Forecasting Doctoral-Level Content in International Agricultural and Extension Education—2010: Viewpoint of Fifteen Engaged International Scholars

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Abstract

Given an increasingly interconnected world with an expanding knowledge base, this research engaged 15 international scholars to resolve two research questions: (a) what are the knowledge objects that are essential for the doctoral-level professional working in international agricultural and extension education in 2010, and (b) what are the knowledge domains that coalesce and organize knowledge objects by general principles? Using the Delphi method, scholars engaged in three rounds to identify, rate, and confirm consensus on knowledge objects (KO’s) and knowledge domains (KD’s) for agricultural and extension education—2010. KO’s consisted of fundamental and powerful concepts, knowledge, paradigms, skills, and/or theories. From a submission of 335 KO’s, 240 distinct KO’s were rated; the number was reduced to 173 KO’s as agreed to by the expert panel. Researchers merged the 173 statements into 126 unique KO’s and assigned them to one of 12 knowledge domains. Knowledge domains were defined as related KO’s organized by general principle. The expert panel reached agreement on the 12 KD categories and the placement of 126 KO’s that delineate the field of study.

Keywords: Competency, Delphi, Doctoral-level Professionals, Experts, Knowledge Domains, Knowledge Objects
Introduction

Drucker (1968) coined the idea of a knowledge worker and predicted that major changes in society would be brought about by information. Drucker reasoned that knowledge had become the central key resource that knows no geography. Clark (2004) wrote “Peter Drucker predicted that the major changes in society would be brought about by information. . .” and that “. . . the defining characteristic of these knowledge workers is the level of their formal education. Thus education and development, and to some degree training, will be the central concern of a knowledge society” (p. 1). Almost four decades after Drucker’s original work, Altbach (2006) concluded that “globalization in the 21st century is truly worldwide in reach—few places can elude contemporary trends, and innovations and practices seem to spread even faster due to modern technology” (p. 122). Merrill (2000) posited, “a knowledge object is a precise way to describe the subject matter content or knowledge to be taught” (p. 1). Further, Merrill noted that “a knowledge object is a framework for identifying necessary knowledge components” (p. 1). Extrapolating the trends of knowledge and globalization begs the question, “What knowledge is essential for professionals who work in international agricultural and extension education in 2010?”

Lindner, Dooley, and Wingenbach (2003) identified competencies as important and desired by graduates in three primary areas: (a) Knowledge of teaching strategies, foundations, and applications and international knowledge; (b) Skills in content, process, social, complex problem-solving, technical, systems, and resource management; and (c) Abilities in communications, idea generation and reasoning, perceptual and spatial, attentiveness, and quantitative. In their cross-national study of agricultural and extension education graduate students, Lindner et al. found that “most perceived competency rankings varied by country” (p. 51). Based on this finding, Lindner et al. recommended that additional research be conducted to understand better the global applicability of findings from single country studies. Research conducted in the United States to define doctoral study in agricultural education led to a recommendation that similar research needed to be conducted involving a more global perspective (Baker, Shinn, & Briers, 2007; Shinn, Baker, & Briers, 2008). The research presented in this paper is an attempt to understand better what knowledge should constitute doctoral study in agricultural and extension education from a global context.

Mulder and Kupper (2006) contended that the position of agricultural education is threatened in many countries throughout the world; admittedly, agricultural and extension education is a small enterprise. It is essential for continued growth that all in agricultural and extension education work together to understand our knowledge base and educational needs so that we may develop knowledge in agricultural and extension education and disseminate that knowledge beyond our field of study.

