THEME: Problem-Solving Instruction
The future of vocational-technical education in agriculture appears to be more uncertain now than at other times in the past several decades. Vo-ag may become extinct in the next few years. Why could this be written? Is it true?

Any educational or other program of the government is always subject to attack, whether justified or not. Since the Vocational Education Act of 1964, vocational-technical education has greatly expanded. Many new programs in specialized areas have been developed. Why the concern about the future?

The Federal Government

Vocational-technical education in agriculture has its roots at the federal level. The Smith-Hughes Act, 1917, provided funds for vocational education. The Smith-Hughes Act was replaced by the Smith-Vanish Act (1953) which expanded the program. The act provides that the FFA and VTEA (Vocational Technical Education Act) have mutual purposes and objectives.

Plans also include the elimination of all vocational education personnel at the federal level by 1984. This means that there would no longer be funds available for vocational-technical education in agriculture in the federal government. Further, it means that there would no longer be a National FFA Advisor.

The plan to "eliminate" vocational agriculture is a part of the "New Federalism" movement. It basically involves the shifting of federal programs to the states. The federal government would still provide some general funds to the states through 1991, at which time the states could continue or end vocational education programs.

The State Level

"Economic development" is a popular term in many states today. Governors and other state-level leaders want to use vocational-technical education as a vehicle through which they can hopefully stimulate employment, industry growth, and the expansion of tax base. Much of the effort centers on the establishment of high technology programs in postsecondary institutions. When this occurs, the plan is to cut back funds to the states and the vocational technical education programs.

The Professional Level

Are vocational-technical agricultural educators contributing to their own demise? Are they providing the needed leadership to remain a strong component in American education? There are several indicators of atrophy within. The internal disintegration of vocational-technical education in agriculture is a product of the following:

A decline in professionalism — Fewer vo-ag teachers are joining professional organizations and subscribing to professional magazines. (Does this indicate that we have lost faith in ourselves?)

An increase in vocational education generalists — These individuals fill many administrative, supervisory, and teacher education positions. The "generalist" movement has weakened program-specific leadership. The only way to have strong programs is to have well prepared professionals who are highly competent in the specific program areas.

The use of non-degree teachers — This is a very serious problem. There is no training (individuals without professional teacher preparation) can be members of the profession. A professional vocational-technical agricultural educator must be well prepared and hold at least a baccalaureate degree. (General vocational teacher education won't do either! Program-specific teacher education is just as important as program-specific administration and supervision.)

The standards in local programs — The real measure of vo-ag is at the local level. High quality local programs speak well for all of the profession.

Whose Hands Hold Our Fate?

The future of vocational-technical agricultural education is up to everyone involved with it. We especially need strong professional organizations. Leaders of our professional organizations need to speak out, take action, and rally members of the profession. Political action may be necessary! Whether they do or not, the agricultural education field is currently in a critical situation. Our professional leaders must be willing to take it.

The future need not be all gloom and doom. We must be enthusiastic. We must develop programs of high quality which teach the technology of today's industrial society.

Note: Information supplied by Robert W. Cox, Executive Director of the National FFA Alumni Association, on activities at the federal level was helpful in preparing this article. Individuals who wish to have a voice in shaping the future of vocational education should contact their representative or senator or call the FFA House of delegate number at 303/497-7357. The address to use in contacting Mr. Cox is FFA Alumni Association, P.O. Box 1058, Alexandria, Virginia 22310.
Dissolving Some Myths About Problem Solving

Agricultural Educators must return to using problem solving as the way to teach or as a profession must be willing to accept that our program is well on its way to becoming a non-occasional program. This is a bold statement with which to start an article, but a true statement. If we as a profession do not teach to solve problems confronting the students, then something is seriously wrong with our educational program. Perhaps one approach to a discussion on the use of problem solving is to dispel some myths about problem solving as a method of teaching.

Myth 1: Problem solving reduces the opportunity to use different teaching techniques. A person who holds this belief does not fully understand the mechanics of using problem solving. Used correctly, problem solving is an overall approach to guide the teaching/learning process by identifying problems or questions that need to be solved related to the topic under discussion. The teacher then assists students in identifying alternative solutions to each of the problems or questions. The next step is to work with the students in selecting the one best solution, given a situation, for the problem at hand. All through the process of identifying problems or questions; searching out information either through student, teacher input, or a combination of each; decision-making situations; evaluation; and evaluation, ample opportunities exist for teachers to use different teaching techniques and instructional aids.

Myth 2: Students do not know enough about the subject to use the problem solving approach. This myth is likely to be used by an individual who has not planned the lesson well or does not know enough about the students’ backgrounds to relate to their situations. This myth could also come about from a teacher who was teaching a topic totally irrelevant to the students’ community needs. The point is that if the topic should be taught, students will have a sufficient level of knowledge that will permit the teacher to start the problem solving process.

In the department, the curriculum must be adequate or out of date for use in problem solving. Two observations are pertinent if this is the case. First, if this situation exists, then the department is in trouble no matter what or how the teacher attempts to teach. All departments should have as a high priority the maintenance of an up-to-date library. And second, the use of problem solving can be very effective if a large number of resources are not available. For example, not all students need to be seeking information for the same problem and/or using the same material. Prior planning by the teacher can avoid the situation where every student would need the same material when the quantity of that resource is limited.

Myth 3: Students must be able to read if problem solving is to be used. This statement implies the teacher is missing problem solving. Again, problem solving is an overall approach to teaching. This myth could also come about from a teacher who was teaching a topic totally irrelevant to the students’ community needs. The point is that if the topic should be taught, students will have a sufficient level of knowledge that will permit the teacher to start the problem solving process.

As with many other aspects of life, the development of an understanding of the problem solving process as a methodology and technique is a learning experience. For purposes of this writing, the focus is on those critical points in the problem solving process which are most frequently associated with a lack of teaching success. For ease of discussion, the critical points are grouped under the headings of philosophy, planning, technique, and time.

**Philosophy**

Unless one believes in problem solving as a method of teaching, the result of using it will usually be a failing effort of some magnitude. A lack of confidence or faith in a method or technique tends to cause one to perform in a way which guarantees that the use of the method or technique will result in failure. In education, the shaping of a faith in or a lack of faith in problem solving can be found in one’s philosophy of education.

**Teaching methodology and teaching techniques used are a reflection of what the teacher believes the purposes of education, in part, to be.** And unless the teacher views the educational values of the use of problem solving to be important and to be attainable, success with problem solving teaching will not occur. Thus, the first and most significant of the critical points in the use of problem solving as a teaching method is the determination of one’s own faith in it through an examination of one’s philosophy of education.

Some examples of philosophical considerations may help clarify this point. The first factor that comes to mind regarding one’s philosophy of education is whether one believes learning should include development of the ability to analyze or whether learning consists mainly of the memorization of material. If the teacher believes learning is memorization, the student need only be presented material to be memorized; working out solutions to problems would not be essential. Another factor is whether the teacher believes a student should locate (discover) information or whether the information should be assigned or presented. In the latter situation, the teacher can use the lecture method and avoid the more challenging tasks of preparing for and of directing learning through problem solving.

