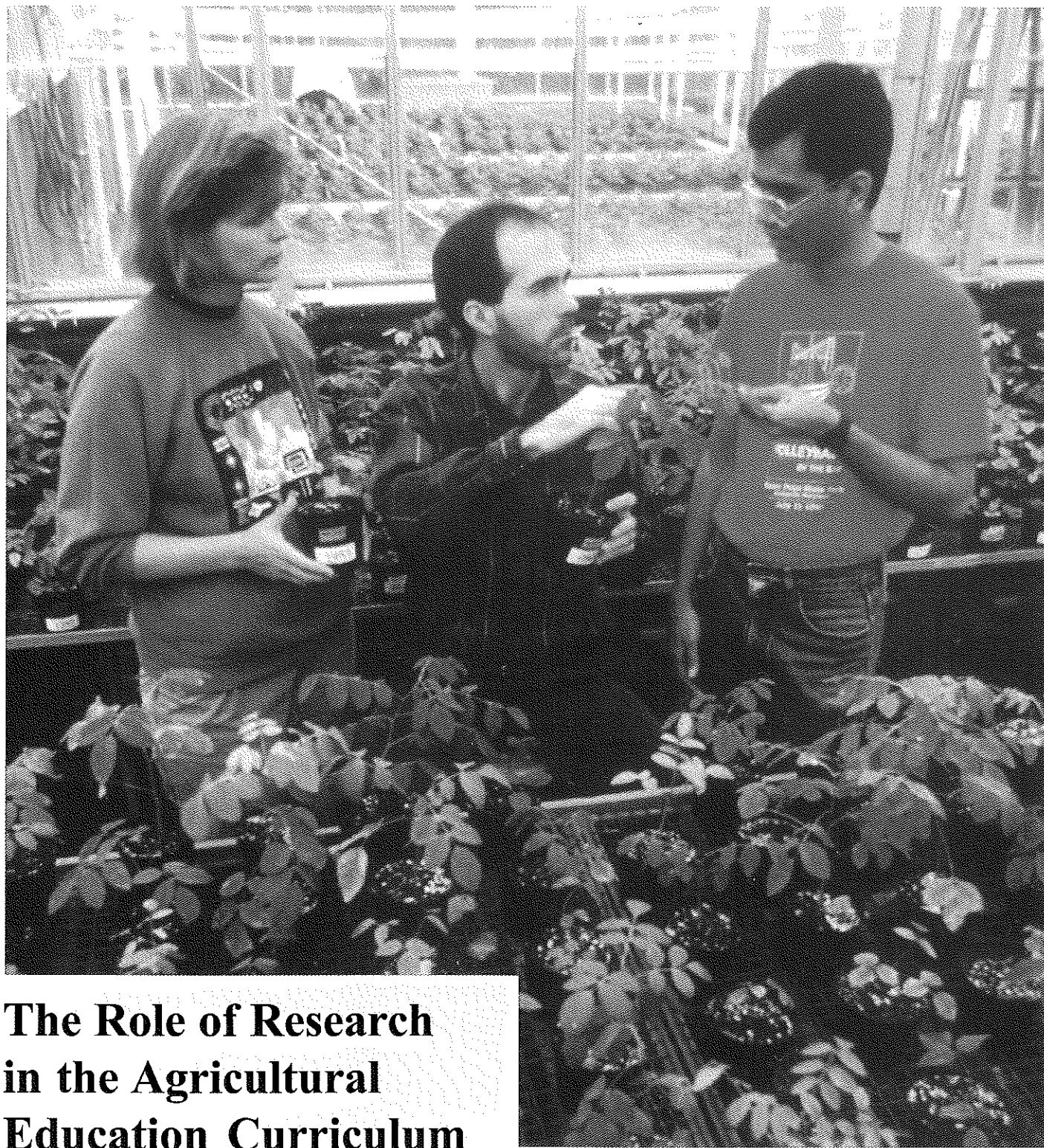


September-
October
2002
volume 75
issue 2

The Agricultural **EDUCATION** M A G A Z I N E



**The Role of Research
in the Agricultural
Education Curriculum**

Known for the Questions We Ask

By Robert A. Martin

It has often been said that the best teachers are the ones that ask a lot of questions. Teachers should be known for the questions they ask rather than the mere subject matter or facts they are often too ready to unload. Indeed, this "unloading the truck" approach to teaching seems to place all the focus on the teacher as a "delivery tool" rather than a facilitator of learning. I hope you would agree that there is a major difference. The delivery approach is certainly easier. Although, I have never found a good lecture easy to do, the focus of a lecture usually centers around *delivering* the subject matter without much thought put into the application or use of the subject matter by the audience, at least at the time of delivery. This isn't to put down lecturing. A stimulating lecture has its merits. However, the facilitation approach to teaching and learning is much more difficult. In this approach the teacher not only needs to have a complete grasp of the subject matter, but he/she also needs to have the learning facilitation process planned and organized to match the delivery of the subject matter. The outstanding teacher will use a variety of "process" strategies to engage learners. Many of these strategies are based upon framing a set of probing questions.

The best teachers are much like the best researchers in our field: curious, probing, focused, systematic and questioning. Questions make us think and, quite naturally, questions cause us to seek answers through the literature, interviewing experts, experiencing trial and error, testing, experimenting, collecting data, and analyzing information from others' experience. When one thinks

carefully about teaching and learning, isn't it true that the qualities and behaviors of researchers are the same qualities and behaviors we would like our students to acquire in the process of learning? I believe we want our students to be able to search for the truth not be mere receptacles into which knowledge is dumped for temporary awareness or to pass a test.

If we want our students to be good at learning, they need to be provided with the tools to conduct appropriate research across the learning continuum — simple (information gathering in doing a magazine report) to the complex (conducting an experiment) and everything in between. Here are some steps we all can use to help transform teaching and learning through the use of investigative approaches:

- 1) Frame teaching around a series of well thoughtout questions related to the subject matter or skill development procedure.
- 2) Plan lessons using objectives that can be converted to questions.
- 3) Use activities that motivate students to seek input from a variety of sources.
- 4) Assist students in framing investigative questions when they are contacting individuals or other sources of information.
- 5) Assist students in using the problem-solving approach to situational analysis.
- 6) Model good questioning techniques.
- 7) Frame questions to get the

most information — not just yes or no questions.

- 8) Categorize questions according to their difficulty level.
- 9) Assist students in asking specific questions; not generalized or vague questions.
- 10) Assist students to analyze responses to questions and use the information in decision-making.

When we think about research processes, we need to be thinking broadly. Taking research processes to the classroom may help students develop the skills to solve problems and debate issues. In addition, using these research processes in our classrooms may motivate students to someday become researchers at the highest level of science and technology. That would be a very good outcome, indeed.

The authors writing for this issue of the magazine are commended for their excellent suggestions, ideas and practices. There is certainly plenty of food for thought. Please read this issue of *The Magazine*. Special thanks goes to our Theme Editor, Dr. Greg Miller, for his efforts in compiling this issue. Enjoy!



Robert A. Martin is Editor of *The Agricultural Education Magazine*. He serves as Professor and Department Head of Agricultural Education and Studies at Iowa State University.

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Authors writing for the September-October issue of *The Agricultural Education Magazine* discuss the role of research in the agricultural education curriculum. The authors share many ideas and suggestions about research in agricultural education. (Photo courtesy of Iowa State University, College of Agriculture.)



Subscriptions

Subscription price for *The Agricultural Education Magazine* is \$10.00 per year. Foreign subscriptions are \$20.00 (U.S. currency) per year for surface mail, and \$40 (U.S. currency) foreign airmail (except Canada). Single copies and back issues less than 10 years old are available at \$2 each (\$3.00 foreign mail). All back issues are available on microfilm from UMI University Microfilms, 300 North Zeeb Road, Ann Arbor, MI 48106. UMI University Microfilms telephone number is (734) 761-4700 or 800-521-0600. In submitting a subscription, designate new or renewal and provide mailing address including ZIP code. Send all subscriptions and requests for hard copy back issues to the Business Manager: Business Manager, National Council for Agricultural Education, 1410 King Street Suite 400, Alexandria, VA 22314, Phone 800-772-0939.

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Articles and photographs should be submitted to the editor or theme editors. Items to be considered for publication should be submitted at least 90 days prior to the date of the issue intended for the article or photograph. All submissions will be acknowledged by the Editor. No items are returned unless accompanied by a written request. Articles should be typed double-spaced, and include information about the author(s). One hard copy and one electronic copy of the article should be submitted. A recent, hardcopy photograph should accompany the article unless one is on file with the editor. Articles in the magazine may be reproduced without permission but should be acknowledged.

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Publication Information

The Agricultural Education Magazine (ISSN 073224677) is the bi-monthly professional journal of agricultural education. The journal is published by the Agricultural Education Magazine, Inc. 1410 King Street, Ste. 400, Alexandria, VA 22314 and is printed at M&D Printing, 515 University Av., Henry, IL 61537.

Periodicals postage paid at Alexandria, VA 22313; additional mailing offices.

POSTMASTERS: Send address changes for *The Agricultural Education Magazine* to the attention of Pam Holbert, Executive Assistant, 1410 King Street Suite 400, Alexandria, VA 22314, Phone (800)772-0939 ext. 4367.

