Lesson A7–6

Determining the Role of Science and Technology in Agricultural Production

Unit A. Agricultural Literacy

Problem Area 7. Recognizing the Impact of Technology on Agriculture

Lesson 6. Determining the Role of Science and Technology in Agricultural Production

New Mexico Content Standard:

Pathway Strand: Agribusiness Systems

Standard: V: Utilize technology to accomplish AFNR business objectives.

Benchmark: V-A: Use technology and information technology strategies for business improvement.

Performance Standard: 1. Utilize leading technology; (e.g., Global Positioning System (GPS), Geological Information System (GIS), Personal Data Application (PDA), cellular). 2. Create and use documents using word processors, spreadsheets, databases, and electronic mail. 3. Conduct research using the Internet. 4. Conduct oral/visual presentations using presentation software.

Student Learning Objectives. Instruction in this lesson should result in students achieving the following objectives:

1. Describe science and technology.
2. Identify and explain major areas of biological and physical science related to agriculture production.
3. Describe the role of technology in agriculture production.
**List of Resources.** The following resources may be useful in teaching this lesson:

**Recommended Resources.** One of the following resources should be selected to accompany this lesson:


**Other Resources.** The following resource will be useful to students and teachers:


**List of Equipment, Tools, Supplies, and Facilities**

- Writing surface
- Overhead projector
- Transparencies from attached masters
- Copies of Student Lab Sheets

**Terms.** The following terms are presented in this lesson (shown in bold italics):

- Agriscience
- Animal science
- Aquaculture
- Biological science
- Biotechnology
- Botany
- Computer science
- Earth science
- Entomology
- Environmental science
- Forestry
- Genetic engineering
- Horticulture
- Laser technology
- Mechanical technology
- Pathology
- Physical science
- Precision farming
- Radiation
- Remote sensing
Interest Approach. Use an interest approach that will prepare the students for the lesson. Teachers often develop approaches for their unique class and student situations. A possible approach is included here.

Have the students develop a list consisting of areas of science. Compile these to make a master list using a chalkboard, overhead projector, computer, etc. Then, ask students to identify all the areas of science they have listed that apply to the agriculture industry. Request examples, and when needed, give some examples for each.

Summary of Content and Teaching Strategies

Objective 1: Describe science and technology.

Anticipated Problem: What are science and technology?

I. Science and technology go together and are very important to agricultural production.
   A. Science is the knowledge of the world around us based on general facts and laws.
      1. Agriscience is the use of science in producing food, fiber, and shelter.
      2. Agriscience involves the scientific method, which involves asking questions and seeking answers in an organized way.
      3. Research is the careful and diligent search for answers to problems.
   B. Technology is the practical use of science.

Create student interest with an interest approach. Invite teachers from the science department in your school to speak to the students about science, research, and the scientific method. Use TM: A7–6A as a visual aid to the discussion.

Assign students research-based assignments. Encourage students to participate in school- or FFA-sponsored science fair competitions. Have students keep Supervised Agricultural Experience records on their science project.
Objective 2: Identify and explain major areas of biological and physical science related to agriculture production.

Anticipated Problem: What are the major areas of biological and physical science related to agriculture production?

II. Biological and physical science have many applications in agriculture.
   A. The study of living things is called biological science or life science.
      1. Botany is the study of plants.
         a. Horticulture is the science of growing plants for food, comfort, and beauty.
         b. Forestry is the science of growing and using forests.
      2. Zoology is the study of animals.
         a. Entomology is a branch of zoology that deals with insects and related small animals.
         b. Animal science is an area of biological science dealing with the production of animals.
         c. The science of water farming is aquaculture.
      3. The science that involves ways to wisely use and protect the things around us is environmental science.
      4. Plant and animal pathology involve the study of diseases.
   B. Physical science is the study of non-living things around us.
      1. The study of the environment in which plants and animals live is earth science.

Use text material to strengthen student understanding of concepts. Chapter 2 in AgriScience is recommended. Have students take notes on the major points presented in the reading. Follow up the reading assignment with a discussion of the material to evaluate student progress. Assign LS: A7–6A, Science Applications in Agriculture, to reinforce student learning related to the objective.

Objective 3: Describe the role of technology in agriculture production.

Anticipated Problem: What is the role of technology in agriculture production?

