Aquaculture - An Introduction

Lee, Jasper S. & Newman, Michael E., (1992) Interstate Publishers, Inc., Danville, IL

Reviewed by:
Lynne M. Cook
Agriculture Teacher
Tift County
High School
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One of the hottest subjects in the agricultural industry today is aquaculture. Producers along with other landowners have found this business to be an added way to make profit on the land taken up by previously unused ponds. As an agricultural educator, I must make sure that my curriculum fits the interests and endeavors of the agricultural community which will surround my students when they leave high school or college and seek a career. It is with this thought in mind that many agricultural educators have introduced the study of aquaculture into their curriculum. Until recently, very little literature was available to the teacher for help in the classroom. However, now with Lee and Newman's book, I believe that the agricultural educator has an outstanding tool for use in the classroom.

The most outstanding feature of **Aquaculture - An Introduction** is that it covers the total industry of aquaculture. The basics of the science of aquaculture (fish, pest, and water biology) are covered with enough information to allow the reader to understand the fundamentals without getting bogged down in the particulars. A chapter on the aquaculture industry today is included, which tells the reader of the increased use, history of, and need for the industry. This chapter also has a good section describing current careers. Not only are catfish and trout production discussed in the book, but crayfish, ornamental, baitfish, plant aquacultural production, and recreational aquaculture are also covered.

Another strong point of the book is the directions given to those who wish to begin a small aquaculture enterprise. The authors indicate the materials needed, h to use the setup, and the factors to be considered before you begin. Many inex pensive ways are described that could b used for SAE programs. Other plans are for the more production-oriented person who wishes to begin a business.

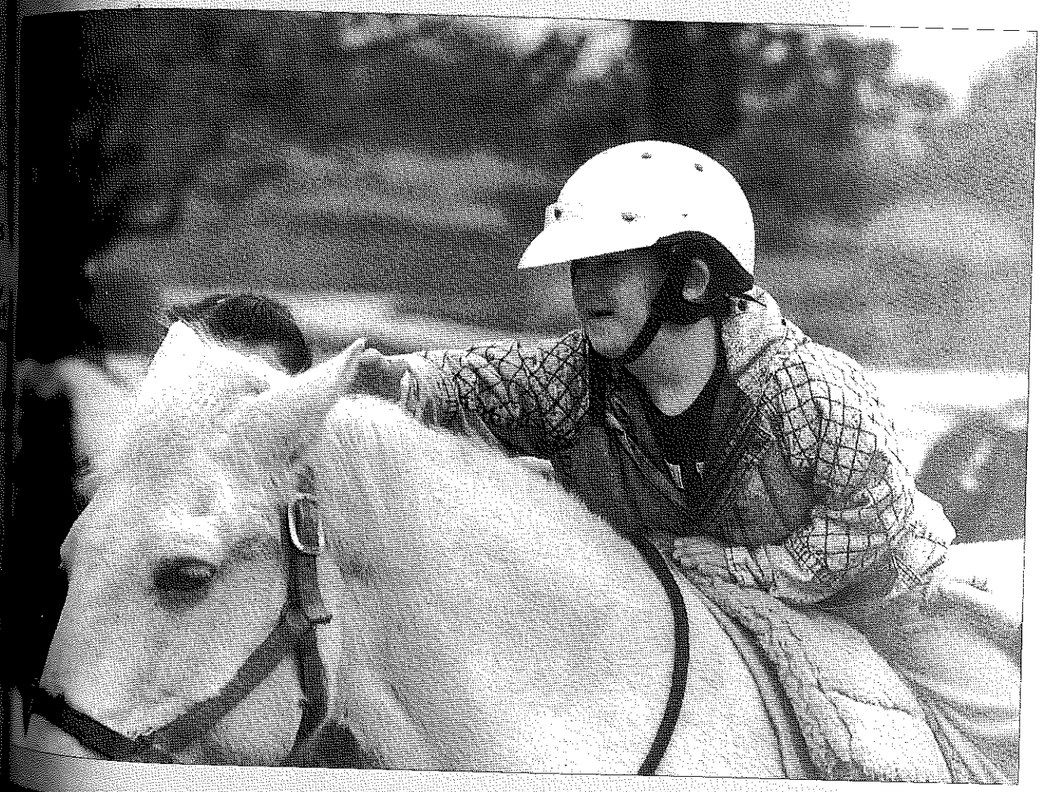
The only weak point of the book is the lack of detail in some parts. This vague ness is due to the immense amount of material that the book covers, however, and the authors do give specific examples to enable the reader to go beyond the book and ask questions to clarify the sub jects. Since much of the technology of aquaculture is new or just being devel oped, much of the equipment is discussed as thoroughly as could be expected.

Overall, this is an excellent book in my opinion. My plans are to include much of the new information I have gathered fro the book in my classes. I also hope to employ some of the smaller, inexpensive aquaculture setups for my students.

About the Front Cover

Being able to effectively solve prob lems encountered in teaching requires teachers to reflectively think about possible causes for problems observed. A diagram such as this helps to lay o the possibilities and makes it easier fo teachers to develop a plan of attack (solution plan). For the sample prob of *lack of student motivation*, teache should determine if the problem is a whole class problem or one that is limited to a few students in the class. Solution strategies must vary accordingly.

Agricultural Education Magazine



Serving Individuals with Disabilities

THE
AGRICULTURAL EDUCATION
MAGAZINE

March, 1993 Volume 65 Number 9

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ARTICLE SUBMISSION

Articles and photographs should be submitted to the Editor, Regional Editors, or Special Editors. Items to be considered for publication should be submitted at least 90 days prior to the date of 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). Two copies of articles should be submitted. A recent photograph should accompany an article unless one is on file with the Editor. Articles in THE MAGAZINE may be reproduced without permission.

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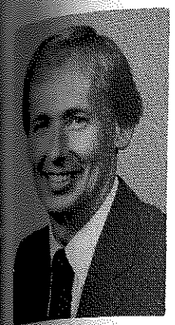
Targeting Readers



By Ed Osborne

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

While a variety of agricultural educators receive *The Agricultural Education Magazine*, the primary subscribers are junior high and high school agriculture teachers. Easily more than 80% of the content of *The Magazine* is focused toward these school-based agricultural education programs. Yet, currently less than one-half of all junior high and secondary agriculture teachers nationwide subscribe to *The Magazine*. At the unbelievably low subscription rate of $7 per year (a subscription for The National Science Teachers Association publication is $38 per year), one has to wonder why a much higher percentage of agriculture teachers does not subscribe to this professional journal.

In response to this concern, the Editor recently completed some exploratory research on readership of *The Agricultural Education Magazine*. One state was selected from each of the six NVATA regions, and a contact person in each state was asked to administer a very brief readership survey during a state meeting this past summer. A total of 502 responses was received, with the data set split equally between subscribers and non-subscribers.

The following findings and conclusions are based upon the perceptions of the responding teachers:

1. Teachers believe *The Magazine* can be improved by having more teacher-written articles and by upgrading the appearance of the publication.
2. Teachers prefer articles that focus on practical ideas, teaching methods, local success stories, technical agriculture topics, and curriculum and program improvement ideas.
3. Most teachers do not support a nominal increase in subscription rate.
4. Some support exists for including *The Magazine* as a non-optional part of NVATA dues.
5. Nearly half of the respondents believe *The Magazine* should broaden its content to more fully address dimensions of agricultural education beyond high school-based programs, especially adult and elementary level programming.
6. Subscribers are generally satisfied with the current publication.
7. Nearly all subscribers read *The Magazine* to some degree. Most readers select issues or articles of interest, rather than reading all issues cover to cover.
8. Subscribers like the use of monthly issues.
9. High school agriculture teachers do not subscribe to *The Magazine* because of the cost, being unaware of the publication, lack of time to read, perceived low relevance, and lack of interest.
10. Most non-subscribers have held a subscription to *The Magazine* at some point in the past.

Although the sample of teachers involved in this small study was not randomly selected, their perceptions do suggest some general direction for *The Magazine*. First, those involved in obtaining articles for publication in *The Magazine* will continue to push hard to secure articles from classroom teachers. This has been an elusive goal for as long as anyone can remember, but we did make significant progress on this front during 1992 by nearly doubling the percentage of teacher-authored articles to about 25%. However, in the opinion of the Editor, *The Magazine* would best serve the readers if approximately 50% of the articles were written by classroom teachers. As theme editors place more emphasis on securing articles from classroom teachers, we need more teachers who are willing to share their successes and ideas, either as theme articles or in short pieces for the new *Success Stories* column (see the December 1992 issue).

Most topics suggested by teachers, with the exception of technical agriculture topics, are already on the drawing board for 1993. Given the purpose of *The Magazine* and the existence of numerous periodicals focusing on science, production, and management in agriculture, a move to begin incorporating agriculture content irrespective of teaching method or program planning must be carefully considered. As evidenced by remaining themes and feature columns for 1993, efforts are underway to expand the focus of *The Magazine* to address both non-school and school-based agricultural education programs. The use of monthly themes will be continued, but an attempt will be made to slightly reduce the number of theme articles in each issue so that more non-theme articles may be included, giving more content

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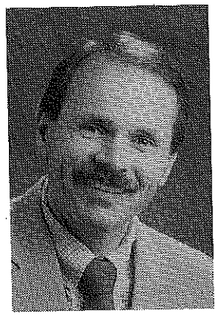
Renewing our Commitment to Individuals with Disabilities



BY MARTY FRICK

Dr. Frick is assistant professor of agricultural education at Purdue University, West Lafayette, IN.

This issue, like many other issues of *The Agricultural Education Magazine,* provides you, the reader, with methods, strategies, and technical information related to an important topic for agricultural education. So what's different about this issue besides the topic? For me, as theme editor, it is the overwhelming feeling that this issue directs our attention on a group of people who can use our technical, but more importantly, our emotional and spiritual support in overcoming barriers, resulting in greater self-confidence, a sense of empowerment, and increased self-esteem. The extra effort put forth in working with individuals with disabilities can also provide an enriching experience for a teacher. It is possible through our agriculture curriculum-the skills we teach and the caring we demonstrate-that we can cultivate an independence not yet experienced by many individuals with disabilities.

