

FOCUSING AGRICULTURAL EDUCATION RESEARCH: STRATEGIES FOR THE PROFESSOR

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Universities are in a period of transition driven by profound changes in society. "Strategic planning" is a common term used on many campuses to describe an ongoing process of program evaluation and refinement. Colleges of agriculture and education, the home of most agricultural education programs, are identifying priorities and clarifying missions. To provide a basis for decision-making and resource allocation, mechanisms are being stalled to monitor the status and progress of academic programs.

Periods of transition provide agricultural education units in higher education the opportunity to define the unique contributions they make or could make to the teaching, research, and extension functions of the institution and to explore changes that would maximize productivity of the faculty. Transition is also a time for professors to prioritize their work.

This paper concerns agricultural education research from the faculty perspective. A dictionary definition of research is "careful, systematic study and investigation in some field of knowledge" (Webster's New World Dictionary, 1990). Borg and Gall (1989, p. 15) described the purpose of research as the "discovery of new knowledge about teaching, learning, administration, and other educational phenomena." Much of the research in agricultural education focuses on understanding the processes of curriculum planning, delivery methodologies, and program evaluation as applied in various educational settings (schools, university, extension, and agencies), with the goal of developing knowledge useful to agricultural educators. The scientific method, which includes formulating hypotheses, deducing their consequences, and testing them empirically provides a systematic approach to generating a new knowledge. Research should not be viewed as a routine process, but as a means of producing new knowledge. Moments of scientific discovery can be among the most exciting experiences of a professor's life.

Nine action steps or strategies are discussed to aid agricultural education professors in focusing their research. These strategies are: (1) understanding their discipline, (2) knowing their position, (3) reviewing priorities, (4) developing a research program, (5) building the program on a sound theoretical base, (6) engaging in collaborative research, (7) assigning credit and responsibility, (8) marketing their findings, and (9) evaluating their research program.

Understanding Their Discipline

Professors must be thoroughly acquainted with their disciplines before attempting to make a contribution to knowledge through research. Agricultural education is a young discipline. It evolved from the scientific disciplines of (1) agriculture whose roots are in the biological and physical sciences, and (2) education whose roots are in psychology and sociology (Barrick, 1988). Barrick, (1988, p. 5) defined agricultural education as "the scientific study of the principles and methods of teaching and learning as they pertain to agriculture". Williams (1990) has made a number of observations regarding the salient characteristics of agricultural education:

1. Agricultural education applies technologies and theories from the biological and physical sciences, psychology, and sociology.
2. Agriculture and education form the foundation for agricultural education.
3. Agriculture education bridges the two, focusing on the principles and methods of teaching and learning about agricultural science and technology.
4. The general processes used in agricultural education to apply teaching and learning are: (1) curriculum planning, (2) delivery methodologies, and (3) program evaluation.
5. Application settings for agricultural education include universities, secondary and vocational schools, extension, industry, and agencies.

Knowing Their Position

Changes in universities, particularly in land-grant universities, away from the predominance of traditional classroom teaching into research and extension have altered the work environment of agricultural education professors. MacKenzie and Koonce (1987, p. 1) state that "today's university is very much committed to research and service, and sometimes it seems almost at the expense of classroom teaching." New performance criteria are challenging professors accustomed to assignments in teaching and service to include a research component in their work. The position descriptions of tenured faculty should be reviewed and revised to include a research component. New position descriptions commonly define a research focus already identified as a priority of the department or college. These changes provide an opportunity for agricultural education units and professors to focus their research programs.

A criterion given considerable weight in evaluating research is its direction or focus. "To appear unfocused or without direction in...research is not good. This oftentimes requires the ability to resist the attractions of "one more project" or the fortitude to say no to "one more invitation to participate." To be good at a few activities is better than to be poor at many activities" (MacKenzie and Koonce, 1987, p. 6).

Creative efforts in agricultural education can take many forms although the university may not consider all of equal importance. As a criterion of productivity, research producing refereed publications is the norm in many universities. "Very rarely will a university disclose the expected number of publications per year, but a general rule of thumb is that an average of two per year is pretty good" (MacKenzie and Koonce, 1987, pp 5-6). Professors hoping to advance in the academic community should ask themselves and their superiors "What is expected of my research program?" and "How will my productivity be measured?" Administrators should recognize as a part of faculty workload, not as extra duty. Excellence in research should be rewarded with merit pay increases.