Yet another factor is whether one believes information is learned to be used or whether the student’s mind is simply a "place for learning to be stored." If information is learned to be used, opportunities for application under supervision of that which has been learned are essential and require the use of some aspects of problem solving as a method of teaching.

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Critical Points in Problem Solving (Continued from Page 5)

To prevent the development of a philosophy based on difficulty in the use of problem solving, future and present teachers should emphasize the following:

1. What education is all about. While the study of education and engaging in educational activity contribute to the shaping of one's educational philosophy, it is also important to recognize that the educational philosophy be discussed as a topic to develop a conscious and firm philosophy to serve as the basis for future decision making in matters of education and personnel.

2. Finality, for effective use of program solving in teaching, a teacher must believe that students have the right to direct their own educational development and that the schools have an obligation to teach them how to do it. The main emphasis on developing students' abilities to make their own educational choices must mean keeping firm control of the process by which the students make decisions on direction rather than controlling the actual decisions.

Planning

Sound planning is a critical element in any teaching method. Many of the teaching difficulties associated with problem solving are built into the plans developed by the teacher. Planning for the use of problem solving does require more effort than does planning for a lecture. In addition to subject matter content, problem solving requires plans for how the teacher will treat the students and plans for student activity. When the teacher fails to prepare a plan complete in every detail, the stage is set for possible failure.

Planning, can, of course, be based on the wrong thing. If the subject matter content has not been properly divided into teachable units and problem areas, the teacher will have a very difficult time both in planning and in teaching. In fact, improper content segment development leads to confusion in all other aspects of the teaching process.

Another kind of confusion in planning is that of not properly defining teaching/learning objectives and anticipated student objectives. Teaching/learning objectives are ability/competency based while student objectives are based on achievements possible through the use of learning. An incomplete analysis of the teaching situation also may lead to teaching problems. It is not enough to prepare the subject matter only. The teacher needs also to take into consideration grade level, individual differences, cultural background, resource time, relationship of content to prior instruction and to instruction to follow, local community needs, student motivation, and the opportunity for application. Other kinds of planning failures include not planning for teaching resources and poor selection of teaching techniques.

The elimination of the kinds of problems related to planning obviously requires the development of complete, sound teaching plans, while it is a good practice to keep teaching plans on file, it is absolutely necessary to prepare or revise teaching plans for each class to be met. One need only recognize that teaching is a unique individual to appreciate the necessity of preparing for each class. Of course, the experienced teacher can accomplish the needed replanning in a very short time and with less detail than can the beginning teacher.

Technique

Not only must the teacher be familiar with the proper teaching techniques into the teaching plan, the teacher must also be able to use each technique. In addition, there are techniques that, while used, are not identified in the teaching plan.

Techniques recorded in a complete teaching plan include the steps in the plan outline, the use of notebooks, demonstrations, field trip resource, self-supervised study, and many others. But skill is required in the use of each technique. For example, field trips must be planned and a field trip leader must be available during study tours. Teachers must be informed regarding the objectives for the field trip and what to see and do in order that the objectives may be achieved. Motives should be previewed and discussed with students before viewing to acquaint them with the objectives for viewing and with content. A second discussion is required after the trip has been completed.

Examples of techniques and learning activities not recorded in teaching plans include discussion leading, teacher involvement with setting student objectives and with identifying problems, pace of classroom activity, listening, and adjusting teaching to student responses.

A teaching activity, in this case, is defined as a teacher's attempt to influence a student's behavior. The major purpose of teaching is to promote student learning. The process of teaching is the major technique in teaching. A teaching technique is an activity with an identifiable purpose. An activity is an action or a behavior.

While the teacher cannot control the length of the class period, the teacher does control how the class period is to be used. Problem solving provides complete flexibility for starting and stopping instruction at almost any point in the teaching/learning process. Thus, it is up to the teacher to assure proper timing within the period for including the necessary articulation, at the start of each class, with what was done the previous day and to provide whatever time is needed at the end of the period for summarizing and preparing for the next day. Time as scheduling of content within the school year is also critical to success in teaching. Scheduling a content segment just ahead of the time when students can make use of the learning

The Versatility of Problem Solving

The problem solving approach to teaching has been a traditional method of teaching vocational agriculture. In past years, problem solving was nearly the exclusive teaching approach in most units. A unit identified with accompanying enterprise, problem areas, and specific jobs. Original problem solving was more than a teaching technique; it was the way to teach. This approach to teaching was strongly supervised at the centralized occupations experience programs of students, and successfully with many students coming to the farm.

As the industries of agriculture changed, so did the methods of teaching vocational agriculture. Many traditional methods of teaching were revised or discarded. This was largely due to the fact that the type of student taking vocational agriculture was also changing. The percentage of students in vocational agriculture with farm backgrounds began to decline as fewer farm families lived in the farm area. The students were more interested in the chance to be attracted to the vast opportunities of vocational agriculture and the FFA.

The philosophy of teaching vocational agriculture shifted away from using the problem solving approach and farm project application. Consequently, many teachers associated problem solving with "old age" and have placed "on the bottom of the list of possible teaching methods." By shunning this method of teaching, we may be less effective teachers. What is more important? Teaching technical information and filling students' minds with facts and data, or teaching students how to think and reason. If you prefer the latter choice, then the problem solving must have a place in your teaching strategy.

Stimulate Creativity

The problem solving approach stimulates creative thinking, student interest, and the decision making process. It also makes instruction more personal to students and helps to build confidence in themselves. Through the use of the method of teaching, students discover problems and answers to these problems. The role of the teacher is also different. Rather than actively stuffing the students with technical information, the problem solving method may or may not be interested in knowing, the teacher passively guides the learning process that allows students to learn for themselves.

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The Versatility of Problem Solving
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If problem solving is so effective and does develop the
students' thinking abilities, why isn't it used more by
teachers? There are several reasons to see why this is
true. First, many teachers still believe that it has little value in
the modern classroom since students don't have the farm
background and experience that their parents had. Students lack
experience and/or the ability to identify and to conduct good
projects. Other teachers contend that the problem solving approach
is too limiting and restricts the use of other
techniques.

In response to the first objection to using problem solv-
ing, it should be kept in mind that problem solving can be
used to teach topics which are not related to student pro-
ject work. To the latter comment, the problem solving appro-
ach may well be the most versatile method of teaching
and a variety of teaching techniques is needed more than
ever before in the classroom. Problem solving establishes a
framework of instruction that promotes the use of a vari-
te of techniques.

Versatility

Let's examine the versatility of the problem solving ap-
proach and how it encourages the use of other teaching
techniques. Assume that a unit on choosing proper
welding electrodes is planned and the problem of
choosing electrodes, the class can identify factors
which need to be considered when choosing electrodes.
This could be done by having students list factors that
they would consider when choosing welding electrodes.
Once the factors are identified class discus-
sion can be used to find out how much students know
about choosing electrodes. At this point students will
realize that more information is needed to understand fully
how to choose electrodes properly. Through the use of
supervised study, technical information can be presented
to supply important information needed to solve those
problems in choosing electrodes.

