



High School

National FFA Organization

Lesson HS.94

INTRODUCTION TO GROUP PROBLEM SOLVING

Unit. Stage Three of Development—DO

Problem Area. How Does the Vision Get Accomplished?

Precepts. **J4:** Solve problems.

National Standards. NS.9-12.1 — Science as Inquiry — Students should develop abilities necessary to do scientific inquiry.



Student Learning Objectives. As a result of this lesson, the student will ...

- 1 Set the steps for effective group problem solving.
- 2 Identify steps in solving a problem.
- 3 Differentiate between effective and ineffective problem solving.



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Time. Instruction time for this lesson: 50 minutes.



Resources

Leadership Curriculum Guide, National Association of Secondary School Principals.



Tools, Equipment, and Supplies

- ✓ *HS.94.AS.A Role Playing Skit—one per student*
- ✓ *HS.94.AS.B Role Playing Cards copied and cut apart*
- ✓ *Transparency of HS.94.TM.A*
- ✓ *Transparency of HS.94.TM.B Scrap paper*
- ✓ *Overhead projector*
- ✓ *Writing utensils in three different colors*
- ✓ *Note cards with review exercise written on them*
- ✓ *Tape or means of sticking cards to a visible surface*
- ✓ *Transparency of HS.94.TM.C*
- ✓ *HS.94.Assess—one per student*



Key Terms. The following terms are presented in this lesson and appear in bold italics:

- ▶ *Problem*
- ▶ *Brainstorm*
- ▶ *Map*
- ▶ *Solution*



Interest Approach

Before class, arrange the chairs, tables, and desks into a circle. Make sure you have copies of handout HS.94.AS.A for each student in the class. Teamwork and problem solving is the theme. Have HS.94.AS.B cards cut out and ready to distribute to students.



Welcome! Thanks for signing up to take part in today's experiment. As research subjects, your ability to adapt quickly to new information and to work with your neighbors is going to be very useful. Let's get started with our experiment.

Each of us plays a role when we work on teams. Have a conversation in your head about the role you usually play on a team. <I>Pause for a moment<I> Hold on to that image while you prepare to take on a different role.*

Randomly hand a role card to students in the circle. There may not be enough role cards for each member of the class, so you may want to hand them out to every other, or every third person. Pass out the role-playing handout HS.94.AS.B.





Some of you are taking on the role of the keen-eyed observer, while others are taking the role explained on the card. Keen-eyed observers, listen closely to the others and note the how the role-playing members interact with each other. Role playing subjects, it might be useful to think of people you've seen exhibit these behaviors in a past situation. Let's discover our scenario and observe what happens.

ave the students read the scenario out loud in class.



The card you received will be the role you will be reading on the handout. Not all of you have a reading role, but you all have a listening role. Listen closely to the group members and look for ways the group interacts. Think about how the different roles contribute to effective teamwork or ineffective teamwork. Try to relate to a time you've personally been in this situation in the past. We're now going to read through the scenario.

Have the students read the scenario out loud in class.



What did you notice about how members interacted?

From these observations, think about the following questions:

Was the group very effective?

What did they do that contributed to or detracted from effective teamwork?

Use the Me-You-Us Moment to process these questions.

Conclude the interest approach by summarizing the opening activity and preparing the class for the lesson ahead.



Thanks for taking part in our experiment. The best part of experiments is what you learn from them. When working as a group, there are many great ideas, suggestions, and solutions that can come from the experiences and wisdom of all members. This concept is especially important when it comes to working with others to solve problems. Through activities and key knowledge, we're going to unpack keys being successful the next time you are part of a team that faces a problem.

SUMMARY OF CONTENT AND TEACHING STRATEGIES

Objective 1. Set the steps for effective group problem solving.

The theme is thinking about working efficiently together as a team. In this next segment, you will need to step aside from your role as a teacher, and become a facilitator and encourager.





At some time in our lives we've been members of a team. Usually, when we're working on a team, there is a problem to solve. Share a team you've been a part of and the problem your team had to solve. *Elicit responses.* Often, teams fall apart the first time they have a problem or challenge that is not easily solved. Why? *Elicit responses.*

Think for a moment about the team in the opening experiment. How could the group have prevented the chaos that arose? *Elicit responses.* How would an agreed upon set of ground rules affected the outcome of that team? *Elicit responses.*

Now, extend that thinking further.

What ground rules would be useful to teamwork?

Take the next few moments to jot these ideas down on a sheet of scratch paper.

Ask for a student to volunteer to be the scribe. Have them write responses on a sheet of paper.



Who'd like to be the first person to volunteer as a scribe for our group?

Select your scribe volunteer.



When you are called on, be prepared to contribute a “ground rule” for group problem solving.

Call on students and brainstorm a list of ground rules on the board. Suggested Responses: respecting all team members, not talking while other people are talking, being open-minded to everyone's ideas, encouraging input from all group members, seeking win-win solutions.