Reviewing Priorities

As stated earlier, agricultural education bridges agriculture and education. Thus, in focusing a research program, professors of agricultural education can ask themselves several questions related to state, national and international priorities:

1. In which area of agriculture do I have the greatest interest or expertise? In answering this questions, consideration should be given to the latest national priorities for food and agricultural sciences, e.g. water quality, biotechnology application, food safety, and expanded uses for agricultural products (Joint Council on Food and Agriculture Sciences, 1989).
2. In which area of education do I have the greatest interest or expertise? Consideration should be given to new educational developments in curriculum planning, delivery methodologies, and program evaluation, e.g. issue or principle approach to curriculum development, teaching methods for distance learning, and impact evaluation.
3. Which application setting should I target--university, secondary and vocational schools, extension, industry, or agencies?
4. What are the agricultural and educational priorities in my state and at my university?
5. What are the national priorities for agricultural education research? These priorities were identified by Buriak and Shinn (1989) and Silva-Guerrero and Sutphin (1990).
6. Is there a possibility of forming (or joining) a team of researchers (perhaps multidisciplinary in nature) in a priority area to enhance the scope and impact of my research program?
7. Is there a possibility for forming a partnership with agencies or industry to accomplish mutual goals and to consolidate resources?
8. Is an international dimension possible to develop cross-cultural linkages?

Developing a Research Program

A research program is much more than maintaining a list of research publications. In fact, it affects all aspects of faculty work. A research program can be used a tool for planning a career, establishing priorities, and setting goals for scholarly development and productivity.

A research program should define a small element of the discipline in which new knowledge is sought. Faculty should establish their areas of specialization within the discipline and create a base for teaching and service activities through their research. Scholarship is maximized when the research, teaching, and service (extension) of individual faculty have the same focus. The development of a research program may begin in graduate school when the selection of a thesis or dissertation problem and continue throughout the individual's career. The development of a research program making a significant contribution to a discipline may take a lifetime.

In addition to a sound base of publications, research programs should yield complementary activities. Such activities may include: identification of a specialization in the discipline; applications for and receipt of grants and contracts; titles and summaries of individual research projects; collaborative efforts; invited seminars and papers; assistance with other research projects; awards and honors; courses revised and taught based on research; service (extension) activities to disseminate research findings; curricular and instructional materials developed based on research findings; articles in popular or professional magazines; and, work in professional organizations related to specialization.

Building the Programs on a Sound Theoretical Base

To advance scientific knowledge, professors must identify, study, and evaluate research already done in fields of interest. Successful researchers are aware of the inroads that theory can make into scientific research. Much effort must be put forth to determine the frontier of knowledge in a defined area. Professors must first learn what others have done and what remains to be done in an area before attempting to expand knowledge. "Scientists build on previous results because it is not practical (or necessary) to reconstruct all the observations and theoretical constructs that go into an investigation" (National Academy Press, 1989, p. 11). Borg and Gall (1989, p. 116) state that "the literature in any field forms the foundation upon which future work must be built." But the literature base for agricultural education research should not be limited to other agricultural education studies. Rather, it should be grounded in relevant biological, physical, and social sciences in addition to the disciplines of agriculture and education. Theories and paradigms from education, sociology, and psychology may form a sound base for agricultural education research. The use of appropriate research designs, data-collection techniques, and statistical treatment of data will not make up for a sketchy and shallow synthesis of existing knowledge. A weak theoretical base for a research program leaves the door open for a "lack of focus" indictment. "Mistakes made while trying to do one's best are tolerated in science; mistakes made through negligent work are not" (National Academy Press, 1989, p. 14).

Engaging in Collaborative Research

Graduate courses in universities provide a means for young researchers to learn the methods and values of scientific research. Personal contact and interaction with other researchers remain, however, the best ways to develop and refine the process of generating scientific knowledge. For this reason, M.S. and Ph.D. candidates have major professors. Frank Press, president of the National Academy of Sciences, described this aspect of a scientific education as follows "Any beginning researcher who does not work closely with an experienced scientist is missing one of the most important aspects of a scientific education. Similarly, any experienced researcher who does not pass on to younger scientists a sense of the methods and norms of science is significantly diminishing his or her contribution to the field's progress" (national Academy Press, 1989, p. v.).

Basic research methods such as designing experiments and statistical treatment of data can be learned from books and classes. "But many methods are learned only through personal experience and interaction with other scientists...many of the intangible influences on scientific discovery--curiosity, intuition, creativity--largely defy rational analysis, yet they are among the tools that scientists bring to their work" (National Academy Press, 1989, p. 6).