III. New agricultural technologies have resulted in improved methods of producing food, fiber, and shelter.
   A. Biotechnology involves using biology to develop new products or processes.
   B. Genetic engineering is a form of biotechnology that involves the changing of the genetic makeup of living organisms.
   C. The use of machines and equipment to do work is known as mechanical technology.
   D. Precision farming uses cropping practices that improve yields based on the needs of the land.
   E. Remote sensing technology gathers and records data from a great distance.
Have students scan newspapers and periodicals for articles on the application of technology in the agriculture industry. Assign each student the task of preparing a summary of the material. Then, have them give an oral report to the class. Assign LS: A7–6B, Technology Applications in Agriculture, to reinforce student learning related to the objective.

**Review/Summary.** Focus the review and summary of the lesson around the student learning objectives. Call on students to explain the content associated with each objective. Use their responses as the basis for determining any areas that need reteaching. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary. Use the lab activities in reviewing and reinforcing student learning.

**Application.** Application can involve one or more of the following student activities using the attached lab sheets:

- Science Applications in Agriculture—LS: A7–6A
- Technology Applications in Agriculture—LS: A7–6B

**Evaluation.** Evaluation should focus on student achievement of the objectives for the lesson. Various techniques can be used, such as student performance on the application activities. A sample written test is attached.

**Answers to Sample Test:**

**Part One: Matching**

1=i, 2=g, 3=d, 4=a, 5=b, 6=c, 7=f, 8=e, 9=h, 10=j

**Part Two: Completion**

1=Entomology
2=scientific method
3=Biotechnology
4=biological science
5=Laser technology
6=Precision farming
7=Horticulture
8 = Animal science
9 = Mechanical technology
10 = Remote sensing
11 = Genetic engineering
12 = Radiation
13 = Environmental science
14 = Computer science
15 = Earth science
Test

Lesson A7–6: Determining the Role of Science and Technology in Agricultural Production

Part One: Matching

Instructions. Match the term with the correct response. Write the letter of the term by the definition.

a. botany  e. science  i. aquaculture
b. forestry  f. research  j. agriscience
c. technology  g. pathology
   d. zoology  h. physical science

   ______ 1. The science of water farming.
   ______ 2. The study of diseases.
   ______ 3. The study of animals.
   ______ 4. The study of plants.
   ______ 5. The science of growing and using forests.
   ______ 6. The practical use of science.
   ______ 7. The careful and diligent search for answers to problems.
   ______ 8. The knowledge of the world around us based on general facts and laws.
   ______ 9. The study of non-living things around us.
   ______ 10. The use of science in producing food, fiber, and shelter.

Part Two: Completion

Instructions. Provide the word or words to complete the following statements.

1. ______________________ is a branch of zoology that deals with insects and related small animals.

2. Agriscience involves the ______________________, which involves asking questions and seeking answers in an organized way.

3. ______________________ involves using biology to develop new products or processes.

4. The study of living things is called ______________________ or life science.
5. _____________________ _____________________ involves the use of a device that produces an intense, narrow beam of light known as coherent light.

6. ______________________ _________________________ uses cropping practices that improve yields based on the needs of the land.

7. ___________________________ is the science of growing plants for food, comfort, and beauty.

8. _______________________________ is an area of biological science dealing with the production of animals.

9. The use of machines and equipment to do work is known as ___________________ ____________________________.

10. __________________________ technology gathers and records data from a great distance.

11. _______________________________ is a form of biotechnology that involves the changing of the genetic makeup of living organisms.

12. _________________, a form of energy that travels as waves, is being applied to food processing and insect control.

13. The science that involves ways to wisely use and protect the things around us is ___________________ ____________________.

14. The use of computers to do mathematics and science problems is ___________________ ____________________________.

15. The study of the environment in which plants and animals live is ___________________ ____________________________.
Steps in the Scientific Method

Step 1—Identify the problem.

Step 2—Review related literature.

Step 3—Form a hypothesis, a predicted answer to the problem.

Step 4—Design and conduct an experiment to test the hypothesis.

Step 5—Collect data.

Step 6—Form a conclusion or judgment based on the results of the experiment.

Step 7—Write and/or present a research report.
Name_____________________________________

Lab Sheet

Science Applications in Agriculture

Instructions: Identify 10 areas of science that are applied in the agriculture industry. Give specific examples of the practical application of each.

1. ____________________________________________________________________________
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   ____________________________________________________________________________
   ____________________________________________________________________________

2. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

3. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

4. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

5. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
Lab Sheet

Technology Applications in Agriculture

Instructions: Identify 5 applications of technology that have had an impact on the agriculture industry. Give a specific example of each technology and a benefit received.

1. ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________
   ____________________________________________________________________________

2. ____________________________________________________________________________
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   ____________________________________________________________________________
   ____________________________________________________________________________

3. ____________________________________________________________________________
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4. ____________________________________________________________________________
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5. ____________________________________________________________________________
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