

## **MISSION, INITIATIVES, AND OBSTACLES TO RESEARCH IN AGRICULTURAL EDUCATION: A NATIONAL DELPHI USING EXTERNAL DECISION-MAKERS**

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Systematic research has established science and technology as central components of our world-class agricultural industry (Kerr, 1987). This dedicated, programmatic research effort has discovered new facts and revised accepted theories, and in effect, has revolutionized agriculture. Has agricultural education experienced a similar research driven revolution?

"Progress during the past years in the technological and methodological aspects of research (in agricultural education) has not been accompanied by comparable improvements in another very important aspect of research, namely, the relevance, significance, and importance of problems and issues that we investigate . . . I propose that our highest priority for continuing progress in research in agricultural education must be that we pay greater attention to the significance and importance of the problems and issues that we research" (Warmbrod, 1986, p. 9). Similar concerns regarding issues, focus, and programmatic efforts have been expressed by Krebs (1976), Mannebach (1980), Moore (1987), Stewart, Shinn, and Richardson (1977), and Vaughn (1983).

The agricultural industry used its established knowledge-base and external expert advisors to help shape today's research agenda. "National advisory panels went far toward the goal of providing national policymakers with an agenda arrived at by a consensus of public institutions, private industry, and consumers. . ." (Kerr, 1987, p. 182). An established knowledge-base upon which to base research decisions and develop a research agenda for agricultural education is incomplete; therefore, expert opinion and intuition tempered with the sound judgement of agricultural education professionals must be utilized. Utilizing expert opinion is an acceptable alternative in the absence of a knowledge-base upon which decisions can be made (Helmer, 1966).

Nash (1978) suggested that if experts in the field under investigation hold the most powerful positions, it is likely that their opinions will come to pass. Knowledge of the perceptions of those individuals who have power could provide focus and direction to the research efforts of agricultural education.

Two assumptions underlie this investigation: administrators (decision-makers in the approval and support of research) possess knowledge of research and have power to influence change, and; meaningful and important research is being conducted by the top research universities in the United States. Following these assumptions, deans of resident instruction in colleges of agriculture (DAG), directors of experiment stations (DIR), and deans of education (DED) from the top 100 research institutions having programs of agricultural education were identified and invited to participate as expert external advisors (The Chronicle of Higher Education, 1987).

### **Purpose and Objectives**

The purpose of this investigation was to develop a consensus document that could provide focus and direction to programmatic research efforts in agricultural education. The specific objectives were:

1. To identify research missions for agricultural education;
2. To identify research initiatives important to the profession;
3. To identify obstacles limiting programmatic research in agricultural education.

### **Procedures and Analysis**

The investigation was conducted in four phases, each phase moving closer to satisfying the objectives. Delphi was the research procedure most congruent with the purpose and objectives of the study (Dalkey, 1969; Helmer, 1967; Linstone and Turoff, 1975). The Delphi technique is a method of eliciting and refining group opinions. The procedure is based on iterative and controlled-feedback interactions.

**Phase I (Pre-data collection):** Experts were identified from current and appropriate frames, a prototype Delphi instrument was developed and validated, and experts were invited to participate. The frames used were the 1987 directories of Agricultural Experiment Station Directors, the Who's Who in Resident Instruction in schools and colleges of agriculture, and the American Association of Colleges for Teacher Education. The initial questions were determined through formalized discussions and futuring techniques (Phi Delta Kappan, 1984) with opinion leaders in agricultural education. A panel of internal experts was then asked to validate the Round 1 questions and the research procedures. An individually prepared letter describing the purpose, objectives, and procedures of the study was sent to each invited participant. This established an open dialogue that would involve an important commitment of time; therefore, only those experts who could allocate dedicated time for the duration of the study and felt they had expertise were included.

This investigation was a study of expert opinion and interaction. The process was iterative; reliability is not expressed in terms commonly observed in the profession. The Rand Corporation (1969), in extensive studies of the Delphi technique, found process reliability to be a function of group size. When the number of participants per advisory group was greater than 13, questions of process reliability were satisfactorily answered; mean correlations were greater than 0.80 (Dalkey, 1969).

**Phase II (Rating the Opinions):** The Round 1 instrument was mailed to all invited experts. Opinions in the broadest sense were collected through the objective-driven Round 1 Delphi instrument. Individually prepared follow-up letters were sent to encourage participation. Round 1 responses were converged and incorporated into the Round 2 instrument. The researchers did not edit the content of the Round 2 instrument. Round 2 was mailed to all invited advisors, asking them to respond using a six-point Likert-type scale describing their strength of agreement to the random listing of the opinions forwarded through Round 1. Summary statistics were then calculated per advisory group per Round 2 item. The Round 2 participants from each of the three external advisory groups became the intact groups for the remainder of the investigation.