Graduate education should be only the beginning of the research team idea. Research problems in many areas demand resources and expertise beyond those that can be provided by a sole researcher. Williams (1990, p. 7) advocated that "effective research teams of the future will include

scientists from outside of agricultural education, technicians and graduate students inside and outside of the discipline and will frequently cross state and national boundaries. Multidisciplinary approaches will be needed to solve many of the research problem areas identified." Collaborative research can broaden scientific perspectives and advance research far beyond what might have been accomplished otherwise (National Academy Press, 1989).

Assigning Credit and Responsibility

Publishing in refereed journals is an acceptable way to report research results. In scholarly publications, credit for research is acknowledged in a list of authors and in a list of references. Conflict over proper credit can arise in both places. Researchers have an ethical and professional obligation to give others the credit they deserve.

To avoid later difficulties, research teams, including graduate students and their major professors, should discuss the authoring of published papers early in the process. Omitting names from the list of authors or simply ordering them can create conflicts among researchers. Proper listing of authors is important because it not only gives credit but also assigns responsibility for the research (National Academy Press (1989). "Well-established scientists may decide to list their names after those of more junior colleagues, reasoning that the younger scientists thereby receive greater boost in reputation than they would if the order were reversed" (National Academy Press, 1989, p. 17).

Accuracy in citations and in the reference section is also important. Frequent errors in these areas reflect unfavorably upon the scholarship of a researcher (Borg and Gall, 1989). Citations serve several purposes in a research paper. They acknowledge the work of others, direct the reader towards additional sources of information, acknowledge conflicts with other results, and provide support for the views expressed. More broadly, citations relate the present state of scientific knowledge and provide a paper trail for later researchers to follow (National Academy Press, 1989).

It is equally important for professors to credit appropriate units within the university. Most universities have procedures for submitting papers to scientific and professional journals and meetings. This approval process may include an accountability element recording the number of papers submitted and accepted for publication. Agriculture experiment stations commonly provide this and similar services that can help faculty develop their research programs.

Marketing Their Findings

Professors have to make decisions not only about the focus and methods of their research program but also about marketing strategies. Research is of limited value unless the findings are made available to other researchers and practitioners.

A marketing strategy should include both informal and formal mechanisms for sharing research findings. Before being released to a broader audience, research observations should be shared with colleagues and supervisors in hallways and over the telephone and through presentations at local seminars and conferences. Thus, refinements can be made before results are submitted to scientific journals.

Whereas publishing in peer-reviewed journals remains the standard means of disseminating scientific results to maximize the impact of research, other methods of communication should be considered. Research findings should be infused into the classes researchers teach and disseminated through their service, outreach, and extension activities. Presentations at professional meetings; individual meetings with scholars, textbook authors, and curriculum writers; and seminars given at other universities enhance the impact of research. "Discussion of scientific ideas in small groups is one of the many social processes that establish new observations and theories as publicly accepted scientific knowledge" (National Academy Press, 1989, p. 11).

MacKenzie and Koonce, 1987 wrote that university professors frequently feel the pressure to publish and are tempted to cut corners to compile a long list of publications. But sacrificing quality to such pressure is likely to have a detrimental effect on careers. The number of publications to an individual's name, though a factor in hiring and promotion, is not nearly as important as the quality of overall work (MacKenzie and Koonce, 1987). To have findings incorporated into the work of colleagues is one of the greatest rewards from research.

Evaluating Their Research Program

Williams (1990) advocated that as a discipline matures it should move from an evaluation of the research process to an assessment of the impact made by the research. Likewise, research programs of individual professors should develop to the point that sound research methodology is a given and assessments made with regard to educational, agricultural, environmental, social and/or other impact.

Successful research programs have a built-in evaluation component, e.g. judgment by peers for publication and presentations, and citations in the literature. Self-assessment should also be a feature of research programs. The strength of the self-judgment can be tested by comparing conclusions to those of peers. Questions agricultural education professors should ask in a self-evaluation of their research program include the following:

1. Are the classes I teach laced with my research findings?
2. Are the results of my research disseminated through my service, outreach, and extension activities?
3. Has my research been published in refereed journals?
4. Have I shared my findings with teachers, extension personnel or other user groups?
5. Have I presented my research at professional meetings?
6. Have I shared my findings with textbook authors and curriculum writers in the discipline?
7. Have I met with other researchers to discuss my observations?
8. Have I tied my findings to the work of others for the advancement of knowledge?
9. Have I explored the implications of my findings for curriculum planning, delivery methodologies, and program evaluation?
10. Has my work been funded by external sources to expand my research and development initiatives?
11. Has my research been cited by others?

The changing environment existing on university campuses provides an opportunity for agricultural education professors to develop and expand their research programs. Agricultural education professors should consider themselves scholars dedicated to creating and sharing new knowledge. Research programs can be focused via a continuous process of careful and systematic planning.

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