Have you worked with an individual with a disability? Have you worked to ensure that an individual with a disability can participate in an FFA activity? Have you been the only one in your school to visit these students at their home or worksite while conducting a supervised agricultural experience visit? Have you assisted students with disabilities in selecting worthwhile supervised agricultural experience programs? As a profession, we need to consider the ways and means to break down barriers that limit students with disabilities from fully experiencing what our local programs offer them. We represent an industry that is the most hazardous occupation for children and work in a school environment that welcomes individuals with disabilities through its doors. As we browse through this issue of our magazine, let us remember that it is the student who ultimately deserves our attention throughout our careers as agricultural educators.

That which is most important to consider when reading this issue is most aptly expressed in the following piece.

The Animal House [1]

by

Dr. George H. Reavis

Assistant Superintendent, Cincinnati Public Schools, 1939-1948

Once upon a time, the animals decided they must do something heroic to meet the problems of "a new world." So they organized a school.

They adopted an activity curriculum consisting of running, climbing, swimming, and flying.

The duck was excellent in swimming, in fact better than his instructor; but he made only passing grades in flying and was very poor in running. Since he was slow in running, he had to stay after school and also drop swimming in order to practice running. This was kept up until his webbed feet were badly worn and he was only average in swimming.

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Targeting Readers

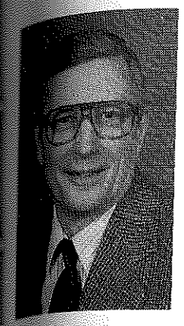
(Continued from page 3)

variety to each issue.

Perhaps the most troubling findings from this exploratory research pertained to the reasons given by teachers for not subscribing to *The Magazine*. In this study, the most often cited reason for not subscribing was the cost of a subscription. At $7 per year, this response is shocking and inexplicable. What does this say about the professionalism of our teacher corps? Equally as troubling, we have teacher educators, state supervisors, and even officers of state agriculture teacher associations that do not subscribe to *The Magazine*! Where else do these agricultural educators turn for a continuous source of updating and renewal in the process of *educating others in and about agriculture*.

This study has also shown that there is significant potential for increasing the percentage of teachers that subscribes to *The Magazine*. Members of the Editing-Managing Board will be soliciting the help of state leaders this year to introduce and reacquaint non-subscribers to the current publication. And you, as a subscriber, can have a tremendous impact by promoting *The Magazine* among your peers in agricultural education.

Modifying Laboratory Equipment



BY THOMAS A. SILLETTO

T. Silletto is an associate professor in the Departments of Biological Systems Engineering and Agricultural Education, Leadership, and Communication at the University of Nebraska-Lincoln.

Expanding emphasis on experiential education in agricultural education laboratories provides new challenges (and opportunities) to serve students in meaningful ways. Modifying laboratory activities, processes, and equipment for disadvantaged students is an important part of that service. State departments of education estimate that one student with disabilities can be expected to be enrolled in each class session in secondary schools. Of the total 1991-1992 school enrollment in Nebraska, 10.5% were identified as having disabilities (Nebraska State Department of Education, 1992). Estimates suggest similar data for the United States population. Greater numbers of students are identified as having disabilities, and students more commonly identify themselves as having disabilities (Office of Services for Students with Disabilities, UN-L, 1992). Their enrollment in classes is often accompanied by recommendations of help needed. Many know and readily indicate what assistance they need in classrooms and laboratory sessions.

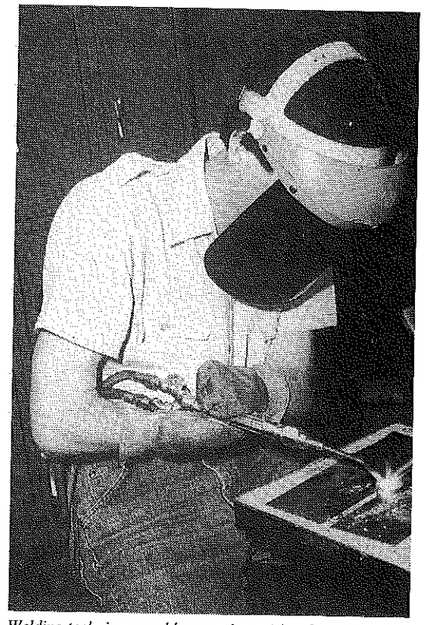
Situation

This article explains the process of planning, goal setting, and modifying gas welding equipment for a student who had arms but no hands. The concepts will be applicable to laboratory situations for other students with disabilities. The student was enrolled in metalworking, which emphasizes eye-hand coordination activities and considerable dexterity in working with tools and equipment. In addition, electric arc, oxy-acetylene, GTAW, GMAW, resistance, and plastic welding activities were completed by the students. Most students are challenged by the class activities and unusual situations are expected, but this particular student's situation was a surprise and a challenge for the instructor!

According to Dr. Gary Meers (1980), "Special needs students are unique individuals who need special teachers and school support to enable them to complete the schooling process successfully." He further stated that ". . . 90 percent of success is in having the right attitude." Newcomb and others (1986) added support for the importance of correct attitudes by stating, "The challenge to the teacher is to develop a positive atmosphere in which students can learn." Meers also suggested that, "Teachers of special needs students have a unique opportunity to meet students where they are and to help them go places they never thought possible." A unique challenge (opportunity) existed in our metalworking class.

By enrolling in the class, the student had created an opportunity to put into practice "Suggestions for Implementation in Instruction of Disadvantaged Students, as proposed to student teachers" (Silletto, 1992). The suggestions included:

- Identify student's limitations, aptitudes, interests, and outstanding abilities.
- Identify activities which provide desired changes of behavior (learning) and provide the specific desired results.
- Identify appropriate ways students may compensate for limitations or other factors.
- Be aware that there may be few psychomotor skills which the students cannot accomplish; they just learn to do things in different ways.
- Anticipate ways in which a procedure or an activity can be adjusted to provide the experiences desired.
- Be concerned that tool and equipment use is without risk of damage and involves minimal risk of injury to the student and others, even when use is unconventional.
- Be sure that the students are properly supervised. ➔



Welding technique used by a student with a disability when operating a gas welding torch fitted with a foot control.

Initiating the Process

Bruwelheide (1981) stated that "the process of developing appropriate instruction for special needs students (with disabilities) does not need to be a lengthy or a complicated one, but careful attention should be paid to several important aspects." It is important that goals are set so that both student and instructor are comfortable with the process.

Conference sessions with my student revealed that:

- The student's disability was congenital.
- His parents' challenge had often been, "Learn what you can do and how to compensate."
- He didn't like prosthetic devices and preferred wearing mittens on his arms.
- As a farm employee, he had operated tractors and field machinery.
- His ability to compensate was emphasized by the fact that with a specially designed shotgun he was a state-level competitor in trapshooting.
- His career goal included employment in wildlife conservation work.

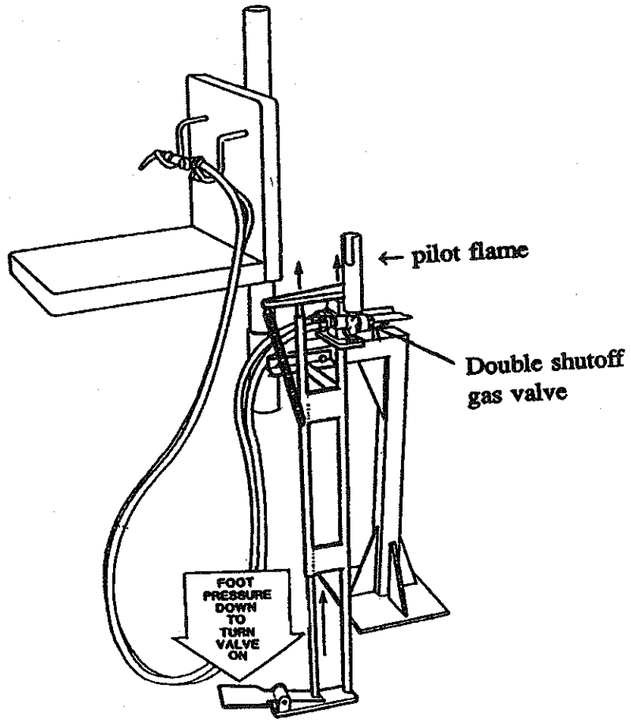


Figure 1. Gas welding station modified for foot control to the gas torch using a double shut-off gas valve.

- He had previously taken several mechanics laboratory classes but had never been allowed to operate a gas welder; that was why he had enrolled in the course.
- He had an excellent work ethic and an excellent attitude.

Goals were established:

- Laboratory activities would emphasize electric arc and gas metallic arc welding.
- The activities would not include use of small hand tools, tool grinding or hot and cold metal-work.
- Acceptable use of the gas torch had become the major challenge in his program.
- Regular conferences would be held to review progress and facilitate planning, and an exit conference was to be conducted to evaluate the student's program.

Modification of Equipment

The student readily completed early tasks with little assistance. He was adept at holding hand-held equipment in his particular way by using his mittened arms in an opposing manner to compensate for not having hands. However it was apparent that added safety hazards would exist in use of a lighted gas welding torch which might be dropped. A strategy for use of the gas welding equipment with minimal risk was to identify appropriate ways the student may compensate for limitations or other factors.

During supervised "dry-runs" with an unlighted torch the student held a welding torch, adjusted the valves, and simulated welding procedures. It was agreed that he should not attempt to operate a lighted torch without some means of reducing the risk of dropping the torch, catching clothing on fire, or risk of burns. A positive valve shut-off system was needed to eliminate the risks of personal injury.

A double shut-off valve and foot control provided a solution. The valve lever moved the valves for both fuel gas and oxygen downward to closed position. The valve was mounted at a workstation with a linkage attached to a foot lever and a tension spring in such a way as to reverse its normal operation. Thus, foot pressure downward moved the valve to the "on" position. When foot pressure was removed, the valve returned to its normally "off" position, and the flame was immediately extinguished (See Figure 1). A pilot light on the valve provided a means of lighting the torch to eliminate need for use of an igniter.