Following a careful selection of the problem, an ex-
cellent follow-up would involve a demonstration on the
practical application of the information learned. Ex-
ceptions could be used to show the results of proper
or improper electrode selection. Resource persons from local
welding shops could be used with, or in place of, the super-
vised study. In this way, different teaching techni-
cues were used to complement the problem solving ap-
proach to this unit.

Problem solving would be an excellent approach to
teach using engine troubleshooting. Many students have
practical experience with contrary engines and are keenly
interested in learning how to solve the problems they have
encountered. Students can readily identify possible causes
for engines not starting or not running properly. Once
possible problems are identified by students, the stage is set
for the instructor to choose from a variety of techniques to
provide essential information to solve these problems. A
small independent study, demonstration, or field trips can be
used. Additionally, the teacher can choose from many aids such as films, filmstrips, repair
manuals, charts, and reference books to supplement the learning activity. As part of the instruction, practical ap-
plication of troubleshooting would be planned for in the
laboratory in order to allow students to apply troubleshooting
concepts.

Another idea would be to reverse the approach and let
students first work on engine which will not start. Students work in teams to identify why their engine
would not start and then through independent study, students could gather information to help solve their par-
ticular problem. This approach allows problem solving to be a form of individualized instruction. The same procedure could be followed by approach would be increasing in the gain of cattle. Students with cattle projects may have this
problem, however, the cause for low weight gains may be different for each student. Because each student may
research the same problem yet find a different answer for
solving his or her particular problem. Thus problem solv-
ing can make instruction personal and can address the par-
ticular needs of each student.

Problem solving is not limited to just laboratory units. For
example, it can be used to teach farm management and
farm economic concepts. I taught a unit on making the
farm more efficient by increasing labor efficiency and plan-
ning for farm expansion. The idea was to see how
students can identify problems related to increasing labor efficiency and problems in planning for farm expansion. The class
then broke into small groups and young farmer who was experi-
encing some difficulty in the expansion of their farm labor, and who also was experiencing expansion problems.
While on the field trip students were observing and identi-
FIA. What is it about problem solving teaching that has so
together the attention of educators and claim-
ing "invaluable" loyalty? The reason that agricultural
educators are enamored with problem solving teaching is
because it works so well!

Problem solving teaching is a way of thinking. It is a
process by which one is able to learn. It is a systematic way
of bringing logical organization and structure to a learning
situation. When students learn via problem solving
practicing, they discover new knowledge in the same way a
scientist discovers new knowledge by using the scientific
method. Both the scientific method and problem solving
are the same general method of teaching follow the same essential steps. There is a provoc-
itive problem, the student is given. Information is gathered and studied; possible solutions are formulated; proposed solutions are tested; and the results are evaluated.

While problem solving teaching has been used by pro-
duction agriculture teachers for years, is it a worthwhile
way of teaching in non-production agriculture programs?
Under what conditions does it best work?

Problem Solving Works Best When Teachers

Have Students Studying Real Problems

While the basic components of problem solving teaching can be used with almost any unit of instruction, it is most
robust when used in real problem situations. It can be used to lead students to learning basic fact and information. For ex-
ample, FFA students identify a students a unit entitled
"Breeds of Beef Cattle," problem solving teaching could be used.
Examples of problems and concerns include: What are the breeds of beef cattle? What are the advantages and
track, and that the technical information learned helps to solve problems. It is important that solutions to prob-
lems work. Students need to feel achievement and success when using problem solving. Student frustration and failure dampens the desire to learn, and lesson their confidence in learning.

Problem solving achieves one of the primary goals of
education, which is to teach young people how to think. With its versatility, it is adaptable and flexible in nature. It proves to be an effective approach to teaching by stimulating interest, decision making, self-confidence, and achievement. Problem solving needs to be a part of the in-
structional program of all vocational agriculture instruc-
tional programs.

THEME

Using Problem Solving Teaching in Non-Production Agriculture Classes

The words, problem solving teaching, are almost as
Sacred to educators as the circles as the three letters,
FIA. What is it about problem solving teaching that has so
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viously served as a Theme Editor for Ten MAGAZINE.)

disadvantages of each breed! These could be drawn from the
class. Answers to these questions could then be developed.
However, problem solving teaching enjoys its finest hour when it is used to direct learners toward resolving
meaningful felt needs (problems). Such is the case when teaching a unit like "Renovating a Lawn" and the students each have the opportunity to actually renovate a lawn. They are confronted with a problem lawn, and that gains
their interest. The teacher can then draw from them
problems, such as those shown here: When should you renovate a lawn? What procedures need to be followed
when renovating a lawn? In such situations, learners are then able to try out their new knowledge (answers, solutions) in a functional setting in order to see if these solutions really work.

Problems versus Questions

In the case of the breeds of beef cattle, the problems and
concerns were questions to be answered. In the example of
renovating the lawn, the problems and concerns were real
problems. A question is aimed mainly at gaining informa-
tion. It asks what or it can be information that is needed to solve a problem. On

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Using Problem Solving Teaching in Non-Production Agriculture Classes

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the other hand, a problem personally affects one and usually calls for personal action (often in the form of decision making). The chief distinction between a problem and a question is the level of personal involvement. Questions may bite to know about, but they do not personally affec

ant one demand attention. Good problems deal with actual situations and demand answers in terms of conclu

sions. They do not make a proposal or generate a test

book. Rather the information from the textbook must be applied to each specific situation if the problem is to be solved.

Conditions Which Provide Real Problems

In order for a teacher to have a higher proportion of units of instruction falling in the category of problems, the students must have situations at school, at home, or in some other location that are the bases for the instruction. It is out of such occupational experiences that problem solving instruction grows. It is these same situations that stude

nents are able to apply their new knowledge in a functional setting.

In non-production agriculture programs with extended labs (two or more hours in length per day) such conditions can readily exist. If a lab has been well developed it pro

vides a wide array of excellent occupational opportunities. These experiences are closely interrelated with the curric

ulum. The lab provides students with a situation which contains a real setting where they can apply their new knowledge and judge its effectiveness for themselves. Fur

thermore, it provides a common frame of reference and provides sufficient scope to allow the involvement of students to be meaningful.

My Experience Using Problem Solving Teaching in a Non-Production Setting

In March of 1980, I returned to the high school class

room for one month. I began as a teacher educator I got to be back on the firing line so as to stay in touch with the day-to-day challenges agriculture teachers encounter. I wanted to teach a more m

onumental group of students than my previous high school teaching experience. I also wanted to teach a non-production agricult

ure subject. My choice was horticulture. In addition, I wanted to see if the methods of teaching which I teach at the Ohio State University worked in a contemporary voca

ional agriculture program.

During my four week stay, I taught a full schedule of horticulture classes in a large suburban high school. I was involved with classes, laboratory instruction, as well as visiting my students at their homes.

How Did Problem Solving Teaching Work in a Non-Production Agriculture Program?

