THEME: Agricultural Education 2025
Table of Contents

EDITOR'S PAGE ........................................ Phillip R. Zurbrick 3

THEME: Agriculture Education — 2025 ........................................... Lou E. Riesenberg 4

Agricultural Education: First Twenty-Five Years of the Third Millennium ........................................... Larry Powers 9

Weathering the Thunderstorm of Change Toward the Year 2025 ........................................... Martin J. Frick 12

Outlook 34 Years from Today ........................................... Michael K. Swan 13

The Swing of the Pendulum ........................................... Lou E. Riesenberg 12

The Purpose Behind the Tool — A Philosophy ........................................... Marcus G. Bietia 16

Developing Skills for the Future ........................................... Shannan R. Lierman 18

ARTICLE

Using Readability Formulas ........................................... Mary G. Hitchner 22

FEATURE COLUMNS

Computer Technology Resources ........................................... Gaylan Scofield 5

Agricultural Mechanization ........................................... W. Wade Miller 8

Historical Review ........................................... John Hillison 20

Book Review ........................................... David L. Howell 21

STORIES IN PICTURES ........................................... 24
Agricultural education has for years espoused the idea of teaching problem solving and has endorsed the technique of problem solving as a teaching methodology. Given the emergence of problem solving as an accepted teaching methodology and the fact that the ability to solve problems is a nearly universally acknowledged outcome for all educational programs, it seems sacrificial to question problem solving in an educational journal. However, it may be like so many things that have become institutionalized — people accept them without question and often without even bothering to understand the concept or institution.

Who would have the audacity to suggest that education should not develop a student’s problem solving ability? Further, it would be hypocritical for an agricultural educator to propose that problem solving be anything more or less than the modified scientific problem solving technique; after all agriculture is an applied science. Every elementary school student learns the steps in the scientific process. The first step in the process is to identify the problem. The next step is to analyze the problem and identify possible causes of the problem situation. Based upon the analysis, problematic solutions are proposed and steps taken to test each in turn until the problem is logically and happily solved. Wouldn't it be nice if life were so simple and straight forward!

It is time for agricultural education to become more sophisticated in teaching students how to solve problems and recognize that there is more than one logical approach. Blindly teaching students to solve all problems using the reductionist approach is inaccurate, ineffective and misleading. We are in effect doing our students a disservice if we teach them to solve all problems using the reductionist, scientific approach, or if we leave the impression that this is the only acceptable approach via our failure to mention or acknowledge other methodologies.

Problem solving techniques are diverse and wide ranging. Often times accepted techniques are associated with certain cultures, life styles and/or religious persuasions. It does not require much discussion of some of the “right brain” approaches to spark name calling and other forms of demonstrative behavior by individuals in traditional western societies. Students in this country are so inculcated with the reductionist approach to problem solving, it is little wonder that the “left brain” has not developed to the point where the head needs to be carried on the left shoulder!

Reductionist problem solving behavior is based upon one crucial assumption and that is the problem must involve a simple cause and effect relationship. If, for example, a tree is not producing an acceptable quantity or quality of fruit (the problem), we begin looking for the cause. We check the level of soil fertility, adequacy of moisture, age of tree, presence of plant pests to name a few possible causes of the problem. Based upon our analysis of the results, a course of action is selected which eventually solves the problem or reduces the unease. Agriculturalists have had so much success in using this technique in working with the plant and animal problems that it is easy to erroneously assume it will work in all problematic situations. Such is not the case!

Problems involving complex, messy social problems are good examples of the type of problem for which the reductionist approach is not suitable. Land zoning and water utilization are examples of these kind of problems. Another example would include the numerous attempts to provide assistance to developing countries in solving food and fiber problems by importing technology that seemed to work in another country. Importation of pesticides to control plant pests might seem to be a perfectly logical solution to a pressing problem. If the importing country does not possess the knowledge and equipment to deal with the pesticide, it often fails to solve the pest problem and may create even greater problems resulting in human death and misery. Such problems require a holistic, systems approach to problem solving.

This approach known as the “soft systems methodology” has recognized steps of techniques just as the scientific method involves distinct steps. The soft system starts by recognizing an unease or problem situation. Themes and roots of the unease are identified by using “mind maps” and “rich picturing” techniques. Based upon these inputs a root definition for the unease is generated and conceptual models constructed. The conceptual models are then compared with the real world situation. Desirable and feasible changes are debated among those directly involved. Eventually, the changes are implemented in an attempt to reduce the unease. The soft system methodology does not generally solve a problem, but perhaps the most that can be expected, if carried out properly, is to reduce the unease. For most complex, messy social problems reducing the uneasiness is perhaps as much as could be expected. The key to the soft system method is an understanding and awareness of the natural and man-made systems involved in a situation. The person using the approach must be able to sense the interaction of the various systems. The soft system method of problem solving has contributed to the concept of “appropriate

(Continued on page 11)
Agricultural Education — 2025

Will agricultural education be available to the students in our public schools in the year 2025? If agricultural education is still in our public schools in the year 2025, what will be its form and substance? We do not know, but . . . !

It seems reasonable to assume society would survive if agricultural education was discontinued at the secondary, postsecondary and the university level. To assume differently would be quite pretentious.

However, it would not be pretentious to assume the lives of the students that have and will participate in agricultural education would be considerably different; the lives of those students would have less value to the individual and less value to the constituent society in which those students participate.

Without agricultural education, less value would be added to the lives of those students, value that cannot be added by any other form of education or training. While the previous statement may be very bold to some, those of us in agricultural education believe it to be fact. Notwithstanding, agricultural educators encounter some difficulty when attempting to convince the rest of society of the value added by agricultural education.

American society invests in public education for two basic reasons. Individuals are important to our society, and therefore, as with health and safety, we provide some form of public education to each individual within our society. Education is good for the individual. The education of individuals of our society is also good for society as a whole. The publicly supplied education adds value both to the individual and also to society as a whole. American society has never wavered on this matter since public education was instituted.

Agricultural education will be a part of the secondary school curriculum for a long time to come.

Educational literature seems to suggest three distinct high school curriculums — college preparation, general and vocational. Much ado is made about the fact that these curriculums do exist and are distinct. Many discussions about curriculum delegate the responsibility of certain educational objectives to each of these factions. For example, the responsibility of certain educational objectives is usually delegated to the vocational faction, as if the college bound and generalist will never make a career choice. Development of entry-level employment skills is also assigned to the vocational arena. The responsibility for social development is given to the general curriculum. Insuring the success of the college bound student is usually the province of the college preparation curriculum.

Obviously, these concepts are treated somewhat superficially here; but the point is, this arrangement (distinction of curriculum) is very convenient when components of curriculums are discussed for discussion's sake. However, when components of those curriculums, such as agriculture, are evaluated for contributions to the overall objectives of the secondary school, the categories are not very practical or useful.

Tomorrow, the forward-looking, modern secondary agriculture program will be comprehensive and will be designed to provide social development, occupational exploration and job preparation. It will contribute considerably to career and general education. And for the student enrolling in a university agriculture curriculum, a high school agriculture program will be a valuable background.

For some students, secondary agriculture will provide the technical competencies and human relation skills to enter directly into the agribusiness job market or into production agriculture itself. This entrance will not be achieved with the background of a nine-week exploring agriculture program. Agreed, the number in this category will be small, but where will these students develop the competencies if there is no secondary agriculture?

Tomorrow's comprehensive secondary agriculture programs will provide students with opportunities to apply competencies gained from a broad spectrum of high school disciplines. Through both the classroom study and student's supervised occupational experience program, the principles of biology, mathematics, economics and communications will be applied in the most "real world" situations available to high school students short of dropping out of school and entering the real world.

The modern secondary agriculture program will also emphasize values, work ethic, problem-solving skills and decision-making abilities. The student will not be successful in his or her supervised occupational experience program unless she or he is adept at goalsetting, problem solving and decision making. Again, it should be stated that these skills and/or abilities will be practiced in "real" situations.

The modern secondary agriculture program will stress development of social and leadership competencies in public speaking, parliamentary procedure and other organizational activities. The program will promote cooperation and competition. For competitive events, every student will receive basic preparation in the classroom; and through additional concentrated training, every student will have the opportunity to achieve to the level of her or his ability.

(Continued on page 7)
Computer Technology Resources
Designing an Effective Spreadsheet

Spreadsheet templates (or programs) are great “real life” learning tools for your students. They are ideally suited for problem-solving and decision-making. Ideas for spreadsheet templates can be found in many places (farm magazines, extension publications, tax forms, sales pamphlets). The following example spreadsheet template is developed using the AppleWorks spreadsheet. It allows students to compare the performance of three different farms. It can easily be adapted to any spreadsheet for any brand of computer. When designing a spreadsheet template you should follow these rules.

A. Build flexibility. Spreadsheet templates should be flexible. Flexibility can be achieved by avoiding constants in formulas. Using cell references will make the spreadsheet template easier for students to use and understand. Include instructions that describe how to use the spreadsheet template. The instructions should be placed within the working area, or “hidden” off-screen (to the right of the work area). If they are “hidden,” tell the user to issue two Open-Apple-Right-Arrow commands to jump to the instructions and to repeat the command using the Left-Arrow to return to the work area.

