

Agricultural Literacy: A Framework For Communicating To The Public Sector

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The purposes of this study were to refine a group definition of agricultural literacy, identify agricultural subject areas that fall within the framework of agricultural literacy, and identify those concepts about agriculture that every citizen should know. This research was conducted using the Delphi technique. Results provided a consensus definition of agricultural literacy, identified 11 broad areas of agricultural knowledge, and identified concepts that fit under one of the 11 broad agricultural subject areas identified. The definition, subject areas and concepts generated demonstrate the vast amount of knowledge agriculture applies to produce food and fiber.

Introduction

Today, with our abundant food supply and huge agricultural complex, most people do not understand America's food system or its impact on society and the world. Ninety percent of America's population has been off farm for more than 30 years (Douglas, 1984). Due to this situation, the public understands little about the mission or importance of state and federally supported institutions such as the Cooperative Extension Service, colleges of agricul-

ture and U.S.D.A. agencies. Thompson (1986) stated, "If even well-informed citizens remain ignorant of basic facts about food, agriculture and natural resource systems, the activities of agricultural colleges will increasingly be perceived as serving only the interests of a narrow (and dwindling) constituency."

Only through effective communication can we improve the agricultural literacy of our society so it may sufficiently look at agricultural issues and needs in the context of

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society's broad goals. According to the National Academy of Sciences' Committee on Agricultural Education, "Achieving the goal of agricultural literacy will produce informed citizens able to participate in establishing the policies that will support a competitive agricultural industry in this country and abroad" (1988). If the improvement of America's agricultural literacy is to succeed, standards and aspects of agriculture that fit under this concept need to be determined.

The purposes of this study were to refine a group definition of agricultural literacy, identify agricultural subject areas that fall within the framework of agricultural literacy, and identify those concepts about agriculture that every citizen should know. The identification of agricultural literacy subject areas and the concepts that constitute the content of agricultural literacy would further unify agricultural communicators in conveying information about agriculture to American citizens.

Related Literature

The concept of agricultural literacy has gained considerable attention within the agricultural education discipline because of the 1988 National Academy of Sciences (NAS) report. Yet the lack of education about agriculture and its implications were noted years before the NAS study was released. Mayer and Mayer (1974, p. 84) stated that "The failure of our secondary schools and liberal arts colleges to teach even rudimentary courses on agriculture means that an enormous majority, even among well-educated Americans, are totally ignorant of an area of knowledge basic to their daily style of life, to their family economics, and indeed to their survival."

Little (1987) stressed the im-

portance of making agriculture courses mandatory for students at the high school and college levels. He believed agriculture, like physics, zoology, and geology, is worthy of study for its own sake as a science. He further stated that "The reason the agricultural industry has no interpretive information . . . to speak of is that the public does not know how to ask for it. We do not know the terms of agriculture, the language, or the basic concepts" (p. 146).

Prior to the release of the NAS report, agricultural educators had addressed agricultural education's role in improving the agricultural literacy of Americans. Warmbrod (1987) wrote that a mood seems to be developing that reform of vocational agriculture in secondary schools is warranted, if not overdue. He believed that for agricultural education to be a viable element in public education of the future, changes in purpose, clientele, curriculum, and policy for vocational agriculture must occur.

Since the release of the NAS report, agricultural educators have responded to its findings and proposed changes regarding implementation of the committee's recommendations. Herring (1988), reacting to the report, asked "Should curriculum materials for agricultural literacy courses be developed by curriculum specialists in agricultural education?" Stewart (1989) suggested that an operational definition for agricultural literacy is needed before undertaking agricultural literacy initiatives.

Thorough manual and computer-aided literature searches provided little evidence of research related to agricultural literacy. Only one study had been conducted to assess students knowledge of agriculture. Horn and Vining's (1986)

finding that fewer than 30 percent of 2,000 Kansas students sampled could give correct answers to basic agriculture questions indicated the magnitude and seriousness of the task before us.

