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November, 1993
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Effective Teaching

Student Learning Styles

Effective Laboratory Teaching

Motivating Students

THE
AGRICULTURAL EDUCATION
MAGAZINE

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Table of Contents

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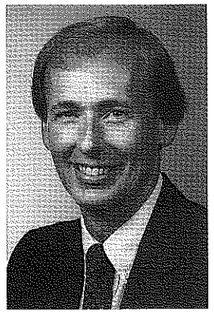
Teacher Behaviors and Methods That Make a Difference



BY ED OSBORNE

Dr. Osborne is associate professor and program chair of agricultural education at the University of Illinois, Urbana-Champaign.

Teaching is so complicated. Too bad we can't just zero in on a few things and then feel confident that our teaching is solid and our students are learning. With plants it's much easier to predict the effects of a particular treatment; more fertilizer generally means increased yields. Water stress means poor crop/plant performance. Plant responses are due to biological and physical processes (reactions). But teaching is different. The same amount of encouragement might make Johnny turn away while Susan takes off in her learning. What works like dynamite for one student can be a dud for another. So we must try our best to find the right combination for each student. Effective teaching means teaching each student effectively.

Research has shown that there are some powerful determinants of effective teaching. Most of these are very familiar to the seasoned teacher. The challenge is to find a way to incorporate most or all of these effective teaching strategies in our everyday teaching.

Cues, engagement, corrective feedback, and *reinforcement* are strongly associated with improved student learning. *Cues indicate to students what they should learn and how learning should proceed.* Brief overviews (advance organizers), group goal setting, hierarchical learning (easy to complex), and pretests are very effective cues. *Engagement* refers to the extent that students participate in learning activities. Not surprisingly, the more students participate, the more they learn. *Corrective feedback* is aimed at correcting oral and/or written errors. Effective teachers correct errors quickly and follow by reteaching or providing additional engagement time. *Reinforcement* can take many forms and serves to inform students about expectations and upcoming activities. One study found that teachers who extensively used cues, engagement, corrective feedback, and reinforcement had students who scored one to two grade levels above other students. WOW!

Other significant findings about effective teaching are consistently appearing in the research literature. Teachers with higher expectations have higher achieving students. Frequent tests can increase learning. Questioning is one of the most pervasive techniques that teachers use. How teachers respond to student questions and answers has much to do with determining teaching effectiveness.

Homework has been a major source of frustration for many years. However, if students do homework, engagement is increased. Graded homework that is promptly returned with corrective feedback has been shown to advance students over one-half grade level above their peers who do not participate in homework. Home interventions designed to improve student learning in the home (like our SAE program visits) have been found to have a similar effect.

Inquiry teaching, where students formulate hypotheses and conduct laboratory investigations, substantially improves student learning, particularly in the area of scientific processes. National Science Foundation studies have shown that giving students opportunities to do science, to explore on their own, to contract with teachers about what they will learn, and to participate in an activity-based curriculum all have substantial positive effects on student learning.

Research has shown that students learn more when they are being taught or supervised by their teacher as opposed to working on their own. Personal involvement of the teacher in each student's learning increases achievement. Teacher talk in this case is not primarily lecture, but rather lecture/discussion, demonstrations, questioning, providing feedback, and the like. Personalized instruction has been shown to advance students as much as one-half grade level above their peers. When teachers explain class and homework assignments and go over examples before independent student practice, learning is enhanced. Monitoring of student work, corrective feedback, and reteaching are all important in promoting effective teaching and learning.

Students learn more when the subject matter is well organized/structured. The use of outlines, smooth transitions, and summaries increases student learning. A certain degree of redundancy has been found to have a positive effect on student learning. Teacher clarity and enthusiasm also promote higher achievement.

Making gains in our teaching effectiveness requires that we reflect on our teaching

(continued on page 22)

Effective Teaching: What Is It?

BY VERNON D. LUFT

Dr. Luft is professor of occupational teacher education at the University of Nevada, Reno.

Effectiveness can be likened to success and may be interpreted differently, depending upon one's profession. To a business person effectiveness or success might be measured by profit made. To an athlete it may mean performing at his/her best, contributing to winning as a team or individually. To a manufacturer it may mean producing a certain number of quality products. To an agriculture teacher it should mean producing students with skills, knowledge, and attitudes necessary to succeed in postsecondary education or the work force.

What then is effective teaching? Educators have defined effective teaching in a number of ways. Rosenshine and Furst (1971) were among researchers that described teacher behaviors leading to higher student achievement. They reviewed 50 studies to determine if there were common variables (practices) used by teachers leading to the attainment of student achievement. They found that teacher clarity, use of variety, enthusiasm, use of business-like procedures, informing students of intended criteria, minimizing criticism, offering appropriate praise, and using positive reinforcement were teacher behaviors contributing most to student achievement.

In a previous edition of The Agricultural Education Magazine, Larsen (1992) suggested that when assessing the teaching effectiveness of an agriculture teacher some aspects such as knowledge of subject matter, variety of teaching methods, linkage with real life examples, classroom control, and student motivation should be considered. Scott (1992) reported that elements contributing to a positive teaching-learning environment are professionalism, preparing the students to learn, using clarity in teaching, providing immediate feedback, holding students' attention, asking questions, enthusiasm, and motivation.

To me, teaching effectiveness is obtaining desired results. It is directing our students to achieve intended learning objectives or outcomes. The teaching behaviors reported by the authors cited previously are those found to obtain desired results.

How do we know what the results or outcomes should be? If we are preparing students for careers in agricultural occupations, then the outcomes should be those which are demanded by the industry. We determine those outcomes by working with people within the various agricultural occupations and ask them what is required to carry out their jobs. This is the basis for a competency-based program.

The identified required tasks can then become the basis for developing the content of a program. The instructional planning process begins with determining what the outcome should be, and working backwards to determine what content, activities, and teaching methods are used to obtain the desired results. Let's assume that for a horticulture program it has been determined that "prune shade and ornamental trees" is a task that should be learned (desired outcome). The task can easily be written in the form of a terminal behavioral objective, including the acceptable level at which the students must perform the task. From this, enabling objectives can be determined, based upon what the teacher thinks the students need to know and be able to do in order to acceptably prune a tree. When the students can meet the objective, or acceptably prune a shade or ornamental tree, they have met the desired outcome, and an effective job of teaching has been accomplished.

How can this process contribute to effective teaching? First, if effectiveness is obtaining desired results or outcomes, the teacher must know what outcomes are expected in the industry. Knowing the outcomes enables teachers to more easily direct students to acquiring the competencies desired within the industry. Secondly, if students know the desired outcomes and criteria for reaching them, they will more readily attain them, resulting in a greater degree of effectiveness. Thirdly, teachers can still use the behaviors identified as those contributing to effectiveness as they lead the students toward attaining the desired outcomes. In conclusion, effective teaching is employing the various behaviors or practices necessary to obtain the desired results. The desired result is producing competent students that can be successful in their chosen path in life. I believe agriculture teachers have been effective and will continue to be effective because they know about the desired results.

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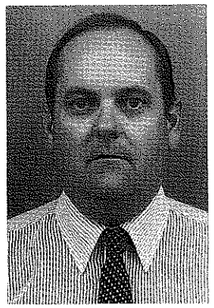
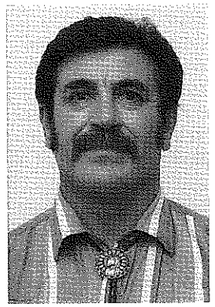
Student Learning Styles and Effective Teaching





BY DAVID E. COX & ERNESTO ZAMUDIO

Dr. Cox is an associate professor of agricultural education at the University of Arizona, Tucson. Mr. Zamudio is an agriculture teacher at Chinle High School, Chinle, AZ.

How many times, as an agriculture teacher, do you hear students say things like, "I can't get this," or "How do you figure that again?", or "Will you go over that one more time?" When you work hard to plan a good lesson and a few students really struggle and don't catch on, does it make you wonder why? As a teacher, do you ask yourself questions? Why didn't they get it? What did I do wrong? What should I have done? Perhaps our first thought, as teachers, is to *fix blame*. By asking questions like those above, what we are doing is blaming someone, either those students or ourselves. Finding fault may not be the most accurate way to solve the problem. A better approach is to find the solution. Perhaps the solution may be found by looking into the teaching-learning process and recognizing that the way teachers teach affects how much students learn. Similarly, the way students learn affects how much they learn.

As a teacher, do you ask yourself questions? Why didn't they get it? What did I do wrong? What should I have done?

Learning Style

Teachers take subject matter areas very seriously and constantly make efforts to keep current in the latest science and technology. A great deal of professional time and effort is expended on inservice education activities in agricultural education. As teachers, we invest a good deal of time thinking about and preparing for what we should teach. Likewise, we should spend an equal amount of time thinking about and preparing for how we should teach.

