DEFINING DOCTORAL STUDY IN AGRICULTURAL EDUCATION—2010: THE PERSPECTIVE OF ACTIVE SCHOLARS IN THE UNITED STATES

Abstract

Peter Drucker (2003) warned us–a global knowledge economy rewards not only creators of new knowledge but also those who can identify and integrate knowledge effectively. Doctoral preparation is critical on both fronts. Consequently, there is a need to re-examine periodically the conceptual framework, definition, and knowledge base of the field. A classical Delphi method was congruent with the purposes of this research. Seventeen engaged scholars, each representing the expert agricultural education community, reached consensus on defining the field of study, 10 knowledge domains and 67 knowledge objects. The Delphi panel agreed "Agricultural education—2010, as a field of study, integrates social and behavioral sciences with the natural and applied science of agriculture, renewable natural resources, and environment. The knowledge base for agricultural education—2010 includes planning and needs assessment; curriculum development; learning theory; instructional design; delivery strategies; evaluation; research methods and tools; scholarship and writing; history, philosophy, and ethics; and contextual applications, culture, and diversity—all effecting continual improvement. Agricultural education empowers people to think more critically, to perform more skillfully, to communicate more clearly, to plan and affect change more efficiently, to solve problems more creatively, and to act based on principles—all of which involves vital choices and consequences in a global society." Within the ten knowledge domains, the Delphi panel concurred on 67 core knowledge objects. Knowledge objects consist of fundamental and powerful concepts, knowledge, paradigms, skills, and/or theories that are essential for building professional practice in agricultural education. These knowledge objects represent an emergent knowledge base for doctoral study in agricultural education.

Introduction

A number of global forces are evoking a re-examination of doctoral programs. Welch (2005) asserted that in recent times many disciplines have faced challenges to reinvent themselves and to incorporate newer modes of inquiry. This inability has affected the sustainability of their academic world. Additionally, Welch suggested that advances in pedagogy, changing demographics of students, changes in the managerial structure of higher education, international challenges, and a loss of what he refers to as exclusivity have all impacted the academic climate in which many of us work.

In 2000, Nyquist and Woodford cited Bob Weisbuch, then president of the Woodrow Wilson National Fellowship Foundation:

> When it comes to doctoral education, nobody is in charge, and that may be the secret of its success. But laissez-faire is less than fair to students and the social realms that graduate education can benefit. Re-envisioning isn't about tearing down this successfully loose structure but about making it stronger, most particularly through asking it to see and understand itself. (n.p.)

Bernstein (2004) encouraged university deans to focus on the "big questions" in graduate education. Clearly, no bigger question exists than examining the essence of the field of study (Nyquist & Woodford, 2000) and the knowledge objects and conceptual domains that authenticate doctoral education.

Doctoral preparation is critical for the future of any field of study. Shulman, in Golde and Walker (2006) proposed, "We view the doctorate as a degree that exists at the junction of the intellectual and moral. The Ph.D. is expected to serve as a steward of her discipline or profession, dedicated to the integrity of its work in the generation, critique, transformation, transmission, and use of its knowledge" (p. 3).

Peter Drucker (1997) provided sage advice:

> ...it is pointless to try to predict the future...But it is possible–and fruitful–to identify major events that have already happened, irrevocably, and that will have predictable effects in the next decade or two. It is possible, in other words, to identify and prepare for the future that has already happened (p. 20).

We live in a world of constant change. Although there have been few specific calls from within agricultural education to examine doctoral education, doctoral preparation is powerfully linked to the very essence of our discipline and numerous scholars have expounded on disciplinary typology (Barrick, 1989 ; Buriak & Shinn, 1989; 1993; Hamlin, 1966; Love, 1978; McCracken, 1983; Miller, 2006; Radhakrishna & Xu, 1997; Scheer, Ferrari, Earnest, & Connors, 2006; Shinn, 1994; Silva-Guerrero & Sutphin, 1990; Warmbrod, 1986; 1987; Williams, 1991). Using Drucker's logic, there is a need to re-examine agricultural education in a future that has already happened. Has the knowledge base changed along with the times? What are the implications for preparing stewards for the profession?

