640,000 \text{ minus } N86,000 = N554,000$. Gross margin per hectare = $N554,000 / 1 \text{ ha} = N554,000/\text{ha}$.

Part 5.3: Performance Measures and Gross Margin Analysis

1. Gross margin per hectare; net farm income; return on capital invested; labour productivity (output per person-day); land productivity (output per hectare); cost of production per unit of output.
2. Cost of production per kg = total variable cost / total output = $N120,000 / 800 \text{ kg} = N150/\text{kg}$.
3. Gross margin analysis calculates gross margin (gross output minus variable costs) for each enterprise and compares them on a per hectare or per animal unit basis. It identifies which enterprise makes the most profitable use of land, labour, and capital. Enterprises with consistently negative or low gross margins are discontinued or replaced. Enterprises



with high gross margins are retained or expanded. It is the most practical tool for enterprise planning on a school farm or smallholder farm.

4. Biological (variety or breed, health status, age); physical (soil quality, water availability, climate and season); managerial (timeliness, input application rates and timing, quality of husbandry); economic (input prices, output prices, access to credit); institutional (extension advice, input availability, road infrastructure).
5. Any two with investigation method: Late planting (managerial factor): check the farm diary and calendar for actual planting date versus planned date; calculate the number of days late and compare with published data on yield penalty per week of late planting for that variety. Inadequate fertilisation (managerial/economic factor): check the farm records for fertiliser quantities actually applied versus recommended rate; calculate if the application was below the recommended level and estimate the yield loss using extension service response curve data.

Part 5.4: Using Farm Accounts in Teaching

1. The teacher presents a farm account or income-expenditure statement from a realistic Nigerian farm situation as a case study; students calculate performance measures (gross margin, cost per unit, return on capital); they identify the highest-cost input and the lowest-performing enterprise; they recommend at least one management change to improve profitability; they present their findings to the class. The case study approach makes abstract calculations relevant by anchoring them in real Nigerian farming problems.
2. Any two: students can connect the calculations to real experiences they had on the farm (pest outbreaks they observed, inputs they measured, yields they harvested), making the analysis more meaningful and memorable than a hypothetical example; the accounts reflect local conditions, input prices, and yield levels, so the results are directly relevant to farming decisions the students may face in their own communities.
3. Any three from the list: keep a simple cash book; prepare an income-expenditure statement for one enterprise; calculate gross margin for one enterprise; identify the major cost items; interpret the result and make at least one management recommendation.
4. Start with a single-enterprise account where all data are given and students only calculate gross margin (gross output minus variable costs); then provide accounts where one data



item is missing and students must identify and calculate it; then provide a two-enterprise account where students must compare gross margins and rank enterprises; finally, present a case study with a yield shortfall and ask students to identify the probable cause and recommend a management change. Each level requires more analysis and judgement than the previous one.

5. In a vocational agriculture course the goal is to develop practical farm business management competence: the ability to keep records, calculate gross margins, identify problems, and make sound management decisions. In an accountancy course the goal is mastery of formal double-entry bookkeeping, financial statement preparation, and audit standards. Vocational agriculture teaches enough accounting to manage a farm profitably; it does not aim to produce qualified accountants.



References and Attributions [Series 5]

Textual References (Books and External Sources)

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Figures, Plates, Tables, and Boxes

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