What do we know about learning styles of students? A growing body of evidence indicates that learning styles are important to both understanding and managing the teaching-learning process. This aspect of educational practice is relatively new, although the psychological basis is not. Simply stated, learning style means the way each person absorbs and retains information and/or skills (Dunn, 1984). Evidence indicates that students are able to learn in a variety of ways, and the predominant and preferred learning styles can be profiled (Sproles, Cox, and Sproles, 1987). One of the earliest studies which reported results of research on learning styles of students in vocational agriculture indicated that important variations in learning style were observed between students from rural and urban schools (Cox, Sproles, and Sproles, 1988).

Research suggests that learning style is an important influence on a student's choice of learning strategies, and that both styles and strategies affect learning (Oxford, 1989). Hodges (1983) noted the link between learning and teaching when he reported that students learn faster and with less effort when they are taught through their individual style. In many instances, teachers tend to use a single approach or teaching style with all students, expecting them to succeed, yet stressing conformity and overlooking individual learning preferences (Ewing and Yong, 1992).

Additional research in agricultural education is continuing to reveal more about how students learn, as well as how teachers teach. Recent research in Ohio (Cano, Garton, and Raven, 1992) and Montana (Raven, Cano, Garton, and Shelhamer, 1993) compared learning styles, teaching styles, and personality types of preservice teachers of agricultural education. Similarities existed, yet the authors raised intriguing and perplexing questions regarding relationships between teaching and learning. In both cases, the learning styles were assessed the same way. Researchers in Pennsylvania (Rollins and Scanlon, 1989) measured learning styles and developed a distance profile of students in secondary agriculture programs.

A lot of time and effort is being expended by some researchers in the area of learning styles. Some practical questions which should arise from a teacher may be: *So what?* or *How can I use this information?*. In other words, what is the application of this research to a local agriculture program? As with any body of research, it ultimately comes down to the utility of the results in actual practice. Not everyone wants to be, or should be, a specialist in learning styles. But there are some aspects which have direct use for a local teacher. As a teacher who may have some interest in putting some of the results to use, it is important for you to be informed of the uses, as well as the limits, of learning style information.

Diagnosis of Learning Styles

Critical to the application of learning →

styles in day-to-day teaching in agricultural education is the method used to identify the learning styles of students. A variety of ways to assess learning styles is available to schools and teachers. Many of them are paper/pencil instruments, some are self reported, some are self (or teacher) scored, others require professional scoring and interpretations, and still others may be inappropriate for a particular group. The following is a very brief summary of four such instruments. It is important that you carefully choose an instrument based upon your students. Do not make interpretations beyond the limits of the chosen instrument.

Because students are not aware of learning styles (and probably don't care) it is incumbent upon the teacher to accommodate the variety of learning styles which is encountered in any classroom.

The Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, and Karp, 1971) uses simple figures imbedded in a complex drawing to assess analytical versus non-analytical styles of information processing. This is a non-verbal, perceptual test and is appropriate across cultures. Subjects who score above the group mean are considered analytical or *field independent*, and subjects who score below the group mean are considered non-analytical or *field dependent*. Field independent learners are typically more internally motivated and have more cognitive flexibility than field dependent learners, who are global, externally controlled, and need help organizing and comprehending material. This instrument is short, easy to administer, self-scored, and can be used with a broad range of ages.

The National Association of Secondary School Principals (NASSP) Learning Style Profile (LSP) (Keefe and Monk, 1986) yields scores in 24 elements of style, such as analytical, spatial, discrimination, memory, verbal skill, and other learning preferences which are grouped into three categories: cognitive styles, perceptual responses, and instructional preferences. The results can be used in planning instructional strategies for individual students and groups of students. The LSP can be used with students from junior high through high school. This test is a self inventory and is subject to inaccurate reporting by the subjects, either intentionally or unintentionally.

The Learning Style Inventory (LSI) (Kolb, 1984) measures an individual's relative emphasis on concrete experience, abstract conceptualization, active experimentation, and reflective observation. In addition, the LSI indicates the extent to which an individual's preferred style is abstract versus concrete or active versus reflective. This test is short and easy to administer, either individually or in large groups, and is self scoring. It is a self inventory and may be subject to inaccurate self reporting. This learning style instrument is most appropriately used with adults and may have application in an adult education program.

Learning Styles Inventory: A Measure of Student Preferences for Instructional Techniques (Renzuli and Smith, 1978) is composed of 65 items which are designed to measure student attitudes toward nine general modes of instruction. The specific modes are projects, drill and recitation, peer teaching, discussion, teaching games, independent study, programmed instruction, lecture, and simulation. A teacher test is included and is designed as a tool for teachers to evaluate the range of instructional techniques used in their classrooms. This test is designed to be used by grades 4-12, and is easy to read and administer. This is self inventory and is subject to inaccurate reporting, either intentionally or unintentionally, by the subjects.

Summary

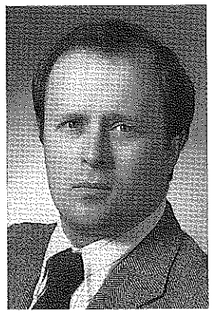
The next time you encounter students who work best in situations where they are cooperation rather than competing, need help organizing material, do best in situations where a single correct solution is needed, love to brainstorm and generate ideas, appear to be internally motivated, act unemotional, want to know the theory behind something, prefer to work independently rather than in groups, or like to work on projects, you will know they are just being *normal.* Those behaviors are the result of their learning style.

The responsibility for the professional application of these known learning styles rests with the teacher. Because students are not aware of learning styles (and probably don't care) it is incumbent upon the teacher to accommodate the variety of learning styles which is encountered in any classroom. This is accomplished by spending time thinking and preparing for how one should teach. We now know there is a variety of predominant and preferred learning styles in every classroom. We also know that teachers have a preferred learning style, which influences the way they teach. As a teacher, you need to be aware of both, and make a concerted and conscious effort to use a variety of instructional methods, techniques, strategies, modes, assignments, and activities in order to accommodate the variety of learning styles represented by the students in your program.

A final caution is noteworthy. Be careful not to over-emphasize or over-use learning style information. Please don't label or pigeonhole students by some category of learning style. You should be purposeful as you plan how you will teach particular lessons to be sure to vary the methodology used. Agricultural educators have long advocated using a variety of teaching methods. We are now understanding why it is so important to the profession of teaching.

(continued on page 22)

Effective Teaching in Agricultural Mechanics Laboratories



BY LEON SCHUMACHER

Dr. Schumacher is an assistant professor of agricultural education/agricultural engineering at the University of Missouri, Columbia.

Effective teaching in the agricultural mechanics laboratory begins by teaching the competencies needed by students. Selection of these competencies should be based on the needs of the community, state, and region. Employment demographics and opportunities often influence these needs.

Students may not always view these competencies as an important part of their high school education. A "felt need" must be developed in the student before effective agricultural mechanics instruction can occur.

Several teaching methods and management activities facilitate effective agricultural mechanics instruction. The selection of the projects that students will construct, the tools that are available for your students to use, the knowledge of the instructor, inservice opportunities for the instructor, arrangement of the facility, the storage of equipment, the lessons planned, the rotation of students from one skill area to the next, and the control of the agricultural mechanics environment all impact the teacher's effectiveness in the agricultural mechanics laboratory. This article will discuss each of these topics briefly.

A "felt need" must be developed in the student before effective agricultural mechanics instruction can occur.

Projects

Are you selecting required projects that keep your students busy, or are you requiring projects that teach the competencies needed by your students? Students and parents quickly differentiate between projects that are "busy work" and projects that develop needed competencies. Further, are you providing a variety of options for your students, or did your students' parents construct the same project 20 years ago?

These two examples accentuate the importance of selecting a project that meets the intellectual needs of your students. When students see a valid reason to construct a project, they naturally work harder, and their parents provide behind-the-scenes support that is essential for effective agricultural mechanics instruction.

Tools

The tools used for agricultural mechanics instruction should be selected based on the competencies needed by the student. The quantity of tools is important. However, quality tools should be purchased to facilitate instruction of these competencies. The balance between quality and quantity when purchasing tools for your students can be a difficult decision that influences effective teaching. The quality of your tools, not the quantity of tools, should be emphasized. High quality tools last longer, are less frustrating to use, and students are more productive when using these quality tools. If support dollars are short for tools, a rotational scheme should be incorporated that allows adequate time for students to learn how to use each respective tool as they master each competency.

Instructor Knowledge/Inservice Opportunities

"We teach what we know" is often discussed in educational circles. This should not negatively affect the ability of your students to master the competencies needed. If the agricultural mechanics competencies needed by your students are not your strong suit, seek inservice opportunities that will allow you to feel comfortable as you teach these competencies.

Inservice can and should be gained through both formal and informal instruction. Opportunities include National Council inservice activities, such as the "train-the-trainer" instructional series that has been available across the nation. Companies such as Briggs & Stratton, Case-IH, John Deere, Lincoln Electric, and Miller Electric all sponsor workshops for teachers at their factory training schools. People in the community are also an invaluable resource that should be called upon to supplement and foster effective agricultural mechanics instruction.