**Phase III (Developing Consensus):** Frequency distributions were used to distill and refine the Round 2 responses. Those statements where 50% or more of any one of the three advisory groups chose to 'agree' (rating of 5) or 'strongly agree' (rating of 6) were included in the Round 3 instrument. The Round 3 instrument and another individually prepared personalized letter was mailed. Each expert received the percentage agreeing or strongly agreeing for their group, for the other two groups, and their initial rating of the statements. The experts were then instructed to reevaluate the statements in light of the additional information provided through the summary statistics.

**Phase IV (Analysis of Data):** Round 3 responses were analysed per statement using summary statistics selected for their ability to describe consensus. Frequencies were again used to distill and refine responses. Findings were used to develop a consensus document that can provide focus and direction to research efforts in agricultural education.

### **Findings**

Letters of invitation were sent to three experts from each of the 31 identified research institutions. Fifty-four expert advisors responded to our request by completing the Round 1 Delphi instrument, by composing detailed letters, or by telephone. Five expert advisors chose not to participate in Round 1, yet requested to participate in the subsequent Rounds.

The Round 2 instrument received responses from 14 Deans of resident instruction in colleges of agriculture (DAG), 15 Directors of experiment stations (DIR), and 15 Deans of education (DED). The remaining dialogue was limited to these groups. All Round 2 participants responded to the Round 3 instrument.

**Missions:** Twenty-six unique mission statements were collected from 54 Deans and Directors as the result of Round 1. Consensus was achieved for 11 statements in Round 3. DAG reached consensus on ten mission statements. They concurred with DIR on five statements and DED on seven statements. DAG identified two missions which were unique to the group. DIR reached consensus on six missions. DIR identified one unique mission and concurred with DED on four additional missions. DED reached consensus on seven mission statements and were not unique for any mission. See Table 1 for a complete description of the mission statements.

**Research Initiatives:** The combined responses of the three expert advisory groups to the initial communication identified 74 research initiatives. Selecting statements where 50% or more of the

Table 1  
Research Missions: Between and Within Group Consensus

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
85.7% C Assure relevance of agricultural education programs in schools, universities and adult education in committees.	78.6% AC Improve the basis for development of new or modified programs of vocational education in agriculture.	100.0% AE Improve the basis for development of new or modified programs of vocational education in agriculture.
85.0% BC Improve the basis for development of new or modified programs of vocational education in agriculture.	78.6% AC Project future occupational and career needs to which vocational agriculture courses should respond.	85.7% A Build on the existing professional knowledge-base through inquiry that is both theoretical and applied. The research mission should focus on translating the research knowledge-base into practice.
78.6% Assure more effective instruction on the part of teachers, more effective performances on the part of students, and a better informed public about agriculture.	71.5% AC Investigate curriculum developments and teaching methods (new and old), that are relevant and best facilitate learning in agriculture.	78.6% AB Project future occupational and career needs to which vocational agriculture courses should respond.
78.5% BC Improve the effectiveness of the delivery of agricultural programs, both formal and informal to students, the general public, and other clientele.	64.3% AC Improve the effectiveness of the delivery of agriculture programs, both formal and informal to students, the general public, and other clientele.	78.6% A Focus on applied research in teacher preparation, facility development, and the development of educational objectives and missions as it applies to agriculture.
64.3% C Build on the existing professional knowledge-base through inquiry that is both theoretical and applied. The research mission should focus on translating the research knowledge-base into practice.	50.0% Solve both contemporary problems and anticipated issues, relating to agricultural education.	71.4% AB Investigate curriculum developments and teaching methods (new and old), that are relevant and best facilitate learning in agriculture.
56.1% BC Investigate curriculum developments and teaching methods (new and old), that are relevant and best facilitate learning in agriculture.	50.0% A Focus on the cognitive processes through which individuals learn about agricultural issues, institutional arrangements, new educational technology, and the effects of cultural and socioeconomic factors on learning.	50.0% A Assure relevance of agricultural education programs in schools, universities, and adult education in communities.

Table 1 (con't.)  
Research Mission

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
50.0% BC Project future occupational career needs to which vocational agriculture courses should respond.		
50.0% Investigate motivation and decision-making processes of young people and provide data to effectively enhance leadership training.		
50.0% C Focus on applied research in teacher preparation facility development, program planning curriculum development, and the development of educational objectives and missions as it applies to agriculture.		
50.0% B Focus on the cognitive processes through which individuals learn about agricultural issues, institutional arrangements, new educational technology, and the effects of cultural and socioeconomic factors on learning.		