To illustrate how problem solving teaching worked in the horticulture department of this suburban high school, a teaching unit producing bedding plants was planned with a focus pre

paredly as students in my methods course are instructed to do their planning. The following outline was formed:

1. Title: Producing Bedding Plants
2. Situation
3. Teacher Objectives
4. Materials and apparatus
5. Identification of Students' Reasons for Needing to Study the Unit
6. Identification of Problems and Concerns to be Solved
7. A Plan for Teaching the Solution to Each of the Problems and Concerns
8. List of Approved Practices
9. References and Teaching Aids
10. Special Activities
11. Quiz or Plan of Evaluation

The situation for the unit was the laboratory greenhouse where the class would grow a crop of bedding plants for sale to finance other lab activities and generate some revenue for the FFA. The teachers were faced with a situation that they were a part and they had a common frame of reference.

After becoming familiar with the students' situations (scope, detail, deadlines, facilities, money available), a set of teacher objectives was developed for the unit. This allowed me to provide a framework within which to develop the remainder of the unit. It outlined the scope and targeted the essential behavioral outcomes I expected.

The students' situations were used as the bases for creating their own, and, more importantly, a personal need to be felt in their part for studying the unit. They were given the task of measuring the space available, deciding on the plants which would sell in the community, deciding how much greenhouse space to allocate to each plant, deciding how many seeds on seedlings to order and determining the appropriate available time for the class. While they could experience some success with the task, such as measuring the greenhouse, they had a problem for which they lacked sufficient information to solve without further study.

Hence, when they were asked if they felt they needed to learn how to produce bedding plants, their response was clearly yes.

When asked to list some reasons why they needed to study the unit, they were readily able to identify their reasons why they wanted to study this unit. Likewise, they had enough understanding of the problem area to be able to think of a set of questions which they needed to ask before they could produce a crop of bedding plants. This problem and concerns which served as the organizer for the unit of study.

The class then studied each problem in turn. A number of teaching techniques were used to guide them in solving the problems of producing bedding plants. Class discus

sions, supervised study, demonstrations, experiments, and the skills sheets were used in order to solve the various problems. Short periods of totally supervised study were frequently used in order to determine if today's students (with their attendant reading problems) could suc

cefully use this technique. When the reference materials were readily available today, they were able to make good use of well planned, supervised study periods which were then followed up by using the class to develop the unit.

Careful attention was paid to developing specific conclu

sions and/or arriving at definite decisions for each prob

lem. Instead of preparing for application, practice was deve

oped for a given problem as a way of summarizing. At the conclusion of the unit a complete set of approved procedures and guidelines was developed by the class. Students then planned practices for lab activities as appropriate.

Problem solving teaching worked very smoothly in this non-production agriculture program. Students had more of a real problem to solve than is true for many production agriculture students these days. The opportunity for applica

tion was constant. Real problems were solved and the students grew a fine crop of bedding plants. The same approach to teaching should work equally well in other non-production agriculture areas of instruc

tion. Students in in their natural resources use problem solving when studying agriculture areas such as "Raising Game Birds," "Improving a Timberstand," or "Building a Pond." Animal care students could use problem solving when studying areas such as "Setting up Salt Water Fish Aquaria" and "Grooming Dogs." Agricultural equipment and mechanics students could learn how to tune tractors, service com

bines, or repair brakes using problem solving. In all these cases, there could be real problems demanding unique solutions.

A Logical Way

Problem solving teaching is a very logical and successful way to teach non-production agriculture students. It is a way of teaching that is able to relate mastered matter by hav

ing students gain an overview of a group of related prob

lems and then solve each related problem, in turn, such that the conclusion of their study of the unit they have mastered a new area of agriculture knowledge and/or skill.

Problem solving teaching grows out of and makes use of sound learning theory. Hence, why not use it?

Five Approaches to Problem Solving...

Using the Possibilities-Fact Finding Approach

The problem solving approach to teaching tends to focus classroom work on real problems; the kinds of problems students will face in their careers in the agricultural field.

In the process of developing the problem solving ap

proach, the problem must be concisely identified, the various kinds of facts and detailed information ap

propriate to the solution of the problem must be identified and gathered, and the facts and details must be put into a problem solving format appropriate to the type of problem under consideration. The students should then make a decision based on the information gathered and be able to justify their decision. Problems and decisions should be discussed in class.

Problem solving will both promote and test the thinking of students, its emphasis on real life problems, and the solution of those problems will bring application to teaching.

Use Versus Memorization

Problem solving puts an emphasis on the use of material rather than the memorization of it. Problem solving forces the learner to identify important facts and organize them in such a way that a solution can be derived based on logic rather than emotion or impulse. Problem solving lends itself to student participation and individual student evaluation of all facts gathered.

Process Versus Product

Problem solving is more process oriented than product oriented. Don't be misled, there will be a final solution to a real life problem confronting an individual in the classroom, in the school's land lab, or a member of the local agricultural community. The exact solution to a given problem may be the same for similar problems with differing circums

stances. For example, time, capital outlay, production potential, and acreage may change from one farm to another, even for potential potential in the final solution. It is imperative that students learn the process of solving problems so that the process may be applied to the many problems which people encounter during their lives.

It could be said that we use the problem solving tech

nique in class in order to solve a pressing problem con

fronting us at the time. The solution to the problem may not look like the solution to the student. Having been through the problem solving format, rather working

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Five Approaches to Problem Solving... Using the Possibilities-Factors Approach (Continued from Page 11)

through the problem solving format, will be the long lasting advantage to the student. There are five accepted problem solving formats which are used. These should be used frequently so that students know them and are comfortable using them.

Many teachers use problem solving quite frequently in their teaching, some without even labeling what they are doing as problem solving. Problem solving does require vocational agriculture teachers be in tune with the agricultural communities they serve.

It also requires that teachers be actively involved with the SOE programs of their students. Many problems suitable for classroom work will arise out of the SOE program. Further, the agricultural library must be complete and up to date. Time is required for frame problems correctly so solutions may be derived, but good teaching in any form requires preparation. The teacher must solve the problem before the students in order to guide the students and provide appropriate input upon request. A final consideration as to why problem solving may not be used as extensively as it could be is that people fear that with which they are unfamiliar. If a teacher has never been exposed to problem solving instruction, either while they were in high school or while they were involved in a teacher preparation program at a university, it may take great courage to try the problem solving approach. This writer would advise, "try it, you'll like it."

Five Approaches

Many educators accept five problem solving approaches, as follows:

1. The "possibilities-factors" method — This is used in making selections. Whenever the problem deals with selecting something, this method is appropriate. The key words to use in writing the problem statement are "what source of," "what breed of beef cattle should," or "when should we breed our pigs?" This method provides for having several factors and alternatives to consider.

2. The "steps and key points" method — This method is most appropriate when leading students through a process or procedure. The key words to use are "what procedure should we follow" or "how should we." The steps constitute the conclusion in this method.

3. The "present situation with accepted standards or an ideal situation" method — This is most appropriate when determining if changes should be made in an existing situation. The key words for the problem statement are "should we consider?"

4. The "advantages or disadvantages" method — This is most appropriate when making a decision between two courses of action. The key words for the problem statement are "should we consider?" A concluding statement is essential.