Conceptual Framework

All advanced civilizations have recognized the need for higher education. Perkins (2006) provided a synthesis of the history of universities and concluded that most were “. . . taught in high culture, received doctrine, literary and/or mathematical skills of their political or religious masters, with little room for questioning or analysis” (p. 159). Certainly oversimplified, higher education was an unchanging autocracy. Enders (2006) noted that today’s university is a European invention of the 12th and 13th centuries with roots “. . . in Bologna, Salerno, and Paris”
The conceptual framework evolved to a more pragmatic academy during the 18th and 19th centuries. Again oversimplified, European and American universities embraced pragmatism and behavioralism. Doolittle and Camp (1999) recognized this underlying foundation throughout the 20th century but argued that the 21st century will evolve toward a framework of constructivism. Doolittle and Camp posited, “Of the three basic types of constructivism discussed, cognitive constructivism is most compatible with [U.S.] career and technical education” (p. 1). Recognizing the global changes that were occurring, the ministers of education of 29 European countries convened in Bologna and on June 19, 1999, signed a joint Bologna Declaration that moved toward cognitive constructivism (Umeå University, 2007). Golde and Walker (2006) concluded that “disciplines continue to change . . .” (p. 4).

The conceptual model for this study is a constructivist approach to grounded theory. Mills, Bonner, and Francis (2006) noted that “constructivist grounded theory has its foundations in relativism and an appreciation of the multiple truths and realities of subjectivism” (p. 8). Further, Mills et al. noted that “key issues for constructivist grounded theorist[s] to consider in designing their research studies are discussed in relation to developing a partnership with participants that enables a mutual construction of meaning . . .” (p. 8).

It appears that this is an appropriate environment in which professionals in agricultural and extension education should examine doctoral education; there are numerous international scholars to guide such efforts. The conceptual framework of this study hangs on the experiences and reflections of a purposefully selected panel of international scholars. We, as authors, value experience, particularly when coupled with praxis and reflection.

**Purpose and Objectives**
As part of a larger study, the authors re-examined the history, trends, and issues in agricultural and extension education from an international perspective and extracted the implications for doctoral-level content from an international agricultural and extension education context. Two research questions framed this study:

1. What are the essential knowledge objects for doctoral-level professionals working in international agricultural and extension education in 2010?
2. What are the knowledge domains that coalesce and organize knowledge objects by general principles?

**Methods**
The Delphi method (Dalkey, 2002; Linstone & Turoff, 2002; Weaver, 1971) was congruent with the purpose of this research. The Institutional Review Boards from Texas A&M University and Texas Tech University approved the research protocol. Dalkey (2002) 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 a 0.9 coefficient of reliability.

On July 6, 2006, the researchers solicited nominations of engaged scholars from the broad field of agricultural and extension education by individually e-mailing 120 authors who published during 2003-2006 in one of four international journals—the Journal of Agricultural Education and Extension (formerly, the European Journal of Agricultural and Extension Education), the Journal of Extension Systems, the Journal of International Agricultural and Extension Education, and the South African Journal of Agricultural Extension.

On October 8, 2006, the researchers invited 21 most frequently nominated engaged experts as Delphi panel members.
In addition to confirming their acceptance, panelists were given the parameters of the research and a planning calendar. Seventeen engaged scholars accepted invitations to participate in the three-round design from March to October 2007. Because of other commitments, two of the 17 panelists did not engage in any of the rounds; however, 13 panelists responded to all rounds. All correspondence between the researchers and expert panel members was by individual e-mail, and panelists responded using a confidential web form. Feedback was provided in the form of the distribution of ratings among the expert panel. The Delphi panel members represented specialties in international agricultural and extension education from five United Nations regions: Africa, Europe, Latin America, North America, and Oceania. The absence of scholars from Asia and non-response by scholars from Oceania are limitations of this study.

Round 1 asked panelists to identify content (i.e., knowledge objects) for doctoral-level programs in agricultural and extension education—2010. Round 1 was sent on March 29, 2007, and concluded on April 9. Responses to Round 1 led to Round 2, seeking agreement on knowledge objects. Round 2 was sent on April 20 and concluded on May 10. Consensus among the Delphi panel members was set a priori as two-thirds of the expert panel members rating a statement “agreed” (5) or “strongly agreed” (6) using a six-point Likert response scale.