Impacting the Curriculum Through Research

By Greg Miller

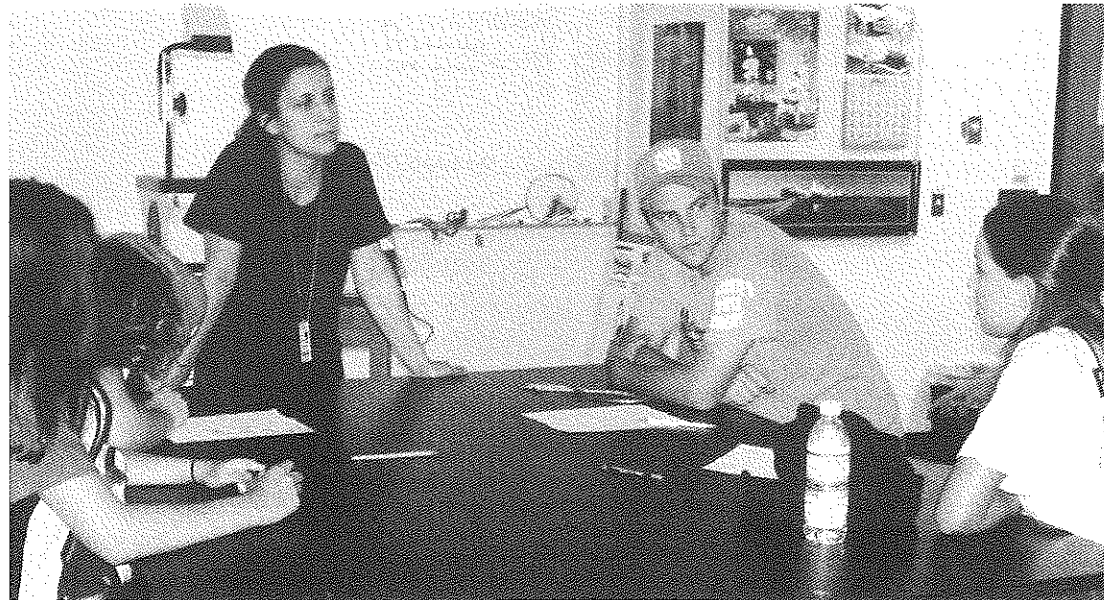
Research at the local, state, and national levels can significantly impact the curriculum in agricultural education. What qualifies as research? According to McMillan and Schumacher, (2001) "research is a systematic process of collecting and logically analyzing information (data) for some purpose" (p. 9). Given this expansive definition, I propose that there are three primary ways that research can impact curriculum in agricultural education.

First, research can be used to assist educators in deciding what to teach. The process that led to the development of the National Council for Agricultural Education's (2000) A New Era in Agriculture: Reinventing Agricultural Education for the Year 2020 (RAE 2020) document is a good example of research that can impact the curriculum on a national level. The mission statement that resulted from RAE 2020 is: "Agricultural education prepares students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems." This powerful statement provides focus for curriculum developers at state and local levels.

For Iowa, The Vocational-Technical Education Program Management Guide: Model Programs for Agriculture Education outlines the systematic process used at the state level to gather and

analyze data for curriculum planning purposes. The process culminates in the development of a list of competencies for each of six occupational clusters in agriculture. The competencies provide a foundation for the local agricultural education curriculum. Teachers are expected to go beyond the minimum list of competencies provided by the state in deciding what to teach (Iowa Department of Education, 1993).

Agricultural educators should conduct research at the local level that will enable them to make wise decisions about what to teach. A strength of agricultural education lies in its ability to be flexible in meeting educational needs within specific communities. The National Council for Agricultural Education (2002) included within its Agriculture Teachers Survival Kit compact disc a Community-Based Program Planning Kit. The kit should be a valuable resource for gathering information needed in curriculum planning.



Miller encourages agricultural educators to "conduct research at the local level that will enable them to make wise decisions about what to teach". Maria Navarro, from the University of Georgia, shares her expertise in international agriculture.

Agriculture teachers may also design their own needs assessment studies. One such study might involve a survey of current and potential agriculture students to determine what areas of agriculture are of most interest to them. Taking into account the preferences of potential students is of particular importance when the subject area is an elective.

The second potential impact of research on the curriculum has to do with delivery. Integrating the scientific approach into the delivery of agricultural education is a very effective way of actively engaging students with the content of a particular curriculum. When students become scientists/researchers, they not only learn important existing agricultural knowledge, they add to the knowledge base. This approach to teaching can promote a more effective integration of academic and vocational education and lead to partnerships with the broader scientific community. The scientific

approach can be used to facilitate learning for any subject area in agriculture.

I recall a good example of facilitating student learning through application of the scientific approach from my experience as a graduate teaching assistant for Dr. Joe Gliem at The Ohio State University. Dr. Gliem taught a course on concrete and construction. In this course, students conducted an experiment to test the effect of cure time and curing method on the strength of concrete. Students learned facts about concrete in the classroom and used this information to form hypotheses concerning the likely outcome of their experiment. In the lab, students mixed the concrete, placed it in cylindrical forms, and subjected it to different curing methods. Each week, students determined the number of pounds per square inch of pressure required to break the concrete test cylinders. Students entered the data into a spreadsheet, conducted an analysis, presented the results, and developed conclusions and recommendations concerning the amount of time and the conditions under which concrete should be cured.

Beyond classroom and laboratory instruction, agriscience demonstrations and experiments can become excellent supervised agricultural experiences. The National FFA Organization (2002) encourages agriscience by recognizing students and teachers for their accomplishments. Two examples of this recognition are the "Agriscience Student of the Year Award Program" and the "Agriscience Teacher of the Year Award Program."

Finally, research can be used to determine whether or not the curriculum and the methods used to deliver it were effective. Were the desired outcomes achieved by

students? Did the curriculum contribute toward accomplishing local, state, and national goals for agricultural education?

Follow-up surveys are commonly conducted to aid educators in evaluating their curriculum. Typically, graduates are asked about their current occupation, whether their occupation is related to the instruction that they received in the agriculture program, how well the agriculture program prepared them for their current occupation, and how satisfied they were with the agriculture program.

The questions asked in a follow-up study can be adapted to elicit information, useful for judging the effectiveness of a particular agriculture program. Other forms of data that may be useful in evaluating the curriculum include interviews of current and former students, interviews of employers, and standardized test scores.

You might question whether all of these examples are truly research. Obviously, not every example would yield a report suitable for publication in a refereed journal. The value of each example lies in its usefulness for the intended purpose not necessarily in its potential for publication. I would strongly urge those who decide to use research to accomplish purposes related to curriculum to do so in a careful and systematic manner. Using appropriate procedures is not only necessary to gain acceptance of the results by fellow researchers/scientists, doing so is necessary to yield quality data, accurate conclusions, and promising recommendations.

I would like to express my sincere appreciation to the authors of articles in this issue of The Agricultural Education Magazine. To the reader, I encourage you to read this issue from cover-to-cover. No matter who you are, I can almost

guarantee that you will find information you can use. You will find articles that address issues and offer strategies that are applicable to agricultural education from the local to the national level. You are guaranteed to discover excellent ideas concerning the role of research in the agricultural education curriculum.

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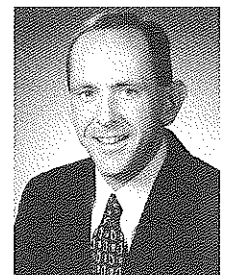
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We Need New Play-Doh

By Dale Gruis

I am jealous of my kids' exciting, new Play-Doh colors. When I was their age I had never even seen a Play-Doh pumper. Unfortunately, the bright colors disappear as they create their Play-Doh masterpieces, and cans of fluorescent yellow, pink, green, blue, and red Play-Doh eventually combine to become brown globs. When thoroughly mixed, it is nearly impossible to identify the specific colors that were combined to make these brown globs.

Upon closer analysis these brown globs remind me of Perkins reporting. (No... probably not what you are thinking.) For years we have collected aggregate student data, and have only required instructors to report their course totals: total males, total females, total economically disadvantaged students, etc. Unfortunately, this process renders generic globs of data. The unique characteristics of individual students disappear as the numbers are aggregated.

The current climate of accountability has left us scrambling to make a meaningful analysis of our agricultural education programs based on these globs of mixed data. In reality, the numbers fulfill our federal reporting requirements, but the data is of limited value to program improvement. We need more comprehensive information. In reality, we need data that is itemized and reported on an individual student basis. However, as would be expected, our bureaucratic system of state government would not allow us to require schools to change their reporting

to an individual basis. Our only solution was to wait a couple of years until we could change the state reporting system.

What did we do?

Aggies are far too impatient to wait a couple of years. So the Iowa FFA Board of Directors voted to create a "revised" annual FFA report. The revised report would combine Perkins demographic information, course enrollment information, and FFA/SAE information into one document. Rather than report aggregate data each school would provide raw data that is itemized by student. In other words, schools would list each student enrolled in their agricultural education courses and complete a checklist of student characteristics for each student. The new FFA Annual Report would generate over 1.5 million pieces of student data, so to simplify the reporting process we

created an Excel template. Most importantly, the FFA Annual Report is not regulated by the Department of Education so we could make the change immediately.

How did we collect the student data?

Secondary instructors download the Excel template from our website and enter each student's information on a separate row. The template automatically calculates the values needed for Perkins reporting, but more importantly each student becomes an individual record. To protect the students' identities, the local instructors delete the students' names prior to emailing the template to the state.

The following items are a few examples of the type of information that is collected on each individual student: gender; grade level; units of courses completed; ethnicity; special populations; standardized test scores for math, reading and science;



Iowa State FFA Association used agricultural education student data to compare the characteristics of students that join FFA with students that do not join FFA.

program completion; occupational competency; graduation plans; FFA activities; and SAE information.

Results: FFA Members vs. Non-Members

This year's data collection is almost complete, we have currently entered into our master database information on 15,500 secondary agricultural education students. Using our current information we have started to compare the characteristics of students that join FFA with students that do not join FFA. The following summaries are a few examples of our preliminary data comparisons:

1. A comparison of national norm percentages for standardized test scores in science showed that, as 8th graders, the FFA members outscored the non-FFA members by 3.5%. In a comparison of the same students, as juniors, the FFA members outscored the non-FFA members by an average of 6.4%.
2. Eighty-eight percent of "program completers" were FFA members. ("Program Completers" are students that have completed three or more units (years) of courses in agricultural education.)
3. FFA members were more likely to be classified as "occupationally proficient" than non-FFA members.
4. FFA members were more likely to be classified as "academically proficient" in science than non-FFA members.
5. FFA members were more likely to be classified as
6. Sixty percent of all agricultural education students are FFA members. However, only 25% of Hispanic students are FFA members.
7. Students who were identified as Asian were 41% male and 58% female. However, only 9% of females were FFA members as compared to 63% of the male students.
8. Students in Iowa agricultural education courses classified themselves as: 49% town/urban and 51% rural.
9. Ninety-eight percent of FFA members were identified as "involved" or having participated in at least one FFA activity.
10. Fifty-seven percent of FFA members have attended an FFA leadership conference or workshop.
11. Twenty-three percent of FFA members have served as a chapter officer.
12. Iowa agricultural education students earned nearly \$15,000,000 through their supervised agricultural experience programs.
13. On average, Iowa FFA members received 1.35 SAE visits by their teacher per student per year.
14. The average Iowa agricultural education student has completed 2.08 years of agricultural education courses.
15. FFA members are more

"academically proficient" in math and reading than non-FFA members.

likely to pursue post-secondary education than non-members.