Arrangement of the Facility

A floor plan should be laid out on paper that outlines all the devices, drains, sinks, and ventilation ducts (in other words, items that would be expensive to relocate). Work areas should be laid out that minimize student movement and promote safe instruction and effective teaching.

If needed, tools should be relocated within the respective work areas of the agricultural

(continued on page 12)

The Challenge of Motivation

BY MARLIN BERG

Mr. Berg is an agriculture teacher at Pipestone High School in Pipestone, MN.

In business the customer is always right, and the treatment of that customer determines the success of the business. In agricultural education the challenge of motivating the student determines the success of the curriculum.

The presentation of the curriculum to students does not necessarily result in learning. Just because you think students should want to know more about certain topics does not mean they will be motivated to learn. They don't necessarily learn what you think is important. Therefore, it is important for you as an instructor to create a desire to learn in students.

In business, successful firms always greet their customers in a cheerful, positive, sincere way. Teachers must greet their students the same way. You must determine what the students want to know and guide them to the realization that there is a need to know the information you are presenting. Teaching is a constant selling job, just as a business must continually sell its product or service.

TV commercials often depict their product with excitement, and action. Teachers also need to be excited about what they are teaching. If you are excited about a topic, that enthusiasm will transfer to the students, and they will become interested in learning about the topic.

The curriculum must be relevant. Students today are sophisticated. They are not interested in learning unimportant facts that may already be outdated. We are living during the time of modern technology which will supply facts in microseconds. For example, when teaching agricultural credit, we are aware that not every agriculture student will be a farmer or agribusiness person, but the fundamentals are important to all consumers.

In business, successful firms always greet their customers in a cheerful, positive, sincere way. Teachers must greet their students the same way.

I have found that involving students in FFA is one of the best motivating devices. If I can get students involved in an FFA activity, their interest and performance in the classroom often improve. All types of FFA activities can be effective. Judging team competition and exhibiting livestock and crops are the most common, but activities such as community service, recreation, committee meetings, chapter leadership, and Greenhand camps are also good ways to get student excited about learning.

When students are active in FFA, they develop friendships, see possible activities they can participate in, develop self confidence, and create an interest in agriculture. All of these benefits often result in improved interest and success in the classroom. Success breeds success, and students often improve in other classes because they have set goals and now have direction.

Several years ago I wrote an article for The Agricultural Education Magazine entitled "Let's Not Forget Those That Want to Farm." Although many years have passed, I still adhere to that theory. However, times have changed and agriculture instructors must also change.

The principles of farming in Pipestone, Minnesota, still center around beef, sheep, swine, dairy production, corn, and soybean crops, but the principles of this type of farming are the same as the production of trees, flowers, vegetables, small animals, and even aquaculture. The specifics are different but the principles are the same. Selection breeding, feeding, growing, disease control, and marketing are all factors in production.

There is no magic formula to motivate students, but a sincere interest in them and their achievements is probably the key to success. If you have this, you will incorporate all of the other teaching and technology into a process of learning "how to learn" which they need to succeed in the career of their choice. ■

Coming in December . . .

Theme: Teaching Academically Disadvantaged Students

— Using learning centers

— Georgia's Lamb Project Adoption Program

— Teacher Expectation

Plus other topics and feature columns.

Effective Teaching of Agriscience Through Cooperation and Resource Sharing

BY DR. LINDA WHENT

Dr. Whent is supervisor of agricultural teacher education at the University of California, Davis and program director of the AgriScience Institute and Outreach Program.

Studies have shown that integration between subject areas and teacher collaboration across disciplines can strengthen teaching effectiveness and increase student learning. Roegge and Russell (1988) conducted a study to determine how well agriculture and biology can be integrated in a high school setting. They found that the integrated approach was superior to the traditional approach in producing higher overall achievement. Alley (1984) reported that experts agreed that the process of education should assert that teaching be a facilitating process; they also endorsed less lecture and increased opportunities to integrate academic theory and real-life learning. The California High School Task Force stated in Second to None: A Vision of the New California High School (1992, p. 7), "If we have learned anything about educational reform during the decade of the 1980's, it has been that single initiatives cannot simply operate in isolation." They recommended that students "choose an organized program around a special focus that combines academic, applied academic, and field experiences" (p. 21).

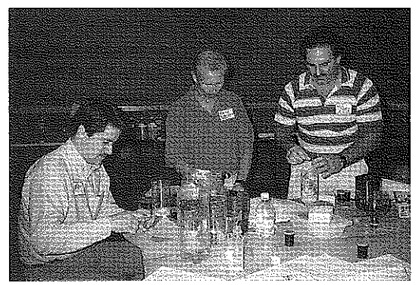
The AgriScience Institute and Outreach Program is a three-year project funded by the W.K. Kellogg Foundation through the National FFA Foundation and The Council. The Program was designed to bridge the gap between agriculture and science education and is testing a model to integrate agriculture and science education in a variety of high schools across the United States. A specific objective of the program has been to increase the teaching effectiveness of agriculture and science teachers through resource sharing and collaboration. The program model focuses on increasing resource sharing and collaboration between agriculture and science teachers in two phases.

The first phase comprised the selection of 10 agriculture and science teacher teams from the same high school districts across the United States. Teacher teams ranged from having a strong relationship to hardly knowing each other at the beginning of the program. During the Institute, the teacher teams worked in collaboration with university researchers to develop agriscience instructional materials. In the fall of that same year, the teacher teams returned to their classrooms to work together and field test the instructional materials that had been developed.

A specific objective of the program has been to increase the teaching effectiveness of agriculture and science teachers through resource sharing and collaboration.

The second phase of the program comprised a two-day workshop at the University of California, Davis. The purpose of this workshop was to prepare teachers to conduct workshops in their region of the United States. In the spring, summer, and fall of 1992, a total of 63 Outreach Workshops were conducted in the continental United States and in Alaska. This model was repeated in 1992-93, and another 60 plus workshops have been conducted throughout the United States and Hawaii.

The AgriScience Program focuses on the process of learning, rather than the end product; the journey rather than the destination. The materials stress the inquiry approach to student learning. Students are not handed information to memorize, but rather they are asked to investigate a variety of scientific principals related to real agricultural problems through laboratory experiments. Teachers do not provide answers, instead they help students develop the skills to find the answers themselves. An interesting off-



Teachers participating in an Arizona team workshop focusing on Fast Plants and Bottle Biology techniques.

shoot of this teaching style enables teachers to learn with their students as they extend laboratories into other areas of interest. Throughout the Outreach Workshops a common answer to a question is "That's a good question, how can you go about finding the answer?"

The agriscience materials inserviced during the workshops utilize recyclable plastic →

Science and agriculture teachers working together to develop effective labs for their students.

soda bottles and Fast Plants as tools to teach science principles applied to agricultural examples. Teachers are encouraged to work together to extend the laboratories to larger "real life" field trials at their schools, using a variety of plant species.

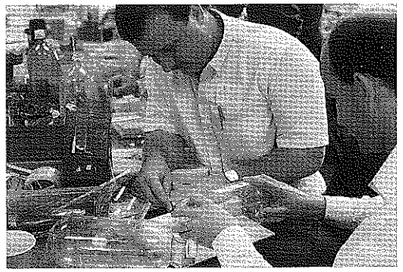
During the past three years, project staff members have been collecting data on various aspects of the program. In order to address the major objective of increasing the communication and sharing of resources between team members, a study entitled Factors Affecting the Resource Sharing Between Agriculture and Science Teachers Participating in the AgriScience Program (Whent, 1993) was conducted.

Information about science and agriculture departmental resources, facilities and curricula is needed to increase awareness of resource sharing between agriculture and science teachers.

Results from this study provided important insights into the cooperation and resource sharing of teachers from different subject areas. The following conclusions were drawn regarding the cooperation and resource sharing of teacher teams participating in the AgriScience Institute and Outreach Program.

1. Participation in the program increased the cooperation and resource sharing between agriculture and science teacher participants.
2. Through information sharing, team building, and assigned tasks, it is possible to increase the amount of cooperation and resource sharing of both the agriculture and science teacher to similar levels.
3. Due to initially low pre-measure means, science teachers had the greatest gains in cooperation and sharing of resources during the team building, instructional materials development, and testing phase of the program (Phase I).
4. Teachers were asked to list specific barriers to sharing of resources encountered during the program. Four major barriers to sharing of resources were indicated: A) an initial lack of understanding of what the other teacher teaches and the resources available, B) the physical distance between the agri - culture department and the science department (the greater the distance the greater the barrier), C) difficulty in finding time to work together due to preparation periods being scheduled at different times, and D) a general lack of administrative support for integration.Thus, school administrative policies that are supportive of integration of academic areas, house the agriculture and science facilities in close proximity, and schedule the same preparation periods for agriculture and science teachers may remove barriers to agriculture and science teacher resource sharing.