Conceptual Framework

The profession has not examined curriculum development for doctoral study in agricultural education systematically. Some other fields of study—and some larger efforts to look at doctoral education in general—have recently done so. Work by Golde and Walker (2006) served as a conceptual framework for this study. Their book was the first product of a five-year study, begun in 2001, by the Carnegie Foundation. A premise of the Carnegie Initiative on the Doctorate was that "doctoral education will be improved if conversations about . . . the particular elements of doctoral education . . . become routine and public" (p. 7). They proposed, "the purpose of doctoral education, taken broadly, is to educate and prepare those to whom we can entrust the vigor, quality, and integrity of the field" (p. 5).

> Although there is strong evidence that doctoral recipients trained in the United States are excellent researchers and scholars and can look forward to rewarding careers, it is important to continue to strive to make doctoral education the best possible preparation for the next generation of disciplinary leaders. Disciplines continue to change . . . "(Golde & Walker, 2006, p. 4).

Taking that to heart, the authors posited that most academicians in agricultural education want to prepare well the next generation of disciplinary leaders and are fully aware that the "discipline" continues to change.

The conceptual model for designing a doctoral program *de novo*—as offered by Walker (2006)—consists of a four-step process: "Step 1. Look ahead for the discipline. . . . Step 2. Identify what a Ph.D. in the discipline must know and be able to do. . . . Step 3. Construct the goals of the program. . . . Step 4. Design the program" (p. 424).

The Carnegie Foundation is not the only organization that is concerned with doctoral education. In fact, the literature is replete with reports of curriculum development for doctoral study in a field. In the field of social work, for example, there is the Group for the Advancement of Doctoral Education (GADE, 2003). Other similar studies and guidelines included reports by the American Philosophical Association (1998), Anderson (1996), Armstrong (1994), Breslow (1996), the Committee on Science Engineering and Public Policy (1996), Felbinger, Holzer, and White (1999), Knobil (1996), Scheurich (1995), McGee (1999), and Vella et al. (2000). It appears that the climate is right for the profession of agricultural education to examine doctoral education in the field; there are numerous opinion leaders to guide any such efforts.

Purpose and Objectives

The purpose of this study was to look ahead at agricultural education and analyze the knowledge base that guides what a doctoral graduate should know and be able to do. Three objectives guided the inquiry: 1) to develop a definition for Agricultural Education—2010 that will guide the field of study, 2) to identify core knowledge objects for doctoral-level study, and 3) to categorize knowledge objects into knowledge domains. Knowledge objects consist of the fundamental and powerful concepts, knowledge, paradigms, skills, and/or theories that are essential for professional practice in agricultural education.

Methods

The classical Delphi method (Turoff & Linstone, 2002) was congruent with the purposes of this research. The Institutional Review Boards from two universities (the authors are from two universities) approved the research protocol. The researchers solicited nominations of scholars from the broad field of agricultural education by individually contacting 217 authors from the United States who published during 2003-2005 in the *Journal of Agricultural Education, the Journal of Extension*, or the *Journal of International Agricultural and Extension Education*. Dalkey, et al. (1972) concluded that the Delphi method is reliable when a panel is truly representative of the expert community and that an engaged group of 13 would provide reliability within a 0.90 coefficient.

On January 6, 2006, the researchers invited 20 frequently nominated scholars as Delphi panel members. In addition to confirming their acceptance, panel members were given the parameters of the research and a planning calendar, and they were asked to provide their definition of agricultural education—2010. Seventeen scholars accepted an invitation to participate in the five-round design beginning in January and concluding in April. All correspondence between the researchers and panel members was by individual e-mail. The Delphi panel members represented

specialties in agricultural communications, agricultural leadership education, agricultural teacher education, extension education, and international agricultural education.

Round 1 asked for confirmation as a panel member and for a definition of agricultural education—2010. Round 1 concluded on January 27. The responses to the Round 1 instrument created Round 2. The panel received Round 2 on February 10. Round 2 included two parts. Part 1 sought convergence on definition stem statements from Round 1. Part 2 asked each panel member to write knowledge objects in the form of fundamental and powerful concepts, knowledge, paradigms, skills, and/or theories that they believed were essential for professional practice in agricultural education in terms of entry-level doctoral preparation. Consensus among the Delphi panel members was set *a priori* and defined when two-thirds of the panel members rating a statement "agreed" (5) or "strongly agreed" (6) using a six-point scale. Round 2 concluded on February 17.