16. Iowa agricultural education students are: 71% male and 29% female.

These are just a few examples of the information that will be generated by this comprehensive report. We assume that the report will probably generate more questions than answers, but it is a first step toward a more comprehensive evaluation of our agricultural education programs. The most important step is to determine what other comparisons can be made and how to use the results for program improvement.

Where do we go now?

Many people view our agricultural education programs as old, dull globs of Play-Doh. Like that old Play-Doh, they feel these programs have served their purpose and can now be discarded. Even in a leading agricultural state, like Iowa, many people do not value our programs as academically challenging and economically important.

Market. Market. Market. It is time to use hard data rather than anecdotal evidence to market the value of our programs. It is time to show students, parents, educators and legislators that our programs now come in bright, new varieties, and our students are academically prepared to produce tomorrow's exciting new innovations.



Dale Gruis is the Agricultural Education Consultant with the Iowa Department of Education.

Linking Local Programmatic Questions to Answers Developed Through Research

By Linda Moody and Susan Fritz

The plea was straightforward: "Help us decide what is important to teach students in our local agricultural education programs." This secondary Nebraska agricultural educator articulated for us, University of Nebraska agricultural education faculty, a problem likely being faced in many local programs across the country. Secondary agricultural education programs are inundated with information and changing technology, as well as providing a two-part mission of literacy and vocational preparation. Over a 25 year time span, Nebraska agricultural educators have gone from a five-subject matter vocational agriculture production curriculum to a 10-subject matter curriculum that emphasizes non-traditional subject matter, agricultural literacy and vocational preparation (Siekman, 1974) (A graphic depiction of this relationship is found in Figure 1.). Most of the curriculum and programmatic changes took place within the last 10 years with the advent of content standards (Nebraska Agricultural Education Curriculum Frameworks and Content Standards, 1999). It is no wonder that teachers are asking for assistance in determining their local curriculum.

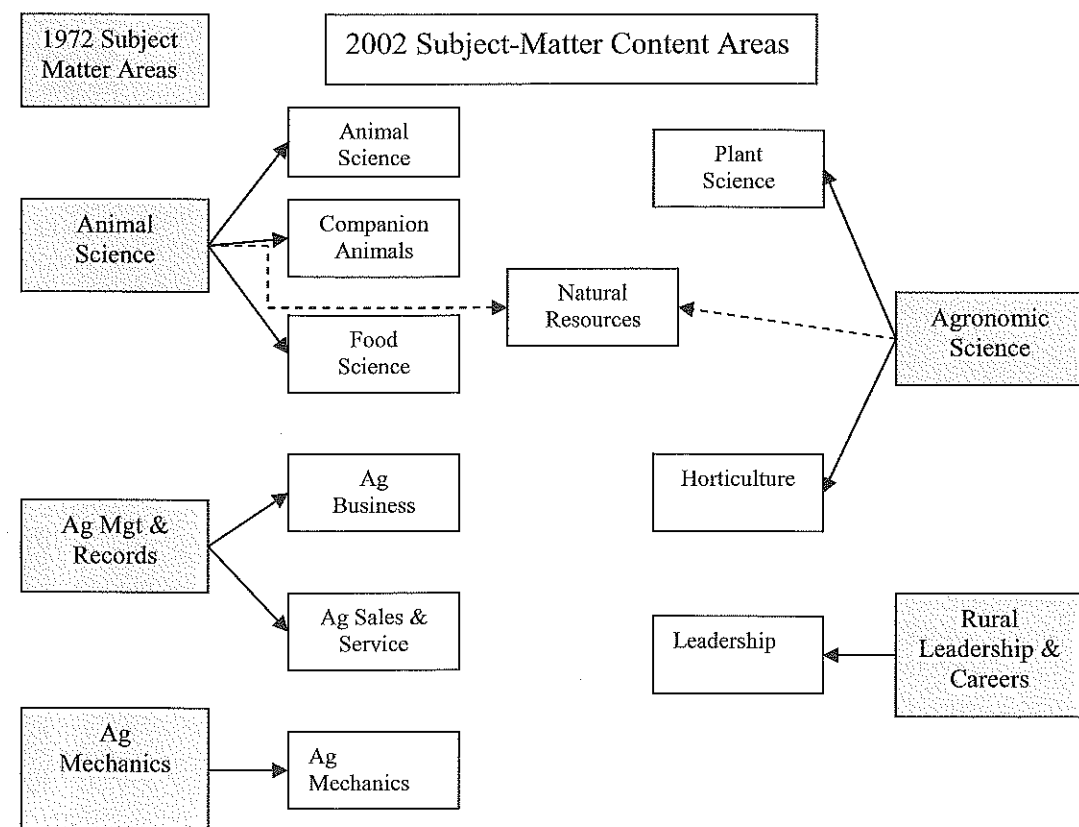


Figure 1. Nebraska's Secondary Agricultural Education Curriculum Growth from 1972 - 2002.

The quick response to this teacher is "identify local needs." While this has a place in program planning it may not offer the full picture of what should be included in local agricultural education programs. Therefore, university faculty with a statewide responsibility and connections can offer input through a broader look at needs (Rockwell & Bennett, 2000). This look at needs should be scientifically based so that it can stand up to replication and the scrutiny of technical scientists and local administrators, rather than based on intuition or gut instinct.

While the study question had been defined by the secondary agricultural educator, who to ask the question of had not. In this case, it was decided that there were three

stakeholder groups best positioned to answer this question: Nebraska secondary agricultural educators, post-secondary faculty and employers. A three-part needs assessment process was launched. In the first part, agricultural educators participated in a curriculum study addressing importance, teacher knowledge, teacher competency and student competency. The second part was a record analysis of post-secondary introductory and capstone coursework, and entry-level job descriptions to ascertain assumed competencies at both levels. The third part included a study of secondary agricultural educators and post-secondary faculty to determine the importance and proficiency of future high school graduates, and a study of

post-secondary faculty and employers' proficiency level expectations of college graduates which will be launched later this fall.

Thus far, results of the research have identified the competencies secondary agricultural educators perceive as important, their knowledge and skill levels, and their students' skill levels. Now, a clearer description of their formal subject-matter training exists. Although, information regarding life experiences outside of formal education may assist in drawing conclusions on course content expertise.

We also found duplication in course objectives between secondary and post-secondary introductory coursework, identified gaps between secondary and post-secondary introductory curriculum, and post-secondary capstone curriculum and entry-level job descriptions. One conclusion drawn from the data analysis process was there are challenges in pre-service and professional development for our teachers (Moody, 2001).

In the pre-service area, agricultural education faculty are reviewing the breadth of preparation in areas of agricultural sciences and natural resources versus the merits of depth of preparation as well as the impact of life experiences. (Nebraska agricultural educators are certified or endorsed to teach the broad range of agricultural sciences and natural resources areas rather than specializing in one or more subject-matter areas.) Currently, students complete 36 hours of agricultural and natural resource sciences fulfilling subject-matter knowledge within seven categories mandated by certification requirements. This is forcing undergraduate students to take coursework often outside of their secondary preparation and life experiences.

From a pre-service standpoint, it has become obvious to us that agricultural educators are teaching what they are comfortable with which is typically what they were taught in their secondary program and was enhanced in their undergraduate studies. However, we believe that this can be impacted through in-servicing teachers in areas they have not been previously prepared.

One goal of educational programs is to focus on what is best for students. Students and parents want accessible and affordable education resulting from mastery of curriculum perceived as relevant to business and industry expectations. This includes a curriculum lacking in course content duplication and replication of courses between secondary and post-secondary institutions. When we compared the secondary agricultural education curriculum to introductory post-secondary courses, most duplication of content existed in animal science, agronomy (plant and soil science), agricultural mechanics, and agribusiness management. The duplication in course objectives, and in some cases introductory courses opens the door for conversations regarding advanced placement opportunities (e.g. dual credit, tech prep). This process furthers, an emerging fertile area for collaboration between secondary and post-secondary programs appears to be in the area of what some call "seamless education."

While we have not totally answered the plea of that secondary agricultural education teacher, we better understand his concern. We anticipate a full response to his question will be delivered at next year's Invest Conference where we hope our Nebraska agricultural educators will be reminded of the important role that research can play in the development and revision of

the local agricultural education curriculum.

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Starting an Agriscience Research Program with Junior and Senior High School Students

By Alan D. Spencer

In 1993, while attending Iowa State University, I met my future wife, Andrea. We had a lot in common. Both of us had grown up on farms. Both of us had been in FFA in high school. Both of us had goals of receiving the American FFA Degree. Andrea, however, had been heavily involved in agriscience in high school. I thought I had a basic understanding of agriscience but later found that was not the case.

Andrea started to take me on romantic trips to help judge science fairs throughout Iowa. I soon learned that junior high and high school students were performing cutting edge agriscience research. As an Agricultural Education major, I started to take great interest in what agriscience and science fairs could offer and what that would mean to students in my own future classes.

During my time as a volunteer judge, I had the opportunity to witness students developing their education, skills, and confidence. One student conquered his stuttering problem after presenting his research on swine feeds at science fairs. One student patented a method to control mites that attack honeybees. One student won enough scholarship money through science fairs to send him to college.

I also discovered that many students that participate in science fair activities were not necessarily the straight "A" students. Many were average students who found an area of interest to study and who enjoyed the competition.

When I started teaching, I knew that I wanted to start students with agriscience projects for several

reasons:

- ~ The students would gain an understanding of and utilize the scientific method.
- ~ The students would develop logical thinking skills and would learn to analyze data.
- ~ The students would develop their communication skills and confidence in themselves.
- ~ The students would have the opportunity to compete and earn scholarship money.
- ~ The students would also be able to use the agriscience research for Supervised Agricultural Experience (SAE) projects.