Understanding Agriculture (1988, p. 62) stated, "As students progress through school,



An Ohio agriculture and science teacher team participating in an Agriscience Institute workshop.

instruction should continue to illuminate the links between science, society, and practical problems." However, barriers to teachers sharing and cooperating must be removed before effective teaching of both academic and vocational subject areas can take place. Information about science and agriculture departmental resources, facilities, and curricula is needed to increase awareness of and resource sharing between agriculture and science teachers. Teaching materials, inservice sessions, and preservice programs should address the need to increase teacher awareness of other departmental resources and increase sharing of resources and facilities with other disciplines. Barriers due to lack of administrative support may inhibit departmental sharing of resources. Thus, it is recommended that future integration programs include an administrator in the model as part of the teacher team. Programs seeking to increase resource sharing and integration should schedule common preparation periods for cooperating teachers.

AgriScience Outreach Workshops are presently being conducted across the United

(continued on page 16)

Knowing the Student and the Subject Matter

BY JAMES D. WHITE

Dr. White is professor of agricultural education at Oklahoma State University, Stillwater.

Knowing the target — Bulls Eye: Zig Zigler exclaims as he tells the story of the great archery champion Howard Hill. A more contemporary version might be — "Howard Hill knows archery." Do you know teaching? Classroom instruction is the foundation upon which supervised experience and student organizational activities are developed. What happens in the classroom sets the tone for the development of skills and competencies which lead to gainful employment or future career goals. Does it make a difference when teaching captures our imagination and commitment and teachers give their very best in order for their students to excel in the "game of life"? You already know the answer. We can no longer afford the "luxury" of students in this country completing educational programs unprepared to face the realities of life. Where then do we start?

Knowing the Student

To establish a positive learning climate in your classroom today, it would be well if you knew the students on a first name basis and called them by their first name. When called on in class by their first name, especially for questions which they know the answers, students' self-worth is enhanced. Calling people by their first names with a positive tone in your voice is the ultimate compliment you can pay those people. It sends a signal that you like them and you respect them.

Knowing the student on a first name basis is a starting point. What else do you know about the student — classification, age group, gender, interest, background — rural or urban, work experience, career goals, and the like? If you know the students and their background, can you do a better job of preparing for today's lesson? Yes, a resounding yes! Having the opportunity to know the students allows you to do a better job of preparation, because you not only know them, you have an understanding of their needs, goals, and interests. This allows the teacher to do a more effective job of introducing the lesson and personalizing it to capture the students' interest and imagination. If the students can see themselves achieving a goal or being successful then we have succeeded as teachers. Introducing "today's lesson" and using the appropriate interest approach is difficult under the best of circumstances. What would it be like if you had no prior knowledge of the class?

Knowing the Subject Matter and How to Teach It

As human beings, teachers tend to teach what they are familiar with and enjoy. Knowing the subject matter not only lends itself to understanding what teaching methods to utilize (and there are many in agriculture), but also the kinds of questions which can be asked and from which ideas can be stimulated. If the teacher understands/knows the subject matter, generally there will be an "air of excitement" pervading the classroom, models to observe, hands-on activities in which to involve students, projects, and appropriate real-life examples. Furthermore, the teacher will feel comfortable in asking probing critical thinking/problem solving kinds of questions, as well as higher order questions, which require one to develop and think through a similar scenario to solve the existing problem.

To prepare for the next step in teaching today's lesson we must decide ahead of time the lesson title, how we were going to introduce it, and the interest approach we plan to use. Now it's time to decide not only how we are going to teach the subject matter, but "what do we want the students to learn and how well do we want them to learn it." In other words, what are the objective(s) of today's lesson and what will be important for students to remember and be able to apply? In addition to being able to articulate the objectives and use a particular teaching method effectively, what instructional aids and supplemental materials will be appropriate for this particular lesson? And now let's put "the icing on the cake" — did you summarize the high points of the lesson and bring it to finality?

Conclusion

We in agriculture are indeed fortunate to teach a subject matter which lends itself to so many different teaching methods. In teaching agriculture we are teaching the science of life. It's exciting! There is something about seeing the beginnings of new life, developing a new skill, applying a new practice, and/or achieving a goal that brings out the very best in our students.

Understanding students and the subject matter allows teachers the opportunity to develop

unique introductions and interest approaches that reach and help students "become all they can be." However, the points we have addressed concerning teaching — the introduction, interest approach, teaching methods, and similar aspects of effective teaching are all moot unless we understand the student and know the subject matter. **The teacher does make the difference!**

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Effective Teaching In . . .

(continued from page 7)

mechanics laboratory to ease project construction. Consumable supplies should then be relocated to minimize student movement (within limits of safety). Projects should be moved progressively closer to the exit after each construction phase is completed. If planned correctly, the project should be setting next to the exit just before completion.

This type of planning minimizes the need for excessive student movement in the laboratory. Minimizing student movement and locating tools near the areas of their use in the agricultural mechanics laboratory helps keep students on task during the learning process. It also promotes a safe and effective teaching environment for you as a teacher.

Tool Storage

Tools that are common to a given task should be stored in the appropriate work area of the agricultural mechanics laboratory. Examples include sandpaper and welding equipment. Sandpaper should be stored near the paint/finishing area of the laboratory. Welding-related tools should be located near the welding area of the agricultural mechanics laboratory.

Proper tool location minimizes student movement, allows for most effective use of the agricultural mechanics laboratory,and facilitates effective teaching.

Lesson Planning

Agriculture teachers are sometimes criticized for simply "taking the students the shop." Teachers who allow this to happen find that their students master competencies at a pace that is slower than expected. Much structure is needed in agricultural mechanics laboratory instruction. Units must be planned well in advance, and classroom discussions must focus on the knowledge and competencies to be learned. Demonstrations must be planned and delivered to maximize student learning and retention. Agricultural mechanics laboratory instruction requires as much thought and planning as preparing for a classroom learning activity.

Rotational Management

Effective teaching can be accomplished with limited tools and equipment. Under these circumstances, a student rotational plan, where students spend a predetermined amount of time in one area of the lab and then systematically move to another work area, must be implemented. A laboratory activity book facilitates the use of a rotational teaching plan. The laboratory activity book should contain the objectives for each activity, the materials and supplies needed to complete the activity, the steps that the students should follow as they complete each activity, additional drawing/plans that illustrate construction details, and the evaluation criteria that will be examined during the grading of the projects. These activity books should be available when the instructor demonstrates each competency to be learned.

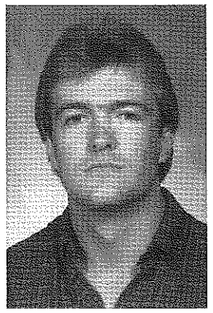
Environment

People work more effectively and learn more efficiently if they are able to work in a "friendly" environment. Conditions in the agricultural mechanics laboratory that restrict students' ability to see, breathe, and/or hear can substantially reduce their ability to concentrate. Ventilation must be adequate for the learning activity. Lighting must be a minimum of 75-100 foot candles above workbenches. Adequate hearing protection must be available for students. Obstacles on the floor should be rearranged, moved, or returned to storage. Benches, tools, equipment, and floors should be color coded to maintain a safe learning environment. We cannot expect our students to work at their best if we ourselves would find it difficult to concentrate on an activity.

Summary

The key to effective teaching in agricultural mechanics is the development of a systematic instructional process for the laboratory. A felt need must be established in the student by the teacher; projects must be selected that are meaningful, useful, and facilitate the mastery of the competencies identified; quality tools must be identified that facilitate the instruction of these competencies; teachers must become involved in inservice activities; the facility must be arranged efficiently and safely; tools should be stored in an orderly fashion and as close as possible to the appropriate work area; the agricultural mechanics laboratory must be environmentally safe and friendly to work in; and lessons must be planned in advance. ■

Going the Extra Mile



BY MICHAEL L. GRISSOM

Mr. Grissom is an agriculture teacher at West Jefferson High School, Quinton, Alabama.

Which teacher in your school would be missed the most if he/she were to leave? Would it be the math teacher? How about the chemistry teacher? Maybe it's the head football coach! I strongly suspect that in most cases it would be the agriculture teacher. I stopped computation years ago of how many times I have gone out of my way to help a student, colleague, community adult, or the school administration. Most of these second mile journeys cost me personal time, family time, stressed me out, and wore out my pickup truck – not to mention the toll it took on my personal bank account.

Agriculture teachers have always been a unique group of professionals who go beyond the call of duty in serving their school, community, and professional organizations. Many teachers work extremely hard to get the job done and many times without proper recognition.

Recently, while serving a term on the Jefferson County School District's countywide inservice committee, the idea of developing criteria for a special teacher award was proposed to us by the new school superintendent. The new superintendent brought to our system several worthwhile ideas and programs, all of which bore his name. Therefore, the "Superintendent's Award of Excellence" was born and was to be annually given to a deserving teacher at each school in the district who goes beyond the call of duty. A committee was formed consisting of one school principal and four classroom teachers representing both academic and vocational fields. You guessed it, I volunteered not only to serve, but to chair the committee which developed the criteria for the Second Mile Teacher Award. After a series of meetings we established the following criteria:

The Second Mile Teacher is the teacher whose performance in the classroom exemplifies mastery of subject matter, effective teaching methods, and communication of knowledge to students, and who also. . .