The student observed demonstrations and assisted in planning modifications of procedures to be undertaken. All of his weld jobs were completed at the "downhand" position. Welding rods were placed upon the joints to be welded. The ends of rods were bent to right angles to help keep them in position. Braze welds were completed using pre-fluxed welding rods.

Results

The student readily adapted to use of the modified equipment. He was able to control the equipment after the main lines were turned on (usually by a classmate who wanted to help).

He adjusted the torch valve settings for the type of flame needed. In addition to steel fusion and braze welds, the student mastered the welding of cast iron and hardsurfacing of steels. Each job submitted for evaluation was quality work and frequently was superior to that of his classmates, who often chided him for "raising the curve" of laboratory grades. He worked comfortably with the equipment. He completed work in a different manner than his classmates but was not concerned, because that was his "normal" way of doing things. He always displayed a safe attitude and frequently expressed appreciation for the opportunity to learn a skill which he had not been able to try in earlier classes.

Recommendations for Working With A Student With Disabilities

At the exit conference, the student also expressed appreciation for support during the class and provided a summary of recommendations for instructors working with students with disabilities:

- Identify the student's needs as early as possible.
- Avoid making students feel that they are different; be accepting of them as individuals and encourage them to learn by trying new activities.
- Let the students learn by trying, failing if need be, modify processes, and find success.
- As an instructor, be available and provide help when it is needed, but avoid spending excessive amounts of time with a student when it is not needed.
- Help students develop new ways of doing things by making appropriate adjustments from the usual procedure.
- Anticipate possible problems and help the students avoid or overcome the problems.

Modification of gas welding equipment provided a student with no hands experiences beyond his and the instructor's expectations. Unconventional procedures were developed which allowed the student to successfully complete selected laboratory activities. The example of help afforded the student will be applicable to laboratory situations for other students with disabilities. As stated by Bruweilheide (1981), "The major difference is developing instruction for special needs (disadvantaged) students is that it is planned for one individual with specific characteristics which may be handicapping or limiting in nature." My student reinforced educational theorists who have argued that, "Students with disabilities don't want to be made to feel as though they are different; they need help to develop ways of doing which compensate for their limiting situations."

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Renewing our Commitment

(continued from page 4)

But average was acceptable in school so nobody worried about that except the duck.

The rabbit started at the top of the class in running, but had a nervous breakdown because of so much make-up work in swimming.

The squirrel was excellent in climbing until he developed frustration in the flying class where his teacher made him start from the ground up instead of from the treetop down. He also developed a "charlie horse" from overexertion and then got a 'C' in climbing and a 'D' in running.

The eagle was a problem child and was disciplined severely. In the climbing class he beat all the others to the top of the tree, but insisted on using his own way to get there.

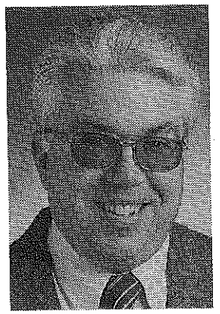
At the end of the year, an abnormal eel that could swim exceedingly well, and also run, climb, and fly a litttle, had the highest average and was valedictorian.

The prairie dogs stayed out of school and fought the tax levy because the administration would not add digging and burrowing to the curriculum. They apprenticed their children to a badger and later joined the groundhogs and gophers to start a successful private school.

Examine the facts, figures, and success stories of working with individuals with disabilities that are found in this issue and then consider the potential of similar success stories for your agriculture program. We must always remember that although our subject is agriculture, people (students) are the heart and soul of every program we represent. Let's challenge ourselves to positively contribute to the self-concept and self-esteem of individuals with disabilities who desire to be a part of an agriculture program. I urge you to take the time to read the excellent articles featured in this issue. Hopefully, they will empower you to take the extra initiative to work with an individual with a disability who is enrolled in your local program, and in the process enlighten your life.

[1]Reprinted with permission from Phi Delta Kappa. ■

Equine Facilitated Therapy



BY TRACY S. HOOVER, BEN H. NOLT, AND CHRISTINE J. DAVIDSON

Dr. Hoover (top) is assistant professor of agricultural and extension education at the University of Florida, Gainesville. Mr. Nolt is coordinator of 4-H therapeutic riding programs and Ms. Davidson is a senior in agricultural education at The Pennsylvania State University.

Horses have been a part of human life from the very beginning of time. The horse has served humanity in many ways, including work, worship, transportation, and war. Mention of riding for people with disabilities can be traced through the centuries. In early Greece, horseback riding was prescribed to improve the morale of otherwise untreatable people. In the 1600's, daily riding was recommended for cases of gout, and August Tissot, physician, insisted that it cured symptoms of tuberculosis. European medical writings as early as 1735 contained information on medical use of the horse (Ruddock, 1992). Research traced to 1875 in France shows that movements of the horse improve posture, balance, joint movement, and muscle control, as well as morale in humans (Cusack, 1988). However, therapeutic horseback riding programs were not started until the middle of the 1900's (Depauw, 1986). Horseback riding as a form of therapy has developed in many countries in the past 30 years. These programs were instituted in Europe and spread to the United States in 1967 (Brock, 1988). Today there are more than 450 programs operating in North America (Ruddock, 1992).

Opportunities for Agricultural Education

Equine Facilitated Therapy (EFT) offers agricultural youth organizations many educational and community service opportunities. Volunteering as a club or on an individual basis in an EFT program provides youth with exposure to and experience working with individuals with disabilities. This level of interaction can be a tremendous growth experience when students learn to place people before their disabilities. In addition to increased awareness about disabilities, many occupational opportunities are available within an EFT program. Career paths range from riding instructor to program administrator, physical therapist, and/or special education instructor. While there is exposure to many careers in an EFT program, students also realize the importance of volunteers to the viability and success of a program. EFT programs could not exist without the assistance of individuals who volunteer their time.

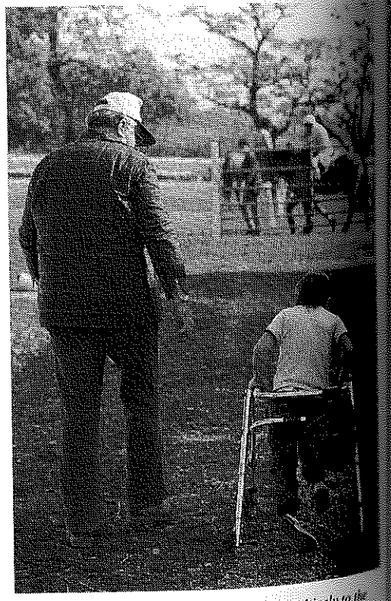
Who Can Ride

Equine Facilitated Therapy can provide individuals enjoyment, the thrill of competition, education, and emotional and physical therapy. However, both risks and benefits to the rider need to be considered before an individual with a disability begins EFT. Safety is a very important factor to consider. Some disabilities can be contraindications to EFT. Riding may exaggerate the disability or even be fatal. All individuals with disabilities who wish to participate in an EFT program must have a doctor's referral and a complete physical, medical, and therapeutic evaluation before beginning. It is also necessary that a qualified physical therapist and experienced riding instructor be part of the consultation team for the rider.

As stated by the North American Riding for the Handicapped Association (NARHA), therapeutic riding or EFT uses equine-oriented activities for the purpose of contributing positively to the cognitive, physical, emotional, and social well-being of people with disabilities. EFT provides benefits in the areas of sport and recreation, education, and medicine.

Therapeutic Riding Classifications

The following classifications reflect the three primary fields of therapeutic riding and their different orientations. Many programs utilize all three classifications in their delivery and instruction; however, they can be practiced individually.



Equine Facilitated Therapy contributes positively to the cognitive, physical, emotional, and social well-being of people with physical disabilities.(Photo courtesy of Steve F. Williams, Penn State.)

Sport

Equine activities can be adapted so people with physical, mental, and psychological disabilities can participate in sport activities with the horse. This includes riding, driving, and vaulting as types of recreation and competition. As riders learn the skills associated with the sport, they gain therapeutic and educational benefits. Therapeutic riding instructors are primarily responsible for the design and implementation of the program. Medical professionals, educational specialists*, and recreational specialists may also play a role in the development of skills (NARHA, 1992).

Education

The horse is also used as a tool to achieve

...ities can be adapted so people with physical, mental, and psychological disabilities. (Photo ...esy of Steve F. Williams, Penn State.)

educational objectives for individuals with disabilities. There is emphasis to incorporate cognitive, behavioral, psychological, and physical objectives in the program using riding, vaulting, and driving as the vehicle. The horse is a very effective motivational tool for accomplish ing these goals. Therapeutic riding instructors, educational specialists, and medical professionals are involved in the development and coordi

**(Medical professionals include physical therapists, occupational therapists, speech therapists, psychiatrists, psychologists, nurses, and physicians. Educational specialists include teachers, special education teachers, and adaptive physical education instructors.)*

nation of the lessons (NARHA, 1992).

Medicine

When EFT is used for medical purposes of therapy, it is called hippotherapy. The Greek word "hippos" means horse. While a majority of the EFT programs in the United States use the horse as a medical therapeutic tool, there are currently no licensed hippotherapists located in the United States (Ruddock, 1992). Using the horse as a therapeutic modality to achieve physical goals is accomplished by integrating principles of medical or psychological treatment into the lesson. Physical, occupational, and recreational therapists combine therapeutic exercise and related activities with the movement of the horse. Psychological specialists take advantage of the human-animal bond and developmental theory to treat individuals with emotional and psychological disabilities. The medical use of the horse involves a team of individuals consisting of medical professionals, the riding instructor, and the rider (NARHA, 1992).

North America's first EFT program was initiated in Toronto in 1965 when the Community Association for Riding for the Disabled was opened. The formation of the National Foundation for Happy Horsemanship for the Handicapped in Malvern, Pennsylvania, in 1967 was the start of EFT in the United States (Brock, 1988). North American Riding for the Handicapped Association (NARHA) was founded in 1969 and serves as an advisory and regulatory body for North American programs. Cheff Center, located in Michigan, is one of the largest facilities built for people with disabilities in the United States. It was built in 1970 and was the first facility built specifically for therapeutic horseback riding.