5. The "question-answer-discussion" method — This is appropriate for presenting factual information and problems which do not fit the other categories. The key words are "what are the essential parts?" A verbal conclusion of the main points may be used to summarize the discussion.

The Format

The remainder of this article is devoted to the possibilities format. It is one of the least used problem solving approaches. It holds great potential for use in vocational agriculture classrooms.

A problem set in the format of possibilities and factors problem solving is presented. Some educators would disagree with the use of problems, such as tractor selection, saying that there is too much room for arbitrary, emotional input. While there is the potential that personal preference would over-rule all logic in the selection of a tractor, it is an area that many vocational agriculture students that are involved with (or could be excited about) this particular problem allows the vocational agriculture teacher to follow the lesson with such topics as machinery management (especially tractor size requirements) and/or energy considerations in modern agriculture. It also allows the teacher to introduce materials like the Nebraska Tractor tests, as well as manufacturer's tests to the classroom environment for consideration and study.

The chart provided, gather the data necessary to solve the problem, and choose the problem to your students from the perspective of one of your students or a farmer in the area wanting to make such a decision. (To make it real to your community, identify a local farmer planning a tractor purchase. Change the model and/or various factors to make the problem format fit your real problem.)

Allow the students to gather the data. (The teacher should have already gathered the needed information so you will know if it can be obtained. You should also get the implement dealers to cooperate with the students in gathering data directly for themselves.) Put all of the data collected by students together in the format (chart) you developed for your problem. Before you allow any discussion of the facts on the completed data sheet, have each student write his or her selection and, most importantly, why they selected the tractor they did. Have the students band in their answers (problem sheet). Then discuss the information and allow students to give oral arguments for their selections.

Excitement

Routine studies can be made exciting by using problem solving. Further, the problem often changes into another important area of agricultural instruction. Give problem solving a try.

ARTICLE

Solving Problems in the Real World

Because their knowledge has been achieved in connection with needs of specific situations, men of little book learning are not equipped to put to use every ounce of knowledge they possess; whereas, men of vast erudition are often swamped by the mere bulk of their learning, because memory, rather than thinking has been operative in obtaining it" (Dewey, 1933, p.53).

As this quote explains, learning is of little value without thinking and systematically using the knowledge learned. Vocational agriculture has long been one part of the school curriculum which helps students think and learn by doing. Thinking is, however, accomplished in a vacuum. Dewey (1933) emphasized that memorization of facts does not lead to action. Problem solving leads to action. Action creates further problem which require further thought and knowledge.

There is a growing concern among vocational agriculture teachers that we are getting away from problem solving as emphasis is placed on competency-based education. This need not be the case. In fact, these concepts should compliment each other. But there are lingering questions.

What is problem solving? What makes problem solving good? Why do problem solving and vocational agriculture fit together? Why don't more vocational agriculture teachers use problem solving? How can problem solving be implemented?

Not Negative

It is a safe assumption that most people automatically associate the word "problem" with something negative. Teachers have often said that they and their students don't have any problems to solve. These teachers say they just want to teach agriculture. Unfortunately these teachers overlook the positive aspects of problem solving as a teaching technique and, of course, they miss the point entirely. Phipps (1980) defines a "problem" as a life situation which creates a state of suspense, doubt, confusion, or difficulty. In essence, a problem is an opportunity for action.

Phipps (1980, p. 49) emphasizes that problem solving has the following advantages:

1. It is active — not passive.
2. It uses real experiences.
3. It employs creative thought.
4. It adjusts to change.
5. It provides incentives to learning.
6. It emphasizes that learning with knowledge is a tool, not an end in itself.
7. It develops democratic abilities.

Doing to Learn

Put quite simply, we learn what we do. If we merely talk about agriculture (Continued on Page 14)
Solving Problems in the Real World (Continued From Page 13)

problems, we learn only to talk about agricultural problems. "The assumption that information which has been accumulated in the past can be integrated into the solution of the problem may later be freely employed at will by those who have learned it, the only information otherwise than by accident, that can be put to logical use is that acquired in the course of thinking while carrying out a task." (Dewey, 1933).

This "doing," however, must be systematically approached in a disciplined way. Teachers and students should be concerned with knowledge and skills which may be used now or in the very near future as it relates to present problems or ones that will be encountered in the near future.

Too many teachers teach for the distant future, thus making problem solving difficult. Teachers may try to teach students how to raise cropwe, for example, even though the farmers in the community do not grow cropwe because of a pious belief that some day they might raise cropwe.

It is very difficult to teach for future use. We want fast what we do not use. We lose interest and do not learn what is being taught. It would be desirable to know what is being taught. By keeping records, when we lose interest in the work of the plant science teacher, we remember the factor that was taught and when the students remember the teaching of the plant science teacher, they remember the factor that was taught.

Recording keeping taught without analysis and interpretation is not too helpful. Rather, students not to keep records instead of teaching them to keep them is it. It is a question of readiness for the student to begin where the students are; effective learning cannot begin anywhere else. So it is with problemsolving. We are not learning more skills, but we are learning to solve real problems as we develop the techniques of solving problems that will be transferable to many situations. Basic skills may change rapidly over time.

Unfortunately, problem solving is not used by a vast number of teachers of vocational agriculture because of several factors. Not least among them is that some teachers have never operated a tractor and the related equipment, owned an animal, grown a garden, kept financial records, or made management decisions. Many teachers are not involved in any of these activities currently nor have many experienced teachers recently been aware of the work of solving problems in the district of occupational skills. To these teachers, problem solving is a threatening approach. But more important is the problem solving is not being used because it is not fully understood by many teachers.

There is an assumption made that problem solving is just learning by doing and that it means that students should be set free to do whatever they want whenever they want. Of course, this interpretation of problem solving and learning by doing is haphazard and it is learning by trial and error in an unorganized way. Problem solving, however, is learning by doing in a systematic scheme of events leading to a productive goal. It is thinking, gathering information, testing ideas and procedures, making decisions, and acting upon these decisions by developing further the technical skills needed to solve the problem.

Implementation

The following outline of a problem solving procedure is given as an example of how it might be utilized. As an example is used it should be evident how this approach stimulates interest, develops thinking ability, gets problem solving involved, helps students evaluate their progress, and helps students draw inferences, and finally students make decisions.

Situation

You are teaching a lesson on corn rootworm as a part of a unit on corn production. (pick your own topic). The plan to use the problem solving approach. List briefly the steps/activities that you might use to teach this lesson. Justify each.

Answer

1. Identify the significance of the corn rootworm for corn production in the United States, a given state, and locally.
   a. Have students look through farm magazines for ads selling corn rootworm control insecticides.

   b. Talk with local farmers, farm supply and seed salesmen, county agents, etc. about the extent of the problem locally. (Students might do this as a class project.)

   c. Conduct a survey of incidence of rootworm on local farms.

2. Identify the insect.
   a. Show slides showing rootworm damage.
   b. Have a sample (picked) or pictures of other organisms.