The Second Mile Teacher is the teacher whose performance in the classroom exemplifies mastery of subject matter, effective teaching methods, and communication of knowledge to students, and who also…

- maintains a positive attitude (toward our profession, our community, our school, our student body, and our faculty);
- appreciates and values learning and reinforces effort in all areas of school work;
- exhibits school spirit and enthusiasm;
- sponsors extracurricular activities;
- maintains membership and participates in professional organizations;
- shows evidence of continued professional growth and uses initiative, imagination, and creativity;
- provides enrichment for students such as outside reading, speakers, performances, travel, and work-study opportunities; provides an attractive learning environment (bulletin boards, paintings, plants, and personal touches to make the classroom and school inviting);
- is available to work with students before and after school and during unscheduled time;
- volunteers for those thankless tasks around the school; and
- WOULD BE MOST MISSED IF HE/SHE WERE TO LEAVE OUR SCHOOL!!!

The names of the three teachers receiving the most votes from the school faculty are then considered by the school's nominating committee of five. The committee of five is composed of the school principal, a classroom teacher selected by the faculty, president of the school PTA/PTO, school secretary, and president of the Student Government Association.

The recipients of this honor are invited to a dinner banquet sponsored by a local business interested in education. Those honorees receive a nice plaque that reads "Jefferson County School District congratulates our Second Mile Teacher (winner's name) for superior professionalism and for unmeasured service beyond the required call of duty of a classroom teacher."

During the 1990-91 school year I'm proud to say that I was selected by my school to receive this award. Of all the honors that have ever been bestowed upon me this is the one that I treasure the most. I think it might be because I worked harder and longer and had a small part in helping make the award become a reality in a school system that until 1989 really didn't recognize second mile employees.

This program has been a tremendous success in my school district. It has boosted teacher morale and put deserving teachers in a positive spotlight. I encourage other school districts to implement a similar program to recognize "Second Mile Teachers." ■

Increasing Teaching Effectiveness by Encouraging Higher Order Thinking

BY M. SUSIE WHITTINGTON

Dr. Whittington is an assistant professor of agricultural education at the University of Idaho, Boise.

Higher Order Thinking?

What is the world in "higher order thinking"? Would it be an evasion of the question to respond, "It depends upon who you ask"?

Higher order thinking is a term which currently has nearly as many definitions as users of the term. In this article though, "higher order thinking" is used to describe the thought processes at the upper levels of Bloom's Taxonomy (Bloom, 1956).

Bloom's Taxonomy

Bloom's Taxonomy was built on a theory of varying levels of complexity in which cognitive thought and associated behaviors could be classified into six hierarchical levels (knowledge, comprehension, application, analysis, synthesis, and evaluation). Bloom argued that accomplishing higher order thinking (application, analysis, synthesis, and evaluation) required some analysis or understanding of the new situation, a background of knowledge of methods which could be readily utilized, and some facility in discerning the appropriate relations between previous experience and the new situation (Bloom, 1956).

In 1988, Gibson and Chandler utilized Bloom's Taxonomy when they set forth this goal for education, "... to challenge students to learn how to apply facts in new situations, to analyze and synthesize the information they take in, and... to make judgements about what they have found" (p. 433).

Are We Reaching The Goal?

Based upon the work of Newcomb and Trefz (1987), Pickford (1988), and Miller (1989), students entering a college of agriculture today could expect to be taught by professors using discourse delivered primarily at the comprehension, application, and analysis levels. They could expect very little, if any, in-class discourse at the synthesis and evaluation levels.

Students could expect to be tested using two midterm examinations and one final examination, all written predominantly at the knowledge, comprehension, application, and analysis levels, with occasional items written at the evaluation level. Sporadically, students might take a class that requires assignments; the assignments would be written at the synthesis level. Previous research indicates that regardless of the subject matter, course level, or experience of the professor, this would be the scenario (Whittington, 1991).

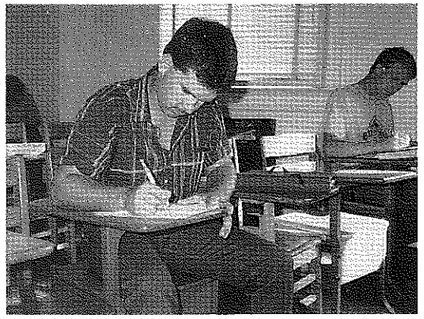
The scenario can and will change as professors work to incorporate higher order thinking into their in-class discourse, tests, quizzes, and assignments.

Where To Begin

The place to begin is planning. Start by writing objectives that are designed to move students beyond the routine ritual; writing notes in class, memorizing notes, and then writing the information on a test in the same form that it was presented in the class. By writing objectives that reach higher order thinking, teaching will be designed to reach higher order thinking.

Write the plan and then ask, "Am I encouraging students to distinguish fact from opinion or to show interaction or relation of elements? Am I allowing them to reorganize ideas, produce a plan, or formulate a hypothesis? Am I offering opportunities for students to evaluate based on criteria?" These questions were adopted from items written at the highest levels of cognition of the Florida Taxonomy of Cognitive Behavior (Webb, 1970) and are useful when writing lesson plans that encourage higher order thinking.

The challenge to incorporate higher order thinking into teaching should be fun. Try these activities (in Activity One the cognitive level reached is written in bold following the activity). →



Students analyze secondary agricultural education and choose valued components.

Activities To Reach Higher Cognitive Levels

Activity One – Model Building

Offer students this challenge: "You are a nationwide task force asked to examine secondary agricultural education as we know it and offer recommendations for improvement." As part of the challenge students will:

a) List all components of the secondary agricultural education program of which they can think **(knowledge)**;

b) Circle those which they hold as sacred **(comprehension)**;

c) State why they believe those they circled are valuable components **(comprehension)**; and

d) Add any components they believe are missing **(comprehension)**.

Using the thoughts the students have written, encourage them to draw a pictorial model of the "NEW" secondary agricultural education program **(synthesis)**.

Make the activity fun by setting the stage. Hand out soft-colored paper titled, **"Think Time"**, turn on the "mood think music", hand out pieces of "hard think candy", and let them create!

Ask three or four volunteers to recreate their models on the board. Lead the students in a discussion of the merits of each model **(analysis)**. Finally, the task force must vote for adoption of the best model of secondary agricultural eduction **(evalution)**.

Suggestion for using this activity:
As a capstone technique at the end of a problem area, unit, or course.

Modifications of the activity:
Compare and contrast the current model of secondary agricultural education with their own model.

Disadvantages of using the activity:
The time spent (one entire class period).

Students may not be familiar with the concept of models, and therefore, may be apprehensive in drawing models.

Students will possess varying degrees of familiarity with the components of secondary agricultural education.

Additional Activities

Activity Two — Trend Analysis

Choose a topic to analyze. Using articles across time from a selected professional magazine, assign students an article at two to five year intervals. An accompanying handout requires students to write pre-selected information including author, date, major theme of the article, and key words describing the chosen topic. During class, chart the years across the blackboard as the students chronologically report their findings. With all the data on the board, lead students in a discussion of likenesses, differences, and recurring themes. Ultimately, lead students in thinking and writing about speculation for the future based on previous trends.

Note: Try using The Agricultural Education Magazine to study trends in SAEs.

Activity Three — The Great Debate

As a summary to a unit of instruction, develop a cast of characters for reviewing various sides of an issue. Write each character on index cards that the students will draw at random one week prior to the summary of the unit. The students will prepare to become that character by writing a one-paragraph narrative describing the fictional character.

Begin class by asking students to introduce "themselves" and state why they are attending the "debate." Serve as the moderator by asking leading questions and encouraging discussion, but allow the debate to unfold.

Ample time should be plannned at the end of class to lead students in drawing conclusions based upon the debate. Challenge students to write (outside of class) their reactions, conclusions, and an approach they will use when faced with this situation (the chosen topic).

Note: Use this activity to stage a debate on requiring FFA membership as part of secondary agricultual education.

Activity Four — Advisory Council

Develop a list of current issues in the profession. Write the current issues on index cards to be drawn at random during class. Divide the class into groups of four to five students. Challenge them to be the advisory council for the local secondary agricultural education program. The advisory council will discuss each topic, then choose the one it considers to be "The Hot Topic" on the advisory council agenda for today. Each advisory council must write and present to the class:

a) and b) - **both** sides of the issue;

c) a possible resolution;

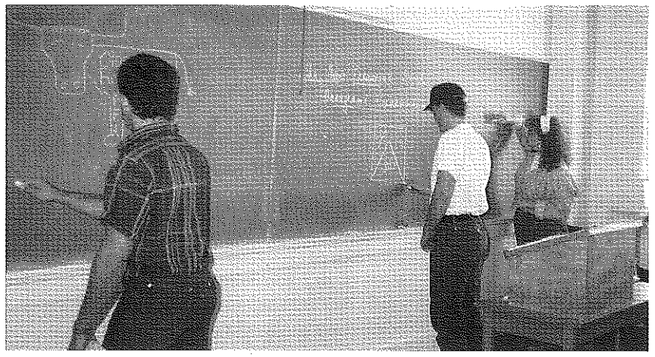
d) the change agents in implementing the resolution; and

e) methodology for implementation of the resolution.

