

Lesson B4–1

Understanding Problem Solving

Unit B. Employability in Agricultural/Horticultural Industry

Problem Area 4. Demonstrating Problem-Solving Skills

Lesson 1. Understanding Problem Solving

New Mexico Content Standard:

Pathway Strand: Problem Solving and Critical Thinking

Standard: IV: Solve problems using critical thinking skills (e.g., analyze, synthesize and evaluate) independently and in teams.

Benchmark: IV-B: Analyze information critically to ascertain its value to whatever discipline it is applied.

Performance Standard: 1. Explain how to analyze, synthesize, and evaluate information and apply its implications to a variety of avenues. 2. Assess problem solutions to determine their appropriateness and efficiency.

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

1. Describe the problem-solving process.
2. Explain the decision-making process.
3. Describe the similarities and differences of problem solving and decision making.
4. Understand the scientific method.

List of Resources. The following resources may be useful in teaching this lesson:

Recommended Resources. The following resource should be selected to accompany this lesson:

Hunter, Sharon, et al., *Developing Leadership and Personal Skills*. Danville, Illinois: Interstate Publishers, Inc., 1997. (Textbook, Chapter 15)

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

Phipps, L. J., and E. W. Osborne. *Handbook on Agriculture Education in Public Schools*. Danville, Illinois: Interstate Publishers, Inc., 1988.

Newcomb, L. H., et al. *Methods of Teaching Agriculture*. Danville, Illinois: Interstate Publishers, Inc., 1993.

List of Equipment, Tools, Supplies, and Facilities

Writing surface

Overhead projector

Transparencies from attached masters

Copies of Student Lab Sheet

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

Conclusion

Data

Hypothesis

Problem

Problem solving

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. Two possible approaches are included here.

Approach One: *Have students pretend they are driving alone in a car (ask a few students the type of car they would drive) in the late afternoon one Sunday. They are about 15 miles from home when their car dies. They pull over to the side of the road. The car will crank but won't start. They are due at their boyfriend's/girlfriend's house in 30 minutes for dinner. What should they do?*

Approach Two: *Have students think individually about this situation. Lead a discussion of their ideas. Challenge their solutions and raise other solutions. Take them to a point in the discussion where they feel a need to learn more about how to solve problems such as this.*

Summary of Content and Teaching Strategies

Objective 1: Describe the problem-solving process.

Anticipated Problem: How can problems be solved?

- I. A **problem** is a life situation which creates a difficulty, a state of suspense, confusion, and doubt.
 - A. **Problem solving** is the process of attempting to deal with problems. It involves eight steps.
 1. Identify the problem
 2. Evaluate the problem.
 3. Gather information about the problem.
 4. Generate alternatives.
 5. Decide on an appropriate plan.
 6. Select and plan a course of action.
 7. Carry out the plan of action.
 8. Evaluate the results.

Many techniques can be used to help students master this objective. TM: B4–1A shows the steps in the problem-solving process. Students need text materials to help understand problem solving and achieve mastery learning. Chapter 15 in Developing Leadership and Personal Skills is recommended. Specifically, the section on “Resolving Conflicts” will be useful.

Objective 2: Explain the decision-making process.

Anticipated Problem: What process is followed when making decisions?

- II. A methodical process should be followed when making decisions.
 - A. State the desired goal or condition.
 - B. Identify the obstacles to realizing the goal or condition.
 - C. Examine alternatives available for overcoming each obstacle.
 - D. Rank the alternatives in terms of their probable consequences.
 - E. Choose the best alternative.

Many techniques can be used to help students master this objective. TM: B4–1B illustrates the steps in the decision-making process. Students need text materials to help understand decision making and achieve mastery learning. Have them read the “Decision Making” section in Chapter 15 of Developing Leadership and Personal Skills.

Objective 3: Describe the similarities and differences of problem solving and decision making.

Anticipated Problem: How are problem solving and decision making similar?

- III. Problem solving and decision making involve similar goals.
 - A. Problem solving focuses on problems and their solutions; decision making focuses on desired goals or conditions.
 - B. Decision making involves problem solving to a large degree.
 - C. Problem solving usually occurs in response to a specific situation; decision making is usually initiated to create a desired condition.
 - D. Problem solving usually focuses on recent events; decision making usually deals with future, planned events.
 - E. Both problem solving and decision making involve the examination of alternative action, choosing the optimal action, and evaluating the results.

Many techniques can be used to help students master this objective. TM: B4–1C compares problem solving and decision making. Students need text materials to help understand the content of this objective and achieve mastery learning. Chapter 1 in Handbook on Agriculture Education in Public Schools, Chapter 2 in Methods of Teaching Agriculture, or Chapter 15 in Developing Leadership and Personal Skills are recommended.

Objective 4: Understand the scientific method.

Anticipated Problem: What is the scientific method?