An investigation into the development and uses of the Delphi technique provided the justification for using this technique as the main method of inquiry in this study. The Delphi technique was originally used as a method of eliciting and refining group judgments. The technique has been used to solicit expert opinion when a knowledge base upon which decisions can be made is absent. According to Helmer (1966), variants of the Delphi can be applied to all phases of educational planning, including curriculum reform. Regarding the use of Delphi in determining curriculum content, Finch and Crunkilton noted that (1979, p. 132) "Obviously, this technique would be of much value when persons desire to reach consensus regarding the content of a particular curriculum."

One methodological study that used the Delphi technique was found to be relevant to the development of this study's instruments. The "Characteristic Of Technological Literacy: Perspectives From The Industrial And Educational Sectors" was conducted to identify the characteristics of the technologically-literate generalists (Foster and Perrault, 1985). The research strategy used was the Delphi technique. Delphi panelists submitted statements that characterized a technologically literate individual. Statements submitted were grouped into categories. The findings of this study characterized technological literacy.

Problem Statement

The fundamental purpose of this

study was to develop a document that could provide agricultural communicators with the concepts about agriculture that every citizen should know.

Objectives

The specific objectives of this study were:

1. To refine a group definition of agricultural literacy;
2. To identify those subject areas which fall within the framework of agricultural literacy;
3. To identify those concepts about agriculture that every citizen should know.

Methods & Procedures

Instrument Development. Two questionnaires were developed and employed. The design of the first questionnaire was based on Stewart's (1989) suggestion that an operational definition for agricultural literacy is needed before undertaking agricultural literacy initiatives. The questionnaire simply asked panelists to submit their definition of agricultural literacy. The design of questionnaire #2 was based on the 11 subject areas identified in the panelists' consensus definition of agricultural literacy.

The subject areas of agricultural literacy identified through the first questionnaire accompanied the second questionnaire that was sent to the panelists. These areas were 1) agriculture's important relationship with the environment; 2) processing of agriculture products; 3) public agricultural policies; 4) agriculture's important relationship with natural resources; 5) production of animal products; 6) societal significance of agriculture; 7) production of plant products; 8) economic impact of agriculture; 9) marketing of agricultural products; 10) distribution of agricultural products; and 11) glo-

bal significance of agriculture. This questionnaire asked each panelist to react to the subject areas by submitting one concept for each of the eleven agricultural knowledge areas identified. Each concept submitted was compiled under its broad subject area and duplicate concepts were eliminated.

Selection of Delphi Panelists.

After reviewing the literature and related research, a letter requesting a minimum of 3 nominees to the Delphi panel was sent to faculty members at land-grant university agricultural education departments. The letter asked that nominees possess an interest in agricultural literacy; have the time, in the nominator's estimation, to devote to the study; and not be faculty members of any agricultural education department. The total number of individuals nominated by 48 agricultural education faculty members was 147. Of the 147 panelists nominated, 100 initially agreed to participate in the study. From the initial 100 panelists, 2 asked to be removed from the panel because of other commitments, 78 submitted subject areas, and 58 submitted concepts. Panelists from 41 states submitted their definitions of agricultural literacy and panelists from 36 participated in identifying concepts for each of the 11 subject areas.

Collection of Data. The two questionnaires described in this study were used to refine a consensus definition of agricultural literacy, identify the subject areas making up the framework of agricultural literacy, and generate the concepts for those areas. Questionnaires were printed and mailed with an appropriate cover letter to each panelist. Each of the individuals receiving the questionnaire was sent a follow-up letter if a

response had not been received a week after the stated deadline. Response rates for the two questionnaires were 78% for the first, 55% for the second.

Five hundred ninety concepts were generated from the second questionnaire. Some panelists elected not to generate concepts in some of the 11 broad subject areas because they felt that they were not knowledgeable in those areas. The large number of concepts made further refinement and consensus of concepts by the panelists difficult. The researchers felt that the large number of concepts to be reviewed by panelists would inhibit participation in subsequent rounds. The researchers eliminated duplicate concepts and further refined the list of concepts submitted.

Data Treatment. Due to the nature of the chosen research procedures, the treatment of data involved the use of frequencies and percentages.

The statistical analysis of Questionnaire #1 involved the calculation and reporting of frequencies of recurring text found in the 78 questionnaires submitted. Subject area text found in more than 25% percent of all submitted definitions was retained for use in Questionnaire #2.