Note. Percentages represent the percentage of the advisory group 'agreeing' or 'strongly agreeing' (rating of 5 or 6) with the mission. Prefix letters per research mission represent agreement with the opinions of the expert group as identified below.  
 A - Deans of Resident Instruction in Agriculture  
 B - Directors of Experiment Stations  
 C - Deans of Education  
 The same applies to tables 2 and 3 also.

Table 2  
 Research Initiatives: Between and Within Group Consensus

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
92.8% BC Identify concepts that can be effectively taught via technology.	92.9% AC Identify innovative instructional technologies related to procedures and materials in agricultural education.	78.6% AB Improve evaluation of agricultural teaching/teachers.
92.8% Identify strategies to motivate teachers to teach effectively.		78.6% A Increase student achievement.
85.7% CB Identify the science content of contemporary programs in agriculture.	78.6% A Determine the most effective methods for keeping agriculturalists abreast of technological advancement.	71.4% AB Identify concepts that can be effectively taught via technology.
78.6% Develop teaching competence of high school and university faculty.		71.4% Research effective education for special needs populations in agriculture.
78.6% BC Identify innovative instructional technologies related to procedures and materials in agricultural education.	71.5% Analyze present educational programs and their effectiveness; e.g., 4-II, Voc. Agriculture, Ag in the Classroom, Colleges of Agriculture.	64.3% A Answer significant and important questions about philosophy, aims, purposes, and goals of agricultural education.
71.5% C Improve teacher preparation.	64.3% AC Identify concepts that can be effectively taught via technology.	64.3% Investigate effectiveness of various instructional strategies and learning characteristics, e.g., age, sex, ability level, cultural isolation, personality variables, etc.
71.4% BC Improve evaluation of agricultural teaching/teachers.	64.3% Focus on theoretical concepts of learning, as it applies to the broad fields of agriculture for youth and adult levels.	64.3% B Conduct longitudinal studies showing clear paths and accomplishments of students completing agricultural education programs.
71.4% C Increase student achievement.	64.3% A Evaluate the consequences of increasingly restrictive university admission standards on vocational agriculture programs.	64.3% A Investigate ways to increase numbers of minority students in agricultural education.
64.3% C Improve faculty development.	64.3% Develop, test, and evaluate the efficiency of information delivery systems in agriculture.	64.2% A Improve effective faculty development.
64.3% BC Research the viability of traditional high school vocational agriculture programs.		
64.3% B Evaluate the consequences of increasingly restrictive university admission standards on vocational agriculture programs.		
64.3% C Investigate ways to increase numbers of minority students in agricultural education.		

Table 2 (con't.)

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
64.2% B Determine the most effective methods for keeping agriculturalists abreast of technological advancements.	57.2% AC Answer significant and important questions about educational methodologies in teaching/learning.	61.3% AB Identify innovative instructional technologies related to procedures and materials in agricultural education.
57.1% BC Further the research base in critical thinking and problem solving.	57.2% A Determine competencies needed for employment in the broad field of agriculture.	57.2% AB Further the research base in critical thinking and problem solving.
57.1% Research effects of culture on adoption-diffusion of agricultural technology.	57.1% AC Further the research base in critical thinking and problem-solving.	57.2% AB Research the viability of traditional high school vocational agriculture programs.
50.0% C Answer significant and important philosophy, aims, purposes, and goals of agricultural education.	57.1% AC Research the viability of traditional high school vocational agriculture programs.	57.1% A Improve teacher preparation.
50.0% BC Answer significant and important questions about educational methodologies in teaching/learning.	50.0% AC Improve evaluation of agriculture teaching/teachers.	50.0% AB Answer significant and important questions about educational methodologies in teaching/learning.
50.0% B Determine competencies needed for employment in the broad field of agriculture.	50.0% C Conduct longitudinal studies showing clear paths and accomplishments of students completing agricultural education programs.	50.0% Determine how agricultural education can meet the needs of students for our future work force.
50.0% C Improve the teaching of basic and academic skills in agricultural education.	50.0% A Identify the science content of contemporary programs in agriculture.	50.0% Investigate the uses of the computer in agricultural education.
		50.0% A Improve the teaching of basic and academic skills in agricultural education.
		50.0% AB Identify the science content of contemporary programs in agriculture.
		50.0% Study knowledge representation in junction with artificial intelligence and expert systems.