The recent advances in the FFA Agriscience award structure also provided good reasons to get students with more non-traditional production agriculture SAE projects involved with agriscience.

Getting Started

Where does a person start? Starting an agriscience student research program is often the hardest part. However, there are many resources to help teachers. There are many science fair related websites that can be very helpful, however, you must stay on your guard about the integrity of the information. Only use information from reliable sources.

Getting started with the students can be as difficult as you want to make it. An outline that includes the due dates of each section of the project (Purpose, Background Research, Hypothesis, Procedure, Data, Results, Conclusions, Applica-

tion) is a very good item to distribute at the beginning. The outline should also include the criteria on which the students will be graded and the dates of the science fair activities in which they will be expected to participate.

Topic Selection

Some believe that a good project title includes fifty words and more Latin than anyone can read. That is not true. The best topics are simple. Students need to focus on something of interest to them and ask a question on that topic.

The questions need to be easy "why do we do it this way" types of questions. The teacher may have to help by asking the student leading questions to get them to think about their interests. During the first year, the student may discover something specific within their topic that they wish to explore. The most important point is to make sure the student is interested in the topic. The younger the student begins an agriscience and science fair project, the more competitive he/she will be in high school. If your school already supports an elementary or junior high science fair, develop a close working relationship with those teachers in charge.

Safety Issues

When students engage in scientific research, a certain level of safety needs to be enforced for the student, the lab, and the test subjects. There are forms that need to be completed by the students at the beginning of the research period. For example, you do not put your safety glasses on after you are done working in the shop. You put safety glasses on before you start. In the same manner, safety forms must be completed ahead of time.

Safety forms exist for projects

that include human subjects, hazardous substances or devices, pathogenic agents, human and animal tissue, controlled substances, nonhuman vertebrate animals, and recombinant DNA. All of the appropriate forms can be found at the Intel International Science and Engineering Fair website (www.sciserv.org/isef/index.asp).

Also be aware that there are general regulations for certain procedures. An example deals with the use of animals. It is extremely important that a veterinarian is consulted to approve the project. The animals should not be put in danger and there should never be anything over a fifty percent death loss (LD 50). Be wary of fish projects because fish have a tendency to die for almost no reason on occasion. Certain safety issues bind college researchers worldwide. We should never ignore the safety issues.

Hypothesis

Each student should complete a background research report. This ensures that each student has a solid understanding of their particular subject area before they begin. Discuss what credible sources are and where to locate information. Be sure to discuss that not all information comes from the Internet. The research report should include a bibliography of references. The background research will help the student to make a better hypothesis, or educated guess, about how the project will work.

Writing the Procedure

Students usually have difficulty writing the procedure. A procedure needs to be written like a recipe so that it can be followed by anyone. Some steps are left out of procedures because they are "understood" by the author. Not everyone will have the same background as the author, therefore I use the peanut butter and jelly activity to get the students

thinking.

This activity can be modified but I find that peanut butter and jelly is the easiest. Make sure to have all of the materials available (peanut butter, jelly, bread, butter knife, paper plate, napkin). Direct the students to write the procedure to make a peanut butter and jelly sandwich either individually or in small groups. Collect the procedures and have one person from each group attempt to make the sandwich with another group's directions. Usually, the students forget to include the steps that open the bread bag or the peanut butter and jelly jars. After a few tries, give each group their directions and have them update. This activity can be repeated multiple times. The students need to be accustomed to writing a logical flow of the directions.

Data Collection

The students need to be very specific when collecting data. Everything they need to record (date, time, temperatures, weights, etc.) should be written into a journal that is displayed later at the science fair. Pictures should be taken during the entire process that includes the student (wearing proper safety equipment) as well as the experiment. Properly recorded data will help to ensure quality results and conclusions.

Results and Conclusions

The results are the hard facts. Results include only what happened during the experiment. This is a good opportunity to teach students how to utilize different computer programs to make their graphs and charts. These graphs and charts will then be used for the final report and included on the science fair display board.

The conclusions are the student's statements of why the project worked the way it did and if it matches with the hypothesis. Students sometimes get discouraged because the project did not match the hypothesis, but this only means that there needs to be more

repetition or there may be a new anomaly that needs to be studied next time. All of the information compiled during the project needs to be bound together as one final report.

The Science Fair

The most exciting part about agriscience is displaying the project at a science fair. The student needs to create a backdrop that includes each of the areas previously discussed and pictures in an easy to read, eye pleasing format. Every state has some different requirements for science fair backdrops, but if the science fair is affiliated with the International Science and Engineering Fair (ISEF) then there are display size restrictions. Visit the ISEF website (www.sciserv.org/isef/index.asp) for further information.

Students have the opportunity to advance from the state Agriscience Fair to the National FFA Agriscience Fair in Louisville, Kentucky. The students may also participate in the FFA Agriscience Student Award Program where eight national finalists are selected from all of the state winners. Recently, the star categories for the Chapter, State, and American FFA Degrees were updated to include a Star in Agriscience. If a student places first in a regional or state science fair affiliated with the ISEF, the student and instructor will win a trip to the ISEF to compete against students from all over the world.

Agriscience would be an outstanding addition to any agriculture program. To some of you, it may seem like more work. Please do not think of it that way. The education students receive by participating in agriscience is more holistic than many other activities in school.

Alan D. Spencer is the Agricultural Education Instructor at Manson Northwest Webster High School in Manson, IA.

Research in the Agricultural Education Curriculum: A Student's Perspective

By Kara Butters

How many times have you heard children ask, "Why is the sky blue?" or "What makes the grass green?" Although the children asking these questions may not realize it, these thoughts lean toward their first involvement in research. Like these children, I have always possessed an inquisitive nature. Yet, my curious air did not truly come into play until I enrolled in my first agriscience class during my freshman year of high school. Upon my first "real" introduction to research in my agriscience class, I never imagined that six years later, I would be named the National AgriScience Student of the Year because of a three-year research project. The objective of this article is to explain how research included within my agricultural curriculum helped me gain premier leadership, personal growth, and career success.

Research in the Curriculum

One of the concepts that resides foremost in my mind from botany/veterinary science is learning about the basic fundamentals of research and the scientific method. My agriscience teacher firmly believed in relating research and science to agriscience. We used Osborne's (1994) *Biological Science Applications in Agriculture* textbook. The first two chapters of the textbook are entitled Conducting Experiments and Summarizing and Reporting Research. The fact that my teacher taught from a textbook that stresses the importance of research in its beginning pages demonstrates that there should be a definite linkage between research and the agriscience curriculum.

I can still remember reading the

first chapter of *Biological Science Applications in Agriculture*. The chapter explained the basic steps of the scientific method used in conducting research, including the problem, hypothesis, experiment procedures, controlled and manipulated variables, dependent and independent variables, and the conclusion. At first it was difficult to understand the difference between several terms, such as controlled, manipulated, independent, and dependent variables. However, it became clearer when we examined a sample experiment in the book that determined the effect of rotating eggs during incubation on hatching rate (Osborne, 1994).

After conducting a simple experiment in class, the ideas of the scientific method and research became even more evident. Using Carolina Fast plants and petri dishes as the main materials, each student in the class was responsible for determining if the seeds placed in the light would germinate faster than the seeds housed in darkness. We had to develop a problem, hypothesis, conduct the procedures of the experiment, collect data, and formulate conclusions at the end of the experiment from our data. Once the experiment was complete, we wrote a short research paper explaining the research project using the main steps of the scientific method. At the conclusion of the research portion of the class curriculum, the importance of research and my interest in the agriscience curriculum were clearly evident causing me to desire to become an agricultural educator and start my path to career success.

My Research Project

While enrolled in botany/veteri-

nary science, my agriscience teacher noticed my interest in horticulture. As a result, I was asked to serve as the co-manager of the agriscience greenhouse the summer before my junior year, which was the second year after the greenhouse was constructed. Noticing the first crop of poinsettias my FFA chapter raised was not very marketable, I tried to discover what could have caused the problem. Through my literature review and talking to other poinsettia producers, I learned there are several factors that determine a quality poinsettia, including bract size, color, and plant height. Immediately, I discovered the poinsettias grown previously were not in the appropriate height range leading me to experiment with plant height.

One of the main contributors of plant height is pinching, or the removal of the terminal or lateral buds. Poinsettias must be pinched terminally to ensure that they develop more lateral buds causing them to branch more like a bush than a tree. I decided to focus my research on determining the optimum number of pinches that poinsettias should receive to help them reach the desired market height. I then developed the hypothesis that as poinsettias receive more pinches, they will become shorter and less desirable.

With my problem and hypothesis identified, I outlined my experiment procedures. I conducted the experiment over a twelve-week time period from late August to late November so that the poinsettias would be marketable by Christmas. Throughout the experiment, I collected weekly data and used the data to form my conclusions at the end of the research project. When my

research was complete and my conclusions were drawn, I compiled my problem, hypothesis, literature review, procedures, collected data, and conclusions into a twenty-five-page research paper detailing each of the steps of my research.

Three replications of the experiment and three papers later, I formed my ultimate conclusion that pinching poinsettias in greater amounts causes a difference in plant height and creates bushier plants; supporting my initial hypothesis.

During my senior year of high school, I was named the Michigan FFA state winner of the AgriScience Student Recognition Contest for my two years of research. I decided to conduct a third trial experiment during my freshman year at Michigan State University to cause my research to become even more reliable. I was selected as one of eight finalists from approximately thirty-five applicants at the national level to compete in the AgriScience Student of the Year competition at the 2001 National FFA Convention.

Based upon my agriscience paper, a fifteen-minute presentation I delivered to a panel of judges along with answering five-minutes of questions, and an eight by four foot display I created, I was selected to serve as the 2001 AgriScience Student of the Year. I was fortunate to earn \$1,000 for being named a finalist and an additional \$3,500 for being named the national winner. Presenting to agricultural industry representatives, working with others to strengthen my research project, and using creativity to develop a professional display, all opportunities presented to me in the AgriScience Student Recognition Contest, developed my premier leadership skills.

Benefits of My Research Project

In addition to the recognition and

award money, I found several other benefits from my research. Foremost, I became proficient in being able to explain the process of the scientific method and what each one of the steps means. I was also able to gain even more knowledge about the scientific method. I delved into many more scientific terms, such as threats to validity, relationships between variables, correlations and the reliability of my research.