A statistical analysis of Questionnaire #2 was not conducted. Concepts submitted in each of the 11 categories were subdivided and duplicates deleted to refine the concepts.

Results and conclusions

Consensus Definition and Agricultural Literacy Subject Areas. Data in Table 1 present the frequencies and percentages of recurring text found in 78 completed questionnaires submitted by panelists. Quantitative content analysis was per-

Table 1: Quantitative Content Analysis Results from Questionnaire # 1 (N=78)

Behavioral and Conceptual Area Text	Frequencies	Percentages
Behavioral Area Text		
An Understanding of Agriculture	42 **	53.85
Knowledge of Agriculture	34 **	43.59
Appreciation of Agriculture	13	16.67
Awareness of Agriculture	7	8.97
Educated about Agriculture	4	5.13
Educated in Agriculture	2	2.56
Ability to interpret	2	2.56
Conceptual Area Text		
Societal Significance of Agriculture	47 **	60.26
Production of Plant and Animal Products *	46 **	58.97
Food and Fiber system	40	51.28
Economic Impact of Agriculture	35 **	44.87
Natural Resources and The Environment *	34 **	43.59
Marketing	29 **	37.18
Processing	28 **	35.90
Public Ag Policies	22 **	28.20
Global Significance	21 **	26.92
Distribution	20 **	25.64
Communication Skills	15	19.23
The Science of Agriculture	15	19.23
The History of Agriculture	11	14.10
Nutrition and Health	11	14.10
Biology	11	14.10
Agricultural Management	10	12.82
Careers & Occupations	10	12.82
Soil/Land Use	9	11.54
Technology	9	11.54
Outdoor Environments	7	8.97
Food Supply	6	7.69
Chemical Use	5	6.41
Sustainable Agriculture	5	6.41
Horticulture	5	6.41
Research of Agriculture	5	6.41
Water/Groundwater Use	5	6.41
Retailing	5	6.41
Financing	5	6.41
Mechanics/Engineering	4	5.13
Animal Physiology	3	3.85
Farming	3	3.85
Forestry	3	3.85
Pleasure Animals	3	3.85
Art of Farming	3	3.85
Aesthetics of Agriculture	3	3.85
Standard of Living	3	3.85
Marine Animals	2	2.56
Rural Development	2	2.56
Risks of Farming	2	2.56
Biotechnologies	2	2.56
Conservation Practices	2	2.56

** Retained as subject areas and used in Questionnaire #2

* Divided into separate subject areas in Questionnaire #2

formed in order to calculate frequencies and percentages of each recurring text. From Table 1, the consensus definition of agricultural literacy was developed. The analysis led to the observation of 11 broad agricultural subject areas and two behavioral texts that were found in over 25% of the 78 completed questionnaires submitted. The criteria of 25% text recurrence was set by the researchers. The consensus definition retained was reviewed by panelists. Consensus was reached since no suggestions were submitted by panelists to alter the consensus definition. The 11 broad agricultural subject areas identified in the consensus definition were the topics of the second questionnaire that asked panelists to identify a concept for each of the 11 broad agricultural subject areas that every citizen should know.

The panelists' consensus definition of agricultural literacy.

Agricultural literacy can be defined as possessing the knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture. Basic agricultural information includes: the production of plant and animal products, the economic impact of agriculture, its societal significance, agriculture's important relationship with natural resources and the environment, the marketing of agricultural products, the processing of agricultural products, public agricultural policies, the global significance of agriculture, and the distribution of agricultural products.

Agricultural Literacy Concepts. The subject areas identified in the group definition of agricultural literacy led to the development of questionnaire #2, and subsequently, to the generation of agricultural literacy concepts. The con-

Table 2: The 11 Agricultural Literacy Subject Areas by the Total Number of Generated and Refined Number of Concepts

Subject Area	Number of Concepts Generated	Refined Number of Concepts
Agriculture's Important Relationship with the Environment	55	39
The Processing of Agricultural Products	51	31
Public Agricultural Policies	53	41
Agriculture's Important Relationship with Natural Resources	56	34
Production of Animal Products	52	29
Societal Significance of Agriculture	55	35
Production of Plant Products	55	37
Economic Impact of Agriculture	56	34
The Marketing of Agricultural Products	53	43
The Distribution of Agricultural Products	49	35
The Global Significance of Agriculture	<u>55</u>	<u>36</u>
Total	590	394