B. Use segments. Design the spreadsheet template in segments. Breaking the template into segments makes it easier for students to use and understand. Use meaningful labels for each segment. Prepare the template with separate input and output segments. The user will enter data into the input segment and will view and/or print the results in the output segment.

C. Check for accuracy. Always have someone else try your template. This will insure accuracy for formulas and also give you input as to the clearness of your instructions. Remember, templates should be easy to use. When you are finished designing the template, always leave the cursor in cell A1 before saving. This assures that the template will load at the beginning.

**Farm Analysis Example.** Use the following information to write a template for farm analysis. Write your template using the cell locations and information listed.

| Column widths: A=29, B=2, C, D, E=14 |

<table>
<thead>
<tr>
<th></th>
<th>Sunny Fields</th>
<th>Green Rolling</th>
<th>Meadows</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross Revenue</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn acres</td>
<td>71,818.50</td>
<td>64,597.50</td>
<td>70,745.50</td>
</tr>
<tr>
<td>Total Gross Revenue</td>
<td>$86,215.35</td>
<td>$77,460.30</td>
<td>$86,795.50</td>
</tr>
<tr>
<td>Variable Costs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seed, fert. etc</td>
<td>33,774.00</td>
<td>30,079.50</td>
<td>36,059.50</td>
</tr>
<tr>
<td>Corn acres</td>
<td>8,644.32</td>
<td>7,145.60</td>
<td>9,671.25</td>
</tr>
<tr>
<td>Total Variable Costs</td>
<td>$42,418.32</td>
<td>$37,225.10</td>
<td>$45,730.75</td>
</tr>
<tr>
<td>Interest on oper. capital</td>
<td>$1,606.70</td>
<td>$1,420.80</td>
<td>1,735.30</td>
</tr>
<tr>
<td>Fixed Costs (equipment)</td>
<td>$24,405.16</td>
<td>$24,094.54</td>
<td>$19,556.29</td>
</tr>
<tr>
<td>Overhead Charge</td>
<td>$3,393.47</td>
<td>$2,978.01</td>
<td>$3,658.46</td>
</tr>
<tr>
<td>(as % of variable costs)</td>
<td>$92.44</td>
<td>$109.03</td>
<td>$65.84</td>
</tr>
</tbody>
</table>

**FARM ANALYSIS INSTRUCTIONS:**

1. Column widths: A=29, B=2, C, D, E=14

2. Press Open-Apple down-arrow two times to move to the input area and three times to move to the output area. Type in the necessary information for the inputs. An example has been provided for your analysis. After reviewing the example, type in your information for comparison. The inputs and outputs. The printout will fit on one page for easy recalculate frequency off, press Open-Apple K twice after completing the input segment and will view and/or print the results in the output segment.

3. Flexible. Flexibility can be achieved by avoiding constants in formulas. Using cell references will make the spreadsheet template easier for students to use and understand. Include instructions that describe how to use the spreadsheet template. The instructions should be placed within the working area, or “hidden” off-screen (to the right of the work area). If they are “hidden,” tell the user to issue two Open-Apple-Right-Arrow commands to jump to the instructions and to repeat the command using the Left-Arrow to return to the work area.

4. Use segments. Design the spreadsheet template in segments. Breaking the template into segments makes it easier for students to use and understand. Use meaningful labels for each segment. Prepare the template with separate input and output segments. The user will enter data into the input segment and will view and/or print the results in the output segment.

5. Check for accuracy. Always have someone else try your template. This will insure accuracy for formulas and also give you input as to the clearness of your instructions. Remember, templates should be easy to use. When you are finished designing the template, always leave the cursor in cell A1 before saving. This assures that the template will load at the beginning.

**BY GAYLAN SCOFIELD and W. WADE MILLER, SPECIAL EDITOR**
(Mr. Scofield is Agricultural Education Instructor, West Marshall Schools, State Center, Iowa.)
(Dr. Miller is Associate Professor, Department of Agricultural Education and Studies, Iowa State University.)
2. Cell Information: Type in the following as you would in the word processor for the instruction segment.

3. A1: FARM ANALYSIS INSTRUCTIONS: A3: Press Open-Apple Down-Arrow two times to move to the input area and three A4: times to move to the output area. Type in the necessary information for A5: the inputs. An example has been provided for your analysis. After A6: reviewing the example, type in your information for comparison. For A7: Farm names may be changed to reflect field numbers, etc. A9: Variable costs include seed, fertilizer, lime, herbicide, insecticides. A10: Tillage and planting costs, labor and harvest costs. Fixed costs A11: includes all machinery fixed costs. A13: To print your completed analysis with inputs, print the BLOCK containing A14: the inputs and outputs. The printout will fit on one page for easy A15: analysis (using default print options, 0" top, bottom, left and right A16: margins, single space and 10 characters per inch. If you turn auto- A17: recalculate frequency off, press Open-Apple K twice after completing the A18: inputs.

Input segment. A20: FARM ANALYSIS A22: INPUTS:
1. Indent two spaces before typing information in cells A23 to A35.


Output segment. A37: OUTPUT AREA:
1. Right justify A42, A43, A47, A48, A49, A53, A60, A64, A66


C40 to E40: (fill with "---") C45 to E45: (fill with "---") C58 to E58: (fill with "---") C69 to E69: (fill with "---")

C72 to E72: (fill with "==")

3. Formulas: C42: (C24*C26)/C28 C43: (=SUM(C42..C43) C48: (=SUM(C30*C26) C49: (=SUM(C27*C31) C50: (=SUM(C48..C49) C53: (=SUM(C26..C32) C54: (=SUM(C27*C33) C55: (=SUM(C53..C54) C57: (=SUM(C25..C27)) C60: (=SUM(C26..C27) C34 C63: (=SUM(C26..C27)) 35 C66: (=SUM(C50..C55)) 36: (=SUM(C26..C27)) C70: (=SUM(C44..C68) C71: (=SUM(C70/C26..C27))

4. Copy the formulas in column C to column D and E.

Answer relative each time.

Check your work. The following answers for the example data are listed in order (Sunny Dale, Green Acres and Rolling Meadows):
1. Gross Revenue: Corn acres: 71,818.60, 64,597.60, 70,745.50. Bean acres: 14,396.85, 12,882.80, 16,050.00.
3. Variable Costs: Corn acres: 33,774.00, 30,079.50, 36,059.50. Bean acres: 8,644.32, 7,145.60, 9,671.25.
4. Total Variable Costs: 42,418.32, 37,225.70, 45,730.75.
5. Interest on operating capital: Corn acres: 1,688.70, 1,428.90, 1,775.30. Bean acres: 445.05, 361.20, 483.75.
6. Total Interest Cost: 2,113.75, 1,790.10, 2,259.05.
8. Fixed Costs (equipment): corn + bean acres, 8,606.40, 6,563.70, 9,660.00.
9. Land Charges: corn + bean acres: 7,392.00, 6,619.95, 8,190.00.
10. Overhead Charge (% of variable costs): 3,393.47, 2,978.01, 3,658.46.
12. Returns to Mgt. Risk: 24,405.18, 24,094.54, 19,556.29.

Per acre: 92.44, 109.03, 69.84.

Conclusion. Now that you have the necessary tools to develop an example spreadsheet template, set aside a couple of hours and build it on your computer using your favorite spreadsheet program. Use it with your students. Ask the "what if" questions that allow for problem solving and decision making teaching and learning. Spreadsheet templates can be useful, realistic, vocational, practical, challenging and fun! If you find you cannot get your template to work, you may send a 5½" disk to: Wade Miller, AGEDS Department, 217 Curtiss Hall, Iowa State University, Ames, IA 50011. Specify either AppleWorks or Microsoft Works (MS-DOS) version. We will send a copy of the template to you.

About The Cover
The cover of this month's issue was supplied by Theme Editor, Dr. Lou Riesenberg, Associate Professor and Head, Department of Agricultural and Extension Education, University of Idaho.
Agricultural Education — 2025
(Continued from page 4)

To provide the student with a "real life" situation in which to practice and improve the aforementioned competencies, tomorrow's secondary agriculture program will encourage each student to be a participating member of the local FFA Chapter. For exploration alone, involvement will be critical. The value of this experience for many different occupations will be attested to by many individuals from many occupations.

Tomorrow's modern secondary agriculture program, through its comprehensive curriculum, will provide the student with a broad spectrum of experiences because agriculture will not pertain only to farming and ranching; it will also involve manufacturing, sales, service, management, marketing, communications, science and technology. The secondary agriculture student will develop competencies useful in many occupations other than the field of agriculture. Also, the student will gain vocational competencies useful for the rest of his or her life.

Tomorrow's modern secondary agriculture program will continue to deal with the basic competencies and skills in agriculture. Students of this age level will still assimilate facts and data much more easily than theory. This exposure to and experience with basic facts and data will provide a concrete basis for the study of the theory and technology of agriculture which the student will have to master if he or she continues at a postsecondary school or university. In this way the secondary agriculture program will be a valuable background for advanced study.

So where will secondary agriculture fit? Will it be vocational? Will it be general? Will it be of benefit to the college bound? Will it prepare for life? Will it be career exploration? Will it prepare students for jobs? Will it be vocational for those students who desire it?

These questions can better be answered by more questions. Will there be students who want the program? Will there be students who need the program? Will there be students who can benefit from the program? Approximately 800,000 students in 8,000 secondary agriculture programs in the nation should serve as some indication. Secondary agriculture is an elective, not a required subject. But, as has been pointed out, tomorrow's secondary agriculture program will have to meet many of the objectives of required coursework in the high school.