Equine Facilitated Therapy programs offer many opportunities to local agriculture programs and youth organizations. These programs can serve as the focus for community service activities (Project PALS, BOAC), fundraising efforts, and can serve as career exploration sites for students. Additionally, EFT programs have many operational and administrative functions that could meet the supervised agricultural experience component of an agriculture program. SAE opportunities exist in care and maintenance of the horses and facilities, serving as a volunteer for the lessons, assisting with the education aspects of a program, and helping with administrative duties. Individuals or programs interested in volunteering time, effort, and financial support can contact the North American Riding for the

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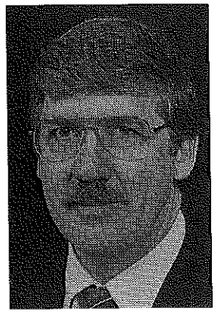
Horticultural Therapy



BY FRANCES REES AND MAYNARD IVERSON

Ms. Rees is a master's candidate in the Department of Adult Education and Dr. Iverson is associate professor of agricultural education at the University of Georgia, Athens.

In today's academic and business environment where change is the norm and adaptation the criterion for survival, creative exploration and experimentation are vital. No field of interest can endure without such an emphasis. It is the premise of this article that horticultural therapy offers a new connection between agricultural education and programs for "special" students, including the disabled.

Origins of Horticultural Therapy

Horticultural therapy is "a process which occurs when one uses gardening activities to improve human psychological, physical, educational, or social adjustment" (Mattson, et al., 1990, p.1:4). Although this is a very inclusive definition, it implies the all-important "people-plant" connection at the very heart of the process. This definition was derived from two sources: 1) a study of the history of gardening projects used to benefit patients with physical, mental, and psychological disabilities; and 2) an analysis of the root words.

One of the most vocal proponents of horticultural therapy, Dr. C. F. Menninger, used the term in the early 1900's to describe the type of therapy he found successful in treating psychiatric patients. He engaged patients in gardening projects and nature walks, believing that the increased and enhanced self-image which resulted "guided patients to some resolution of their problems by (their) experience in horticultural therapy" (Mattson, et al., 1991, p. 3). Subsequently, horticultural therapy has been integrated into medical settings, vocational rehabilitation programs, and projects targeted toward the general public for the purpose of therapy, training, and recreation.

Professional personnel who use horticulture to treat some human need are called horticulture therapists. Their clients range from institutionalized people who are under treatment in medical or rehabilitation programs to the general public who are receiving education, health, and/or wellness benefits. The literature on horticultural therapy indicates that patients can often relate to plants (nature) when they cannot relate to other people and/or cope with their environment. The concept implied is that horticultural activity provides a "bridge" for education, as well as communication.

Applications of Horticultural Therapy

In a workshop held at Kansas State University, Mattson, Pageler, and Diver (1986) outlined theoretical and applied aspects of successful horticultural therapy programs, as described below.

Planning

Participation is the key to successful horticultural therapy programs. Thus, motivating participants is the paramount strategy in program planning. The steps include those found in any instructional design: assess needs, define goals, specify objectives, implement the program, and evaluate. However, there are differences in emphasis. There is heavy emphasis on participant (client) assessment in clinical and rehabilitation settings. Further, client analysis is much more in depth, including physical condition, mental alertness, emotional state, self-image, interest level, and expressed needs. Participant strengths are emphasized and activities are tailored to enhance these strengths. Medical problems are downplayed to de-emphasize disabilities. Assessment is also more pervasive -- often occurring daily. Revision is emphasized and is constant, like trial and error testing. Since most horticultural therapy programs are individualized, plan modification is the norm, rather than the exception. It is also important to take into account the total environment of the participant in every aspect of the program. All equipment and the working environment must be adapted to fit the capabilities of participants. Planning must consider every detail that can add to or detract from participant comfort, satisfaction, and full participation.

Example Activities

1. Light Gardening. This non-strenuous activity involves groups of people in the care and enjoyment of plants outside of the greenhouse. Team building is a goal/result.

2. Flower arranging. This activity appeals to the physical and emotional needs of most people, especially the elderly and the young. A linkage is formed between flowers as cultural rites and expression of feelings. Immediate gratification, and evaluation of participant physical skills and emotional condition, and nonverbal means of expression are advantages of this activity.

3. Miniature landscapes. Self-contained environments (terrariums) are developed, thus empowering the participants and enriching →

their self-esteem. An alternative, creating a bonsai, gives the participant powerful stimuli of creating and managing a species until it reaches maturity.

4. Propagating plants asexually. A sense of responsibility and attention to process are developed in this activity. Benefits to special populations are: provides a means for relaxation and self-expression, gives hope for the future, and teaches a sequence of tasks useful in future jobs.

5. Germinating seeds. Various tasks involved in planting seeds and caring for seedlings are analyzed. Participants learn to discriminate among seeds, count, memorize, and understand the process of germination (scheduling, preparing growing medium, planting, watering, transplanting, hardening off, etc.). These activities require higher order learning and are appropriate for participants with all levels of capability.

6. Landscape design and construction. Both large and small projects involve a problem solving approach. The horticultural therapist serves as an intermediary between the environment, participants, and a designer/contractor.

Participation is the key to successful horticultural therapy programs.

7. Solar greenhouse. This activity involves adapting greenhouse activities and space to disabled participants, technical aspects of greenhouse construction and maintenance, and selecting and growing suitable plant materials.

8. Growing healthy plants. Care and maintenance of plants, both inside and outside, is the focus of this activity. Participants learn to nurture, which in turn meets their needs for a nurturing model.

9. Adaptive gardening. A variety of garden settings, based on the needs of special populations, might include vegetable gardens, water gardens, rock gardens, nature trails, sidewalk gardens, memorial woods, native plant trails, personalized room gardens (for shut-ins), community gardens, and children's gardens.

Implications

From the above discussion, it can be seen that many of the processes and procedures of horticulture therapy and horticulture instruction in agricultural education are similar. The fields are contrasted by focus: agricultural education teaches agricultural science (including horticulture) and related job preparation while horticultural therapy focuses on the plant/people relationship in the healing process.

Agriculture teachers have the technical expertise and the educational preparation and experience to collaborate in the operation of successful horticultural therapy programs. Most communities have great need for the benefits of horticultural therapy for a broad range of potential clientele. Agricultural educators' experience with adult education and community organizations provides a natural entree to such groups as retirees, handicapped persons in rehabilitation, and institutionalized handicapped. A good place to start might be to determine if an organized horticultural therapy program is available in the area. A telephone survey of medical, special education, and rehabilitation centers should provide a list of contacts for potential collaboration. Informal meetings with the personnel identified can lead to shared ideas, problems, and program development activities, such as preparing a grant proposal aimed at better serving the disabled in the community. From such humble beginnings, great things have been accomplished!

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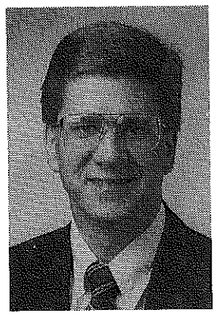
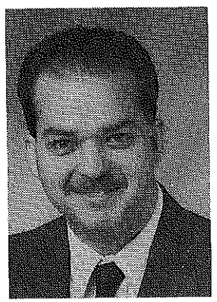
How Accessible is Your Agriculture Program?





BY BARRY DELKS AND BRUCE SILLERY

Mr. Delks (top) is a rural rehabilitation specialist for the Breaking New Ground Resource Center and Mr. Sillery is a graduate student in agricultural education at Purdue University, West Lafayette, IN.

Forty-three million individuals in the United States have a physical disability (West, 1991). Agriculture contributes to this figure by being rated as one of the most hazardous industries in the nation (Accident Facts, 1991). In fact, the agricultural production workplace exposes more young people to extremely hazardous conditions than any other. In the past, students with physical disabilities may have avoided agriculture classes because of inaccessible facilities. Others may have been advised not to participate in programs by those who believe agriculture is "just farming" and not a viable option for individuals with physical disabilities. Recently, there has been a major change that will affect the accessibility of agriculture programs. That change is found in the new federal legislation *Americans with Disabilities Act* (ADA). The ADA requires services and programs to be accessible to all individuals, regardless of the physical disability.

The New ADA Law

Many federal acts prior to the ADA have laid the groundwork for its enactment. *The Education for All Handicapped Children Act of 1975* — Public Law 94-142 addressed the exclusion of children with disabilities from public schools. *The Rehabilitation Act* (Section 504) prohibited discrimination against "otherwise qualified individuals with handicaps" in any program or activity receiving federal financial assistance. *The Carl Perkins Vocational Education Act of 1984* was intended to make vocational programs accessible to all students by supplying funds to update buildings and equipment.

On July 26, 1990 President George Bush signed the Americans with Disabilities Act. The ADA went into effect on January 26, 1992. Agriculture programs are required to comply under Title II — Public Entities of the ADA (Department of Justice, 1991).

Highlights of Title II state that public entities:

1. May not refuse to allow a person with a disability to participate in a service, program, or activity simply because the person has a disability.
2. Must provide programs and services in an integrated setting, unless separate or different measures are necessary to ensure equal opportunity.
3. Are required to make reasonable modification in policies, practices, and procedures that deny equal access to individuals with disabilities, unless a fundamental alteration in the program would result.
4. Must furnish auxiliary aids and services when necessary to ensure effective communication, unless an undue burden or fundamental alteration would result.

How Accessible is Your Classroom and Lab?

You may have asked, "Why do we need to make the agriculture classroom and lab accessible to all students? How you respond to the *Americans with Disabilities Act* to make your programs and classrooms accessible to students and teachers will determine how well you will meet the needs of others you have not served in the past.

Previously, if students with a physical disabilities were told that they could not be a part of the agriculture program, they might have just accepted this as a fact. Now with the ADA in place, agriculture teachers have the opportunity to provide equal access to services and programs for all people, regardless of the physical disability.