3. Develop a list of practices/recommendations for controlling rootworms.

4. Compare the cost of control of rootworm with cost of infestation.

5. Have students decide whether to attempt control.

In this problem solving situation, an attempt has been made to have the students identify the problem, (2) collect data, (3) consider and evaluate alternative solutions, and (4) make a decision. These steps are similar to some outlined by Dewey although the sequencing is not as precise within the context of the problem. As a teacher one could consider using the student surveys, a guest speaker to identify the problem, field trip, slides, slide, class discussion to arrive at a list of practices, supervised study to identify costs and returns, and class discussion to arrive at a decision. Hence, a number of teaching methods would be incorporated into solving the problem.

Summary

Problem solving is regarded by many to be among the most effective approaches to teaching, particularly in a vocational agriculture course. Using the above exercise, students would be required to do what the practitioner (farmer) would do to make decisions. Students are decision makers concerning a management problem as a part of a real life situation. If we are to make learning exciting and effective, we would be wise to use problem solving.

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AUGUST, 1983

Helping Students Become Better Decision Makers

The question is asked often why some students fail to make progress while others struggle along? Why are some individuals leaders in adaptation to change and in accepting the latest technological changes in agriculture? Why do some plan for change while others are ultimately pushed into it in order to just hang on to the farm mortgage?

Apparent each person perceives the environment differently and reacts to it according to these individual perceptions. Some balance their personal and economic lives in unique ways with varying degrees of success. According to Socrates, "Competent individuals are those who manage the circumstances they encounter daily, and who possess a judgment which is accurate in meeting occasions as the need arises and rarely miss the expedient course of action."

The Art of Deciding

Today's social and working systems require that individual be adaptable to change and be a good manager of information in order to cope with the challenges of everyday life. The ability to make informed decisions is a prerequisite to effective working and living. One's ability to choose from among competing alternatives can be, and often is, a difficult task even for the person who has considerable knowledge of the decision making process.

Teachers of vocational agriculture/agribusiness must have the opportunity to work with students who are in the process of making decisions concerning their supervision of occupational experience programs, future educational and employment plans, and other aspects of their personal and social life.

Traditionally, teachers have been a major source of information both in and outside the classroom. They provide advice and counsel to students as it was needed. This approach often helped the students to solve the immediate problem but did little towards assisting them in becoming more independent and capable decision makers, which is an essential characteristic of successful citizens.

What is Decision Making?

Decision making is basically a process of selecting from the available alternatives and then committing oneself to those courses of action that will lead to the desired outcomes. This implies that if one has access to the information concerning the available alternatives, it would be a simple task of selecting the most logical alternative that would lead to the solution that is desired.

Although the quality and availability of information determines to some extent the effectiveness of the decision, it is more important in the way in which the information is processed. That is the key to the quality of the outcome. An individual who uses this ability to process information efficiently, the chances of making decisions that bring about the desired outcome are enhanced.

Who Needs Decision Making Skills?

Everyone needs effective decision making skills. Most rational individuals utilize some strategy when making decisions, whether it be an appropriate or inappropriate strategy. In many cases, however, students decide without really understanding why they have selected a particular course of action since they have not had the opportunity to learn an appropriate decision making strategy. Because of the limited basis, individuals make very simple decisions concerning the route to take to their place of work and often must formulate more complex decisions about how to resolve a personal conflict with a friend or loved one. Although students do not always make the same kinds of decisions that adults make, they make just as many decisions at their present developmental stage which are equally as important to them as are those of adults.

Basic students lack information and experience and are unsure of their values, interests, abilities, and goals in life. Many of the conflicts that students have with their parents, their peers, and others are a reflection of their inability to process information. As such, they are forced to make decisions that are not meaningful to them. They receive conflicting feedback from their environment when they fail to make decisions that are considered to be acceptable. This often results in confusion, frustration and rebellion on the part of the decision maker.

Decision making can be taught and should be a part of the vocational agriculture/agribusiness curriculum. Without the ability to process and utilize the technical information that is taught, students cannot receive maximum benefit from their instruction. Teachers, in their instructional, supervisory, and advisory capacity, should constantly strive to assist students to become more self-directing in terms of their school, social, and work lives.

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Helping Students Become Better Decision Makers (Continued from Page 15)

Requirements for Decision Making

If students are to become skillful decision makers, three major requirements must be mastered. Each individual must develop an awareness of and the ability to:

1. Examine and recognize their personal values
2. Identify and use adequate and relevant information
3. Use an effective strategy to convert this information into an appropriate action

Values. The way one reacts under certain circumstances is determined to a great extent by values. Values are an expression of what is prized, cherished, or held in high esteem and ultimately determine what is satisfying and in turn helps one to set objectives. Values are learned and become an appropriate topic for classroom discussion. Students will become more competent decision makers if they are aware of their personal values and the sources of their values and if they develop a respect for differing sets of values.

The time has since passed whereby teachers can indoctrinate students with one set of values that are their own and have students accept them. It is one thing to encourage general parameters of acceptable behavior which one accepts and another to moralize to the extent that students have no latitude in terms of choice. There is no right or wrong values since values can only be judged by the individual.

An awareness of one’s values is essential to the outcomes and objectives. Otherwise, individuals tend to react not really knowing why they are behaving as they do. If students are thoroughly attuned to their values they are more likely to set clear cut goals and objectives as attainable.

Information. Without adequate and relevant information, the decision-making process fails. If the possible alternative courses of action are unknown or not available, the decision-making process fails. Knowing where to go and what to ask and what information is obtained are key skills to be learned.

An effective decision requires information concerning the following:

1. Most desired plan. This involves selecting a course of action that would both have a high probability of success and a high desirability as viewed by the decision-maker. Although it may appear to be a simple process, it is not since it requires:
   1. Knowing personal values
   2. Knowing the alternatives and having the ability to predict the possible consequences of each
   3. Having the ability to estimate the probability of something happening
   4. Having the ability to rank the desirability of something

Students need opportunities to explore personal values, consider alternatives, estimate their chances for success, and determine their priorities. The classroom is an excellent place to begin. The process can be taught and the skills that are learned can be utilized in every aspect of their lives. With sufficient practice, students can learn to systematically apply a decision-making strategy.

The most difficult task in teaching decision making is finding a time in what may already be an overloaded curriculum. Perhaps you are presently teaching one or several instructional units that could be adapted to include a lesson on decision making or you might consider the following acting as some sort of a lead-in lesson from which you have considered omitting from your curriculum. The topic of the decision-making process is one that can be used not only in the agricultural education class in which they are enrolling but as a general tool.

As the teacher of vocational agriculture you must ultimately decide what is to be taught to your students. If you feel that the skills that you are teaching and the professional skills would be beneficial to your students, each of them should have an opportunity to make a decision concerning some aspect of their life and then use the following steps in the process:

1. State the decision to be made
2. List the alternatives that are being considered
3. Seek additional information that can be used in generating other alternatives
4. List the possible consequences of each alternative
5. Use the list of consequences in making the decision

A reassessment of the past

While those of us involved in the agricultural education profession consider that our program has expanded to include the agricultobus and service resource areas of the agricultural sector of the economy, perhaps we should take time to assess our position as we move through the 1980’s. The real strength of agricultural education results from the “hands-on” activities which allow students to step into the world of agriculture and experience the successes, failures, joys and disappointments associated with the industry.