Round 3 also used a two-part design. Part 1 sought consensus on each definition stem statement submitted in Round 2, Part 1. Part 2 sought panel consensus on knowledge objects developed by the panel members in Round 2. Round 3 was e-mailed to the panel on February 24 and concluded on March 20—17 days longer than originally planned.

Round 4, Part 1 sought consensus on five definitions crafted from Round 3, Part 1. Part 1 concluded on March 24. Round 4, Part 2, sent as a separate document on April 10, sought consensus of assignment of each of the 67 knowledge objects to one of 10 knowledge domains. This round concluded on April 24.

Table 1
Jury Response Rate, Time Line, and Number of Statements Retained in Each Round of Delphi Method on Defining Doctoral Study in Agricultural Education—2010, N=17

	Round 1	Round 2	Round 3	Round 4	Round 5
Jury Response Rate Part 1	16	17	17	17	16
Jury Response Rate Part 2	16	14	15	14	16
Date Mailed	Jan 12	Feb 10	Feb 24	Mar 14 Apr 10	Mar 31
Return Requested	Jan 27	Feb 17	Mar 03	Mar 24 Apr 24	Apr 07
Definition Statements Retained, Part 1	118	71	30	(5*)	(1**)
Knowledge Objects Retained, Part 2	--	299	242	71	67

*Researchers developed five separate definitions based on 30 consensus statements.
**One definition reached consensus.

Round 5 was sent to the panel on March 31. Round 5 sought agreement with and ranking of definitions for agricultural education—2010. Panel members rated five definitions

“unacceptable” or “acceptable” and rank-ordered the “acceptable” definitions. Round 5 concluded on April 7, 2006.

Findings

A minimum of 14 of the 17 panel members responded to each round with confidentiality within the Delphi panel. One panel member chose not to contribute to three rounds.

Definition

Round 1 collected 118 divergent definition stems for agricultural education—2010. Through a series of four iterations, each moving closer to the objective, the researchers were able to reach consensus for the framework for a definition that will guide professional practice in agricultural education:

> Agricultural education—2010, as a field of study, integrates social and behavioral sciences with the natural and applied science of agriculture, renewable natural resources, and environment. The knowledge base for agricultural education—2010 includes planning and needs assessment; curriculum development; learning theory; instructional design; delivery strategies; evaluation; research methods and tools; scholarship and writing; history, philosophy, and ethics; and contextual applications, culture, and diversity—all effecting continual improvement. Agricultural education empowers people to think more critically, to perform more skillfully, to communicate more clearly, to plan and affect change more efficiently, to solve problems more creatively, and to act based on principles—all of which involves vital choices and consequences in a global society.

The researchers extracted a definition from this framework: Agricultural education—2010 is a field of study working at the junction of social and agricultural sciences. The field creates, identifies, and integrates educational theory and best practice within agricultural contexts to advance learning and teaching, communication, leadership, extension, and outreach in domestic and international settings.

Knowledge Base: Knowledge Domains and Knowledge Objects

The authors use the phrase knowledge base in this section to be inclusive of knowledge domains (or what Nyquist and Woodford (2000) referred to as conceptual pillars). The knowledge objects provide substance and definition to the broader knowledge domains. The knowledge domains are referred to collectively as a knowledge base. Sixty-seven core knowledge objects reached consensus by the jury. The researchers then classified knowledge objects into knowledge domains. By reaching consensus, the jury confirmed those 10 domains and the respective knowledge objects within each domain.

Knowledge Domains

The 10 knowledge domains that emerged were

- Planning and needs assessment (PNA)
- Curriculum development (CD)
- Learning theory (LT)
- Instructional design (ID)
- Delivery strategies (DS)
- Evaluation (EV)
- Research methods and tools (RMT)
- Scholarship and writing (SW)
- History, philosophy, and ethics (HPE), and
- Context, culture, and diversity (CCD)

Knowledge Objects

The 67 knowledge objects, each classified in its respective knowledge domain, were as follows:

Planning and needs assessment (PNA). As a doctoral-level professional, the person should have a deep understanding of planning and needs assessment including:

- the educational needs of individual learners.
- how to determine critical thinking skills and dispositions of learners, teachers, and both formal and non-formal educational audiences.
- how to plan and organize effective educational programs using appropriate planning and development models.
- how to organize programs based upon the principles of technology transfer.
- how to work effectively as a change agent with clientele possessing different cultural, societal, environmental, developmental, and technological needs.