Supervised Agricultural Experience Programs

Providing supervised agricultural experience programs for students with physical disabilities can be challenging. However, because all public entities and public accommodations are required to comply to ADA guidelines, many new opportunities will become available to students with disabilities. Assistive technology and equipment modifications can be made both in the agricultural production setting and in business and manufacturing.

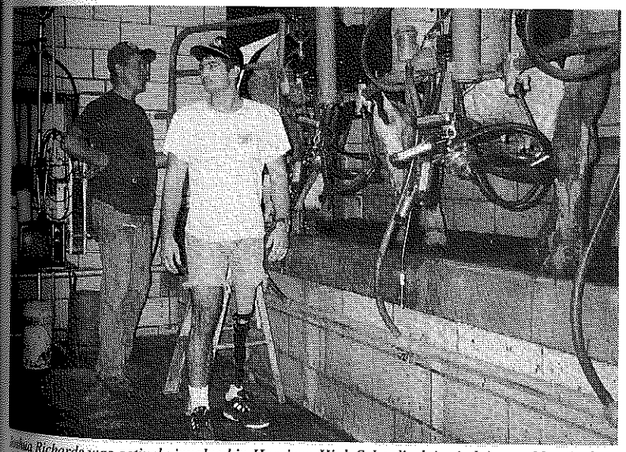
When attempting to create ideas for worksite accommodations, the Job Accommodation Network (JAN) can be very useful. JAN (1-800-JAN-7234) can provide information about appropriate accommodation, such as a computer screen reader, audible carpenter's level, and others.

While visiting with agriculture teachers in Indiana, many examples were seen of students with various disabilities successfully participating in agriculture programs. Following is an illustration of how an agriculture student and FFA member has overcome barriers to become actively involved.

Joshua Richards is a 1992 graduate from Harrison High School, West Lafayette, Indiana. Joshua was a sophomore at Harrison High School when his left leg was amputated because of osteosarcoma (cancer). Joshua continued to be active in the FFA program, participating in dairy judging and horticulture laboratory. Joshua is well respected by his peers and teachers and encourages other students with disabilities to "do what you want to get involved", believing "there's nothing you can't do." Joshua's positive attitude, with the support of his parents and his employer, have attributed to his success in school and work.

Dave and Julie Byers employ Joshua on their dairy farm. Joshua performs all tasks on the farm without any modifications. He expresses gratitude for the Byers' support in allowing him the time to relearn many jobs on the farm after having his leg amputated.

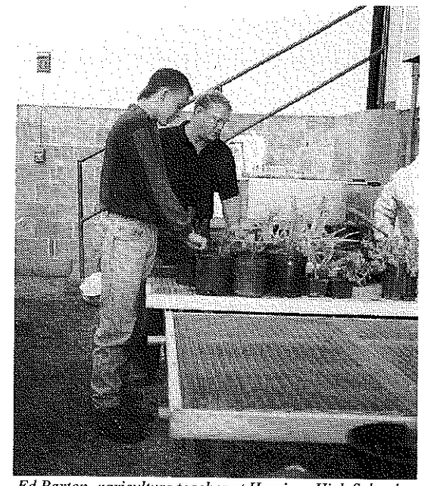
Joshua now attends Indianapolis University and plans to become a teacher. He is on the wrestling team and continues to come home on weekends to assist with chores on the Byers' dairy farm.



Joshua Richards was actively involved in Harrison High School's dairy judging and horticulture program, as well as working on the Byers Dairy Farm.

What Can Be Done Through the FFA

While many agriculture programs have successfully incorporated students with physical disabilities into their classrooms, it is important to remember that this is just a portion of the program. Many activities occur outside the school setting. As agricultural educators, it is important when planning field trips or judging activities, that accessible transportation and facilities be available if needed. Instructors should contact state and national FFA associations for ideas and assistance when a student with a disability will be participating in any judging contest that may be inaccessible. If a program is completely inaccessible and causes an undue financial and administrative burden to make it accessible, then alternative methods may be considered. For example, soil profiles could be pulled and located at one central location for a soils judging contest.



Ed Paxton, agriculture teacher at Harrison High School, says "having a willing attitude to provide materials and programs in an alternative site may be important in overcoming some barriers."

Many states conduct an organized FFA camp. In order to make camps accessible to students with disabilities, a priority list should be made. Start out by making the most commonly used building at the FFA camp accessible. Then, as funds are available, remove architectural barriers as required.

What You Can Do To Help

- Become aware of students with different types of disabilities who may desire to become involved in your agriculture program.
- Be willing to provide programs and activities in an alternative accessible site when architectural barriers seem insurmountable.
- Perform a "self-evaluation" of the class rooms and facilities using ADA guidelines cited earlier in this article. This is not a comprehensive form, but rather a tool to start the process of self-evaluation.
- Create an ADA file. You may want to include:
  - A copy of the Accessibility Guidelines

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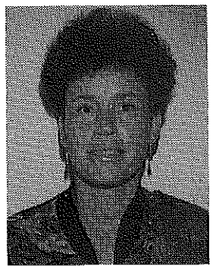
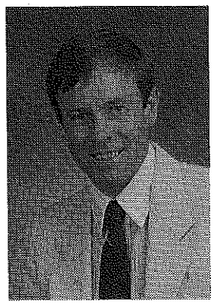
Agricultural Education for the Mentally Handicapped





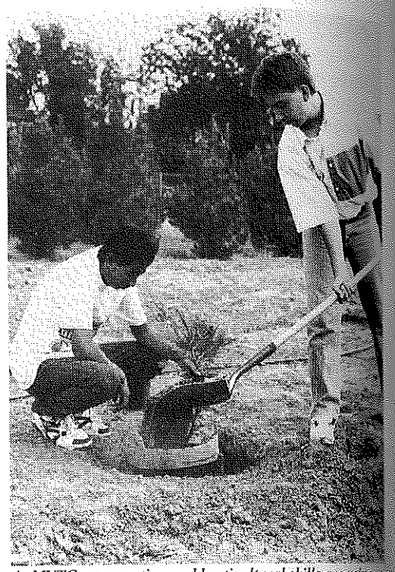
BY LINDA PHILLIPS AND TOM DORMODY

Ms. Phillips is a special education instructor in horticulture at Mesilla Valley Technical Center and Dr. Dormody is an assistant professor of agricultural and extension education at New Mexico State University, Las Cruces.

The Mesilla Valley is a flourishing agricultural community in sunny southern New Mexico located only 45 miles north of the Mexican border. The growing town of Las Cruces is the home of New Mexico State University and the hub of the valley's activities. The Las Cruces Public School District is characterized by a 56% population of bilingual hispanic students, many of whom live in remote rural areas of the farming community. The unemployment rate for the general population is quite high. Approximately 35% of the adults in the county have not finished high school, and recent surveys show that students graduating from the special education programs are not equipped with the skills and social behaviors necessary to compete effectively in the local job market. It was for this reason that special education administrators, teachers, and parents in the district created a plan for developing a training center that would enable handicapped students to gain skills needed for a more successful transition into the world of work.

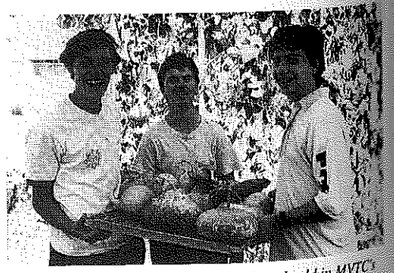
In the fall of 1985, Mesilla Valley Training Center (MVTC) opened it doors as a "hands-on" training facility for mentally handicapped secondary public school students. These students attend academic classes at one of the three local high schools for half of each school day and attend MVTC for job training experience for the other half of the day. At MVTC, the students strive to improve their employability skills by rotating through one of four diverse programs each nine-week period of the school year. These include building trades, home living skills, industrial arts, and horticulture. All of these programs have been designed to teach skills that are compatible with the job market of the local community.

Each student has an individual educational plan developed to meet his/her particular needs. Program and job activities are tailored for individual students in order to allow them to achieve their objectives. Mentally handicapped students learn more readily through the utilization of concrete, hands-on activity rather than the presentation of abstract concepts. Therefore, teaching techniques utilized at MVTC include the use of modeling behavior,



At MVTC, cooperation and horticultural skills are reinforced by many learning activities like planting trees in bags for later digging, potting, and sale.

with a strong emphasis on the three-step approach of "say, see, do", the use of repetitive step-by-step verbal and visual cues, and peer teaching. Having older or more experienced students teach and supervise students as they learn a new task has proven to be very reinforcing for both students involved. All students receive financial compensation for their work commensurate with the quality and quantity of their production and their behavior on the job. Available monies are limited to the profits →

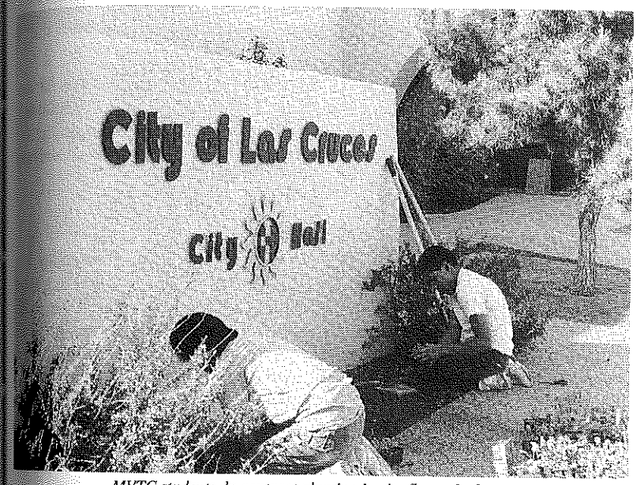


Gourds are grown, dried, decorated, and sold in MVTC's retail shop.

made through students' labor and sales.

The horticulture program has been developed to meet individual student goals through seasonal activities that are compatible with Mesilla Valley's agriculture. For many years the valley has been well known throughout the country for its production of high quality chile, pecans, and onions. Although these crops are still a high priority in the valley, the fast-growing population has increased the demand for more urban horticulture activities, such as the growing of bedding plants and other landscape plant material.