Some educators criticize secondary agriculture programs for not being completely open entry. However, the comprehensive nature of the program will be its greatest asset. To break down the comprehensive program to allow easier entrance for some students will destroy the continuity for the students already enrolled. This will be especially true for single-teacher programs. The very fact that the successful program will build on previous work (as do other disciplines) will be of paramount importance.

Critics who espouse the claim that all agricultural education should be delivered at the postsecondary or university level, should also have to answer to the students who do not continue past secondary school. Why should these students be compelled to continue their formal education to gain access to agricultural education? Will there be enough postsecondary and/or university programs that can offer a comprehensive agriculture program to even 25% of the secondary enrollment?

To be sure though, agricultural education will change significantly. But the question remains, "How will agricultural education change?" If someone were able to forecast the future, that individual would be an invaluable asset to whatever profession she or he belonged. However, most of us have to rely on events and trends of the past, as we see and interpret them, to give us an insight into the future. It is, perhaps, better to identify factors we think will have an effect on the future and prepare contingency plans for those factors.

If the overall objective of secondary education will be to prepare youth for their role in society and if one can assume that this objective will never be completely met, that is, there will always be room for improvement, then it is inevitable that the new educators coming into the profession will attempt to improve the situation they have inherited. They will attempt to improve the situation by applying new methods. These new methods will lead to change in how programs are delivered. This, of course, is not to say that all of the changes will improve secondary education, however, simply because of the fact that new educators will be coming into the profession and will be applying their ideas to the problem will make for change.

To cope with this phenomenon, agricultural educators will have to be prepared to be change agents and have the capabilities to use the inevitable change to their advantage rather than to take the position, "If it ain’t broke, don’t fix it."

As was indicated, the reason change will take place is that the new practitioners will apply "their" methods to improve the system. This change will take place. Do we fight it? If we do, we in agricultural education will lose. We will have to recognize that significant change will take place during our tenure. We may be able to identify many faults with the changes taking place, but we as an agricultural education profession, even with solidarity, will not be able to stop this change because we are and will be only a very small part of the total education profession and process.

Another element influencing the future direction of agricultural education is the image and the knowledge of the agriculture industry and the job or professions within that industry. Much has been said in the past about the decline in enrollment being heavily influenced by the image or knowledge young people have of agriculture. One of the basic problems is we do not have a good handle on what young people think of agriculture and jobs within, and who influences or helps shape that image. It has been said that parents, mass media, counselors and administrators have a tremendous influence. Do we have information that we consider reasonably factual to use in devising a strategy to overcome the problem?

We need to obtain more factual information as to what potential students think of agriculture and jobs within the field of agriculture. We will also need better information as to who or what influences the image young people have. If we can gain this information we can develop a strategy to improve or counteract that image.

(Continued on page 17)
Agricultural Mechanization
A Model of Technology Transfer

By Joe G. Harper, Special Editor
(Dr. Harper is Associate Professor, Department of Agricultural Education, Clemson University.)

Second, the overall quality of the instructional materials was excellent. A successful program is dependent upon quality instructional materials as well as quality people. With the recent developments in technology it is increasingly important to utilize only top quality materials. Our students are constantly experiencing high technology materials through mass media. If our materials appear to be outdated and substandard, then it is difficult to instill and maintain interest, let alone present current technology. The instructional package developed by Spraying Systems was very marketable because of the overall quality of the materials.

Third, the timeliness of the information provided related to the environment. The 1990s have been expressed as "The Decade of the Environment". We must pay particular attention to the needs and interests of our society and especially the local community. The instructional package on sprayers contained information related to both personal and environmental safety. The effective instruction of affective behaviors is a critical element for teaching technology.

Fourth, the applied approach to technology transfer used problem solving strategies and the latest technology. As we all have experienced, it is difficult at times to teach young people to solve problems. At first we seem to have a narrow, let's get out the calculators to solve something, approach. Being about to solve all kinds of problems in a variety of formats is a very important learning process which our students need to experience. Technology transfer instruction is based upon those critical thinking processes related to problem solving.

Fifth, many groups cooperated. Several institutions of higher learning provided workshops and teacher in-service programs for teachers. The National Agricultural Mechanics Committee was involved early on with the program. This Committee has representatives from about every state, and is familiar to many of you as the group that conducts the National FFA Agricultural Mechanics Contest and develops the understandings and performances listed in Bulletin Four. This group performs other activities related to technology transfer instruction and recognizes the overall potential of the program model.

For many years we have recognized the need for industry involvement in our instructional programs at all levels. These levels represent students in high schools, technical schools, community colleges, universities, adults, as well as agricultural educators. There have been many successful programs in the past; however, at this stage we should pay particular attention to this recent program because it exemplifies many of the things we need to do and demonstrates possible strategies for accomplishing our instructional goals.

Spraying Systems developed the instructional package for teaching the basic principles and practices of calibrating agricultural sprayers. Many of you used these materials in your instructional programs this year. While not a perfect program, the instructional program was a resounding success which was very well received by just about everyone. What were the key factors that allowed this instructional package to be such an effective instructional program in agricultural mechanics?

First, and probably foremost, the program was developed with industry input and support. I hope that other industries will take note of the success of this program. In order for technology based education to be successful, it absolutely must have industry support. Cooperation between industry and education is necessary when developing and implementing programs of technology transfer. Our programs of agricultural mechanics should be viewed as instructional programs which teach people how to use and apply technology in the agriculture industry. Conceptually, that is a much broader perspective than our traditional concept of competency skill development. Industry involvement is the key factor which will allow us to expand our horizons in technology transfer instruction about agriculture. All of us should support 100 percent, the efforts of industry to develop and implement instructional programs. We need their support!
Agricultural Education: First Twenty-Five Years of the Third Millennium

If you had a crystal ball or some type of super talent that would enable you to accurately predict the future — what do you think the future would be like? If we were able to accurately predict the future, it would allow us to plan and make the necessary adjustment that would improve the overall quality of life for every American.

However, this is not currently possible. We cannot predict the future, but we can analyze the present and past and develop some ideas relative to what the future holds. A number of scholars have attempted to predict the future by studying the present and past. Nostradamus, an astrologer, attempted to predict the future by studying the future arrangement of the universe (stars, planets, etc.). Many scholars believe that he accurately predicted such events as World War II, the rise and fall of Hitler, the assassinations of the Kennedys and Dr. Martin L. King, and more recently, specific events occurring in the Middle East.

More recent scholars and futurists include John Naisbitt, author of Megatrends: Ten New Directions Transforming Our Lives and co-author of Megatrends 2000: Ten New Directions for the 1990s. In the book Megatrends 2000, Naisbitt and Aburdene predict changes in society and the world and how these changes will affect our lives now and in the future. The authors of this article thought it fitting to review some of the ideas of Naisbitt and Aburdene to develop the focus for Agricultural Education by 2025. The book by Naisbitt and Aburdene takes a comprehensive approach to addressing society and the world; however, the authors will select specific germane points pertinent to this article for discussion.

Three points discussed by Naisbitt and Aburdene that the authors would like to discuss are Global Society, the utilization of biotechnology, and changes in the workplace.

The idea of a Global Society suggests that we exist in a world community. This is evidenced by advances in technology/biotechnology, communications, information, transportation, production and marketing systems. Advances in these systems allow us to communicate all over the world and produce and market products across geographic, cultural and/or political barriers. These changes have given old words new meaning, i.e., global pricing, global economy, information age, cultural nationalism, high-tech/high touch, etc.

Biotechnology is a buzz word used in many academic, social, political and technological and industrial settings. A generally accepted definition of biotechnology is that it is "a new science that focuses on manipulating and modifying plants and animals using recombinant DNA and other new technology such that it can produce a product it ordinarily would not produce."

By Larry Powers and Francis Walson
(Dr. Powers is Assistant Professor, Dr. Walson is Principal Investigator, Agricultural Education, North Carolina Agricultural and Technical State University, Greensboro.)

This new science is having a tremendous impact upon our daily lives. Many believe that biotechnology holds the key to solutions to many health, agricultural and environmental problems; however, it presents some serious concerns and implications for the same. In addition to the concerns listed above, many also believe that biotechnology presents concerns relative to religion and ethics. While discussing biotechnology, Naisbitt and Aburdene (1990) stated:

Biotechnology is becoming a powerful presence in our lives, yet most of us know very little about this massive scientific phenomenon and even less about its social and ethical implications. Biotechnology will eventually make it possible to identify and manipulate inherited characteristics. And that's the scary part. While biotechnology suggests awesome contributions to the improvement of life, it also raises questions that make people very uneasy.

Students are studying biotechnology concepts and technology in agriculture.
Implications for Agricultural Education

In an attempt to plan and implement an agricultural education program that will meet the needs of students and the community, state and national education planners must address three basic areas — teacher education, curriculum development and teacher in-service. These three areas address three basic questions that should be answered if appropriate educational experiences are to be provided for students. Who shall teach? What shall be taught? What shall be the nature and content of in-service?