Table 3  
Obstacles to Programmatic Research: Between and Within Group Consensus

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
92.9% B The perception that agricultural education research is "soft," without clearly defined objectives or hypothesis, and lacks rigor.	100.0% AC A lack of focus. 92.9% A Convincing decision-making (granting agencies and administrators) that agricultural education can identify important researchable problems which, if pursued rigorously, will lead to clear solutions.	85.7% AB Insufficient funding earmarked for research.
85.8% B Tradition; agricultural education departments have not traditionally been involved in research in agriculture.	85.8% AC Inadequate qualifications, agricultural education researchers have weak training in research methodology.	71.4% A Limited long-range planning of research programs (programmatic research).
78.6% BC Insufficient funding earmarked for research.	85.7% AC A teaching and service orientation among agricultural education professionals.	64.3% AB A lack of focus. 64.3% AB A teaching and service orientation among agricultural education professionals.
78.6% BC A lack of focus.	85.7% A The perception that agricultural education research is "soft," without clearly defined objectives or hypothesis, and lacks rigor.	64.3% A Limited amount of 'accountable' time (dedicated time) assigned for research.
78.6% BC A teaching and service orientation among agricultural education professionals.	64.3% A lack of networking among agricultural education personnel with strong research interests.	50.0% AB Inadequate qualifications; agricultural education researchers have weak training in research methodology.
78.5% C Limited long-range planning of research programs (programmatic research).	57.1% AC Insufficient funding earmarked for research.	50.0% AB Many agricultural educators do not value research endeavors; conducting research for promotion and tenure, rather than for its importance and utility to the profession. 50.0% Not enough theory building.
64.3% C Limited amount of 'accountable' time (dedicated time) assigned for research.		

Table 3 (con't.)  
Obstacles

A. Deans of Resident Instruction in Agriculture	B. Directors of Experiment Stations	C. Deans of Education
57.2% B Convincing decision-makers (granting agencies and administrators) that agricultural education can identify important researchable problems which, if pursued rigorously, will lead to clear solutions.	57.1% A A lack of definition what is agricultural education.	
57.1% B Limited contact, coordination and support of research conducted by agricultural education faculties by college of agriculture administrators (including experiment station).	50.0% A Tradition; agricultural education departments have not traditionally been involved in research agriculture.	
57.1% BC Many agricultural educators do not value research endeavors; conducting research for promotion and tenure, rather than for its importance and utility to the profession.	50.0% A Limited contact, coordination and support of research conducted by agricultural education faculties by college of agriculture administrators (including experiments station).	
50.0% BC Inadequate qualifications; agricultural education researchers have weak training in research methodology.	50.0% AC Many agricultural educators do not value research endeavors; conducting research for promotion and tenure, rather than for its importance and utility to the profession.	
50.0% B A lack of definition; what is agricultural education.		



experts from any one of the advisory groups 'agreed' or 'strongly agreed' reduced the number of research initiatives to 34. Round 3, the final round, further reduced the list to 19, 14, and 20 for DAG, DIR, and DED, respectively. These remaining research initiatives represent consensus of agreement within each expert advisory group.

All groups concurred for seven initiatives. DAG and DED were in agreement for six initiatives. DIR concurred with DAG for three initiatives and with DED for one additional initiative. DAG, DIR, and DED had 50% or more experts within their groups agreeing or strongly agreeing independently for three, two, and six initiatives, respectively (Table 2).

Obstacles: Thirty-one unique obstacles were collected as a result of Round 1. Fourteen statements were included in Round 3. DAG reached consensus on 12 obstacle statements. They did not identify any obstacle unique to their group. DAG concurred with DIR on ten obstacles and with DED on five obstacles and were unique for only one obstacle.

Fourteen obstacles reduce the programmatic efforts of research in agricultural education. Consensus was achieved by the three groups for five obstacles to the conduct of research in agricultural education; lack of focus, inadequate qualifications, teaching/service orientation, insufficient funds, and a lack of value of research among agricultural educators (Table 3).

### Conclusions and Recommendations

Delphi provides a window into the perspectives of decision-makers who can impact research in agricultural education. These decision-makers can identify primary missions and research initiatives, as well as obstacles which impede the conduct of research in agricultural education. The views of the external experts are important; they demonstrate similarities between groups and unique differences. Their views represent the beginnings of a knowledge-base that can be used to assist the establishment of a programmatic research effort in agricultural education.

The research missions and the research initiatives should be:

1. focused and articulated to take advantage of the knowledge and talents within the profession;
2. clustered to reflect the focus and direction of different organizational structures, i.e., agriculture, experiment station, education; and,
3. refined by internal decision-makers. Objectives should be developed leading to researchable problems, which if pursued rigorously, will lead to clear solutions.

A strategic plan designed to remove or minimize the identified obstacles should be developed by individual researchers, universities, and the profession of agricultural education.

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