Secondly, I was able to learn about poinsettias in general. Not only did I learn about pinching, I gained knowledge about growth regulators, temperature levels, watering and fertilization schedules, photoperiod, pesticides, and fungicides.

Finally, I was able to gain skills unrelated to the scientific method, such as communication by talking to other poinsettia producers or record keeping. I learned how to compile data into a research paper, which is easily understood by others. Each of the benefits that I received from my agriscience research developed my personal growth.

Research in the Curriculum

The knowledge that I gained from my agriscience class about research proved to be a vital asset later when I participated in the AgriScience Student of the Year competition. A main reason that research plays such an important role is it provides students with hands-on experiences and helps them develop critical thinking skills. This proved to be just the case for me.

In *Methods of Teaching Agriculture*, Newcomb, McCracken, and Warmbrod (1993) state, "Laboratories are a very crucial component of the teaching-learning program in agricultural education. The whole notion of learning by doing is a very important psychological construct." Students must be motivated to learn,

and they learn what they practice. Motivation occurs through students' involvement in planning learning activities and when they attempt tasks that are challenging. Performing research is an excellent method for students to practice hands-on activities that challenge them as well as motivate them to learn.

Based upon my experiences as a student who learned in an agriscience classroom where research was an integral part of the curriculum, I can attest that teaching agriscience students about research is essential to their learning process and strengthens the amount of knowledge that they can gain. Learning about research in my agriscience curriculum caused me to gain knowledge on how to experiment with something to find possible answers instead of just being curious and asking the questions that many children ask today. The research opportunities in my agriscience courses made a positive difference in my life by developing my potential for premier leadership, personal growth and career success through agricultural education.

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Student Achievement in Agricultural Education: Who's Doing the Math?

By Glen C. Shimm

USA Today. Thursday, August 1, 2002. p.9A.

Colorado: Denver – Some Colorado students lost ground on mandatory skills tests, and other scores remained flat. But state officials said there has been slow steady improvement when measured over the long term. The state has phased in tests in reading, science and math for certain grade levels. Schools can face reorganization if there's no improvement after three years.

Today's Reality

Pick up almost any newspaper and you will find a lead article on mandatory student testing in mathematics, science and reading. Superintendents and principals, in fact all educators, are under intense public scrutiny to raise student achievement scores in today's public schools. Whether or not we personally agree with the practice or the process, student testing is a high-stakes public issue!

Student Achievement: Policy or Politics?

Tom Loveless and Paul Diperna report that Americans spend \$350 billion each year on elementary and secondary education. Today, measures of student achievement are on

the front page of newspapers, widely available on the Internet, and the subject of intense scrutiny by both the public and political spin-doctors. Regardless if it is policy, politics, or both, Americans expect public schools to develop high achieving students who can compete in an increasingly global workplace.

Agricultural vs. Educational Productivity

Increases in U.S. agricultural productivity are legionary. The past three decades have seen plant and animal yields double or triple using new knowledge in science and technology coupled with increased education and training. Systematic research practices that are adopted by agricultural producers explain much of the gain in agricultural productivity. Do systematic educational research practices adopted by agricultural educators have the same effects?

Connecting Agriculture and Education

The philosophical roots of agriculture tap deep in science and mathematics. Founders, including W.H. Shepardson, recognized the important linkage between science and agriculture. Early vocational courses built upon foundation knowledge of biology and chemistry and applied science as approved practices in animal husbandry, soils, and agronomy. Today's agricultural education student will benefit from the knowledge of science, math and reading to solve increasingly complex problems of food systems, natural resources, and environmen-

tal degradation. In addition, the students will perform better on school tests.

A New Work Group

Larry Case, in his role as senior program officer, recognized the emerging challenge to agricultural education programs. In April 2002, a 19-member national agricultural education work group was appointed through a collaborative proposal between The Council, National FFA Foundation and U.S. Department of Education. The membership includes teachers, state directors and consultants, university faculty, and other national leaders.

The mission of the work group aims to communicate research-based practices in agricultural education that have positive impacts on student achievement in mathematics, science, and reading. The group is charged with three responsibilities within a 200-day time frame to:

- identify current research in agricultural education that corroborates effective school-based educational practice,
- analyze and probe the gaps in the research, and
- focus action and engage others in seeking ways to communicate and coordinate a research agenda that will aggressively examine research problems related to high school student achievement, particularly mathematics, science, and reading, over the next five years.

What Has Been Done?

The work group has identified and summarized 123 agricultural education research articles reported since 1990. They are analyzing and probing the gaps in the existing knowledge and examining complementary research in other disciplines. A strategy for communicating promising practices to teachers, administrators, and policy makers is in the making.

What Can You Do?

How can you, as an agricultural educator, realize the same gain in student achievement as those realized in food systems, natural resources and environmental stewardship? In the near-term, you can:

- identify and use the research-based practices that are currently available.
- use your own classroom and laboratory as a practical research plot to field-test promising practices.
- communicate high expectations for student achievement in mathematics, science, and reading, as well as technical skills, personal development, and entrepreneurship.
- watch for new promising

practices for increasing your students' achievement.

Remember the Whole Student

Academic achievement is only one of many desirable outcomes expected from schools. Secondary-school-based agricultural education is traditionally known for fostering technical skills, leadership, and personal development. However, the singular focus of the Agricultural Education Research Workgroup is the identification of research-based practices used in secondary-school-based agricultural education that contribute to student achievement in the academic areas.

In short, more rigorous research in school-based agricultural education is needed to identify effective practices that contribute to state and national educational priorities and to identify strategies for assessment and documentation of student achievement based on accepted educational standards. Once identified, these research-based practices must be communicated and supported through teacher preparation and professional development so teachers and school administrators can put them into practice.

Our Expected Results

Working together, we can

increase student achievement through the adoption of effective teaching and learning practices. At the same time, we can increase the appreciation and value of agricultural education by the public while broadening the base of the research. When put to work, these practices will help close the achievement gap, provide accountability, add flexibility and increase the use of research based practices in Agricultural Education. This will meet the true intent of the four US Department of Education pillars of "No Child Left Behind."

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“Academic achievement is only one of many desirable outcomes expected from schools.”

User-Friendly Research

By Kara Ladlie

Two years ago I had the opportunity to work with the National Agricultural Education Research Conference (NAREC) in San Diego, California. The Agricultural Education and Studies Department at Iowa State University was hosting the event and I was hired as an undergraduate student to coordinate the project. By the completion of the conference I had become aware of the research being conducted in Agricultural Education and was constantly asking these questions, "How can I as an Agriculture Instructor use this information?" and "Why hasn't my undergraduate course work in Agricultural Education introduced the topic of research?"

Universities engaged in preparing Agricultural Education teachers need to expose their students to research and the research process in

their field of study. Instructors need to share the research that graduate students and professors are working on in their departments. Instructors should include research developed by other universities when it relates to the topics studied in lecture. Referring to research studies will give the undergraduate students a better perception of the professorship and graduate school in general. For students who are interested in continuing their education, this approach would be a great promotional tool for graduate programs.

Since research in agricultural education is so broad-based, current issues in this field should be on the top of the list when deciding what type of research to conduct. With the increasing demand for new teachers in agricultural education I would like to see more research that looks for ways to recruit and support new teachers in agricultural education. A good example of this research is

current work done by Dr. Richard Joerger at the University of Minnesota, St. Paul and Joel Larson with the Minnesota Department of Children, Families and Learning. With early groundwork done by Joel Larson, Dr. Joerger has been using research to develop a training program and support structure in Minnesota for beginning teachers called the "Teacher Induction Program". The program is designed to pair beginning teachers with experienced mentor teachers for one year. Throughout the year the new teachers gather to share their experiences and to share what they have learned with each other. Access to graduate level courses and on-going assessments with feedback are also part of the program. The data Dr. Joerger and his staff collect from the Teacher Induction Program will be used to provide support for all first year teachers in agriculture and to

decrease the number of agriculture teachers leaving the teaching profession in Minnesota.

Researchers in agricultural education need to share their research results with teachers, farmers and other stakeholders. Also, research in agricultural education needs to be user-friendly for teachers out in the high schools. Of the research papers chosen to be presented at the National Agriculture Education Research Conference in 2000, thirty-three of the forty-eight papers were reports of perception studies. A panelist on the

last day of the conference made a comment on whether or not research in Agricultural Education was moving to higher levels of research. As the teacher and FFA advisor of an agriculture education program at the high school level, I know how students perceive the department and the FFA program. The research that would be most interesting to teachers would be solid research that is relevant to the day-to-day tasks they perform. Not all research results are useable or relevant to teachers in the classroom. When research is completed that is relevant to the classroom teacher, make it user-friendly. Look for a way to deliver the findings to current teachers in a format that is easy to incorporate into their programs. Researchers need to write grants or find other ways to provide teachers with the tools they need to put into practice the new methods

and techniques studied. Information learned from reserach that is not passed on to the stakeholders in agricultural education who might benefit from the work is wasted.

The best way to meet the needs of agricultural instructors is to ask them. Teachers need answers to various questions that could frame research studies. Qualitive research is really needed and case studies would be an excellent approach. Examples of concerns in the teaching profession that could be researched include: effective teaching strategies and what makes them effective, block scheduling and the impact it has on student retainment, strategies for building support for middle school agriculture programs, and ways to build a stronger agriculture literacy program.

My impression of research in agricultural education before job

placement was limited. I was aware university professors had other responsibilities outside the classroom lecture that included writing papers, articles, and research but that was about the extent of my knowledge. Since then I have developed a richer understanding of the research carried out in agricultural education, but I continue to evaluate it on its contributions my classroom.



Kara Ladlie is the Agricultural Education instructor at Kingsland High School in Minnesota. Ladlie is the FFA Advisor for the Spring Valley-Wyokoff FFA Chapter.



Ladlie encourages researchers in agricultural education to share their research with teachers, farmers, and other stakeholders. Additionally, Ladlie feels that, to be effective, this research must be user-friendly. (Photo courtesy of Kara Butters, Michigan State University.)