Who shall teach? Currently, agriculture teachers are prepared by the universities and the licensor process is administered by the various state departments of public instruction. As the American society changes, so shall the role of the agriculture teacher. If agriculture teachers are to be adequately prepared, teacher preparation must change to keep pace. The universities should take the leadership for providing prospective teachers with the necessary experiences in biotechnology, high tech subjects and advanced teaching methods and strategies. Agricultural education administrators and faculty will systematically review admissions, student evaluation and exit policies; student teaching will be extended to one year with pay.

The changing demographics suggest that teachers should have continuous cultural and sensitivity training as the classroom will become the melting pot of students from culturally diverse backgrounds. Lawrence Lezotte (1989), in his research on effective schools, indicated that "by the year 2000, America will be a nation where one of every three citizens will be nonwhite." Teachers should be knowledgeable of various cultural traditions and norms as not to project ideas that may be deemed ethnocentric.

The population will be older and the role of the educational leader in the community will be renewed significance for agriculture teachers. With the focus on the production of healthy and safe food and the preservation of the environment, the role of the agriculture teacher for providing instruction in and about agriculture should be a tremendous one in the future. According to Kahler (1985), the future will require adults to continuously renew and update their skills as a result of changing jobs or changing technology.

Agriculture teachers can expect a renewed emphasis on adult education activities. Agriculture teachers should be well educated with respect to adult learning theories, procedures and practices.

Who shall be taught? This is not a very complex question to address. Many scholars indicate that discipline content may change with the development of new information, but they agree that the basic principles of teaching and learning remain the same. This question directly refers to content of the agricultural education curriculum. Given that society is dynamic and that we live in a world community, the content of agricultural education should drastically change in order to meet the needs of students. The curriculum to the year 2025 should address and focus on the following:

1. The teaching of concepts. To prepare students for change, they must be able to grasp basic concepts that provide the foundation for change. Bruner (1982) called this the "all encompassing idea" emanating from his curriculum theory, "spiral curriculum." Bruner (1982) also stated:

What learning general or fundamental principles does is to ensure that memory loss will not mean total loss, that what remains will permit us to reconstruct the details when needed. A good theory is the vehicle not only for understanding a phenomenon now but also for remembering it tomorrow.

Given that we live in an information society and that new information is constantly being generated, it seems inappropriate to teach students an array of facts and figures that will be obsolete by the time they are out of school.

2. The new science should be the order of the day. Teachers teaching production agriculture from a purely production perspective will be long gone by the year 2025. Given that agriculture then and now operates on the premise of more output for less input, the new science offers the appropriate approach for achieving this goal. Agricultural Education should focus on the new science, the commensurate, professional and technical careers being developed in the process. This is a very critical point because production agriculture as we know it will not exist in the year 2025. Farming in the future will require highly educated persons who will be able to work with and understand tremendously complex materials and processes. By the year 2025, technology would have solved many of the production problems associated with pollution, processing, packaging, storage, marketing and transportation. By the year 2025, it will be possible to
3. Change, adaptability and flexibility will be the order of the day. Teachers should be taught to develop critical thinking and problem solving skills. In order for teachers to teach, execute and demonstrate these skills, they must possess them. Teachers and students will require a broad knowledge base composed of a variety of theories, concepts and principles to engage in critical or problem solving activities. Teachers will require a broad based education to respond to needs of the students.

4. Leadership is projected to be a critical area in the future workplace. Teachers are considered instructional leaders. Agriculture teachers should develop critical leadership and human relations skills. Individuals in the future are projected to not respond to authority like they have in the past. Agriculture teachers must focus on enhancing their role of instructional leader in the school and community and help students develop leadership skills that will help them to work efficiently and cooperatively in the workplace. Teachers should spend more time on developing those affective characteristics that focus on success in the workplace and society.

What shall be the nature and content of teacher in-service? The university will serve as the center of academic activity for agricultural education programs with respect to teacher in-service and preparation, and will provide research results for policy making. The universities should develop an organized, systematic and ongoing approach for teacher in-service. Research, evaluation and follow-up should be an integral part of this process. This approach should include policy makers, agricultural scientists, university administrators, agribusiness and industrial leaders, local school administrators and agricultural teacher educators.

Summary

Education in and about agriculture will be an important concern in the future. The production of healthy/safe food and fiber and the issues surrounding it will continue to be major concerns for the world community. Just as society is changing, so are the people with respect to attitudes, values and traditions. The development and implementation of an effective and appropriate agricultural education program through the year 2025 will require aggressive leadership, long term planning, and adequate resources. Such a program will require a commitment to the improvement of the quality of life for all, guided and directed by specific goals.

References

Problem Solving?

(Continued from page 3)

Students utilize the computer to study advanced technology in agriculture.

Students need to develop an understanding of the soft system methodology and the ability to know when it is appropriate to use it. An ability to identify the various systems involved in a problematic situation is critical to those using the soft system approach. An agricultural student must not only understand the natural system involved in the production and processing of food and fiber, but must also understand the man-made systems involved (i.e., government, cultural and religious beliefs). Agricultural education must make a conscientious effort to teach students problem solving methodologies that are appropriate to the kind of problems they may encounter. It is not enough to limit problem solving to the reductionist, science approach.

JUNE, 1991
Weathering the Thunderstorm of Change Toward the Year 2025

How would you like to live in a part of the world where the climate is dominated by daily thunderstorms? Predicting the amount of rain from these thunderstorms would be like trying to predict the amount of change that will occur in the future. In a world moving as fast as ours is today, change is a fact of life. The Greek philosopher Heraclitus said, “There is nothing permanent except change.” The challenge for tomorrow’s agricultural educators will be to learn how to improve the quality, not the quantity of changes in the profession.

Throughout the 20th century, we have witnessed an unprecedented rate of change that has grown exponentially, fueled by vast amounts of new educational and agricultural innovations. According to Naisbitt (1982), scientific and technical knowledge is growing at a rate of 13% per year, which results in a doubling every 5.5 years. Taking into account changes in agriculture and education in the past ten years (e.g., changes in tillage systems, increased academics) and the increased speed of innovation adoption, can you fathom what agricultural education might be like in the year 2025?

Certainly agricultural education will be different by the year 2025. That difference will occur because of deliberate adaptation (change) to new developments in both agriculture and education. Understanding some of the basic principles of change and tips for facilitating change can assist you in improving the quality of change for our profession.

What is Change?

Change has become a quick fix for many organizations that have little understanding of what change really means. For agricultural education, does it mean we will have to learn many new things or just a few things very well? Does it mean change in the sense that the average combine manufactured in the 90s will have more computer power than Apollo 11 possessed the day it landed on the moon over 20 years ago? Or does it mean change in the sense that I had a difficult time explaining to my wife that FFA no longer stands for the Future Farmers of America.

Organizational agricultural education will be different by the year 2025. That difference will occur because of deliberate adaptation (change) to new developments in both agriculture and education. Understanding some of the basic principles of change and tips for facilitating change can assist you in improving the quality of change for our profession.

By Martin J. Frick
(Professor, Agricultural Education, Purdue University.)

The Change of Change!

Many theories have been proposed to explain how change occurs. Presenting the basic steps of a common theory that explains the change process can aid us in more clearly understanding what change really involves.

Rodgers has proposed a theory regarding the adoption of technological innovations (change) that is based on his research and a review of other diffusions of innovations research. He contends that change is a developmental process. According to Rodgers (1983), the innovation-decision process consists of five stages:

1. The knowledge stage occurs when an individual is aware that an innovation exists.
2. The persuasion stage occurs when an attitude toward the innovation is formed by the individual.
3. The attitude leads to the decision stage where the person decides to either adopt or reject the innovation.
4. During the implementation stage, the individual learns how to use the innovation, develops expertise, and possibly alters some aspects of the innovation (re-invention).
5. The confirmation stage consists of gathering follow-up information that either supports the decision to adopt the innovation or causes the individual to discontinue using the innovation.

Let’s put this theory into practice within agricultural education. Suppose you are aware of a new method to introduce students to the concept and implications of gene splicing in agriculture. First, you need to have knowledge of the new method to teach the concept and implications of gene splicing in agriculture. First, you need to have knowledge of the new method of teaching which includes the use of a multimedia computer system that assists the participant in understanding abstract concepts. Next, you would form an attitude about this computer technology and possibly to gene-splicing itself (persuasion). Your attitude toward gene-splicing and the multimedia system will determine your decision to either adopt or reject the innovation. You enter the implementation stage when you believe the system and sub-

(Continued on page 19)
The future of agriculture promises new challenges in the generations to come, but what does it all mean? The agricultural industry will continue its growth with a resulting increase in available jobs. In 2025, as in 1991, we will continue to search for enthusiastic young people to become tomorrow's leaders.

Our nation will continue to become transformed by advances in technology. Today's agriculture is much more than farming; it is advanced, highly technical, and a highly specialized field. Today's agricultural education is moving from the traditional methods of teaching production to concentration on a more modern approach. The new approach emphasizes the sciences and technologies as agriculture's fastest growing areas of employment. By 2025, well-educated people will be required to meet the demands of emerging technologies and employment opportunities. This puts a great deal of weight on the shoulders of agricultural educators, but it's a weight they can handle.

Let's explore the education of the future. In-classroom education should start at a much earlier age. Agricultural concepts should be incorporated into the curriculum beginning in kindergarten and should increase in magnitude throughout the elementary years. Seventh graders should see the initial formal examination and broadening of views toward opportunities in agriculture careers. During this time, students would become encouraged and recruited to consider agriculture as a possible future occupation. Students would become aware of agriculture's global impact and the modern developments used in the classroom.