Curriculum development (CD). As a doctoral-level professional, the person should have a deep understanding of curriculum development including:

- curriculum theories, models, design, and development.

Learning theory (LT). As a doctoral-level professional, the person should have a deep understanding of learning theory including:

- the seven apperceptive levels of learning (i.e., knowledge, skills, interests, understandings, appreciations, values, and ideals).
- the developmental phases of learners, especially children, adolescents, young adults, and mature adults.
- cognitive development theory (e.g., Bandura, Bruner, Piaget, Vygotsky).
- a broad range of teaching/learning educational theories.
- psychological theory related to teaching/learning.
- Bloom’s taxonomy and domains of learning.

Instructional design (ID). As a doctoral-level professional, the person should have a deep understanding of instructional design including:

- principles and processes of learning and teaching.

- how to apply experiential learning theory in educational settings (e.g., Dewey, Kolb, Lewin, Witkin).
- the skills and abilities needed to teach and/or advise people in different age groups and with different ability levels.
- effective instructional design methodology.
- how to plan a unit of instruction and a lesson.
- knowledge of appropriate instructional media technologies used in distance education (e.g., technology-assisted learning, e-Learning).

Delivery strategies (DS). As a doctoral-level professional, the person should have a deep understanding of delivery strategies including:

- pedagogy.
- adoption-diffusion theories.
- research-based classroom management practices.
- characteristics of effective teachers (e.g., Rosenshine & Furst, Darling-Hammond).
- how to use learner-centered methods and techniques (e.g., teamwork, project-based learning, problem solving, case studies, facilitation).
- how to use teacher-centered methods and techniques (e.g., lecture, guided discussion, panel, laboratory, demonstrations).
- the use of appropriate learning and instructional resources.
- how to plan, organize, implement, and manage delivery systems to fit specific teaching/learning situations.

Evaluation (EV). As a doctoral-level professional, the person should have a deep understanding of evaluation including:

- knowledge of measurement and evaluation techniques and literature.
- styles and types of student assessment, including outcomes assessment.
- program evaluation (e.g., formative, summative evaluation for accountability and program improvement) and evaluation models (e.g., CIPP, Kirkpatrick, TOPS, goal-free, transactional, decision-making, goal-based).
- how to evaluate programs based upon the principles of technology transfer.

Research methods and tools (RMT). As a doctoral-level professional, the person should have a deep understanding of research methods and tools including:

- guiding principles for scientific inquiry.
- research paradigms (quantitative and qualitative) for discovery of new knowledge.
- research design; how to design, conduct, report, and evaluate quantitative research using appropriate models.
- research methods, with expertise in design, data collection, analysis, and interpretation.
- how to identify and prioritize research needs that have current and future programmatic implications for agricultural education.
- how to pose significant questions that can be investigated empirically.

- how to initiate and sustain programmatic research.
- how to make informed decisions through research-based information.
- methods that permit direct investigation of the question.
- qualitative data analysis.
- qualitative research methods and processes as used in the social sciences.
- quantitative research methods and processes as used in the social sciences.

Scholarship and writing (SW). As a doctoral-level professional, the person should have a deep understanding of scholarship and writing including:

- logic, rational thought, and critical thinking.
- lifelong learning and structured professional development.
- how to read a scholarly article and know what it said.
- major theories and theoretical concepts of his/her sub-field (e.g., in agricultural communications, awareness of various media effects theories).
- theoretical and methodological connections among sub-fields (e.g., agricultural teacher education, agricultural communications, agricultural leadership education, extension education, international agriculture development).
- Boyer's multiple forms of scholarship.
- how to write effectively.
- skills in science writing for journal articles, grant proposals, etc.
- how to provide a coherent and explicit chain of reasoning using classical theories of argumentation.
- how to link research to relevant theory.
- how to secure and manage research and development grants.
- ways to replicate studies and generalize across studies.
- how to disclose research to encourage professional scrutiny and critique.
- identifying journals and creative outlets for scholarship (e.g., *Journal of Agricultural Education, Journal of Leadership Education, Journal of Extension, Journal of Applied Communications, Journal of International Agricultural and Extension Education*).
- current political and social challenges facing agricultural education programs as they struggle to validate their worth in the university system, state, and nation.