Note: This activity works well as a capstone activity in an introductory course.

Activity Five — Character Analysis

Choose a short videotape involving several characters. Develop an accompanying handout designed to allow students to describe the characters. During class, students should thoughtfully engage in observing and writing about the characters. Lead the students in a discussion of the leadership traits of the characters based upon the theories learned previously. Draw →



Students create "models" of secondary agricultural education.

Increasing Teaching . . .

(continued from page 15)

upon the theories learned previously. Draw conclusions and formulate speculations regarding each character. Ask students, "For whom would you vote for President? Why? Which character is most like you? Why?"

Note: This activity can be used in a small group setting for a leadership development class.

Conclusion

Now is the time to change the college of agriculture classroom scenario. Students entering a college of agriculture today should expect to be taught by professors who use activities delivered across the cognitive levels, including the synthesis and evaluation levels.

While the activities presented in this article are aimed at university level teaching, it is also important to apply principles of teaching higher order thinking at the secondary level. Activities presented can be revised to fit secondary agriculture programs.

Encouraging students to engage in higher order thinking is the challenge, but the challenge will not be met by chance. Careful planning and purposeful impementation of student-centered activities designed to encourage higher order thinking are only the beginning of creating classrooms rich in application, analysis, synthesis, and evaluation — thought processes necessary to equip students for living.

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Effective Teaching . . .

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States. For more information about attending or hosting a workshop contact Linda Whent, Agronomy and Range Science Department, University of California, Davis CA 95616 (916) 752-3040.

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Improving Your Teaching: Questioning Techniques

BY WILLIAM G. CAMP

Dr. Camp is professor of agricultural education at Virginia Tech, Blackburg.

Questioning is one of the most often used teaching techniques, according to Kim and Kellough (1987). According to Callahan and Clarke (1988), the use of questions is one of the most important of all teaching techniques. We use questioning during a class to stimulate thinking, assess student progress, check on teacher clarity, motivate students to pay attention, maintain classroom control, provide repetition, emphasize key points, and many more things.

If we try to structure our lessons using problem solving as a teaching method, as described by Crunkilton and Krebs (1982) and by Newcomb, McCracken, and Warmbrod (1986), then questions are central. Not only is much of the instruction organized by questions, we even state the problems to be solved as questions.

An Example:

Teacher goal	To relate slope to soil erosion and then to the use of terracing as an erosion control measure.
Recall Question	What causes most topsoil erosion? (WAIT) Martin. (WAIT)
Martin	I guess water does.
Probing Question	How does water cause soil erosion? (WAIT) (looking at Austin — WAIT)
Austin	It dissolves the soil.
Probing Question	That is partly right. It does dissolve some minerals. But what action of water causes the soil to move away? (Looking at Austin — WAIT)
Austin	???
Shifting Interaction	Can you help Austin with this? (WAIT) Letitia. (WAIT)
Letitia	As the water moves, it picks up soil particles and carries them along.
Comprehension Question	That is right. Now, what does the slope of the field have to do with that? (WAIT) John. (WAIT)
John	The steeper the slope, the faster the water runs off and that makes the erosion worse.
Analysis Question	Super! Now, what can we do to change the slope of a hill without flattening the whole thing out with bulldozers? (WAIT) Dale. (WAIT)
ETC . . .	

The way a student is expected to respond to questioning is determined by the levels at which the questions are worded: recall, comprehension, analysis, or evaluation. But the success of the student in answering the question is more often determined by the teacher's questioning techniques.

Questioning Skills

Presenting Questions

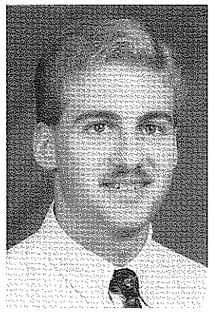
Most questions that teachers ask are simple recall questions that require the student to remember some factual information and recite it to the teacher. Comprehension questions require the student to demonstrate understanding, in addition to mere recall. Analysis questions cause the student to apply that comprehension to a new setting. Evaluation questions ask students for their beliefs or opinions.

Most people think that questioning is so straightforward and easy that anyone can do it right. Nothing could be farther from the truth. Here are a number of simple guidelines for asking questions that should improve most teachers' questioning skills:

1. Make sure the question is clear in your own mind. Think through what you want from the student before you ask the question.
2. Frame (state) the question without calling on a specific student. When you call on a student before the question is asked, every other student is free to ignore the question.
3. After framing the question, pause while everybody has a chance to think of an answer, then (AND ONLY THEN) call on a student to respond. Wait time is an important questioning skill, yet it is amazing how few teachers use it. The average wait time, when the teacher waits at all after a question, is less than a second. There should be at least 2 to 4 seconds after any question before any student is called on to answer it. You might even try counting to yourself to force you to wait the appropriate time.
4. Ask only one question at a time. Multiple part questions are confusing and are likely to result in student misunderstanding. Avoid what Kim and Kellough (1987) call "shotgun" questioning. That is where the teacher

(continued on page 23)

Hunter Education: A Natural Complement to Agricultural Education



BY JAMES E. CORBETT

Mr. Corbett is an exploratory agriculture teacher at Lowndes Middle School, Valdosta, GA.

Agricultural educators are in a unique position to take advantage of a beneficial program that is offered for volunteer instructional participation in 49 of the 50 states of the U.S. The program leads to enrichment and safety in the lives of hundreds of thousands of students annually. It will put agricultural educators in touch with the younger students in the community. This program will allow recruitment for future agricultural education programs, while creating a rapport with parents and the community at large. This effort can become one of the most effective public relations activities available, as it is now mandatory in many states. Utilizing this program will allow agricultural educators to gain the use of one of the most respected resource persons in the community. Among the benefits is that this program can readily be incorporated into most existing natural resource curriculums; the philosophy of this program is consistent with that of agricultural education. Additionally, most administrators are eager for their teachers to volunteer and utilize school facilities for this type of pubic service.

Description of the Program

The program that is the topic of this article is the Hunter Education Program. Hunter education is a comprehensive instructional program with the ultimate goal of giving hunters the responsibility for the sport of hunting. The major emphasis of this program is to prevent accidents and thereby secure the future of the sport, by making it safe. In order to accomplish this, students must be exposed to a diverse array of topics, including information on how to be responsible stewards of natural resources.

Importance of Natural Resources Instruction

The Hunter Education Program is based on natural resources. Indeed, the program materials are researched and written by various state Departments of Natural Resources. These materials should be of use to most agricultural educators as they incorporate natural resources instruction into their curricula.

Natural resources instruction has been a part of agricultural education for years and is currently expanding. Andrews, Weber, Whent, and Williams (1991) recommended that environmental conservation education be included in educational systems. Additionally, their research indicated that conservation of natural resources is important, and that more education is needed in this area. The benefits of natural resource and environmental education are numerous for students and schools. Specifically, Schwartz (1987) reported that students developed a more positive academic attitude after experiencing environmental education instructional activities. A national survey of fifth and sixth grade students (Llewellyn and Westervelt, 1985) revealed that these students, who obviously have not had the benefit of natural resources instruction through agricultural education, demonstrated limited knowledge about wildlife, and that wildlife oriented materials should be infused into established school curricula.

Importance of Hunter Education

A legion of neophyte hunters takes to the field annually to enjoy the pleasing sights and sounds of our great American out-of-doors. These new hunters are eager to enjoy the excitement of hunting wild game with the same anticipation as generations of Americans in the past. However, hunters are beginning to realize that when one accepts the privilege of hunting, there is also an important responsibility which one must accept. This is the responsibility of being a safe, responsible, and ethical hunter.

The new Hunter Education Guide for the State of Georgia states that hunting accidents are usually the result of a lack of knowledge of the principles of safe handling of firearms and hunting behavior, or the failure of hunters to practice these principles. Hunter Education Programs are designed to teach these principles to inexperienced hunters, regardless of age; it is an excellent refresher course for all who enjoy hunting or handling firearms (Georgia Hunter Safety Instructor's Guide, 1991).

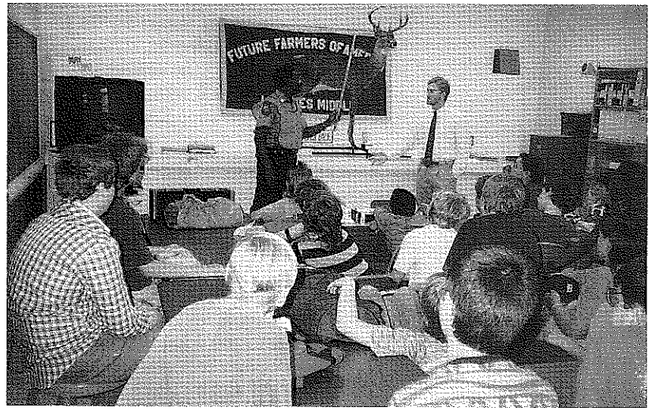
Forty-four of the fifty states have legislation requiring hunters to have passed a hunter education course. The remaining six states; Alabama, Alaska, Indiana, Massachusetts, Minnesota, and South Carolina, do have voluntary programs for hunters (1989 Hunter Education Profile, 1990).