The overall goal of the horticulture program at MVTC is to improve students' employability skills by allowing them to experience a wide range of horticultural activities. Maintenance



MVTC students do contract planting in city flower beds.

of a one-acre pine plantation allows students to be involved in the complete process of sowing seed, transplanting to the field, irrigation, fertilization, weed and insect control, harvesting, and retail sales. Contract work with the city of Las Cruces enables students to participate in the growing of seasonal bedding plants in the school's new 25'x30' greenhouse and then transplanting these plants in prominent beds throughout the city. This type of activity fosters in students a sense of community pride, while allowing the community to see that mentally handicapped people can make a worthwhile contribution to their community.

Evergreens and perennials grown in containers in a lath house are offered for sale to the public throughout the school year. In order to further involve the surrounding community with the training center, MVTC has a small retail sales store that opens during the Christmas season, allowing the public to purchase gift items crafted in each of the four programs. The horticulture program sells natural craft items of southwestern style created with school-grown crops such as gourds, luffas, pine cones, Indian corn, dried flowers, and chiles. With the addition of the new greenhouse, additional flowering plants will be sold around other holidays as well. Other future plans for the horticulture program include regular maintenance of houseplants in the district's central office, organization of small crews to do tree planting for private individuals in the community, and contract growing of seedlings for area farmers and building contractors.

As both the state and federal government continue to mandate the implementation of transition programs that will enable our special education students to be more successful on the

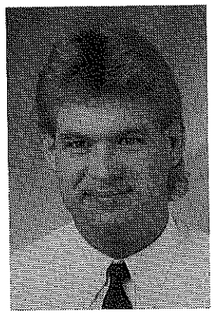
Regardless of a person's ability or disability, there is a lot of pride in a job well done.

job, it is essential that school districts seek innovative methods to achieve this goal. Many legal factors and guidelines must be considered before such a program can be established. Inclusion or mainstreaming of the students with regular education students for at least part of the day is essential. The logistics of scheduling complete busing services makes transportation both extremely costly and tedious. Short term objectives for students must meet the overall goals as developed in their individual education plans. Despite the inherent difficulties associated with initially setting up such a program, the benefits for students and the community can be great. It is essential that the program be developed to fit the needs of the local job market. In communities where agriculture is important to the economy, there are wonderful opportunities to incorporate a wide variety of agricultural activities into a successful educational program for special education students of all exceptionalities. ■

About The Cover...

Equine Facilitated Therapy can provide individuals enjoyment, the thrill of competition, education, and, emotional and physical therapy. (Photo courtesy of Steve F. Williams, Penn State)

Breaking New Ground with Farmers and Ranchers Who Have Physical Disabilities



BY PHILIP B. ALLEN

Mr. Allen is a graduate student in agricultural education and assists with the Breaking New Ground Resource Center at Purdue University, West Lafayette, IN.

Farming is more than a career or a job. Farming is a way of life. Many farmers currently work and/or live on the same farm their father and grandfather farmed. Therefore, it is important to understand that when farmers incur disabling injuries, their lives may be changed forever—but this doesn't mean they want to change their lifestyles.

In 1979, a severely disabled farmer contacted Purdue University's Department of Agricultural Engineering and requested assistance on how he might be able to modify his agricultural equipment and facilities to enable him to continue his chosen occupation—farming. This initial contact was instrumental in the establishment of the Breaking New Ground (BNG) Resource Center, which has become internationally recognized as a primary source of information on rehabilitation technology relating to farming and ranching with a physical disability. In a partnership of funding via the Indiana Easter Seal Society, the United States Department of Agriculture, and Purdue University, the BNG Resource Center established an Outreach Program that provides specialized rehabilitation services to farm and ranch families throughout the nation. The BNG Outreach Program is committed to increasing public awareness of disability issues in rural areas and providing input concerning public policies which affect farmers and ranchers with physical disabilities.

Why Is The Program Needed?

Production agriculture is ranked as one of the most hazardous occupations in the United States. According to the National Safety Council, there were over 1,300 deaths and 120,000 disabling injuries due to agriculturally related accidents in 1991 (Accident Facts, 1991). Each year approximately 300 spinal cord injuries occur to agricultural workers, and more than 2,000 work-related illnesses are caused by toxic gases, chemicals, dust, sun, noise and other farm hazards (Wilkinson, 1989).

Excluding tractors, agricultural machinery is responsible for 17.6% of all agricultural work-related injuries. A study involving 35 states showed that 47.5% of all work-related injuries involving agricultural machinery resulted in a permanent injury (Purshwitz & Field, 1990).

Besides machinery, many other factors present hazards causing agricultural work-related injuries and fatalities. Some of those include or involve the following: tractor related, smothering and asphyxiation, falls, cutting and trimming trees, electrocution, livestock, fires and burns, and drowning (Wilkinson, 1989). Production agriculture is an occupation that presents many hazards.

The BNG Outreach Program assists farmers and ranchers with many disabling conditions, including spinal cord injuries, amputations, arthritis, strokes, back injuries, visual and hearing impairments, and others.

What Barriers Exist?

After experiencing a physical disability, farm operators must make the decision as to whether they can continue their chosen profession. This situation presents hardships for the farm operators, as well as their families. Depending on their individual disability, a variety of modifications may be needed to their home, farm, and farm equipment in order to accommodate their disability. After incurring a disability, the farm operator will have to consider whether it is economically feasible to continue the farming operation. In some cases it may be necessary to hire additional labor in order to farm with the same productive intensity as in the past. It may be necessary for the farmer to diversify the farming operation by incorporating new or alternative enterprises which will make jobs easier. In many instances farm operators decide to pursue their careers on the farm. It is the belief of BNG that most farmers who experience a disabling injury would prefer to continue farming over any other occupation.

A significant problem facing farmers and ranchers with physical disabilities is that they often do not know where to turn for assistance in their efforts to re-enter their chosen profession, farming or ranching. The BNG Outreach Program was developed as a vehicle whereby information and technical assistance is provided to farmers and ranchers with physical disabilities. Breaking New Ground is vital in providing training and resource materials to farmers and ranchers with physical disabilities. In many cases, these farmers and ranchers do not live near a large city that provides services for the disabled. Therefore, it is imperative that such a program exist in order to disseminate information essential to aiding the physically impaired in the rural setting. In 1991 the BNG Outreach Program responded to more than 10, 000 inquiries for information pertaining to disability resource materials, and recommendations about assistive technology. This alone illustrates the significance of determining the educational and training needs for farmers who are physically impaired. →

What Services Does BNG Provide?

1. Access to the BNG Resource Center

The center has a wide variety of resource materials covering topics such as worksite modifications, adaptive tools, and rural independent living skills. BNG also publishes a newsletter on a quarterly basis which is sent to more than 8,000 farmers, ranchers, and rural rehabilitation professionals throughout the United States. The newsletter is available, upon request, to any agriculture instructor. The Resource Center also has technical manuals, reports, and audio-visual materials available for purchase.

2. On-Site Visits

To assist in making the farm worksite or home accessible, individuals from the BNG Resource Center are available to make on-site visits. From this, an agricultural worksite assessment is conducted, recommendations are made for possible modifications, relevant resource materials are provided, and/or a referral is made to other specialist or agencies who can provide assistance.

3. Public Awareness

The BNG staff is available to conduct a limited number of exhibits at rural events such as health fairs, county fairs, field days, and machinery show. Besides working in conjunction with such events, for the past two years agricultural education has been responsible for an exhibit at the National FFA Convention and Career Show in Kansas City. BNG exhibits may include one or all of the following: a wheelchair disability awareness course, a tractor donated by Case IH that is equipped with an electric lift, or a mobile rural assistive technology van. The purpose of the exhibits is to increase public awareness concerning disability issues and to expose rural residents to available resources.

4. Mobile Rural Assistive Technology Van

With support from the U.S. Department of Education and the Indiana Division of Aging and Rehabilitation Services, a van has been put into service that is equipped with a variety of adaptive aids to demonstrate how assistive technology can lead to greater independence. Adaptive aids include a wheelchair lift, three-wheel motorized scooter, and other aids that enable people to be more independent in self-care and work tasks. Members of the Purdue University Agricultural Education staff are now utilizing the van by taking it to Indiana high schools for presentations to agriculture classes and FFA programs upon request of agriculture instructors.

How Can Agricultural Education Make an Impact?

At the local level secondary agriculture teachers can complement the BNG program by incorporating a strong safety program in their classes. Students should be made aware of their potential for injury when working in agricultural occupations. If students realize what hazards exist, their chance of avoiding injury may be increased. They can identify those hazards on their farm or ranch that exist. Young farmers also need to be advised about potential injuries and challenged to assist farmers or ranchers in their community who have a physical disability.

The FFA chapter can also be utilized as a means of educating its members and the agricultural community through safety training programs and assisting individuals with physical disabilities in the rural community. Teaching resources are available that focus on farm safety, farm hazards, and farming with a disability. In many cases, farmers or ranchers who have a physical disability and live in your community may be utilized as guest speakers to discuss their individual disability and accomplishments. Agricultural education and the FFA can be a dominant driving force in agriculturally related injury prevention and disability awareness.

The last verse of the agricultural educators' creed from the NVATA states, "My love for youth will spur me to impart something from my life that will help make for each of my students a full and happy future." It is our responsibility as educators to realize that we have a duty to help our students enjoy a full and happy future. It is important that students and the rural community be informed about the hazards they face when working on the farm or ranch. Equally meaningful is that students are informed about disability issues and their implications. This awareness allows agriculture programs and the FFA to better structure programs and activities that meet the needs of fellow students or members in the community who have physical disabilities.

Through agricultural education, the BNG Outreach Program can continue to inform professional audiences, the general public, and agricultural communities about services and assistive technology available to individuals with physical disabilities. →

How Accessible Is...

(continued from page 13)

from the Department of Justice (202-514-0301).

- The ADAlliances newsletter produced by the Center on Education and Work at the University of Wisconsin. This newsletter is published with the goal to disseminate information that will encourage vocational educators and employers to work together to implement the ADA. The newsletter can be obtained by calling (608) 263-4151.

What Are Priorities?