- IV. The scientific method is used to find answers to scientific problems.
 - A. The scientific method has five steps.
 - 1. Define the problem—usually stated as a question.
 - 2. Gather *data* (facts and information) about the problem.
 - a. Summarize past experiences.
 - b. Review other research results.
 - 3. Suggest possible answers or solutions.
 - a. A *hypothesis* is a prediction of the results of an experiment.
 - b. Write the hypothesis before beginning the experiment.
 - 4. Test the hypothesis.
 - a. Conduct an experiment to test the hypothesis.
 - b. Summarize the data collected in organized charts or tables.
 - 5. Evaluate the results.
 - a. Examine the findings of the experiment.
 - b. Draw *conclusions* or judgements made on the basis of the findings.

Many techniques can be used to help students master this objective. TM: B4–1E compares problem solving and the scientific method. Students need text materials to help understand the concepts and achieve mastery learning. Chapter 1 in *Handbook on Agriculture Education in Public Schools* or Chapter 2 in *Methods of Teaching Agriculture* are recommended.

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. Questions at the end of each chapter in the recommended textbooks may also be used in the review/summary.

Application. Application can involve the following student activity using the attached lab sheet:

Problem Solving in an Agricultural/Horticultural Business—LS: B4–1A

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 activity. A sample written test is attached.

Answers to Sample Test:

Part One: Matching

1=c, 2=f, 3=d, 4=b, 5=a, 6=e

Part Two: Completion

1=decision making

2=problem solving

3=decision making

4=problem solving

5=problem solving

6=decision making

Part Three: Essay

The purpose of both is to find answers. Similarities include gathering data, testing hypotheses, and evaluating solutions/results.

Test

Lesson B4–1: Understanding Problem Solving

Part One: Matching

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

- | | | |
|---------------|---------------|--------------------|
| a. conclusion | c. hypothesis | e. problem solving |
| b. data | d. problem | f. solution |

- _____ 1. Educated guess.
- _____ 2. Way to correct a problem.
- _____ 3. A life situation which creates a difficulty.
- _____ 4. Facts that tell about a problem.
- _____ 5. Judgement made based on findings.
- _____ 6. Process to deal with problems.

Part Two: Completion

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

- 1. _____ focuses on desired goals or conditions.
- 2. _____ deals with recent events.
- 3. _____ deals with future, planned events.
- 4. _____ occurs in response to a specific situation.
- 5. _____ focuses on problems and their solutions.
- 6. _____ is used to create a desired condition.

Part Three: Essay

Compare the scientific method and the problem-solving process.

Steps in the Problem-Solving Process

- 1. Identify the problem**
- 2. Evaluate the problem.**
- 3. Gather information about the problem.**
- 4. Generate alternatives.**
- 5. Decide on an appropriate plan.**
- 6. Select and plan a course of action.**
- 7. Carry out the plan of action.**
- 8. Evaluate the results.**

Steps in the Decision-Making Process

- 1. State the desired goal or condition.**
- 2. Identify the obstacles to realizing the goal or condition.**
- 3. Examine alternatives available for overcoming each obstacle.**
- 4. Rank the alternatives in terms of their probable consequences.**
- 5. Choose the best alternative.**

Problem Solving or Decision Making?

- 1. Problem solving focuses on problems and their solutions; decision making focuses on desired goals or conditions.**
- 2. Decision making involves problem solving to a large degree.**
- 3. Problem solving usually occurs in response to a specific provocative situation; decision making is usually initiated to create a desired condition.**
- 4. Problem solving usually focuses on recent events; decision making usually deals with future, planned events.**
- 5. Both problem solving and decision making involve the examination of alternative actions, choosing the optimal action, and evaluating the results.**

Comparison of the Problem-Solving Process and the Scientific Method

The Scientific Method Involves:

- Defining the problem.
- Gathering data.
- Suggesting possible answers.
- Testing a hypothesis.
- Evaluating the results.

The Problem-Solving Process Involves:

- Defining the problem.
- Gathering data.
- Considering possible solutions.
- Choosing and testing optimal solutions.
- Evaluating the results.

Lab Sheet

Problem Solving in an Agricultural/Horticultural Business

This activity will allow you to use the problem-solving approach to investigate an area of concern.

Purpose:

To demonstrate an understanding of the problem-solving process.

Materials:

Lab sheet
Writing utensil

Procedure:

Read the following scenario and answer the questions that follow.

Julia has established a small, diversified business growing and selling vegetables and small fruit. She has a rototiller that she purchased last year. She uses it to cultivate between the rows of some vegetables. Julia has been tilling her tomatoes for about five minutes when the rototiller suddenly stops running. She tries to restart it without success.

Questions:

1. What provocative situation did Julia experience?
2. What problem is she now confronted with that needs to be solved?
3. What information should Julia gather to help define and describe the problem?
4. What possible solutions are there to this problem?
5. Which solution seems most valuable for Julia?