Seventh grade programs should include animal science, soil science, plant science, some mechanics and careers. The eighth grade program would include agricultural business education, communication skills, global agriculture and careers. These two years will serve as general overview of topics. Essentially, the seventh and eighth grade courses should be designed to recruit students for future years.

Curriculum in grades nine through twelve would become progressively more indepth. General topics should be quite diverse and would be taught from the scientific point of view. A strong emphasis should be placed on human relations and communication skills development. An increased emphasis on marketing, entrepreneurship, international agriculture and biotechnology should enhance the six-year curriculum in agricultural education.

Computer usage will continue to be important at this time and will be utilized more extensively in classroom teaching methods. Instructors will be more proficient in teaching practices, employing more hands-on experience activities for better understanding of subject matter. Students will become more conscious of the skills employers are seeking and will set personal goals by the end of their senior year. Prior to reaching the senior year, a closer examination of career opportunities available will be undertaken. Agricultural educators in this era will be more proficient in guiding and counseling students. According to U.S. Department of Agriculture career opportunities foreseen in agriculture in the 21st century are:

- 32% marketing, merchandising and sales
- 29% scientists and related professionals
- 14% managers and financial specialists
- 11% social service
- 8% agricultural production
- 6% education and communication

The year 2025 will see employers hiring students for summer employment. This employment will be similar to the cooperative jobs made available to college students. Students choosing summer employment will enhance their skills and will experience first hand the operation of the business world in agriculture. With summer employment experience, students will place their collective feet in the door of future employment opportunities in the nation's largest industry and employer. Education in this era will be highly important as employers seek additional education beyond high school and four year college programs.

An additional two years of education will become common; the two additional years will focus on specialized areas of study. For example, the first year of agribusiness will consist of the principles of marketing and the economics associated with it. The second year will consist of application of these principles through job experience. Once again, we will see an increased need for agricultural educators; tomorrow's careers begin with agricultural education.

The public's perception of agriculture needs to change. This should be the agricultural educator's main focus in the future. Many ideas can be implemented to alter this perception and to keep agriculture at the cutting edge.

Agricultural education instructors need to:

1. Emphasize the biotechnology and bio-science aspect of agriculture in dealing with agricultural education students. These people should continue to educate high school administrators, school boards, members of the community and citizens of their countries.

(Continued on page 23)
The Swing of the Pendulum

The Idaho State Board of Education adopted admission standards to Idaho's public college and universities in 1985. The purposes of the admission policies were to:

1. Promote institutional policies which meet or exceed minimum state-wide standards for admission to higher education institutions.
2. Inform students of the academic expectations of college-level work.
3. Improve the quality of academic preparation for college.
4. Make better academic preparation for college available to more students.
5. Admit to higher education students for whom there is a reasonable likelihood of success.

Those admission standards have been a significant impact on those of us who promote vocational education, and especially vocational education in agriculture at the secondary level, as a program that students who have an interest in agriculture as a career could benefit from. The admission standards, as written in 1985, disallowed vocational education as coursework counting toward admission to Idaho's college and universities. The particular standard that disallowed vocational education read as follows:

Practical arts courses will not be counted toward this requirement (Fine Arts/Humanities/Foreign Language). Practical arts are defined as vocational, pre-vocational, or consumer homemaking programs approved by the State Board of Education. Practical arts courses include agriculture education, business education, health occupations education, consumer homemaking education, home economics occupational education, industrial technology education, vocational marketing education, multi-occupations education, and trade, industrial and technical education.

Many of us in agricultural education in Idaho felt that, over the years, the admission standards to higher education were the driving force in defining high school curriculum standards. Agricultural educators in Idaho have never questioned the rationale and propriety of the increased standards in the areas of English, mathematics and science. Agricultural educators particularly object to the very specific exclusion of vocational education (agricultural education) as contributing to the preparation to individuals interested in pursuing university work in agriculture or related areas.

However, the aforementioned not withstanding, things changed.

In October 1988, several agricultural educators gave testimony to the Academic Affairs and Program Committee of the State Board of Education about the worth and value of agriculture and other vocational education courses for preparing students for college. The Academic Affairs and Program Committee reported this concern and concerns about other issues to the Board.

As a result, a review committee was appointed by the Board in June of 1989, to review the college and university admission standards and report any recommendations to the Board. Two agricultural educators were appointed as members of the review committee.

The Admission Standard Review Committee met once a month from August 1989 to March 1990. It prepared a set of recommendations concerning the admission standards and these recommendations were heard by the Academic Affairs and Program Committee of the Idaho State Board of Education in April 1990.

The admission standards were recommended to be changed in the following manner.

The English, Mathematics and Social Science requirements should basically remain as currently written; the Mathematics category is scheduled to be increased from four to six credits in the fall of 1991.

The Natural Science area will also increase from its present four credits to six credits in 1991 and the Admission Standards Review Committee recommended that a maximum of two credits of applied science be allowed toward this category of Natural Science.

The Committee's rationale for this recommendation was a result of the concern of the agricultural education community of Idaho which had been very instrumental over the last several years in revamping and revitalizing the secondary agriculture curriculum, and the Committee felt several of their courses qualified as applied biological science.

The Admission Standards Review Committee decided that if a course:

1. Met the criteria for science as defined by the State Department of Education's Secondary School Courses of Study Guide, and
2. Was verified by a State Department of Education science consultant to be a bonafide science course, and
3. Fell within the broad subject areas of anatomy, biology, chemistry, earth science, geology, physiology, physics, physical science, or zoology,
then it would be viewed as a science course no matter what the course prefix.

A requirement not listed above dealt with the fact that the instructor teaching the course would be certified to teach in the biological science area as a secondary subject matter area.

The category of Humanities/Fine Arts/Foreign Language was changed to Humanities/Foreign Language and reduced to two credits.

The other two credits were combined with the current speech credit into another category called Other College Preparation. In this category students would be allowed to select speech or debate (not more than one credit), studio/performing arts (art, dance, drama, and music), additional foreign language, and State Division of Vocational Education approved classes (Agricultural Science and Technology, Health Occupations Education, Consumer Homemaking Education, Occupational Home Economics, Industrial Technology Education, Marketing Education, and Trade, Industrial and Technical Education).

The Admissions Standards Review Committee has, in most respects, adopted the following rationales for the changes.

Vocational education has changed dramatically the last several years especially in Idaho, and its current status is not commensurate with the traditional historical perceptions. The term Vocational Education is not limited to welding, shop, and home economics, or the courses that many of us took in junior and senior high school during our particular tenure.

The myth that vocational education lacks any sort of quality control was dispelled by the amount of scrutiny the Division of Vocational Education expends when approving new programs and continuing others.

Vocational Education was judged (by the Admissions Standards Review Committee) to be complementary to the total educational process. One of the objectives of the Division of Vocational Education, as identified in the Five-Year State-wide Plan for Vocational Education, was to encourage greater integration of vocational and academic instruction and programs. In addition to occupational skills, Vocational Education was concerned with providing students an understanding of career options and choices, reinforcement of their ability to read, communicate, compute, reason, and solve problems, knowledge of how to find and keep a job, responsible attitudes toward work and co-workers, the ability to set priorities, and the capabilities to study and learn.

A chief purpose of vocational education was to motivate students who utilize a different approach to learning to acquire information through an applied setting. This, by no means, implied that the learning was inferior to that acquired in a more traditional lecture setting.

Additionally, the Committee recognized that adding vocational education to the subject matter allowed to meet the standards would allow increased flexibility in the admission requirements while also giving the vocational community recognition that its courses did indeed have value in shaping and molding individuals for success. The consensus of the Committee was that vocational education did have merits in developing successful candidates for college.

**Implications**

What does it all mean? The recommendations of the Admissions Standards Review Committee were accepted by the Academic Affairs and Program Committee of the State Board of Education and the Idaho State Board of Education accepted the recommendations during the fall of 1991.

Students who elect to utilize vocational education courses, and especially agriculture courses, as part of their high school preparation will be able to apply two of these credits toward the category of Other College Preparation. If an agriculture program has applied biology courses within it, the student may also apply two credits of applied agricultural biology to the Natural Science requirement.

Many people had done much work since the initial college and university admission standards were adopted by the Idaho State Board of Education in 1985. Many people in agriculture and vocational education had worked hard behind the scenes to change the misconceptions that Vocational Education and, especially agricultural education, did not assist students in preparation for life and/or study at Idaho’s college and universities. The payoff for this hard work is in sight.

As the aforementioned standards are accepted, vocational education and specifically vocational education in agriculture will be seen in a new light. In addition, vocational education programs will be measured by a new standard, a standard increased in stringency.

Along with most new statures come new responsibilities. Are we, in agricultural education in Idaho capable of handling this new stature and the attendant responsibilities?

Pendulums do indeed swing in two directions!

---

**Agricultural Mechanization**

**A Model of Technology Transfer**

*(Continued from page 8)*

Agricultural Mechanics Education which you may not be aware, such as conducting technology seminars and presenting research findings. The Committee has members from industry as well as educational groups. By conducting in-service programs and incorporating an agricultural sprayer into the 1991 Mechanics Contest, this group contributed to the overall success of the instructional program. Such cooperation is a critical component to providing effective technology transfer instruction.