The Georgia General Assembly legislation passed in 1977 is an example of such a →

mandate. The act put into effect mandatory hunter safety training for all hunters born on or after January 1, 1961. This law dictated that all hunters must complete an approved course of instruction and be certified before they can legally purchase a hunting license. The law further dictates that while children under 12 years of age are not required to have completed the course, hunters aged 12 to 16 must have a hunter safety certification card on their person while hunting, and they must have hunter safety certification to receive their honorary big game tags (1991-92 Hunting Seasons and Regulations).

Availability of Hunter Education Programs

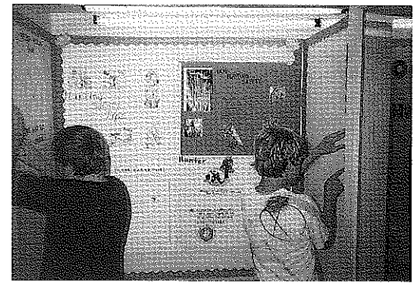
Hunter Education began formally in 1946. Kentucky, with its statewide youth camp program, was the first state to initiate a formal firearms education course. Hunter education has expanded and progressed steadily during the past 45 years. Every state now has an agency responsible for instructing safe hunting behavior and important conservation practices. These agencies are working toward a nationally standardized and improved Hunter Education Program. To date, over 16 million persons have been certified in the various hunter education programs.



Local Conservation Ranger, George Tharpe, discusses wildlife as exploratory agriculture teacher James Corbett observes and assists.

Annually, over 700,000 hunters complete Hunter Education courses. These programs are supported through the revenue raised from the taxes levied on the sale of sporting arms, ammunition, and archery equipment. As the revenue increases annually, these courses are able to expand in support of the American tradition of hunting.

Leadership in hunter education is readily available to agricultural educators. Volunteers may teach hunter education in 49 states. However, all 50 states have hunter education in various school programs. Additionally, in 28 of the 50 states, educators teach the hunter education program.



Students construct posters to apply material learned in Hunter Education sessions .

All states include wildlife management and hunter responsibility to natural resources in their hunter education programs. Additionally, 43 of the programs teach wildlife identification, which may also benefit natural resources instruction (1989 Hunter Education Profile, 1990).

Satisfaction with Hunter Education

A recent report (Jackson, 1990) indicated that the Hunter Education Program in the State of Georgia is quite effective. Among the responses gathered were these concerning natural resources: the majority of the respondents indicated that they hunt for appreciation of nature, and 78.1% of students said that they were eager to enroll in Hunter Education and were motivated to study and learn about wildlife, safety, and hunting skills. The participants rated these items on a scale of 1 to 5, pertaining to effectiveness of the Hunter Education Program:

Wildlife identification - 3.21

Knowledge of the principles of wildlife - 3.58

Nature appreciation - 4.17

Outdoor activity - 3.85

In the area of related natural resources instruction, it was shown that the program augmented the student's own inclinations toward wildlife and nature appreciation. The student's positive motivation toward hunter education may benefit natural resources instruction, thus allowing teachers to incorporate parts of this instruction, as applicable.

Spencer (1991) profiled a set of Northwest Arkansas deer hunters. His findings indicated that the vast majority of deer hunters were closely aligned with the principles of hunter education programs. Of the areas examined, hunter education was the most positively accepted area. This was indicated by data such as:

90.4% of Northwest Arkansas hunters felt that hunter education helped →

promote ethical behavior.

95.6% indicated that hunter education should be continued for safety's sake.

86.6% indicated satisfaction with the existing Arkansas hunter education program.

Sample Hunter Education Curriculum

The new Georgia curriculum for hunter education is divided into 6 sections. Instructors are to spend the required 6 hours divided among the sections as need is indicated by the students. The sections are as follows, with highlights of each listed:

1) Introduction to Hunter Education
   - Firearm Accidents
   - Basic Safety Rules
2) Hunter Responsibility
   - Hunter-Landowner Relations
   - Public View of Hunting
   - Irresponsible Hunting
3) Wildlife Conservation & Management
   - History & Principles of Wildlife Management
   - Habitat & Carrying Capacity
   - Management Problems Today
4) Firearms & Firearm Safety
   - 10 Commandments of Firearm Safety
   - Accident Prevention
   - Safety at Home
5) Survival & First Aid
   - Survival & First Aid Kits
   - Food & Water
   - Wilderness First Aid
6) Topics of Special Concern
   - Turkey Hunting
   - Tree Stands
   - Blinds

All sections include goals and objectives, materials needed, and lesson outlines. These items are the required components of most lesson plans (Georgia Hunter Safety Instructor's Guide, 1991).

Description of Volunteer Training Programs

Hunter education programs in many states thrive on training volunteers as instructors. In Georgia, Department of Natural Resources officials are eager to gather volunteer support for several reasons. In doing so, a large cadre of instructors reaches a greater number of students. Additionally, DNR Conservation Rangers are free to handle other activities not suited for volunteers.

People interested in volunteer Hunter Education Instruction should contact the local Conservation Ranger. The Ranger will then notify the district office and schedule the volunteer for the next instructor training session.

Instructor training sessions in Georgia are led by a DNR Ranger, with accomplished volunteer instructors assisting. The volunteers address areas of instruction in which they excel. The instructor's course content is split between teaching and technical material.

Benefits to Agricultural Education

Agricultural education can benefit from hunter education. At the base of the benefits is the philosophy of conservation that is shared by both programs. As both agricultural and hunter educators, we stress the wise use of natural resources for maximum benefit. The curricula of both agricultural and hunter education complement each other. The curriculum of hunter education includes importance of habitat, wildlife management, hunter responsibility to natural resources, and wildlife identification. Many agricultural educators teach hunter education as a part of their natural resources instruction. Others often use hunter education materials as a supplement to natural resources instruction.

The agricultural educator who chooses to utilize the hunter education program will receive a large amount of teaching materials. These include lesson plans, textbooks, films/videos, teaching aids, and tests. The agricultural/hunter educator will develop a working relationship with the local Conservation Ranger.

As a result of the relationship that develops, the agricultural/hunter educator will have the Conservation Ranger available as a resource person. Conservation Rangers are one of the most respected and knowledgeable resource people that an agricultural educator can utilize.

Agricultural educators should consider hunter education for many reasons, with good will ranking among the primary benefits. As it naturally follows, hunter education students are beginning hunters, usually 10-13 years of age. The agricultural/hunter educator has a golden opportunity to develop a rapport with these students. Early exposure to the agricultural education program can be a valuable means of early recruitment. Furthermore, parents and members of the community respect hunter educators not only for the volunteer service that they provide, but also for the expertise that the public associates with the position.

Agricultural education programs will ultimately reap the benefits from hunter education. Each year there are over 700,000 reasons to commit to such a program, those reasons being the student body of hunter education. Agricultural educators should take advantage of the outstanding opportunities of this individual/community service program. Interested agricultural educators should contact their local

(continued on page 23)

Agrimarketing In the 1990s: The Sky's the Limit

BY STEVEN D. JOHNSON

Mr. Johnson is an extension agent/farm and ranch management instructor at Colorado State University, Fort Collins.

Satellite technology now has a daily influence on our lives. News is transmitted into our homes almost instantaneously from far off reaches of the earth by satellites. In recent years, agriculture has benefitted from these same technological advances. Today, more than 80,000 farms, ranches, businesses and agricultural classrooms nationwide receive timely visual information via satellite systems dedicated to agriculture.

Information related to agricultural markets, USDA reports, weather, and other time-sensitive news is broadcast throughout the continental U.S. and parts of Canada and Mexico. The majority of these agricultural satellite systems consist of a three-foot dish, pointed toward the Southern skies. This dish is placed outdoors, and a coaxial wire up to 75 feet in length connects to a desktop receiving unit and a monitor. Most monitors measure 10 to 14 inches in diameter, with color systems now readily available.

Advantages to Satellite Information

Electronic satellite information systems can serve as a valuable informational and educational tool. The cost is relatively low, since all equipment is leased. A one time initiation fee of approximately $250 is charged, in addition to a monthly rental cost ranging from $30 to $50. There are no telephone costs or special equipment needs. Information is current, with 70 pages or more of visual text available 24 hours a day. The visual nature of the system does not contribute to an unwanted accumulation of dated or unwanted information. A printer can be added to the system if hard copies of specific data are needed.

Agriculturally related information is updated on a daily and sometimes a minute-by-minute basis. Marketing information, such as futures and options quotations on the major commodity exchanges, is reported on a 10 minute delay. Market fundamental related to supply and demand are featured in a text and graphic format. Technical information pertaining to agricultural commodity charts is broadcast during trading days. Local or regional cash market prices are updated once per day for most agricultural crops and livestock.