United States Postal Service
Statement of Ownership, Management, and Circulation

1. Publication Title: The Agricultural Education Magazine
2. Publication Number: 07322-14677
3. Filing Date: 10/01/02
4. Issue Frequency: 6
5. Number of Issues Published Annually: 6
6. Annual Subscription Price: \$10.00
7. Complete Mailing Address of Known Office of Publication (Street, city, county, state, and ZIP+4):
Bimathly
1410 King Street, Suite 400
Alexandria, VA 22314
8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer):
Alexandria, VA 22314
9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank):
Publisher (Name and complete mailing address):
The Agricultural Education Magazine Inc, The National Council for Agricultural Education
1410 King Street, Suite 400
Alexandria, VA 22314
Editor (Name and complete mailing address):
Dr. Robert A. Martin
Iowa State Univ
201 Curtiss Hall, Ames, IA 50011
Managing Editor (Name and complete mailing address):
Mark Leitman
46 National Council for Agricultural Education
1410 King Street, Ste 400, Alexandria, VA 22314
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Full Name: The Agricultural Education Magazine Complete Mailing Address: 1410 King Street, Ste. 400
Alexandria, VA 22314
11. Known Bondholders, Mortgagees, and Other Security Holders Owning or Holding 1 Percent or More of Total Amount of Bonds, Mortgages, or Other Securities. If none, check box None
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 Has Not Changed During Preceding 12 Months
 Has Changed During Preceding 12 Months (Publisher must submit explanation of change with this statement)

13. Publication Title: The Agricultural Education Magazine
14. Issue Date for Circulation Data Below: July/Aug. 2002

16. Extent and Nature of Circulation		Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)		3332	3312
(1) Paid and/or Requested Circulation	(1) Paid and/or Requested Circulation	3012	3059
(2) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	(2) Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Non-USPS Paid Distribution	0	0
(3) Other Classes Mailed Through the USPS	(3) Other Classes Mailed Through the USPS	26	20
c. Total Paid and/or Requested Circulation (Sum of 16b(1), (2), (3), and (4))		3038	3079
d. Free Distribution (Sum of 16c, 16d, and 16e)		16	13
e. Total Free Distribution (Sum of 16c, 16d, and 16e)		30	32
f. Total Distribution (Sum of 16c and 16e)		3068	3111
g. Copies not Distributed		30	33
h. Total (Sum of 16g and h)		3098	3144
i. Percent Paid and/or Requested Circulation (16c, divided by 16g, times 100)		99%	99%

15. Signature of Statement of Ownership: Sept 10, 02 Issue of this publication: Publication not required.
17. Signature and Title of Editor, Publisher, Business Manager, or Owner: Mark Leitman Business Mgr. Date: 9-4-02

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Students: Learning How to Learn Science

By Maria Navarro, Blane Marable, Stacy Byrd, and M. Craig Edwards

Introduction

Our society is becoming increasingly dependent on a myriad of complex technologies, demanding an increasing level of "scientific literacy" to make informed decisions about the use of new technology (National Research Council, 1996). A logical consequence of this trend is a growing demand for students to study science — yet researchers (Britton, Huntley, Jacobs, & Weinberg, 1999; Hoachlander, 1999; Parnell, 1995) have suggested that often the science being taught is too "abstract," lacking sufficient real world "connection" and "context" to learn and apply it effectively. To this end, agriscience and biotechnology provide robust "contexts" in which students learn and apply important scientific concepts and principles while also thinking critically, i.e., acquiring and practicing higher-order thinking skills (Torres & Cano, 1995) about *what* they are learning. The *Governor's Honors Program (GHP) in Agriscience and Biotechnology* is a rigorous and innovative program that provides this opportunity for high school agricultural education students in Georgia.

Background — The Georgia Governor's Honors Program

The Georgia Governor's Honor Program (GHP), a six-week summer instructional program, provides opportunities for gifted and talented students to acquire skills, knowledge, and attitudes essential to becoming independent, life long learners. Each year, approximately 2,400 sophomore and junior students are nominated for one of thirteen majors, from which only about 675 (28%) students will be selected to participate after a state-

wide interview process. During the program students have full use of the campus and facilities of GHP's contracted host, Valdosta State University in Valdosta, GA. GHP is cost-free to participants, except for incidentals and transportation. Classes have a teacher:student ratio averaging 1:15. For six weeks, students attend their major class Monday through Saturday from 8:00 a.m. to noon. After the first week, students choose a minor area of study which they attend from 1:30 - 4:00 p.m. Monday through Friday. In addition, many recreational programs and events are provided by GHP staff as well as the students themselves.

"Agriculture is a meeting-ground of the sciences."
Shepardson (1929, p. 69)

New GHP Major: Agriscience and Biotechnology

The agriscience and biotechnology major, started in 2001, was the first new major since the 1980s. To qualify for this major, students must be nominated by their Agricultural Education teacher, submit the completed application/nomination form, transcripts, a resume, their teacher's recommendation, a proposal for a research project, and a portfolio showing their involvement in agriculture. Each year fifteen students are selected to participate in the GHP agriscience and biotechnology major.

Program and Instruction

Instruction is significantly different from that of the regular

high school classroom, emphasizing exposure to concepts rather than mastery. Accordingly, the program is designed to provide students with tools and opportunities that are difficult to access during the school year, in a low-stress, student-centered learning environment with no grades or exams. Teaching and learning strategies and activities are diverse and include research exercises, laboratory and field experiments, computer-based learning, problem solving, critical thinking, group projects, communication and interpersonal skill-building, guest lectures, and field trips. Guest speakers give students the opportunity to interact with practitioners of agrisciences and biotechnology and give them a "taste" of future career possibilities. In 2002, a three-day field trip took the students to some of Georgia's best research and agriscience facilities.

Agriscience & Biotechnology Minor

The GHP also has a minor in agriscience and biotechnology, which accepts students majoring in fields as diverse as foreign languages, math, executive management, or music, providing an important opportunity for exposing "non-traditional" students to agriscience and biotechnology instruction as well as related career opportunities.

Lessons Learned

GHP students are a diverse group who bring different ideas and expectations about the program, and who may have eclectic plans for their future. It is precisely this diversity that provides one of the GHP's most significant value-added dimensions. Two of the agriscience students summarized their GHP experience as follows: "I was exposed to a diverse group of students, which allowed me

to learn and respect other people's cultures and talents. I learned that there is always room to broaden your horizons," and "GHP is a cornucopia of academia."

The fifteen students participating in the agriscience major work together for six weeks, forming a "cohort" group. According to Brooks (1998), "cohorts provide[d] adult] students with a greater feeling of inclusiveness, promote[d] collaboration and enhance[d] academic performance." Many practitioners also support these contentions in the context of educational programming for adolescents, such as enriched educational programs that occur frequently during the summer months. Most students, with rare exceptions, leave the GHP convinced that they had one of the best and most memorable experiences of their young lives, especially in relation to the friendships they made and the people they met at GHP. One student remarked, "The friends that you can make at GHP will become a second family to you." During the first reunion of GHP Agriscience and Biotechnology alumni, participants indicated that making friends and having fun had been very important aspects of their GHP experience. Moreover, GHP students indicate that the program challenges and motivates them, opens their eyes to a world of new and exciting opportunities, increases their self-confidence, and contributes to self-sufficiency as a valuable (often first) experience to be away from home.

Free of fees and grades, in a



Georgia's State Director of Agricultural Education learns "first-hand" from an agriscience and biotechnology GHP student at the Agriscience/Biotechnology Exhibit Show.

low-stress learning environment focused on exposure to concepts, and with ample opportunities for building relationships, Georgia GHP students gain more than an expanded education; they gain skills and friendships of lifelong value. The fun and learning never ends!

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Agricultural Literacy at the County Fair

By Stacie M. Turnbull

Many people would be surprised to find that they rely on at least half-a-dozen products of the agricultural industry each morning, in the brief time between the buzz of their alarm clock and their daily drive to the office. When you think about it, you really cannot have an 'ag-less' day (Hellerich, as quoted in Jansen, 2002).

We have found that there are a lot of children who have no idea how their food gets to the grocery store (McNeil, as quoted in Jansen, 2002). The vast majority of the population in the United States is two generations removed from any on-farm experience (National Research Council, 1988).

Today's population is ill-equipped to make informed decisions about food and fiber on a personal level (Mayer and Mayer, 1974). A well-informed population is better able to deal with economic, political, social, and environmental issues affecting agriculture, living standards and conditions (Nebraska State Board of Education, 1999, p.2).

For agricultural educators, it is no surprise that the public relies heavily on agriculture, yet lacks an understanding of agricultural entities and processes.

Numerous groups have recognized the need for agricultural literacy activities focused on the American population, though the majority of these efforts focus on elementary-age students. Two examples which may be familiar to agricultural educators are the National FFA Organization's *Food for America* program and the *Agriculture in the Classroom* program, sponsored by the American Farm Bureau and the United States Department of Agriculture.

An exceptional agricultural literacy opportunity may exist that you may have overlooked – the County Fair. When FFA Chapters initiate informal educational activities during the fair, benefits abound for the public, the FFA members, and the community.

Agricultural Fairs

The golden age of the agricultural fair in America was 1850-70. Agricultural societies had become the chief agents for the formation and expression of rural opinion. With the goal of strengthening agriculture, annual fairs aroused interest and inspired success by showcasing innovation and accomplishment (Avery, 2000). Fairs had long educated adults: by the 1930's, large fairs in the Midwest were featuring lectures by professors, social workers, and other sorts of experts and began concentrating on teaching lessons to school-aged children, as well (Nelson, 1999).

The International Association of Fairs and Expositions (2001) lists 3,200 fairs being held in North America each year.

Fairs provide industrial exhibits, demonstrations and competition aimed at the advancement of livestock, horticulture and agriculture with special emphasis placed on educational activities such as 4-H, FFA and similar youth development programs. While enjoying these high-minded pursuits, fair visitors are also able to see, hear, touch, smell and taste the richness and variety of what the world has to offer.

Despite these educational goals, it is easy to forget about a fair's educational objectives, in favor of increasing the entertainment and non-agricultural commercial aspects of fairs.