The instructional program in agricultural sprayers serves as an excellent model for future programs. It had many key components which combined to form a synchronized program involving several different groups — students, teachers, industry personnel and teacher educators. While not perfect, the relative success of this program appears to have evolved from the interactions of these groups to develop and implement effective instruction at all levels. We, as educators, should use this model of cooperation in the future to develop more instructional programs for technology transfer instruction. As a team, we can provide effective, up-to-date instruction for our students that is based upon industry and educational cooperation.
The Purpose Behind The Tool — A Philosophy

Many times in education, we get so enchanted with the process or methods used to accomplish the task at hand that we forget what it is we are ultimately trying to achieve. We get so involved with the subject matter being taught that we lose sight of our final objective.

In the educational process, we, as instructors, help students develop personal responsibility, pride, and integrity. The needs of the students being taught by instructors of agricultural education require the utmost consideration during the educational process. The instructors of agricultural education are responsible for the development of their students.

Perhaps we need to look at the product to observe what he is doing, rather than what he is saying. In the final analysis the important record is written in the student himself. — Juergenson

The purpose behind this tool, called education, is to produce a socially proficient and functional individual. The methods used to produce this individual vary a great deal. Whether or not various instructional subject matter areas produce that functional individual depends on the instructor's presentation of them. It is not necessarily the technical content of subject matter areas which produces the desired outcome. Rather, it is the input from, and interaction with the instructor which produces an individual who can benefit society.

Whether or not we accept the fact, our students' first impression of us is their first visual of us. How we appear and act will largely determine what the students' impression of us will be.

Outward appearance, be it fine or poor, speaks long before our first word. — Anonymous

If we want to refine our teaching, we cannot discount the importance of our appearance. It does matter. It matters to our students, colleagues, and parents. Our experience should tell us that students spend considerable time and effort with their own appearance. We see a lot of hair combing; we see a great deal of "in" clothing. If we have children of our own, we see their need to have fashionable clothes and to look a certain way. This may not be desirable, but it is reality.

The appearance of our classrooms and laboratories is also of the utmost importance. If our classrooms contain only rows of desks and blank bulletin boards, they will not simulate a good learning environment. The appearance of our laboratory facilities is equally important. If we, as instructors, are trying to instill appropriate work ethics and habits in our students, we also must follow some basic principles.

The facilities in which students are to develop desirable habits and characteristics must reflect those desirable habits and characteristics, and the facilities must simulate the real thing as nearly as possible. The lack of local, state, and federal funds is no excuse for an untidy and hazardous learning environment. An untidy and hazardous learning environment only reinforces the common perception that agriculture and agricultural education are for the slower, less motivated individuals. It does not project the extremely technical and demanding attributes of today's agricultural industry and related sciences.

Remember, your classroom and laboratory are you. Ask yourself from your students' perspective whether you could spend an hour learning in the environment provided by your facility. It is that lasting visual impression which will influence, to a great degree, how students will respond to our instruction and guidance.

It is important that we, as educators, maintain a professional appearance, both personally and in our teaching environment. If we dress appropriately, maintain a learning appropriate environment in our facilities, and continually strive for improvement, we can more effectively influence students. After all, as educators, we are the sum of our parts. Being professional in our appearance is as important as being professional in the way we think and act.

It has been proven that most people will rise to the level of expectation set by those they follow or respect. Therefore, let us adopt the philosophy of Joe Paterno, Penn State football coach, "I will never sell you short." This phrase epitomizes what education should be about. How can we, as educators, expect our students to rise to a certain level of excellence when we fail to encourage, push and motivate them to believe in their own ability to achieve success. We must believe in our students even when they lack the self-esteem to believe in themselves.

Not only must we maintain a high level of expectation for our students, but we must maintain even higher standards and expectations for ourselves. Once we cease to demand more from ourselves and to expand our knowledge...
of our field, we begin to stagnate. This leaves us like the student in the back row who has given up on himself.

When we think about our position and function as educators of tomorrow's leaders, many perceptions may come to mind. For instance, we may think of ourselves as planners, presenters, testers, and evaluators; and we are. We may see ourselves as helpers, facilitators, and advocates of youth; and we are. However, often we fail to think of ourselves as leaders; and we should. We are, after all, the chief executive officer in our programs.

This line of thought requires us to ask ourselves two questions. First, what is leadership? Second, are we a leader in our program? One question is easy to answer for you; the other you will have to answer yourself.

As certainly as some individuals have aspired to be leaders, leadership has inspired many others. At some point in our lives, many of us have had certain leaders influence us in significant ways. They may have been parents, teachers, employers, speakers, or friends. Those who have inspired us have had special talents and abilities. They seem to realize that leadership is a privilege, a function, and a responsibility, not a position and they act accordingly. This seems to be the common link among all true leaders.

Leadership is "an individual's willingness to accept and fulfill a given responsibility in causing others to want to accomplish the task at hand." To us, as educators, this should mean the tasks being performed in our classrooms and laboratories. The key word in the definition is want. The word want points out the goal of making both leading and being led a rewarding experience, assuming we are striving to meet the needs of our students.

Our leadership of our program, or the lack of, will shape at least part of our students' characters. Because of this, specific subject matter has little to do with the effectiveness of any given program. It is the instructor who will decide if the program and the students will succeed or simply endure.

The only way in which any one can lead us is to restore to us the belief in our own guidance.
—Henry Miller

We, as instructors, have, at some level of consciousness, decided to accept the responsibility of educating youth. The decision to lead in this task remains and will always be an individual one. To add value to any program, the realization of value must first occur. It is then imparted through foresight and leadership by the instructor.

The value of our programs lies primarily in the following three areas. These are the diversity and flexibility of the curriculum we use; the opportunities allowed us to instill the characteristics of leadership and responsibility in our students; and our opportunities for individual instruction, motivation, and reinforcement.

The student can only develop those characteristics that will make him a socially functional individual through an increased burden of responsibility. The agricultural educator is uniquely equipped, through the basic design of the agriculture program, to do this through a diverse curriculum, leadership opportunities for the students, and individual student instruction, motivation, and reinforcement. The methods selected to incorporate the desired level of responsibility are most often left to you, the program instructor. The choices you make can be all important to your students' development.

We, in agricultural education, know that every tool or piece of equipment in our classroom or laboratory has a specific purpose. If that tool is used for some purpose other than that for which it is intended, it may be damaged and its usefulness decreased. Public education is a tool with a very definite purpose; add value to society by producing graduates who are socially proficient and functional individuals. How do we, as agricultural educators, add value to those graduates?

Agricultural Education — 2025
(Continued from page 7)

After we have determined the image young people have of agriculture and jobs within agriculture then we must determine how potential students envision instruction in agriculture as part of their high school curriculum. Will we be presenting a course of study that will meet the needs and interests of those potential students? Much of the direction into our educational programs comes from the presenter's point of view and very little comes from the user's point of view. We may be offering programs that worked well for the youth of today and twenty years ago. However, do we know if that is what youth are interested in or need for tomorrow?

This issue of The Agriculture Education Magazine develops the theme of Agricultural Education — 2025.

The authors of the articles in this issue describe their view of the future of agricultural education. Perhaps the most common theme is change and the consequences of change.
Developing Skills For The Future

A distinction between objects and persons is that persons are inherently of value and objects are not. An object may or may not be valuable, depending on what it does; but a person in most cultures is prized just because he or she is a person.

Eighteenth-century German philosopher Immanuel Kant grounded his ethics in the principle that an object could be treated as a means to an end, but that persons, because of their intrinsic value, should never be treated as the means to achieve some end, but should always be treated as an end in themselves. It's not that everything a person does is good just because he or she is a person. Humans are obviously capable of thoughtless, inconsiderate, selfish and even brutal acts. We cannot value all human behavior positively; however, as educators we can add behaviors to our students that are valued positively. Behaviors that are valued positively can be learned from positive experiences.

We all learn from our experiences. From touching a hot stove, we learn to avoid heated objects. From communicating with people, we experience feelings and emotions. Everyday we have experiences we learn from. Many of the values students learn can be learned only by experience. Seeing a movie on welding is not the same as practicing welding.

Learning from experience is especially useful when learning new skills. No one wants to ride an airplane with a pilot who has read a book on how to fly but has never actually flown a plane. Reading about how to overhaul an engine is not enough to make us skillful mechanics; we need practice and experience in those laboratory skills.

Our students are not born with all the skills they will need, nor will the skill appear magically when the students need them. As secondary agriculture instructors, we add to the value of our students by helping them develop the skills necessary to prepare them for the world of work. The following steps might be helpful in adding value to our students by teaching skills.

1. Students must understand why the skill is important and how it will be of some future value to them. To want to learn a skill, they must see a current or future need for the skill.

2. Students must understand what the skill is and the component behaviors they have to engage in to perform the skills. To learn a skill, they must have a clear idea of what the skill is, and know how to perform it. Often it is helpful to have someone who has already mastered the skill demonstrate it several times while describing it step by step.

3. Students must have access to realistic situations in which students can practice the skill. To master a skill, they have to practice it again and again. Students may have to try practicing the skill for a short time each day for several days until they are sure they have mastered it completely.