Round 3 provided the set of knowledge objects that reached consensus; knowledge objects were sorted into unique knowledge domains. Round 3 was sent to the expert panel on September 25 and concluded on October 30, 2007. Panel members provided explanations (rationales) for their decisions.

Results

The first round of the study sought to identify the content (knowledge objects) needed by doctoral-level professionals in agricultural and extension education—2010. A panel of 15 international scholars from five United Nations Regions (Africa, Europe, Latin America, North America, and Oceania) provided 335 statements.

Following round one through which 335 knowledge statements were provided by the Delphi panelists, the researchers analyzed each statement. Similar or duplicate knowledge statements were combined or eliminated while compound statements were separated. From 335 original knowledge statements provided, the researchers retained and restructured 240 knowledge objects.

In round two, panelists rated their level of agreement with each of the 240 knowledge objects as a component of the knowledge base for international agricultural and extension education. The panelists used a six-point Likert scale (strongly disagree, disagree, slightly disagree, slightly agree, agree, strongly agree). Fourteen panel members responded to round two.

Following round two, 172 knowledge objects that reached consensus were analyzed again by the researchers and, based on comments and feedback from the panelists, analogous knowledge objects were combined, resulting in 126 unique knowledge objects. These knowledge objects represented fundamental and powerful concepts, paradigms, skills, and/or theories needed by doctoral-level professionals in agricultural and extension education—2010.

Prior to round three, researchers sorted the 126 knowledge objects into 12 unique knowledge domains. The knowledge domains were described using accepted reference materials and organized by general principles; the knowledge domains and descriptions of those knowledge domains used to categorize knowledge objects are described as follows:

Agricultural/Rural Development.
Processes for improving lives of individuals, families, and communities—meeting basic
human needs, improving economic well-being, and allowing hope, promoting peace, and sustaining their environment (see Snapp & Pound, 2008; Wals & Bawden, 2004).

Agricultural/Biophysical Systems. “...the integrity of biophysical systems, in particular, are dependent upon their context, both spatially (across landscapes) and temporally (multi-generational). Thus, a landscape would have integrity if its ecosystems retain their complexity and capacity for self-organization, and sufficient diversity, within their structures and functions, to maintain the systems' self-organizing complexity...through time” (Iverson & Cornett, 1994, p. 1).

Change and Technology Adoption. Processes by which individuals and social systems accept or reject an innovation. Roles of the change agent in influencing acceptance or rejection (see Rogers, 2003).

Delivery Strategies. Processes by which information is transferred (or transfer is influenced) to a learner by a teacher/facilitator/coach (see Tuttle, Lindner, & Dooley, 2007).

Human Resource Development. HRD is concerned with providing learning and personal development opportunities and conducting training programs. According to Rao (2004), “HRD is a continuous planned process by which employees are helped” (p. 291).

Instructional Design/Curriculum Development. Processes by which information for learning is packaged, arranged, presented for the learner (see Berger, 1996; Bruner, 1966; Rothwell & Kazanas, 2004).

Learning Theory. An attempt to describe how people learn, thus providing an understanding of this complex cognitive, emotional, and social process of change (see Bandura, 1977; Dewey, 1938; Knowles, Holton, & Swanson, 2005; Vygotsky, 1978).

Organizational Development. Organizational development is the process through which an organization develops the internal capacity to be the most effective it can be in its mission work and to sustain itself over the long term. This definition highlights the explicit connection between organizational development work and the achievement of organizational mission (see McLean, 2006).

Philosophy, History, and Policy. The epistemology, ontology, axiology, and universal science framed in past, present, and future contexts and that is integrated into a course of action designed to influence and determine decisions, actions, and other consistent patterns of activity (see Durant, 1961).