History, philosophy, and ethics (HPE). As a doctoral-level professional, the person should have a deep understanding of history, philosophy, and ethics including:

- the tripartite mission of the land grant college system and its relationship to America's social and economic well being.
- the history of agricultural education.
- historical philosophies that support development of agricultural education professional practice.
- educational philosophies that have affected global educational thought (e.g., pragmatism, idealism, realism, existentialism).
- a personal teaching philosophy based on historical perspectives and practice, and synthesizing and evaluating appropriate philosophical models.

- professionalism, intellectual honesty, and professional ethics specific to academia, to industry, and to public education.

Context, culture, and diversity (CCD). As a doctoral-level professional, the person should have a deep understanding of context, culture, and diversity including:

- agriculture, including food, natural resources, and environment, as an essential pretext and context for our work.
- the political and cultural role that schools play in socializing youth and adults.
- cultural concepts that affect teaching, learning, understanding, and change.
- diversity; understanding and valuing it.

Knowledge objects, when integrated into professional experience in the natural and applied science of agriculture, renewable natural resources, and environment, empower the doctoral-level professional to advance ". . . the vigor, quality, and integrity of the field" (Golde & Walker, 2006, p. 5) of study of agricultural education.

Conclusions

The Delphi panel of engaged scholars, representing the expert agricultural education community, reached consensus on a framework for agricultural education. The researchers extracted a definition named "Agricultural Education—2010." This definition serves as a guide for doctoral study in the near term. The 17 engaged scholars generated 299 knowledge objects—statements that were offered as important to the field of study. The Delphi panel concurred on 67 knowledge objects that fit within 10 knowledge domains representing a knowledge base. This knowledge base is useful in planning, organizing, delivering, and evaluating doctoral programs and for extending research in the field of study.

Limitations

The expert panel consisted of scholars who live and work primarily in the United States. Consequently, the culture and philosophies of the system of higher education in the United States influenced this study. Thus, the definition and knowledge base of agricultural education were primarily cast through the lenses of "U. S." scholars.

Implications

This study examined the "what" for doctoral study in agricultural education but did not examine the "how" or the "who." Product, process, and participant are important elements in preparing stewards for agricultural education (Walker, 2006) and deserve sustained conversations that are routine and public.

Although 67 knowledge objects achieved consensus, there is a larger body of knowledge to consider for graduate preparation and program design. One or more experts recommended 232 additional knowledge objects. Doctoral program design and individual entry-level professionals may benefit from a careful appraisal of knowledge objects and their interactions and specialties.

These knowledge objects may also have implications for scholarly activity other than doctoral study (e.g., master's degree study, postdoctoral education, and research).

Recommendations

Doctoral granting universities in agricultural education should compare their present doctoral-level knowledge base and knowledge objects with these findings. A rationale may well explain why variations exist within a degree program, but the logical arguments should be clearly developed and supported. Pre-doctoral students should examine the core knowledge objects and compare them with a planned doctoral course of study. An articulated rationale for the selection or exclusion of core knowledge objects will be useful.

In a global society, there is a need to examine continually the definition of agricultural education, the core knowledge objects, and the collective knowledge domains. There must be room for open dialogue about the domains and knowledge objects of doctoral-level preparation in agricultural education. This engaged conversation should become routine and public. The divergent thoughts of this Delphi panel need to be examined and debated. A rich database emerged because of the divergent views of the panel while, at the same time, a strong core knowledge was established through convergent views of the panel. This paradox of diversity-homogeneity within the panel was a strength of this study and is a key to ". . . the vigor, quality, and integrity of the field" (Golde & Walker, 2006, p. 5).

Further examination of the 232 knowledge objects proposed by one or more of the engaged scholars may reveal important content for one or more specialties or contextual areas within the field of study of agricultural education: teacher education, communications, leadership education, extension and outreach, or international development. Similarly, the knowledge objects may provide valuable or additional depth of preparation within a specific knowledge domain. Thus, a doctoral student who desired to specialize in a particular domain may find deeper levels of understanding or skill contained in some of the 232 knowledge objects that did not reach consensus by the expert panel.

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