For example, a photo from an early Nebraska state fair shows students at an educational display. The photo caption reads, "(FFA) club members examine an educational booth at the Nebraska State Fair. Most fairs blended education exhibits with commercial displays" (Nelson, 1999, p. 147). The photo (date unknown) shows three FFA members in front of a 'chick Ferris wheel' watching the chicks. Behind the Ferris wheel, there is a display board



FFA members are heavily involved in Mylo's Animal Barn. Scribner-Snyder and North Bend FFA Members are pictured maintaining and improving the facilities. Chapter members volunteer approximately 150 hours, collectively, working before and after the fair.

titled "What Soil Conservation Means to Us". It is questionable which is gaining the greatest attention – the soil conservation display or the chicks. In addition, it is questionable whether the education message, of soil conservation, is being conferred.

Despite the difficulty in balancing educational objectives with entertainment value, fairs can be an excellent venue to conduct agricultural literacy activities. According to Fiderlein (2001), Iowa State Fair manager Gary Slater feels that agricultural literacy is now more important than ever, as the population gets further removed from the farm. He feels that fairs are a part of the total agricultural literacy package. Messenger (2001) suggests that state and county fairs provide an opportunity to inform consumers about information such as manure management practices.

The county fair provides a unique opportunity for FFA Chapters to promote agricultural literacy activities. Although chapters can put on an agricultural literacy program at any time, the county fair provides two components for any program - the audience and facilities. In addition, it provides FFA members with the opportunity to collaborate with other FFA members within the county. As county fairs increasingly find themselves torn between their agricultural roots and non-agricultural commercial interests, FFA Chapters have the opportunity to step forward. While FFA Chapters have long been involved with the agricultural shows and exhibits, they have the ability to expand their efforts to include agricultural literacy activities and experiences. Agricultural literacy activities can take a variety of forms – including 'petting zoos', displays, and structured learning stations. The important idea is that the program has sound educational objectives.

Mylo's Animal Barn

In 1999, I began working with Mylo's Animal Barn at the Dodge

County Fair in Scribner, Nebraska. The barn served the purpose of providing animals for children and adults to see and touch. The barn had operated this way for many years and was a popular stop for many people. It met the objectives of providing an entertaining experience, while introducing students to a variety of animals – from camels to dairy calves to turtles and kittens.

Two FFA Chapters within the county take responsibility for the barn. FFA members, parents, and alumni work two-hour shifts throughout the five days of the fair. They are responsible for cleaning out pens, feeding the animals, and assisting with activities. Mylo's Animal Barn provides an opportunity for FFA members to interact with adults and children alike, throughout the fair. Students have taken part in much of the upkeep and repair of the barn, as well as building cages and signs.

Parents have told me that they enjoy spending time with their children and being able to interact with people coming through the barn. The barn also allows parents and community members a better understanding of the need for agricultural literacy and education within the schools. Additionally, it provides the chapters with community exposure. Providing agricultural literacy in this setting is a strong addition to a Chapter's Local Program of Success and the National Chapter Award Application.

Through the years, it has become apparent that the barn has the capability to reach a large audience – many of whom were unfamiliar with agricultural practices, history, and concepts. This is where agricultural literacy activities begin. Past activities have included wool spinning and milking demonstrations, providing food samples, distributing educational materials, and viewing agriculturally-based videos. Mylo's Animal Barn, at the 2002 fair, included insects and reptiles for the first time. A pond and

fish tank were added the previous year.

This type of activity is not easy. Coordinating a project of this size includes an extensive amount of collaboration between participating educators, school administrators, students, parents, FFA Alumni members, fair board members, and those donating animals. In the end, though, an exceptional agricultural literacy opportunity exists in the nearby county fair.

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What is a Qualified, Competent, and Caring Teacher?

By Neil A. Knobloch

Researchers, teachers, administrators, parents, and stakeholders continually search for variables that make the difference for students in the curriculum. It is no surprise that the teacher and quality of instruction makes the biggest difference in how students learn. Research on teacher quality identified that the teacher is the single most important variable related to student achievement (Darling-Hammond, 1997).

Knowing that the teacher influences learning most, the National Commission on Teaching and America's Future (NCTAF, 1996) proposed an audacious goal that by the year 2006, every child in America would have access to a qualified, competent, and caring teacher. If agricultural education is going to help NCTAF reach its goal, then agricul-

tural educators should consider what it means to be a qualified, competent, and caring teacher. After reviewing current literature on teacher quality, the purpose of this article is to briefly define the three NCTAF attributes of (1) a qualified teacher, (2) a competent teacher, and (3) a caring teacher.

What is a qualified teacher?

A qualified teacher is one who completes a teaching certification program and earns a degree in an area of study. Therefore, the quality of the teacher preparation and educational degree programs play a significant role in developing teacher quality. The U.S. Department of Education, in conjunction with the National Council for Accreditation of Teacher Education (NCATE), ensures that teacher candidates who graduate from accredited teacher education programs will have the knowledge, skills, and dispositions to

be a qualified, competent, and caring teacher (NCATE, 2001).

Furthermore, NCATE aligned its standards with the Interstate New Teacher Assessment and Support Consortium (INTASC) to help teacher preparation programs develop qualified teachers. The American Association for Agricultural Education also (AAAE) aligned its teacher education program standards with NCATE standards (AAAE, 2000). Therefore, a qualified teacher is one who meets the state's requirements of being a certified or licensed teacher through a teacher education program that meets the qualification standards.

What is a competent teacher?

Helping students be successful learners is the key principle of teaching (NCATE, 2001; Palmer, 1998). Therefore, competent teachers demonstrate knowledge and understanding of their content, teach effectively, and help all students learn successfully.

Teachers should demonstrate knowledge and competence of INTASC's (1992) ten principles of teaching: (1) subject matter; (2) student learning; (3) learning environment; (4) diversity of learners; (5) instructional strategies; (6) communication techniques; (7) planning; (8) assessment; (9) professional development; and, (10) student support.

Further, a competent teacher should know and demonstrate proficiency in content knowledge, how students learn, pedagogy, pedagogy-content knowledge, professional knowledge, and, possess the disposition that all students can learn (Darling-Hammond, 1999; NCATE, 2001).

Therefore, a competent teacher is one who can effectively help students learn based on a competent understanding and performance of the teaching and learning process.

What is a caring teacher?

Of the three characteristics described by NCTAF (1996) and Darling-Hammond's (1997, 1999, 2000) related reports, there was limited discussion about a caring teacher. Darling-Hammond (2000) implied that parents are concerned about their children having access to caring teachers with several questions: Who will teach my child? Will they inspire my child? Will they meet my child's individual needs? Will they teach my child basic skills and the ability to solve problems that my child will face in the future?

Applying a constitutive definition (American Heritage Dictionary, 1985), a caring teacher displays a frame of mind—disposition—to protect, supervise, show interest in, painstakingly guide, and show concern for their students. Further, a disposition is a person's temperament, personality, character, nature, and attitude. If teachers are going to develop dispositions that reflect an attitude of caring, then the theory of attitude and teacher change (Richardson & Placier, 2001) needs to be studied. The study of teacher beliefs is important in teacher development (Pajares, 1992).

Furthermore, good teachers make connections with students and the connections are made with the heart and not teaching methods (Palmer, 1998). Therefore, a caring teacher has the disposition, attitudes, and beliefs that all students can learn and does not give up on trying to help every student succeed.

In summary, NCTAF (1996) commissioned that every child have access to a qualified, competent, and caring teacher by 2006. Teachers

can become qualified by completing a certification program and an education degree in a major area of study. Teachers can become competent by demonstrating the knowledge, skills, and disposition, and by performing the competencies of an effective teacher (INTASC, 1992). However, if a teacher does not possess the belief that he or she can teach by being a caring teacher, he or she may never connect with students (Palmer, 1998).

Although the brevity of this discussion truly limits the full consideration of what it means to be a qualified, competent, and caring teacher, the review of literature and related research findings revealed that the terms "qualified and competent" are more easily defined. Although little was mentioned in NCTAF and Darling-Hammond's literature about "caring," it is the attribute that probably makes the greatest difference in the lives of students in the agricultural education curriculum.

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According to Knobloch, caring is the attribute that makes the greatest difference in the lives of students in the agricultural education curriculum. Georgia's Agricultural Commissioner Tommy Irvin is pictured with Agriscience/Biotechnology GHP students from the University of Georgia.

Research on Service Learning

By Michael Woods

As the United States moves into the 21st century, the education system of our nation is under constant analysis. It is widely recognized that the education of children is of utmost importance and a wide variety of ideas to improve the condition of the education system are being considered.

The Secretary (of Labor's) Commission on Achieving Necessary Skills (SCANS) (Whetzel, 1992) identified some of the skills and competencies needed for the modern workplace. The SCANS report advocated developing the technical skills necessary in our changing society, as well as other skills such as information acquisition and processing skills, and important personal qualities such as responsibility, honesty, and integrity.

Huitt (1997b) identified several omissions in the SCANS report that he believed were important for life success, a broader concept than workplace success. The major modification was in the addition of competencies in the affect/emotion domain. From research in behavioral sciences literature, four additional workplace qualifications were identified: optimism, setting and using goals, self-efficacy, and self-regulation.

Service learning is an important strategy that shows great promise for addressing both the development of academic skills as well as other important outcomes in the cognitive, affective, and social domains identified in the SCANS report and Huitt's (1997b) critique. The purpose of this article is to define service learning and report on research that addresses its success.

Service Learning Defined

Service learning evolved as a vehicle to strengthen a student's learning, to reconnect the learner with the community, to counter the imbalance between learning and living, and to repair the broken connection between learning and community.

The National Community Service Act of 1990 defined service learning as a process whereby students learn and develop through active participation in organized service experiences that actually meet community needs. Service learning provides students opportunities to use their acquired skills and knowledge in real life situations in their communities; this enhances teaching by extending student learning into the community and helps foster a sense of caring for others (Burns, 1998).

Research on Service Learning

Outcome studies conducted on service learning are not as prevalent as articles discussing the concept and implementation of service learning programs. Researchers who have investigated the claims of service learning report only a small research base to support program effectiveness (e.g., Bradley, 1997; Chapin, 1998). One reason for the lack of research support may be the confusion about what service learning actually is. A second reason may be that researchers are in a quandary about the appropriate research focus. Advocates of service learning are most interested in changes in student attitudes and behaviors. However, as Serow (1997) pointed out, program evaluators are challenged to not only capture the essence of the service learning experience, but also to show that students are converting that experience into other outcomes. This

change often takes more than one school year to appear but the service learning programs usually last less than that. Therefore, the long-term benefits for individual students involved in service learning projects are difficult to assess.