4. Students will need someone to observe their practice and tell them how well they are performing the skill. Feedback is necessary for correcting mistakes in learning a skill and identifying problems they have in mastering the skills. Through feedback, they find out how much progress they are making in mastering the skill. Feedback lets them compare how well they are doing to how well they want to do.

5. Students will need to keep practicing! With most skills, there is a period of slow learning, then a period of fast improvement, then a period in which performance remains about the same, then another period of fast improvement, then another plateau, and so forth. Plateaus are quite common in skill development. Students must persevere until the next rapid period of improvement begins.

6. Instructors will need to design and load students' practice toward success. Set up practice units that students can easily master. It always helps students to have some success as they practice a skill.

7. Instructors will need to design an instructional sequence so as to encourage and/or require the student to use the developed skill in a real situation. Students' friends can help them learn by giving them encouragement to do so. The more encouragement they receive, the easier it will be for them to practice the skill.

8. Students will need to practice until the skill feels real. The more they use a skill, the more natural it feels. While learning the skill, they may feel self-conscious and awkward. Practicing their skill is like role playing; it does not feel like real behavior. But they should not let this awkwardness stop them from mastering the skill. If they keep practicing, the awkwardness will pass, and soon they will become comfortable and natural in using the skill.

Add valuable skills to your students' skills repertoire through futuristic, meaningful and realistic experiences and skill development situations. Give your students the tools to be successful in the future; be sure not to only give them the tools that were successful in the past for you.

(Continued on page 19)
ject will work in your agricultural education program. In this stage you learn how to use the multimedia system, take an in-service course or seminar on gene-splicing, and develop new teaching strategies. Finally, after some trial period, you confirm whether or not the multimedia system and gene splicing subject is worth its continued use.

It is important to note that new innovations do not always produce the desired quality of changes expected. You only have to look at the increased concerns over the use of pesticides or the newly directed attention given to at-risk students to see that change has side effects. Therefore, it is important that we select the innovations available to us that can improve the quality of change in our programs.

Strategies for Effective Change

Rodger’s theory regarding the change process can be effectively implemented in agricultural education by considering specific strategies to facilitate quality change in each of our own programs. To facilitate change, the following ideas have been adapted from the book entitled Corporate Cultures by Terrence E. Deal and Allen A. Kennedy.

Recognize that the consensus and support of agricultural education groups will be the major influence on acceptance or willingness to change. In general, we resist change because it is hard work and disrupts the order in our lives. However, sharing new ideas with groups that have a vested interest in agricultural education can help generate change within agricultural education. Such groups could include fellow teachers, students or advisory councils.

Take advantage of the trusting relationships you have with others. Trusting relationships take time to develop and should be an ongoing process. A sense of trust between your administration, advisory council, parents and students will hasten change at the local level. Trust must be nurtured and supported by commitment. Trust will promote getting something done! Openness and trust in the change process influence whether and how change occurs.

A commitment to life-long learning must be made by agricultural educators to facilitate effective change. Certainly the creation of new agricultural knowledge will necessitate the teaching of subjects that are on the agricultural horizon. Acquiring the new skills and knowledge to teach cutting edge subjects are needed to implement innovative curriculum changes. Knowledge acquisition and skill-building is a two-way street — it must be provided in an efficient and understandable form and the participant must commit the time needed to acquire the knowledge provided.

Time is an important part of the change equation agricultural education. No matter what technology presents itself, change in agricultural education still involves people. It takes a lot of time to become accustomed to any significant change. The virtue of patience will assist any agricultural educator attempting to make change happen.

Allow change to fit your situation. Diversity and uniqueness are two pervasive qualities of agricultural education programs. Agriculture applies so much science and technology that every agricultural educator can customize their program to ignite student interest and motivation. Taking risks and being innovative within your program are important activities. Today, more than ever, agricultural educators have a grab bag of subject matter and high quality materials from which to choose. This assortment of topics and materials allows every agricultural education teacher to facilitate change at the local level.

Extended Forecast: Permanent Chance of Thunderstorms?

The answer is, of course, that all sorts of changes confronting us now may subside in the future, but new ones will take their place. The storms will continue with no blue sky on the horizon — at least for the foreseeable future. But, if our profession is changing that fast, is anything permanent except a permanent chance of thunderstorms (change)?

There is no doubt that new innovations will cause change. Knowing this, our biggest challenge is not to adopt every innovation into our profession, but rather, sift through those innovations that truly improve our programs and put them into use. It simply won’t do to sell ourselves on the fact that change is good. Knowing that change is going to occur, we must strive to deliver quality changes that will benefit agricultural education programs in the year 2025.

References


Developing Skills for the Future

(Continued from page 18)

References


June 1941

An editorial written by H.M. Byram was concerned with the coordination of general and vocational education. He noted the importance of having educators in both fields work together. However, it was noted that occasionally the two fields were getting further apart. For 25 years vocational teachers had been struggling to obtain recognition and maintenance of standards in the field. In attempting to obtain such standards, vocational teachers may have given the impression that they were different from academic teachers. Byram believed that vocational educators made a serious error in considering our field to be so different from anything being done in other fields. “Let us cease implying that vocational education is an esoteric subject understood only by the specially anointed. Let us do our part in bringing about coordination and a better understanding between general and vocational education.”

Lloyd E. Apinwall (Teacher of Vocational Agriculture, Ventura Junior College) advocated using more audio-visual aids in vocational agriculture programs. He noted some of the newer forms of audio-visual aids included the third dimension. Sound-on-slide was newly developed and rapidly finding its place in teaching agriculture. He also noted that sound motion pictures had not replaced the silent versions, but “dubbing in” of voice accompaniment by the teacher made home-produced motion pictures a great value. Apinwall determined that “No carpenter uses just one tool to build a house. No teacher should depend upon words alone to convey proper interpretation of problems to students.”

Young farmers and their characteristics were reported by John B. McClelland (teacher educator, Ames, Iowa). Among other things McClelland reported that carrying money for themselves and getting started in a vocation were very important to individuals of this age. He noted that most young farmers were considering marriage or were recently married. A survey in Pennsylvania indicated that half the young men living on farms were qualified to go on to college, but could not afford to. One study indicated greatest interest in evening class topics on dairying with mechanics second. Another study indicated great interest in personality development.

Other topics covered were: Arkansas Future Farmers had turned to using radio, Michigan Future Farmers described its leadership camp, and the influence of adult classes in agriculture on farming practices.

June 1966

In a major article on the training of agricultural technicians, Brookings and Hunnicutt emphasized changing technology in the field and the need for this level in the workforce. They recommended technician training in livestock production; dairy production and processing; poultry; farm crop; ornamental horticulture; agricultural production, equipment, food processing; grain, feed, seed, and supply; forestry; conservation, recreation, and wildlife; and soil science, reclamation, and conservation. Brookings and Hunnicutt emphasized post-secondary training needed to include the “underlying sciences and related technical study of procedures, processes, techniques, methods, and principles. They also recommended extensive laboratory experience and an application-oriented strategy.

E.M. Juergenson (University of California, Davis) wrote an article describing the good record of employment that vocational agriculture graduates had. He noted that Kentucky and Ohio studies had revealed excellent track records such as only 1 percent unemployment six months after graduation from high school. That compared favorably to 15 to 18 percent unemployment nationally for students just out of high school. In Juergenson’s study it was found that some 14.8% of the graduates of vocational agriculture programs were unemployed, that more were in farming than agriculture-related occupations, that the largest group had incomes of $3,000 or less, the next largest group had incomes of $5,000-$10,000, and that an overwhelming number (139 or 149) believed vocational agriculture to be of some help or very helpful to them.

The issue theme of evaluation was recognized with various articles. Editor Cayce Scarborough noted that many writers attempted to distinguish between measurement and evaluation. However, he noted that some degree of measurement was involved in evaluation. He further noted that there needs to be a good concept of “what should be” in order to measure against it. C.J. Crawford (vo-ag teacher, Millry, Alabama) emphasized the balance needed in the total program approach to best serving the needs of the community. He specifically listed the area of all day boys, adult and young farmers, FFA, and Departmental improvement. N.K. Quarles (East Texas State University) encouraged the use of evaluation of teaching by students. He suggested such points as teacher interest in subject matter, speech, student interest, organization, and use of humor.
BOOK REVIEW

Soils and Nursery Operations

These reviews may be of interest to everyone! The study of soils should be a core course that fits into every agriscience curriculum since it directly affects the home owner, gardener as well as all those involved in an area of production from greenhouse to farms and ranches. The nursery operations text is one for many to consider for broadening the scope of their agriscience program, or if they now should be updating their current text. Let's check them out!

The book, **Our Soils and Their Management**, was reviewed by John Davis, an agribusiness teacher at Chicago High School which is a magnet agricultural school located in an urban environment. The students enter the program knowing little about the importance of soils in site selection for homes or as a growing medium.

**Nursery Operations** was reviewed by Brett Norman, the past State Vice President of the Georgia FFA Association and currently an agricultural education major at Abraham Baldwin Agricultural College. Even though Brett has not been teaching agriscience in the high school, he has done a great job in reviewing this text for us.


We tell our students that soil is ever changing and that it only appears stable. This newly revised edition of one of the standards soil textbooks has some changes and they are for the better. The first 11 chapters presents the scientific basis for improved land use. The succeeding nine chapters cover plant groups and enterprise areas. The final chapter deals with career opportunities in soil and crop management.