Table 3: The 11 Agricultural Literacy Subject Areas and Their Respective Sub-areas

Agriculture's Important Relationship with the Environment

The Agriculturalist's Role in Protecting the Environment

The Effect of Agriculture on the Environment

Opinions and Perceptions

Chemicals

Positive Effects of Agriculture on the Environment

Negative Effects of Agriculture on the Environment

The Environment's Close Relationship with Agriculture

Sustainable Agriculture

The Processing of Agricultural Products

Steps and Complexities of Processing

Importance of Processing and Value Added Products

Food Safety

Product Development & Technology

Public Agricultural Policies

Government Policy Impact on the Industry

The Unaware Public / Consumer

Government's Role and Limitations regarding Agricultural Policy

Economic Impact of Agriculture

Macroeconomics / Microeconomics

Farm Management

Economic Benefits and Food Costs

Agriculture's Important Relationship with Natural Resources

Conservation of Natural Resources

Sustainable Agriculture

Stewardship of Agriculture

Pollution and Depletion of our Natural Resources

Codependent Relationship between Agriculture and Natural Resources

Importance for Agriculture

Production of Animal Products

Consumer Concerns

The Uses and Roles of Various Animal Species

Biotechnology and Genetics

Animal Husbandry

Societal Significance of Agriculture

Society's Lack of Awareness

Agriculture's Effect on Society

Rural Life

Social Benefits

Food Efficiency

Production of Plant Products

Greenhouse/Gardens

Use and Care of Plants

Agronomic Practices

Biotechnology, Biology, and Genetics

Profit

Society

Table 3: The 11 Agricultural Literacy Subject Areas and Their Respective Sub-areas (Continued)

The Marketing of Agricultural Products
Marketing Plan and Strategy
Global Marketing
Agriculture's Function in a Market Oriented Economy
Public Perception
The Distribution of Agricultural Products
The Distribution System and its Importance
Global Distribution and Hunger
Cost of Distribution
Efficiency of Distribution
Distribution Sector Employment
The Global Significance of Agriculture
Global Food Economics
Global Hunger and Food Distribution
Technology and University Research
Global Politics / Sociology

cepts were generated by panelists for each of the 11 agricultural literacy subject areas identified. A total of 590 concepts were submitted by 58 panelists (Table 2). The lists of concepts were refined by deleting duplicate concepts, combining related concepts, thereby reducing the number of concepts to 394 (Table 2). Some concepts remain in more than one subject area because they are relevant to a number of subject areas. The volume of concepts submitted prohibited reporting them in full in this paper. Examples of concepts submitted by panelists were: 1) Value added processes increase net income at all levels of the production, processing, and marketing chain (Subject area: The processing of agricultural products) and 2) Social programs involve agriculture and have an impact on consumers, producers, and tax payers (Subject area: Societal significance of agriculture).

Fifty-two sub-areas of the eleven agricultural literacy concept areas emerged from the list of panelists'

concepts. Concepts were grouped into a sub-area when the concepts' content focused on a topic related to the broader subject area. The 11 agricultural literacy subject areas and their respective sub-areas are in Table 3.

Conclusions

The following conclusions were drawn from the results of the study.

1. Agricultural literacy describes the understanding and possession of knowledge needed to synthesize, analyze, and communicate basic information about agriculture.
2. Agricultural literacy knowledge encompassed 11 broad agricultural subject areas.
3. The 394 concepts remaining after refinement demonstrated the vast amount of knowledge and skills that agriculture applies to produce food and fiber.
4. The concepts identified indicate how much agriculture is affected by and affects the world in which we live.

Recommendations

The following recommendations were derived from the conclusions:

1. Further refinement of the concept lists by subject matter specialists and educators interested in incorporating aspects of agriculture into their current curriculum is advised.
2. The identification of where the concepts can be integrated into the existing communication channels is highly recommended.
3. Agriculturists should collaborate with journalists and authors to integrate agricultural concepts into existing materials. Instructional materials developed should represent the breadth and scope of the agricultural discipline found in the concepts submitted.

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