Additionally, Lipka (1997) indicated there is little research available to inform about a connection between service learning and adult life in terms of persistent, long-range effects on behavior, attitudes and predispositions. As a result, educators are left to assumption and estimation to determine the effectiveness of the service learning programs. Lipka (1997) suggested that if school programs are to incorporate service learning, the evidence of future consequences on students should be based on reasonable empirical evidence.

Conrad and Hedin (1997) reported that educators may be reluctant to adopt service learning programs because there is a lack of evidence to demonstrate that these programs result in any higher scores on tests of academic achievement than do traditional approaches. Additionally, they are concerned about a lack of a clear theory that describes the process by which service learning enhances academic achievement or life success.

This research is similar to the conclusions presented at the Service Learning Summit held in 1995. At this summit, experts stated that emphasis should be placed on the positive benefits of service learning, on improving critical thinking and problem solving abilities rather than focusing primarily on academic skills.

Blyth, Saito, and Berkas (1997) supported the idea that quality service learning experiences may have more to do with how they help

youth think and work together in teams than in the improvement of basic academic skills. Kromer and Hitch (1994) described four areas in which students benefited from service learning:

1. An increase of self-esteem;
2. A sense of empowerment by participating in community service where they are needed, valued, and respected;
3. Improved citizenship as a result of active engagement in community life; and
4. A heightening of the student's desire to learn through their experience.

While research on service learning is limited, a major conclusion pervading the literature base is that service learning connects young people to their community, placing them in challenging situations where they associate with adults and accumulate experiences that can strengthen traditional academic studies. In general, students learn to connect the traditional academic classroom experience with life in the community. Therefore, the impact of service learning, for the most part, appears to be on factors other than academic content, although these outcomes are important for life success in the 21st century.

Certainly a new paradigm for evaluation of service learning programs within the agricultural education curriculum that takes into account the interests of everyone involved as well as the limitations of current research and evaluation methods must be developed if we are to accurately evaluate the benefits of these programs. Ultimately, research into the long-term effects must be conducted.

Service learning is designed to make classroom learning relevant

and to help students apply their learning beyond the school setting. While research has shown some benefits of service learning, there is a lack of strong research backing long-term student effects. Bradley (1997) identified two components of the evaluation challenge that faces service learning practitioners. The first is that careful attention must be paid to the design and implementation of programs. It must be clear to students, teachers, and outside observers what quality service learning programs look like and the benefits of these programs. In addition, equal attention must be paid to evaluation of outcomes of service learning programs.

Evaluation of both processes and outcomes should be an integral part of any carefully designed program and more work needs to be done. Nevertheless, early results show promise that service learning is an educationally sound way to combine the needs of schools, students, communities, and parents. It connects students to their community and places them in challenging situations where they can strengthen skills and personal qualities identified as important to success in the information age, including academic studies. It is certainly an educational renewal idea that deserves more study within the agricultural education curriculum.

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Position Paper: Future Federal Career and Technical Education Funding

By ACTE Agricultural Education Division and the National Council for Agricultural Education

The ACTE Agricultural Education Division submits the following items for consideration in future federal career and technical education legislation:

- ♦ Career and Technical Education is an excellent method for delivering and promoting student achievement as a part of the total educational system.
- ♦ Strong State leadership is essential to the success of Career and Technical Education programs and must be funded federally.
- ♦ Student assessment should be used on an on-going basis using a variety of performance and cognitive measures to improve student learning and teacher effectiveness and to enable students to demonstrate their academic and technical skill achievements as well as improve the teaching process. Assessments must be used as a part of program accountability to qualify for federal funds.
- ♦ Career and Technical Student Organizations are essential components of an integrated educational delivery model that enhances academic and skill achievement while

developing leadership, citizenship and personal attributes. Student organizations must be used as a component of program accountability to qualify for federal funds.

- ♦ Research in Career and Technical Education is essential to improving academic and skill standards and must be funded at the federal level.
- ♦ Teacher recruitment, initial preparation, retention, and professional development must be included in Career and Technical Education funding to assist in raising students' academic achievement and skill mastery.

- ♦ Funding is required to assist states in acquiring equipment and developing appropriate instructional/curriculum materials for Career and Technical Education to be delivered effectively to enhance student learning.

Educational research indicates that individuals learn in a variety of ways and that effective teaching recognizes and accommodates a variety of learning styles. Career and Technical Education offers students an opportunity to learn in a variety of ways based upon fundamental concepts of motivation, readiness to learn and the application of performance-measured assessments.

Students involved in Career and Technical Education are motivated by work-based learning experiences

January-February 2003, Issue

The Role of the Teacher in Agricultural Education

In this age of rapid advances in technology, what is the role of the teacher in Agricultural Education? What challenges do teachers face in teaching agriculture today? How do they meet these challenges? What can teachers do to improve agricultural education?

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Articles Due to Theme Editor: December 1, 2003
Articles Due to Editor: December 15, 2003

and they develop a readiness to learn from a need realized in their career-based program of study. State leadership in Career and Technical Education provides an opportunity for each individual state to develop educational standards and to provide leadership to meet not only individual state workforce needs, but also those of the nation. The ability to develop structures on a state basis provides better opportunities for students who exist in today's global society. Effective state leadership allows for more uniformity and higher academic achievement and skill mastery. State leadership also allows for better use of federal dollars to assist in raising all standards.

Assessment in Career and Technical Education should raise the standards in each program area as well as the academic standards of the students. Career and Technical Education allows students to incorporate into their skill development those academic standards that will meet or exceed the standards for all students. The application of these standards to real world, work-based learning allows students to be assessed in a variety of methods to insure a thorough understanding of academic and skill standards as they both apply to actual models in the work force.

Career and Technical Student Organizations engage and provide motivation for students. They are an integral part of the classroom and laboratory learning environments and are essential in the development of both academic and skill standards. The application of assessment through student competitions in workforce models strengthens the ability to extend learning beyond the academic day. In addition, students have the opportunity to develop leadership, citizenship and personal attributes necessary for success in the workforce. Career and Technical Student Organizations must be a

component of accountability in local programs to assist in raising standards.

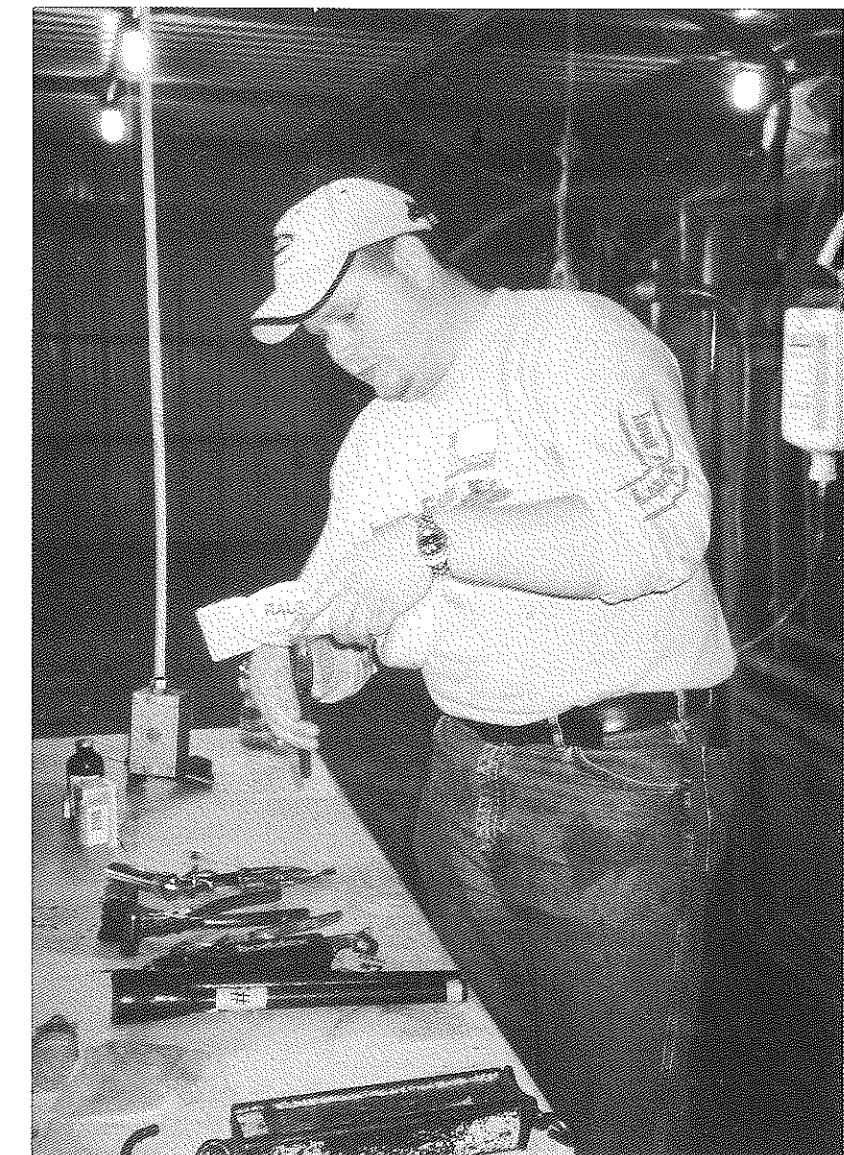
Research is required for all phases of education. Federal legislation should provide funds for such research on a broader base to ensure that the nation's educational system remains competitive in the increasingly global marketplace.

Teacher recruitment, initial preparation, retention and professional development are critical issues in raising the achievement of students in the nation. Funds are required to improve the current teaching workforce as well to recruit and develop new teachers to take the

place of retiring educators.

Developing a well-trained and highly motivated work force requires state-of-the art equipment that meets current industry standards along with the curriculum materials needed to keep the graduates competitive in the work force.

The current workforce of the nation commands the respect of the world. It is a product of federal investment, which has supported development of a world-class Career and Technical Education system. This system will continue to succeed and improve only with greater federal investment in preparing the nation's future workforce.



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