As the program has developed and evolved, the teachers have provided some of the best experiences in the supervisory and occupational programs. However, some teachers have not kept pace with the other programs. This is a significant concern and one that needs to be addressed.

Rural Youth as a Target Population for Vocational Agricultural Education

Vocational agriculture programs are currently provided in many metropolitan areas of the United States. However, rural small communities tend to be a target population for these programs are extremely successful and have proven that all youth with an interest in agriculture can benefit from participation in vocational agricultural and the PFA.

While recognizing the importance of these programs, we must not forget that the traditional strengths of vocational agriculture lies in rural America. An important function of vocational agriculture for the future will be to continue to provide a quality production agriculture work force. This function clearly indicates a continued need for entrepreneurial training in production agriculture. The curriculum in rural schools located in farming communities should continue to reflect this emphasis on production agriculture.

Serving Rural Youth in Vocational Agriculture

By ROBERT VANDEMEER (Editor’s Note: Mr. Vandeemere is Director of Vocational Agriculture, New York State B-161, Box 13, New York, New York 10008.)

Today approximately nine percent of the rural labor force is engaged in farming. Many people still consider vocational agriculture as a program that trains young people for farming, and they understand not why vocational agriculture programs, with the advent of the Federal Program, will continue to remain as dominant skills training and leadership development programs in small rural high schools.

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Providing Entrepreneurial Experiences in Agriculture for Rural Youth

Rural areas of the United States have a high incidence of self-employment and a high proportion of workers with more than one source of income. Over half of the agricultural work force is self-employed and other sectors of the rural economy also tend to have higher rates of self-employment than urban areas. Most businesses in rural communities are small and more diverse than large businesses. These characteristics of rural communities have implications for agricultural educators. The rural youth that these programs serve are likely to have high school small businesses to tend to hire generalists rather than individuals with a high degree of specialization. Many sell-
Horse Riding Therapy for the Handicapped

What constitutes agricultural education programs? Are they only in the formal setting of the high school, vocational-technical schools, and colleges? Are they also in other areas? Do you want to see agricultural education at its best outside the formal school setting? Put handicapped students up on horses and don't bother to tell them they can't handle the situation. Watch their faces at the realization that these gentle animals they sit astride are reacting to their commands. Physical, mental, and emotional handicaps don't magically go away. Yet, the sense of accomplishment and learning, the sense of being in charge has the effect of making handicaps seem far less disabling.

Helping make handicaps less disabling is what The Winslow Riding for the Handicapped Foundation, Inc., is all about. Located in Warwick, New York, the foundation is a non-profit organization that functions under the premise of "Riding for the Handicapped." It is available to all types of handicapped people. Rider handicaps include cerebral palsey, deafness, emotional disturbances, learning disabilities, multiple sclerosis, muscular dystrophy, mental retardation, and a multitude of others. In fact, the only problem that seems to stop students from getting involved in the program has been their own lack of interest.

Dealing primarily on private and corporate donations as its major funding source, the foundation provides over 2500 riding sessions a year at Borderland Farms in Warwick.

As with many in-school programs, volunteers are critical to the success of the riding programs. They work alongside students as safety rules, horsemanship, and procedures are discussed. They are again alongside as riders take the first trip around the indoor riding arena.

The Foundation, administered by Virginia Martin, has worked with various groups since its incorporation in 1974. Student riders range in age from adults to the very young. Schools from both New York and New Jersey have included riding at Borderland Farms as part of their pre-school programs for the handicapped.

If you want to experience real excitement and share a feeling of fulfillment, watch the five and six year old, riding helmets in place, mounted on seven easy-gaited horses. Watch faces that show only pride and joy as students ride out and horses react to hand, leg, and voices telling them what to do.

By John J. Buckley
(Editor's Note: Mr. Buckley is occasional riding teacher at Warwick Valley High School, Warwick, New York 10990.)

Some youngsters are timid to begin with, but the horses soon take on personalities and come to be known on a first-name basis.

One dark-haired, enthusiastic little girl lost all apprehensions as "Joe" and "Brownie" became her good friends. Friday riding became something to look forward to with new information learned each time.

The Foundation is a member of the North American Riding for the Handicapped Association (N.A.R.H.A.). As such, the Foundation has sent riders to events such as the International Special Olympics, National Games of the National Association of Sports for Cerebral Palsy, and the Metropolitan Regional Therapeutic Equestrian Games.

Three riders also took part in international competition in Canada as part of the U.S. Therapeutic Equestrian Team.

Two films have been produced about the Winslow Foundation's work. "Saddle Pals" and "What's Happening on National TV," chronicles the progress of the program from its inception. "Exceptional Equestrians" is geared to showing the public and reasons why riding works in therapy for the handicapped. Both films are available for rent. They, along with additional information, may be obtained by writing to Administration of the Handicapped Foundation, Inc., RD 1, Box 245, Warwick, New York 10990.
Small Engine Trouble Shooting Contest

The Virginia Association of Future Farmers of America has an annual engine trouble shooting contest held at the Virginia State Fair each year. An FFA member representing each supervisor area of the State competes to determine a State winner. Each contestant has won one or more local or regional small engine events prior to competing in the State contest.

During the 1979 Spring State Agricultural Education Staff Meeting, it was determined that there was enough need and interest to conduct a State FFA Small Engine Trouble Shooting Contest. The need was based on the following:

1. The Agricultural Education Instructional Guide included 28 hours of instruction on maintaining small gasoline engines during the second year of Agricultural Science and Mechanics classes.

2. By having to trouble shoot small engines would provide a basic understanding of engines needed in the ever-increasing mechanization of agriculture.

3. More students would be interested in learning about small engines if they had an opportunity to compete in a State contest.

4. A contest similar to the Tractor Troubleshooting contest would provide recognition and encourage additional students.

5. Students, teachers, and representatives from the State Fair had expressed interest in such a contest.

After a thorough investigation of several similar contests, it was decided to pattern the event after the already established Tractor Troubleshooting Contest. (A copy of the Guide for the State Small Engine contest can be obtained at the end of this article.) Since both contests are held in the same building, 30 minutes is allowed between the start of the two contests. This interval provides time for introduction of the contestants. Having the two events occur almost simultaneously gives the spectators more than one type of activity to observe.

Objectives

The objectives of the Small Engine Contest are for the student to be able to:

1. Exercise safety.

2. Demonstrate the proper use of tools.

3. Locate the problem(s) and correctly adjust, repair, and/or replace the item causing the problem(s).

4. Identify parts needed from the parts department.

5. Return the engines to normal operating condition within the minimum time possible.

6. Demonstrate a general knowledge of small engines through completing a true-false/multiple choice test.

The Contest

The contest begins with an explanation of the purposes, rules, and information concerning any unusual conditions of the engine or contest. Students are not told how many malfunctions to find. However, they are instructed that the check-off sheet will be used to rate them on the possibility of correcting a malfunction.

The preliminary portion of the contest involves a short test of the student's general knowledge of small engines. It is timed and recorded on the score sheet to become part of their total score.