Ask students the following questions to challenge them to make applications for this activity.



What would you think group members must all know in order to work effectively. What guidelines would be key to ensure that group members are all working as a team.



Why would this activity be useful for effective teams?

What needs to happen in order that all team members actually play by these ground rules?

Elicit responses to each question.

Use the following information to reinforce students' responses or to fill in missing information.

I. Set the stage by developing group guidelines for effective teamwork.



- A. Have students develop and take ownership in group-developed guidelines.
- B. Establish shared ground rules.
- C. Determine that everyone is interested in solving the problem.
- D. Ground rules reduce the possibility of people getting their feelings hurt.
- E. Ground rules reduce the possibility of people taking things personally.

Write the following sentence on the writing surface. Teams must be _____ to solve problems.

Use the Voice Modulator Moment changing the sound of the missing word, "ready" each time.



Now that we own a few keys to making sure a group is ready to take on problems, let's put them in the ignition so we can help groups drive through problems.

Objective 2. Identify steps in solving a problem.

Having the group-developed guidelines posted will be a great segue into the next section. They will take more ownership. Encourage them to refer to the guidelines as necessary.



Knowing you are pretty sharp group, let's test what you know about solving problems. In a moment, a problem will be displayed. You will have five minutes to solve it, and while doing so; keep track of the steps used to solve it. This isn't an easy problem, so put on your 'really big brain' hat. Also, because we're discussing how groups solve problems, work with at least two other people sitting directly next to you.

Display HS.94.TM.A. You may wish to provide a public writing surface for them to visually solve the problem on



In the middle of nowhere in Northern Wisconsin, there is a lake that is 50 feet in diameter. The lake is exactly 12 feet in depth all the way around. You cannot swim, and there is nowhere to go for help. All you have is a broom and 12 feet of rope. There is a person drowning in the middle of the lake. How do you save that person?

Give the students five minutes to work together to solve the problem provided. Use less or more time as needed. The answer is "walk across the ice." You may wish to give them clues, such as 'the situation is taking place in the northern part of the country in December with emphasis on 'northern'. You may wish to accept other answers to encourage their creativity. The key is group participation and the steps they took to try to solve this problem. It's not cut and dry, where one student can just blurt out the answer. Congratulate each group as they come up with a solution. If groups finish early, have them work on listing out the steps they used to solve the problem. Encourage them to number the steps taken.



Using a thumbs up for 'yes' and a thumbs down for 'no', would you agree that there was a series of steps taken in solving this problem?

Ask for groups to share the steps they used. Thank each for sharing. Announce there are many approaches to solving



problems, as just evidenced. Explain that the approach you are about to share is designed to be common enough to work for many types and kinds of problems.

Have the students relate the steps they identified with the given problem-solving process. Display one step at a time and have the students categorize their thinking in the guideline provided.

Display HS.94.TM.B.

I. Group Problem Solving Steps

A. Identify and define the problem.

1. A problem is a question or situation of complexity.

B. Get information regarding the problem.

C. Brainstorm solutions to solve the problem.

1. Brainstorm is defined as a spontaneous contribution of ideas.

D. Evaluate alternatives.

E. Select a solution to solve the problem.

F. Map out the solution to the problem.

1. A map is a sequence of events that leads to a specified end.

G. Determine if the solution matches the originally stated problem.

1. A solution is an answer to a problem.

What advantages are there for a group to use these steps when problem solving?

Elicit responses.

Use the Fred Astaire Moment by having groups of students come up with a series of dance moves that anchor the seven steps of problem solving.



We've learned groups can be much more successful when they are prepared to solve problems by having ground rules in place and they know the steps to solve problems—they have the keys and can drive the car. Before hitting the open road, though, let's find out how to read the road signs to team success.

Objective 3. Differentiate between effective and ineffective problem solving.

Now that students have determined group guidelines and have become familiar with effective problem-solving steps, they are ready to move on to differentiating between effective and non-effective problem solving.



We all want to be part of a team that solves problems. Often it's easier to evaluate how others solve problems to discover what works and what don't. Think about a group trying to solve a problem. It can be a government agency, a sports team, a group of concerned citizens...anyone. Use the next minute to capture what you know about this group, the problem they face, and your perception of their success or failure to this point.

Give them a minute to journal their responses.



 When you are called on, be ready to share an example. We'll put them on the board.

Call on students to share examples. Write down their responses on a public writing surface as the students state them. Accumulate a list of about five examples, or until you get a response you feel comfortable discussing as effective or ineffective group problem solving. Chose one of the examples presented which can be used to discuss effective and ineffective group problem solving.

 Take a moment to look at the list of examples we've created. What commonalities do you notice about those groups that are effective in solving problems? *Elicit responses.* What's in common about that that are ineffective? *Elicit responses.*

Use two different colors of marker or chalk, depending on your writing surface. One color should represent effective and one color should represent ineffective. Have the students classify the ideas on the board as effective or ineffective and circle them with the signified color. Based on the topic and ideas presented, discuss the components of effective problem solving and ineffective problem solving.