I give high marks to the book for its graphics and the within chapter blocked in notes. The book uses graphics and black and white photography to explain fundamental ideas. The aerial photographs and vertical soil profiles are especially good. The note features are common in most chapters and will give students extra information.

Other strong points of this book include the reference section at the end of each chapter. The 14 page appendix is filled with almost every conversion factor you would need in a soils class. My last accolade for this text goes to the chapter on greenhouses and nurseries.

My only criticism of the book is the lack of chapter questions. I am of the belief that class textbooks should include an evaluation section.

I teach at an agricultural magnet high school in an urban environment. All of our students are exposed to soils units in at least three classes. Even given our students' weak initial background in soils, I think they would be successful with this text. I would recommend it at best as a classroom text and at least a reference for the agriculture department.

---

**Nursery Operations** by Beattie, et al, University Park, PA: Penn State University, 1989, second edition, 216 pp., Student version $17.00 and Teacher version $23.00

Nursery Operations contains information and instruction on the many aspects of the nursery industry. It gives an overview of the wholesale nursery industry. The book also includes what is involved with building, organizing, and running a nursery. Included in this information is nursery sites, facilities, equipment, supplies, production planning, marketing, and management. The book describes the different types of nursery businesses and occupations in each of these areas.

Instruction in the book also includes the science of growing plants. After describing how plants grow, the text goes into a variety of propagation methods and the facilities needed for the asexual and sexual reproduction methods. Entire chapters are committed to growing nursery stock in the field and in containers; information given in these two chapters include site preparation, irrigation, fertilization, pest control, disease control, and harvesting. Because some specific woody crops and herbaceous perennials are grown under different conditions than other crops, the two groups are given special attention. A chapter is also set aside for safety during pesticide use.

A teacher's manual is also available; it has a list of suggestions and references, and a test for each chapter. Each chapter also has a skills and performance evaluation sheet for the teacher to record the knowledge obtained and skills mastered by the student in nursery operations.

Nursery Operations is a text book intended for high school nursery classes. It is an easy text from which the students can learn. It encourages active learning that includes supervised nursery projects to be done by the students at school and/or at home.

---

John E. Davis
Agribusiness Teacher
Chicago High School of Agricultural Sciences
Chicago, IL
Agriculture teachers need an easy and reliable way to choose appropriate and useful textbooks. They want the books to be interesting and easily understood by the students who use them. A book that is not read by the students is money wasted.

"So," a teacher asks, "how do you determine if students will want to use a given textbook?" The first thing a teacher needs to know is if the students will be able to read and understand a textbook. Instead of having students do the choosing (which presents its own problems), a teacher can use a readability formula as part of their selection process.

**Defining Readability**

Readability can be defined as interesting to read or capable of being read easily. A readability formula is a mathematical equation that estimates the number of years of education required to easily understand a selection of text. Several readability formulas have been developed. Most of these formulas use a combination of sentence length and percentage of polysyllabic words to estimate readability.

**Use of Readability Formulas**

Yes, readability formulas are already being used. However, are they used properly? There are as many different formulas as there are methods of using them. Selecting the right readability formula and the learning to use it properly should be the most important criteria at the start of the process.

For teachers of agriculture, being able to use a formula is especially important. In agriculture, teachers need to select new textbooks every few years just to keep up with new research. Advances in science and technology affect agriculture and what should be taught in the classroom. These advances mean that new textbooks must be selected or the older ones updated often. An agriculture teacher cannot select one book and use it for ten years. Most books will be out of date in five years or less.

**Disadvantages of Using Formulas**

Readability formulas are not perfect. They cannot detect bad writing. Someone could string a bunch of words together that have absolutely no connection, apply a formula, and get a result that says a child in the fourth grade should be able to read it with ease. "The cat space laid an egg giant. It said have a horse." These sentences are gibberish, but because the sentences are short and the words simple, a formula would say that it should be easy to read. Formulas can give a false confidence in badly written and unorganized materials, while on the other hand exclude material written with originality and imagination (Davison, 1986).

Some researchers question the validity of readability formulas. In 1982, Longo said, "Validity, a critical characteristic of readability formulas, obviously requires that a measuring device actually measure what is intended." (p. 229). The opinion of dissenting researchers is that formulas do not measure what they were designed to measure.

Methods of taking samples vary from formula to formula. A few researchers say that valid sample sizes vary as well. Experiments have revealed that it may take so many samples from a text to estimate the average readability it would become impractical to use a readability formula. Text sample selection with an inherent standard error of measurement can result in a large variability in interpreted readability scores (White and Jordan, 1987). Because of this variability, some researchers feel that a formula based on scientific and mathematical computations has no place in the process of selecting books based on grade levels.

**Advantages of Using Formulas**

While it is true that formulas should not be considered infallible or conclusive evidence of the readability level of a section of text, they can still be useful. Formulas play meaningful roles in the selection process when used in conjunction with other tools and criteria (Thomas, Stahl, and Swanson, 1984).

Users need to know how to avoid the pitfalls when using formulas. Teachers make a mistake in believing that formulas were created to determine what makes text readable. Formulas were not developed as guidelines for writing text, but were created to predict reading difficulty, which is an advantage over selecting a book on content alone. Because of incorrect use, the creators have warned against "writing to formula" (Trollinger and Kestle, 1986; and Davison, 1986).

In spite of their limitations, readability scores usually agree well with teacher judgment of difficulty. Tested comprehension and student judgment of difficulty also agree with readability scores (Chall, 1962).

**Summary**

Readability formulas have limitations. They should not be used alone, or be accepted as the only reliable methods of determining readability.

Agriculture teachers should decide for themselves if there is a readability formula that would work for them. Once they have decided to use one, and learned to use it properly, a formula can help teachers reduce the time it would usually take to select a textbook. If a teacher has a large selection of textbooks, a readability formula can weed out those books students would have trouble understanding. All
the teacher would then have to do it find which book has
the most pertinent information.

Readability formulas do work when they are used for the
process for which they were intended. In 1989, Edward Fry
wrote, "I am suggesting that the research proof for read-
ability formulas doing what they are supposed to do is good
and solid and just as valid as the research for any educa-
tional or language communication procedure" (p. 296).

References

Reading, 32, 292, 297.
Longo, J.A. (1982). The Fry Graph: Validation of the college levels. Jour-
NAL OF Reading, 26, 229-234.

Outlook 34 Years From Today
(Continued from page 13)

2. Use interactive television to help teach diverse agricul-
ture-related courses. This is almost like consolidating
agricultural programs. Agricultural education instructors
can teach more students diverse courses while utilizing
the highest quality teachers.

3. Utilize industry’s resources and need to help agricultural
education. Start cooperative programs with these
businesses.

4. Start teaching agriculture-related topics to elementary
classes to develop interest, then continue with organized
forums to educate adults. Education should be an on-
going process.

5. Push to get science, math, biology and/or English credits
for agricultural education classes.

Teacher educators of agricultural education need to:

1. Implement teacher in-service days and forums to keep
professional in the agricultural field informed.

2. Keep highly qualified teachers in the agricultural field.
Make sure they teach proactively rather than reactively.
They should be able to teach many subjects including
science, mathematics, computers, economics, etc.

3. Continue to lobby or support government bills which
give funding to agricultural programs, activities and
research.

In an attempt to change people’s attitudes and perceptions,
we need to change portions of our agricultural education
curriculum. We begin by teaching agriculture in the elemen-
tary grades. Programs such as “Agriculture in the Class-
room“ or the use of high school students to assist with some
agriculture programs would be helpful.

The FFA organization will be available to all students,
not just those in agriculture. Along with the increased avail-
ability of FFA, many students will have increased oppor-
tunities to learn business and leadership skills through pro-
jects and activities needed for college and valued by
employers. The FFA will be an important part of agricultural
education; the organization’s functions will be encouraged
but not made mandatory. Currently, today’s FFA organiza-
tion is comprised of more than 385,000 members — the
impact agriculture has on society.

Approximately 21 million people work in some phase of
agriculture, and these numbers will continue to increase. The
agricultural education of our future is in the hands of the
perceiver, and I see the perceivers taking this issue seriously.
We agricultural educators must emphasize the understand-
ing of new technologies, the need for quality people, the
adaptation to cultural diversity, and the approach to
growth from the scientific point of view. I see for
agricultural education a bright future in 2025 and beyond!

Reference

IN AGRICULTURAL EDUCATION. Madison, WI: Wisconsin Department of
Public Instruction.
Agricultural literacy can be enhanced through teacher workshops. Workshops should be a partnership among the University, Farm Bureau, Governmental Agencies, and Industry. (Photo by Glen Shinn, Clemson University)

Dr. Jack Mercer, Clemson University, provided instruction and practice for 79 K-6 grade teachers in South Carolina. The computer applications used agricultural software to teach agricultural science concepts and relationships. (Photo by Glen Shinn, Clemson University)

Elementary teachers enjoyed the opportunity to review materials and techniques, learn about agriculture industry, integrate agriculture into existing curriculum, and earn recognition for professional development. (Photo by Glen Shinn, Clemson University)

Agriculture teachers are eager to learn to maintain new technology and diagnose systems. Mr. Allen James, Service Manager for Ford-New Holland and Dr. Joe Harper provided instruction in a new electronic alternator for South Carolina teachers during the annual conference. (Photo by Glen Shinn, Clemson University)