The task of making agriculture programs accessible can be overwhelming. As a top priority, access should be provided to all program facilities (labs, classrooms, parking lots, bathrooms, etc.), giving special attention to curbs and doorways. Provide assistive devices or interpreters as needed. Some fairly simple changes can be made to bring facilities into compliance with the ADA. Signs can identify accessible doors, bathrooms, and parking spaces. Doorbells can alert you that someone needs your assistance but cannot access your classroom (in multi-level buildings, for example). Placing a cup dispenser next to the water fountain can provide drinking water without lowering the fountain. Clipboards can be used when work tables or desks are inaccessible or too high.

Alternative Methods of Providing Programs

Public entities (which include schools) are required to complete a self-evaluation by January 1993. Modifications to remove architectural barriers are to be completed by 1995. However, it may be impossible to make all modifications desired because of "undue financial and administrative burden." Alternative methods for providing services and programs may include:

1. Redesign of equipment or materials used by students. For example, a student with a mobility impairment could use a retractable pole pruner to assist with pruning in an apple orchard.
2. Provide an aide or personal assistant to enable a student with a disability to participate in a program. For example, have someone available to read a pamphlet to a visually impaired student or have a person available to reach materials located on a high shelf or publication rack for someone who uses a wheelchair.
3. Provide programs or activities at an individual's home or an alternative accessible site.

The *Americans with Disabilities Act* provides the opportunity for agricultural educators to involve many new students. Removing architectural and attitudinal barriers will allow students with disabilities to fully participate in agricultural education and FFA programs throughout the United States.

For more information, call or write to: Breaking New Ground, Purdue University, 1146 Agricultural Engineering Building, West Lafayette, IN 47907-1146; (317) 494-5088.

Agencies available for assistance on the ADA include:

Eastern Paralyzed Veterans Association (716) 856-6582	Great Lakes Disability & Technical Assistance Center 1-800-729-8275
U.S. Architectural & Transportation Barriers Compliance Board 1-800-USA-ABLE	U.S. Department of Justice (202) 514-0301

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Breaking New Ground...

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Anyone interested in obtaining information about the BNG Outreach Program, services, or resources it provides should contact:

Program Coordinator
Breaking New Ground Outreach Program
Purdue University
1146 Agricultural Engineering Building
West Lafayette, IN 47907-1146
1(800) 825-4BNG

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Special Populations: Need, Size and Nature

by ROBERT E. PETREA

Petrea is project manager for a Kellogg-funded Agricultural Safety Project in the Department of Agricultural Engineering and doctoral candidate in agricultural education at the University of Illinois, Urbana-Champaign.

Special populations. The term can conjure up as many thoughts as people that hear it. Many of these thoughts would follow the words of the Apostle Paul:

> Now we who are strong ought to bear the weakness of those without strength and not just please ourselves. Let each of us please his neighbor for his good, to his edification. (Rom 15:22)

However, there are others that would not fit that spirit. As both a review and update, the following will present considerations that led to the inclusions of special populations in vocational education, the overall size of this population, and information on the nature of this client group of interest to agricultural educators.

The major considerations for including special populations in vocational education can be broken into two categories: societal demands and economic considerations. The basic question of whether special populations are to be included in vocational education has been answered with a resounding yes. At least from the date of the *Vocational Education Act of 1963* and the *Civil Rights Act of 1964*, populations with disabilities have been the emphasis of several pieces of legislation. The two most current in this lineage, the *Americans with Disabilities Act* (P.L. 101-336) (ADA) and the reauthorized and redirected *Carl D. Perkins Vocational and Applied Technology Education Act of 1990* (P.L. 101-392) (Perkins), are both continuations of the mandate to provide the inclusion of those covered into the mainstream of everyday life. In agricultural education the Strategic Plan for Agricultural Education should be taken to include special populations in both the Mission Statement and in the Goals(especially numbers two, three and four). Also relevant to local departments would be the primary purposes of school for the state in which they are located, the mission of the local school, and lastly, the instructor's own professionalism. There is really no choice on the inclusion of special populations in agricultural education.

The economic considerations include the many cost/benefit studies that show rehabilitative training to be worthwhile. One study put the returns at $10 or more in lifetime earnings for every dollar expended. In this same vein, the cost of dependency of the unemployed that are disabled is estimated at over $100 billion per year. Another economic factor is that youth labor supply is expected to continue to decrease for at least another decade. There may actually be more opportunities for persons with disabilities to enter the work force. Employers will seek to hire those they formerly regarded as marginal because of the ADA requirements, as well as the shortage of workers. The preparation for employment of *all* those able not only decreases government assistance but also increases tax dollars and personal productivity.

Currently, approximately 10% of all school-aged children qualify for special education services. For 1989-90 this was more than 4.6 million students (Office of Special Education Programs, 1991). For the year 1989-90 at least 7.1% of the nations' 16 year olds, 6% of the 17 year olds, and 3.4% of the 18 year olds (OSEP, 1991) were receiving special education services. According to the National Assessment in Vocational Education (NAVE) High School Transcript Study of 1987 (HSTS) (Hayward and Wirt, 1989) of handicapped students for the 1986-87 year, 5.47% (nearly 235,000) of all 11th graders in public high schools were enrolled in special education. The HSTS is currently the only investigation that has looked on a national scale at the course enrollment behavior of high school students with handicaps. Among the handicapping conditions, approximately one-third have physical disabilities and two-thirds experience mental impairments (learning disabled, behavior disorder, etc.). Also, more than 80% have disabilities such that they may be mainstreamed into regular classrooms.

How do these figures relate to secondary agricultural educators? Again, from HSTS the following summaries can be made.

Handicapped students earned 27% of their total credits in vocational education. Non-handicapped earned 18.3% of their total credits in vocational education.

Handicapped students took 81.7% of their vocational education in regular classrooms. They took only 59.5% of their academic course work in regular classrooms.

Academically disadvantaged (those students whose grade point was less than 2.0 on a →

4.0 scale) earned 23.6% of their total credits in vocational education. Advantaged students (those students whose grade point was 3.0 or over) earned only 12.1% of their total credits in vocational education.

From Hoachlander (1991) the following additional statistics are available:

99.2% of handicapped students took vocational education, while 97.2% of non-handicapped students took vocational education.

17.0% of all handicapped high school graduates took at least one course in agriculture, and 7.7% of all non-handicapped students took at least one course in agriculture.

In total, 8.0% of all graduates took at least one course in agriculture, while 12.5% of males and 3.8% of females took at least one course in agriculture.

By ethnicity, 5.8% of Blacks, 4.1% of Hispanics, 0.4% of Asian, 10.5% of Native Americans, and 9.4% of whites took at least one course in agriculture.

As these numbers indicate, the traditionally under-represented groups in agricultural education remain so. The numbers also indicate that vocational educators feelings that they seem to have a lot of students with special needs is accurate. In Illinois for the school year 1990-91, the actual numbers of special populations students taking agriculture in the secondary schools were 1,576 handicapped, 45 LEP and 4,502 disadvantaged. They represented 52% of all secondary students that took agriculture. The redirection of the Perkins legislation toward districts with the highest concentrations of low income families would seem to indicate that the current Illinois numbers are likely to remain that way. Also, specific information on the economically disadvantaged will slowly become available. Other general indicators seem to confirm the notion that the past is no longer with us. The following are from the National Center for Educational Statistics, 1991:

65% of the young worker population in 2000 will be Blacks, Hispanics, other minorities, and white women.

In the year 2000, an estimated 17.4 million adults will be classified as LEP.

Minority enrollment in elementary and secondary school rose to almost 30% of the total population in 1986.

From 1976 to 1986, Asian/Pacific Islander student numbers increased 116% to over 1.1 million.

Hispanic students now make up almost 10% of the total school enrollment.

Black children are three times as likely and Hispanic children are 2.6 times as likely as white children to live in poverty.

In 1988, 59% of children in poverty lived in female-headed households.

In 1988, more than one-fifth of all eighth graders came from households with incomes less than $15,000 per year, and about the same percent came from single-parent families.

These statistics present a composite picture of those students likely to be taking vocational education from both perceived usefulness and from legislative encouragement. Additionally, it is possible that agricultural education will increasingly draw from students with this label.

The inclusion of special populations in agricultural education is a fact of life, and the numbers with the option of taking agricultural education will continue to grow. The basic question of how to deal with these special populations remains problematic. Other articles in this issue have dealt with specific techniques. As instructors are inundated with "labels" concerning more and more of their students, a temptation may be to concentrate on the label and not the person attached to it. The term "special" is perhaps a misnomer for those so labelled. They are no more special as persons than any other student in the class and in fact are very similar; they are all individuals with similarities and differences. The very same problem solving approach that leads to applied learning and cooperative learning is as effective for those labelled "special" as for those not so labelled. The assistance needed to meet student differences within the special population may be from special education personnel, rather than another outside-the-classroom resource person, but the aim is the same. The aim is to make the same content applicable to all students so that they may eventually take their own productive place in society.

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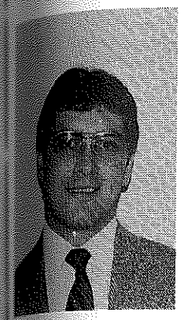
Research on Teaching

What Affects Student Learning?



By George Wardlow

Dr. Wardlow is associate professor of agricultural and extension education at the University of Arkansas, Fayetteville.

Johnny can't read; Melissa can't spell; Matt can't add or subtract; and America can't compete in a global society. We have heard it all. Who gets the credit when students do well? Who gets the credit when they do poorly? For better or worse, teachers pretty much get both.

How much effect does a teacher have on student learning? What other factors contribute to student learning? To begin to answer these questions, we should first consider a model for understanding the teaching-learning process proposed by Mitzel in 1960 and illustrated by Dunkin and Biddle in 1974.

When we think of "student learning," most of us think of student-teacher interaction in the classroom. This interaction is intended to produce some observable changes in "student behaviors." These changes, such as student acquisition of new knowledge or skills, then serve as the basis for evaluation of student learning. Teachers hope that they are affecting and measuring immediate student growth in learning the subject matter, and that they have affected both student attitudes and growth in other skills. Further, teachers hope that these changes will somehow create long-term effects in the students' adult personalities and the development of professional or occupational skills.