I. Group Problem Solving

- A. Effective
- B. Ineffective

Review/Summary

 Let's bring this all together by working on a problem together. We've already established the ground rules to working together as a team. Let's identify a problem we face in this classroom and use the process learned to solve it as a group. What problem should we address?

Take ideas and choose a problem that all students understand and can be quickly discussed. Lead the class through the seven steps of the process, asking them for their ideas and suggestions at each step. If they are unable to solve the problem in the time remaining, highlight what each step might have looked like if they would have taken the time to solve. To conclude, challenge students to use this process in the next week with a group or team and be ready to discuss their observations in class at the end of next week





Application

►Extended Classroom Activity:

Give each student five note cards. Have them write one of the five group problem-solving steps on each of the five note cards. They can include more information on the cards.

►FFA Activity:

Have students attend an FFA committee meeting. They should observe the meeting, identify the problem-solving steps, describe each step, determine if the process was effective or ineffective, and justify their determination. Students could also assist the group in solving any problems that might arise, using the strategies above.

►SAE Activity:

Write down a problem they've encountered when developing or enhancing their SAE. If they could gather a group of people as a resource to assist them in developing their SAE, what would



be the steps the group would use to develop a solution. This could be done as a journal entry or a written proposal. Encourage them to utilize their plan!

✓ Evaluation

Hand out HS.94.Assess to students and have them complete it.

Answers to Assessment:

1. Answers will vary depending on the ground rules the students developed as a class.
2. Identify and define the problem.
 - Brainstorm solutions to solve the problem.
 - Select a solution to solve the problem.
 - Map out the solution to the problem.
 - Determine if the solution matches the originally stated problem.
3. Answers will vary. They should have three effective tips for group problem solving, and three examples of ineffective group problem solving.



INTRODUCTION TO GROUP PROBLEM SOLVING

1. List and describe three ways to set the stage for effective group problem solving.
2. List in order the five steps in the process of group problem solving.
3. If you were given a problem, what process would you implement to come up with the best solutions.



In the middle of nowhere in Northern Wisconsin, there is a lake that is exactly 50 feet in diameter. The lake is exactly 12 feet in depth all the way around. There is a person drowning in the exact middle of the lake. You cannot swim, and are too far from any type of civilization to go for help. All you have is a broom and 12 feet of rope. How could you save that person.



- 1. Identify and define the problem.**
- 2. Brainstorm solutions to solve the problem.**
- 3. Select a solution to solve the problem.**
- 4. Map out the solution to the problem.**
- 5. Determine if the solution matches the originally stated problem.**



GROUP WORK SCENARIO

In biotechnology class the students were given two bags of soybeans. One bag contained natural soybeans. The other bag contained Roundup Ready soybeans. Students needed to design their own experiment to determine which soybeans were which.

There are several ways this can be determined. They could do a PCR (polymerase chain reaction) to determine the presence of the Roundup Ready gene. The supplies for this are not available in the classroom.

Someone contributed the idea of comparing them under a microscope. The class was unsure as to whether that would offer any insight of the difference of the two soybeans.

Another student suggested that each of them design a plant experiment to grow the soybeans to maturity and test the grown soybean plants with roundup. The ones that are Roundup Ready will survive the roundup herbicide application, and the natural beans would be killed by the herbicide. The class decided this was a good idea to determine which soybeans were which.

A student brought up the point that there are other things that could determine the growth of the soybean plant, and to have a good experiment they should set some planting guidelines.

The class mapped this out on the board, and agreed on the controls. When the plants reached maturity, the students tested the various plants they had grown. Applying the herbicide provided a clear visual test of the soybeans. This is the problem they had set out to solve, and they now had an answer.



Sam: So, as a group we're suppose to decide what to do with this assignment to come up with a public service announcement regarding pet overpopulation and why people should spay and neuter their pets.

Seth: I think Sara should do it all because she has the most creativity.

Steve: Did you see that movie on TV last night.

Sara: I can write, but I don't know what we're supposed to do.

Sally: Weren't you listening. You can be so spacey sometimes!

Sam: Steve, will you pay attention!

Steve: Why should I. I'm just going to let all of you do the work. I'll get the same grade anyways.

Sara: Yeah, I don't want to hand in work that isn't perfect.

Suzie: Steve is a good artist, though.

Sam: If we're going to figure this problem out, we don't need Steve.

Steve: I don't think we need Sam either.

Sally: We're never going to get anything done here.

Seth: You're right Sally, what are you doing after school.

Sara: I'll just take it home and figure it out.

Sam: Yeah, I don't feel like working with some of the people in this group; they aren't any help. We're not going to get anything accomplished anyway!



Cut out and randomly distribute cards with the following names:

Sam

Sara

Sally

Suzie

Steve

Seth