The main portion of the contest, which has a two-hour limit, is a performance-based event. Each contestant is given an engine that has been "bugged" by a contest judge and is required to correct the malfunction(s). It is a good practice to circulate among the participants and engage in conversation with them individually. This practice establishes good rapport, and tends to lower their anxiety level. The competition is conducted by a contest committee composed of a manager, timer, parts manager, and judges.

As each student restores the engine to normal operating condition, the judge should observe its operation. The contestant should be present to observe and verify mistakes as the judge checks the ignition system and carburetor. Having the contestant present allows the judge to note any score the trouble-shooting performance, but to show the student any adjustments that may be required. This practice marks the contest as a learning experience, and more than mere competition. It also reinforces the objectives for the student.

Problem Areas

Even the best planned contest can have problems. The following are some problem areas and possible solutions:

1. Engines - It is sometimes difficult to secure engines of the same make and model for all contestants. The best solution would be to have a small engine company donate engines to be used only for the State contest. This would assure sufficient engines to trouble shoot, but precludes having a variety of brands and/or models.

2. Tear-down vs. Trouble Shooting - If there are too many malfunctions, the student who is competent in trouble shooting small engines will take the engine apart and put it back together. Therefore, it is better to have only a few good malfunctions.

3. Prizes - Just as you do in the classroom, a good response should be reinforced. Prizes can be obtained from local merchants. The Virginia contestants receive a ribbon and money award from the State Fair Association, as well as prizes from local merchants.

4. Parts - Students may accidentally break parts for which they must have replacements. Replacement parts can be obtained through donations from local small engine dealers. Some dealers will agree to loan parts to be used in emergencies. Contests should be warned to be careful, particularly about overtightening the small screws. (The proper sheet metal screw can be substituted when the threads strip.)

5. Safety Glasses - Spectacles develop less annoying fog problems than goggles. If the goggle type has to be worn, use the perforated type and treat them with an anti-fog compound.

6. Unanticipated Mechanical Failure - When you least expect it, a problem will develop. The timer will have to be notified to deduct the time from the score of the contestant when an unanticipated mechanical failure occurs. This type of action should be covered in the rules, in case it prevents the student from completing the contest.

7. Motor Mounts or Braces - The engine can be attached to motor mounts or tables. Bolts or C-clamps can be used to hold the engines in place while they are operating. If heavy tables are used, there will be fewer problems with vibration.

8. Correct Tools - Some students will not bring all the tools they need. This problem can be remedied by having a set of tools in the parts department to be loaned to contestants. Students should also be warned and penalized if they use incorrect tools.

9. Large Spaces - To avoid close observation of another contestant, the contestants should be positioned at separate tables throughout the area being used.

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Virginia FFA State Guide Small Engine Trouble Shooting Contest

Purpose

The Small Engine Trouble Shooting Contest is designed to give FFA members an opportunity to demonstrate their knowledge and skill in trouble shooting small engines. Total engine teardown is not encouraged.

Participation

Any bona-fide FFA member is eligible to compete. Each contestant must be scored on engine troubleshooting performance. Each contestant will be scored on safety throughout the contest by the judges. The malfunction check-off sheet used by each contestant will be utilized in scoring to eliminate the possibility of luck in correcting a malfunction.

Time Allowed

Twenty minutes will be allowed for the written examination. The written exam will consist of 25 true-false and/or multiple choice questions. Two hours will be allowed to adjust the engine and get it operating properly. In cases where a malfunction occurs which was not anticipated, time needed to correct the malfunction will be deducted from the participant's total time.

Rules

The general rules and regulations are as follows:

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Simple Adjustments Solve Most Mower, Rack Problems

By Paul Castro

Rakes
don’t require a lot of maintenance. But a few minutes of making adjustments is all it takes to prevent a lot of downtime or hay spoilage at a critical time. Before operating a rake in the field, replace any bent or broken tines and straighten bent stripper bars to make sure the tines are sharp. This can be done by turning the rack with your hands. It is important to keep an eye on the lubricant level in the gearbox—refilling as required. It helps to lubricate the time bar bearing on rakes that have grease fittings. A couple of pumps on each fitting is just enough. Never grease until the old grease is forced out of the seal areas, and don’t operate your rake so low to the ground that the teeth dig into the ground.

The teeth should be at least ½" or more above ground. It is important to always have your operator’s manual close by for quick reference to helpful maintenance tips.

Conventional mowers or disc mowers are very popular in a lot of hay harvesting operations across North America. Preventive maintenance on equipment can help reduce costly machine downtime.

Many nuisance problems on conventional mowers can be eliminated if the operator takes the time to service the mower before the season and for different crops within the season. It is important to replace all worn guards and broken knife sections. In many cases, the complete knife assembly should be replaced.

Take time and evenly adjust the guards fully with the cutterbar. These serve as supports for the knife and push against the blade. Always adjust the hold-down clips to hold the blade against the wedge surface of the guards.

Always lubricate the mower and oil all pivot points, and be sure to replace the drive belt if it is worn or cracked.

Before attempting to use the mower in the field, attach it properly to your tractor. The mounted mower should be adjusted for the different crops you may use. The disc mower for correct frame height, run your tractor at 340 R.P.M. for a sickle of 800-950 strokes a minute.

Make sure the cutterbar has lead at the outer end and that the break-away latch is functioning properly. Adjust the cutterbar tilt for or shorted crops. Make sure the proper knife head bolts are used and tighten. Head bolts properly. In all cases, refer to your operator’s manual for the best maintenance procedures on equipment.

Disc Mowers

Disc mowers are relatively new in many areas of North America, but are fast gaining popularity in rough mowing conditions. Disc mowers are very popular in the South where few hills are filled with fire ant hills.

For the best operation of a disc mower, make sure the cutting blades are in good condition. Blades are reversible; they must be replaced when badly worn or broken. Uneven blades cause vibrations. Never operate the mower unless the end cap dividers are in place. After you lower the cutterbar, wait just a few minutes before operating and allow the oil to spread out in the cutterbar gear case. Drain oil in the cutterbar to flush out any buildup of dirt and foreign materials. This is especially important with a new mower after the first few hours of use.

Always check the pressure relief valve for the cutterbar to relieve any excess pressure. Set tension on drive belts properly. Loose belts may burn up quickly. Regulate ground speed according to crop and field conditions. Remember, a slower ground speed may have to be used in heavy crops.

Do not attempt to operate the mower without the plastic cover over the disc. Adjust the cutting height by tilting the cutterbar with the top link.

Disc mowers are relatively new in many parts of North America, and when properly maintained cut faster than the older disc units. Cut crops are left in a wide, lightly fluffed swath for quick drying. There’s virtually no plugging in down, tangled crops, dense, wet undergrowth or in fire ant hills.
Problem Solving Leads to Success

What tools do we need?

What safety practices do we observe?

How high do I cut?

How do I get the tree to fall in the right direction?

Success comes from solving the problems. (all photographs courtesy of Photo Lab, Learning Resources Center, Virginia Tech, Blacksburg, Virginia).