Mitzel, and then Dunkin and Biddle, labeled the interaction of the student and teacher behaviors, and the subsequent, immediately observable changes in student behaviors, as **process variables**. They labeled the expected, short-term student growth and long-term outcomes, which carry into adulthood, as **product variables**. As educators make changes to improve student learning, we often focus most of our attention on the process variables. After all, these are the factors with which we most closely work. We can "teach something" and then attempt to measure its effects in terms of student changes.

Do the activities of a single teacher have a significant effect on the adult lives of each student? To answer this, imagine all the teachers in all the years in the life of a student. To confound the problem further, imagine all the other "learning" situations which a student encounters in a lifetime. Further, in terms of producing long-term changes in students (the product variables), we can only hope for success, because we have little opportunity to measure how what we have done for students has affected their lives through adulthood. The activities of a single teacher make up only a portion of the complex formula that produces changes in students.

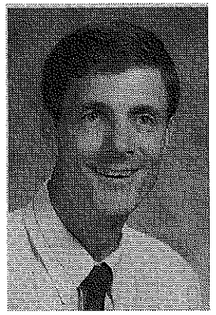
Thus far, we have discussed only one-half of the formula for producing student effects, according to Mitzel. We know that all students do not come into the classroom process equally equipped. Neither do teachers. Have you ever borrowed a teaching technique that worked quite well for another teacher and then absolutely flopped when you tried it? According to Mitzel, the "classroom behaviors" of a teacher, which interact with student classroom behaviors to produce student learning, are affected by a multitude of factors in the teacher's backgroung. These factors are determined long before the teacher ever sets foot in a classroom.

"Teacher formative experiences", such as one's age, gender, or the social class in which they grew up, affect how they interpret life events. These experiences "frame their window to the world." They also affect their teacher training experiences, which include choice of college attended, features of the teacher education program, and preservices teaching experiences. These sets of experiences affect one's "teacher properties," which include teaching skills and motivations. These properties relate to intelligence and personality traits. Each of these sets of experiences, which the teacher possesses before entering the teaching-learning situation, affects teacher behaviors in the teaching-learning process. They are called **presage variables**.

Students' formative experiences (age, gender, and social class) and learner properties (abilities, knowledge, and attitudes) affect what they do in the classroom. Further, the social-community context in which the classroom (the school) is located has an effect on the teaching-learning process. Factors such as the social climate for education in the community, the ethnic composition of the community, the size of the school, the types of educational materials available, and the underlying philosophy about

(continued on page 23) →

Food Science and High School Agricultural Education



BY STEVE MILLER

Mr. Miller is an agriculture teacher at Conrad Weiser High School, Robesonia, PA.

A hallmark of agricultural education has always been the teacher's ability to have students discover and then pursue competencies and topics relevant to career interests. We are smack in the middle of a highly challenging era of adaptation to new discoveries in agriculture.

However, many agriculture teachers find they aren't as adequately trained in a formal sense to meet these challenges. How many teachers with 10-15 or more years of teaching experience took courses in genetic engineering, plant tissue culture, or food science? Most of us realize by now that career opportunities for our students have changed and will continue to change. We are aware of the fact that careers requiring basic science and applied science backgrounds are wide open, and that being raised on a farm is not a prerequisite for career entry or success.

So, what units of instruction do we need to add to our curriculum that will really help our students succeed? What will attract students to applied sciences in agriculture that will help fill the career paths open in the agricultural industry and satisfy our students' career goals? How do we prepare ourselves to teach these new units competently? Dr. Dean Sutphin, Associate Professor of Agricultural Education at Cornell University, made an excellent point in the October, 1992, issue of *The Magazine*. He wrote, "The science of agriculture can provide a connective fabric to link subject matter across the curriculum." I believe that food science is one of those applied agricultural sciences that meets Sutphin's criteria and can help answer, in part, the questions raised earlier. It is my assignment in this article, and in future feature columns, to zero in on how units of instruction in food science can be added to the agriculture curriculum.

Why Teach Food Science?

1. Food science represents a multidisciplinary subject.
2. There is viable career opportunity in food science.
3. Food science is interesting and practical.
4. Food science can be helpful in other courses our students will study.

These are criteria that are important in selecting any unit to be taught in agriculture. The more students can use competencies, scientific facts, and vocabulary in several other classes (other agriculture units and chemistry, biology, history, etc.), the more they will dig in and master them. When this occurs the first or second time, our students will take a fresh look at the units offered in our programs. It is important for us to reinforce this natural link between the basic sciences of chemistry, biology, and physics and the applied sciences of agriculture. Woven through this link with the basic sciences is the very important connection to career opportunity.

Our role as teachers of agriculture is certainly not to replace the basic sciences of chemistry, biology, and physics, but to enhance their importance. Moreover, we can add a touch of reality to the basic sciences. Even more importantly, we can show the career potential that lies in a bachelor's degree or technical training in the agricultural sciences. The better our agriculture students understand biology, chemistry, and physics, the more they have to offer science-based careers available in the agricultural sector.

Getting Started

If your state has organized inservice courses in food science, by all means take them. If inservice opportunities have been slow to develop, **you take the lead**.

Make the Contacts

Dr. James Howe, agriculture teacher at Oley Valley High School, took the initiative just five years ago. We called the Food Science Department chair, Lowell Satterlee, at Penn State and made an appointment to see him while we were on campus for our annual agriculture teachers conference. He wasn't exactly sure how he could help a couple of "vocational agriculture" teachers at first - but he listened. Once he realized we had students that were interested in attending college, and that we wanted to add food science to our curriculum, his ears perked up. Food science departments, with the assistance of the Institute of Food Technologists (IFT), have been trying with limited success to get the attention of high →

school students for several years. They targeted high school chemistry and biology teachers first and were trying to attract their talented students to look at food science as a major. Once Dr. Satterlee realized we were for real - that our students were capable and worth pursuing - he gave us full support. Our expected 15 minute meeting lasted over an hour. We left with a pile of reading materials, local contacts, and a promise to help in any way he could. He made good on that promise. Dr. Satterlee and several more staff members have been involved in a number of agriculture teacher inservice programs. We can't thank them enough for all of the help they have provided.

The bottom line is - if you want expert advice, go directly to the experts. I've had similar experiences with two other departments at Penn State when new units in agriculture were being researched. Getting started means getting current information directly from the source. Stay in touch and develop contacts. Then, **go back to school**.

Further Training

The inservice classes are a good start. They can help us realize what food science is. It isn't long before we realize many areas we are currently teaching are already set up to add food science instructional units.

However, the best firsthand information can be received directly from "the horse's mouth." Contact your university's agricultural education department **and** your food science department to arrange for the introductory food science course to be taught to a group of agriculture and science teachers. Try and set up graduate credit for it so you can take advantage of salary step increases. These professionals will expect you to pass written exams and do extra work to earn the graduate credit. If you want to be able to teach new units in agricultural science with competence - **get the proper training**. Don McNutt, my fellow teacher at Conrad Weiser, and I took the course and found it invaluable. The text that is used is broad-based and multidisciplinary. I guarantee that with a little thought and some investigation you will be ready to add food science to your units of instruction at each grade level.

The next step is to arrange for some independent study credits from your university's agricultural education department. Spending extra time on school work is always more palatable when you get paid for it. Get your graduate advisor to help you take full advantage of tuition reimbursement and graduate credits for salary step increases while adding **meaningful** upgrading to your high school agriculture classes. ■

Research on Teaching

(continued from page 21)

education and its value to the social structure each have an effect on the teaching-learning process. These factors are called **context variables**.

Our social system expects teachers to have significant impact on the long-term well being of today's youth. In light of the number of factors which affect the teaching-learning process, what is the likelihood for success for all students?

In this short article we have explored only one model for understanding the complexities of the teaching-learning process. If we as teachers are to make significant improvements in this endeavor, we must begin to understand our role in the complex formula. From this understanding we can develop the wisdom to change those things which we are capable of changing and be attentive to those things which we cannot change.

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Equine Facilitated Therapy

(continued from page 9)

Handicapped Association, PO Box 33150, Denver, CO 80233, (303)452-1212, for information related to local EFT programs.

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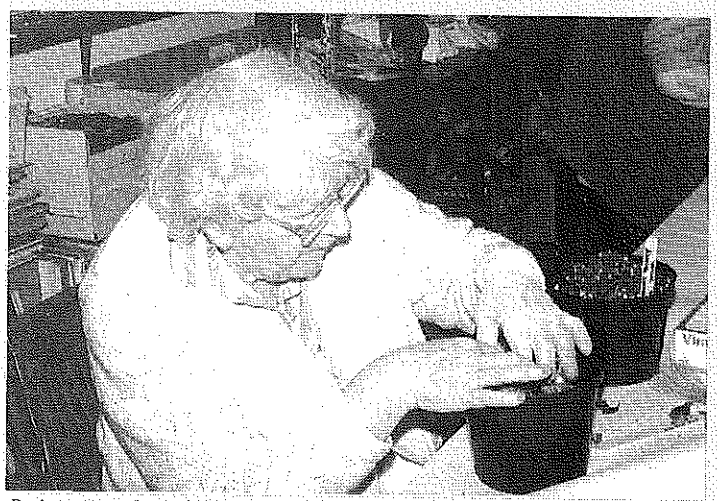
STORIES IN PICTURES

Serving Individuals With Disabilities



Patients can often relate to plants when they cannot relate to other people or cope with their environment.

Horseback riding as a form of therapy has been developed in many countries the past thirty years. (Photo courtesy of Steve F. Williams, Penn State.)

Upcoming Themes

Issue	Theme	Theme Editor
April	Teaching Agrimarketing	Dr. Jim Leising University of Cali Davis
May	Lab Facility Improvement	Dr. Glen Miller University of Ariz
June	Agricultural Educators in Non-School settings	Dr. Al Mannebach University of Connecticut
July	Strengthening Programs	Dr. Earl Russell University of Illino