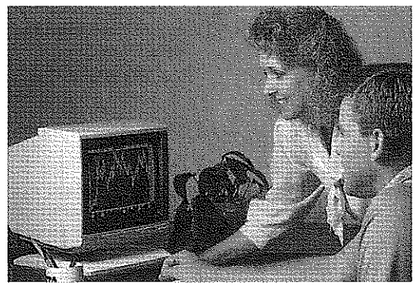
Implications for Teaching

Educational programming is now being conducted using the satellite information systems to reach national, regional, and state audiences. Secondary agriculture students throughout the U. S. can participate in the "Commodity Marketing Activity" each fall sponsored by a Wisconsin-based advisory firm. More than 4500 students from 21 different states participated in the nationwide program during 1992. Non-credit courses are offered during the winter months on topics related to futures and options marketing.

Colorado State University has designed a year-around course focusing on distance learning utilizing the satellite information system. Access to the system is the primary requirement for the course, and educational programming can be articulated for use by adults as well as high school students. Introductory workshops and meetings are conducted statewide to promote basic understanding of new futures, options, and other marketing tools work. During the winter, problem solving activities related to agricultural marketing are broadcast each Friday and submitted for evaluation early the following week. Educational delivery using the satellite system has been well received by participants, and many like the convenience of learning at home. In addition, tremendous potential exists in reducing instructor travel time and cost.

Enhancing Student Learning

Students benefit from the distance learning course not only in convenience, but also through the problem solving nature of the assignments. Solving realistic marketing problems stimulates student interest and helps develop critical thinking skills. Cooperative learning is also encouraged, through facilitation of agriculture classes, marketing clubs, and other small groups. Individuals gathered at local grain elevators, livestock auction barns, and even coffee shops discuss the marketing assignments. Experiential learning is encouraged through futures and options trading games and related activities. Groups can set their own trading rules. The live, interactive, and →



everchanging commodity quotations provide an opportunity to incorporate competition that can be use to enhance student learning.

The Colorado State University course is entitled "Colorado Ag Commodity Marketing Challenge '93." Students are challenged to be active learners and participate in the anticipatory nature of the futures markets. Understanding the use of futures and options to manage price risk in today's agriculture is a necessary tool needed by many producers and agribusinesses.

The Future for Agricultural Satellite Systems

Today the future looks bright for continued technological developments that can benefit agricultural education. Advancements related to auditory delivery and two-way interactive satellite communication systems are currently being designed for future use. Agrimarketing is positioned to be a major recipient of state-of-the-art communication systems. The challenge lies with educators that can adopt the developing technologies to enhance student learning. For the 1990s, instructors teaching agrimarketing will find that perhaps the sky is not the limit.

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Student Learning Styles . . .

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Teacher Behaviors . . .

(continued from page 3)

successes, failures, and methods on a frequent and regular basis. This reflection must be guided by knowledge about teacher behaviors and methods that promote learning. And we must be able to accurately recognize the levels at which we display these behaviors and use these methods. We must continue to be students of teaching to be effective teachers.

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Hunter Education . . .

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Improving Your Teaching . . .

(continued from page 17)

asks a series of related questions or restates the same question over and over without get ting (sometimes without allowing) an answer.

5. Use recall questions first to be sure the students have the knowledge. Then proceed to comprehension and analysis questions. Follow those up with evaluation questions.

Using Probing

Effective use of probing is one of the most important questioning skills. If the student does not provide a complete answer, he or she may know a partial answer. In some cases, even though the question is perfectly clear to the teacher, it might need to be restated or broken down into smaller pieces. The teacher should not accept "I don't know" as the final response.

Probing is the use of further questions to force the student to put together his or her partial knowledge not a more complete answer. Probing often involves the use of follow-up or leading questions to help the student answer the initial question to provide a more complete answer.

Probing means going deeper; it means digging. It can sometimes be painful to both the student and the teacher. It requires patience on the part of the teacher. In any case, it means not answering your own questions until you have tried to make the students think through the answer. Even a simple recall question may lead to important new learning on the part of the student if probing is used effectively.

Shifting Interaction

Another important questioning technique is called shifting interaction. This involves redirecting the class discussion from one student to another. If a student's response is incomplete or incorrect, the teacher should try probing that student first. If that is not productive, responsibility for the question should be shifted to another student. Positive reinforcement should be provided to the first student, and the same question should be redirected to a second or even third student.

Sometimes a student will respond to a teacher's question with another question. The teacher then should simply redirect the student's question to another student. If the student asks for an opinion, the teacher may even redirect it back to the same student.

Conclusion

Questioning is a means of getting feedback to evaluate student progress and is an important way to increase student learning. Just as importantly, it is a way to force students to think during class. Too often we treat our students like sponges — devices to soak up content — without expecting them to think.

Effective use of questioning is a critical asset in every good teacher's toolbox. But just as a good mechanic selects the right tool for the job and then uses it correctly, a good teacher uses questions at the right level and practices good questioning techniques.

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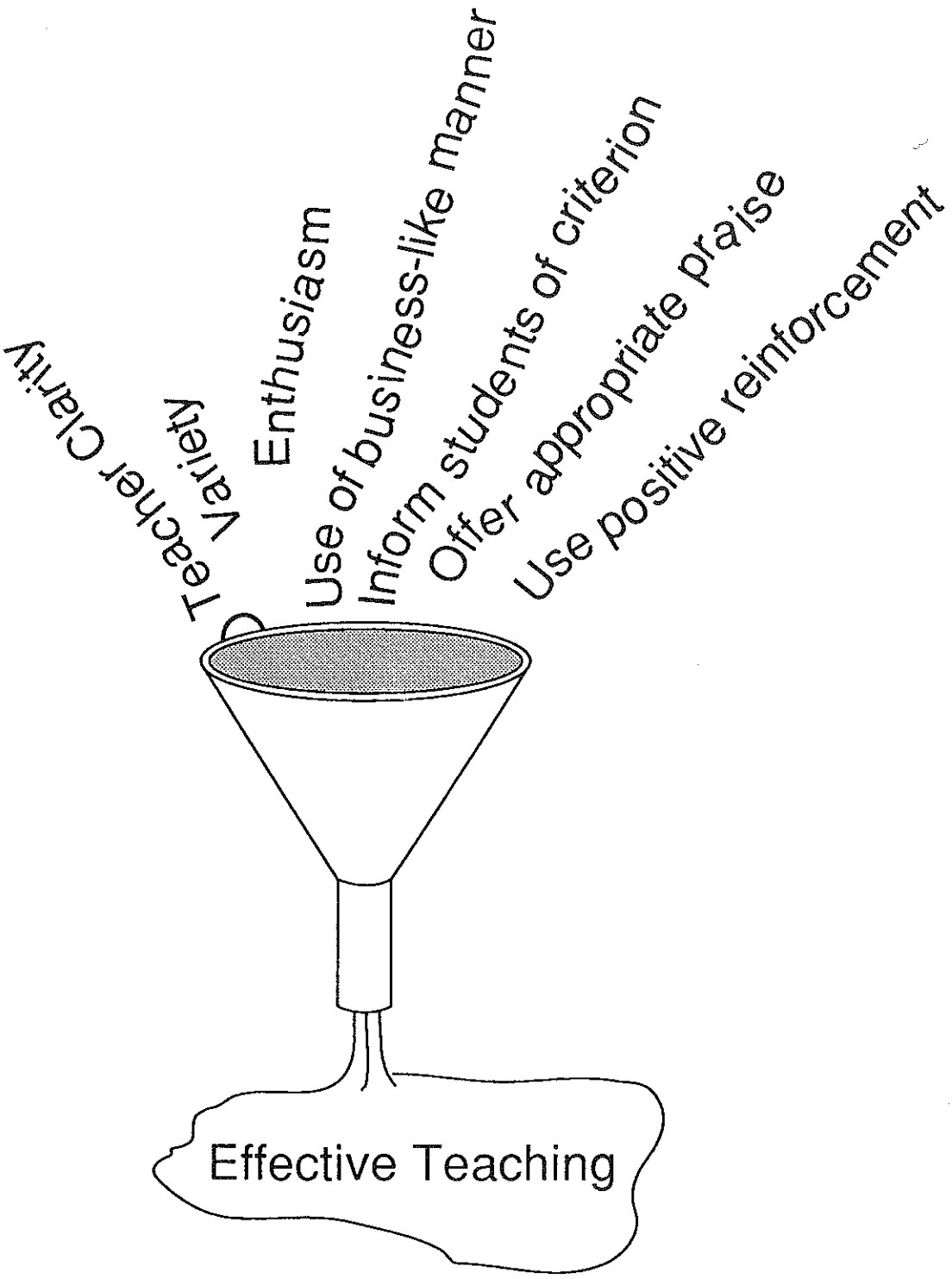

Funneling together some of the major teacher behaviors that lead to effective teaching. (Courtesy of Vernon Luft, University of Nevada, Reno.)