Planning, Needs Assessment, and Evaluation. A comprehensive, systematic, and flexible approach to charting direction, determining the strengths, weaknesses, opportunities, threats, and resources of an educational program, and determining the extent to which the purposes are being accomplished (see Witkin & Altschuld, 1995).

Research Methods and Tools. Processes of unusual persistence and systemacy whereby new knowledge is discovered (see Hamlin, 1966).

Scholarship and Communications. Processes of preparing, packaging, verbalizing, depicting, and displaying information for new consumers of that information (see Boyer, 1990; Weiser, 1996).

In round three, the panel of scholars examined each knowledge object and either agreed that the knowledge object was correctly placed within the appropriate knowledge domain or disagreed that the knowledge object was placed within the appropriate knowledge domain. If panel members disagreed, they were given the option of reassigning the knowledge object to a different knowledge domain or recommending that the knowledge object be removed. By panel consensus (two-thirds), no further reduction in knowledge objects was required and no reassignment of knowledge objects to different knowledge domains was needed. Thirteen members of
the expert panel reached consensus on 12
knowledge domain categories and the
placement of 126 knowledge objects that
connect and describe the content for
doctoral-level professionals in agricultural
and extension education—2010. The 12
knowledge domains and 126 knowledge
objects are shown in Table 1.

Table 1

Knowledge Domains and Objectives for Doctoral Professionals

Agricultural/Rural Development Knowledge Domain:
1. farming systems approach to research and extension (i.e., water catchment
management, marketing chain management, agro-biodiversity management,
poverty reduction)
2. community leadership organization and development (e.g., theories, principles,
practices, culture, people, environment)
3. extension’s role in building social capital, then organizing small-scale farmers to
achieve economies of scale and market access issues
4. roles of extension in disseminating technical, marketing, management, and policy
information to farmers
5. environmental and sustainable development issues, including agricultural
production systems
6. global dimensions (internationalization) of agriculture (i.e., global perspectives and
skills to understand the global nature of agriculture)
7. roles and management of rural youth programmes
8. strategies for stakeholder participation in extension planning
9. social consciousness and commitment to managing and conserving rural
life/communities
10. agricultural development (e.g., concepts, models, and theories)
11. integrated community economic development (e.g., business organization,
entrepreneurship)
12. roles of extension in reducing rural poverty
13. roles of information technology in extension systems in developing countries

Agricultural/Biophysical Systems Knowledge Domain:
1. basic agricultural subject matter (e.g., animal science, crop science, engineering,
economics, and agribusiness, agricultural education, and extension)
2. farming systems approaches (i.e., water catchment management, marketing chain
management, agro-biodiversity management, poverty reduction strategies)
3. roles of agriculture in environmental conservation and sustainable agricultural
development (i.e., how food systems can function in harmony with natural
environments to ensure sustainable development)
4. a systems perspective of agriculture (e.g., connections among larger
interdisciplinary nature of agriculture that cuts across issues of production,
processing, marketing, nutrition, policy, food security, health, HIV/AIDS)
Table 1 (continued).

**Change and Technology Adoption Knowledge Domain:**
1. roles of change agents with clientele who possess different cultural, societal, environmental, developmental, and technological needs
2. approaches and strategies for facilitating farmer-extension-research linkages
3. teaching theory, principles, and strategies pertaining to the adoption and diffusion of planned, purposeful technological, educational, and social change
4. need for adaptability (i.e., graduate can “move” among people in the discipline and related disciplines and retain credibility)

**Delivery Strategies Knowledge Domain:**
1. strategies to acquire knowledge, skill, and understanding among selected knowledge bases
2. teaching problem solving and engaging people in successful problem-solving activities
3. methods to transfer skills to peers and students
4. organizing and evaluating experiential methods (e.g., internships, field experience, student exchange)
5. the role of distance education in agricultural education programs
6. teaching skills in individual, team-teaching, face-to-face classroom, and at-a-distance settings
7. preparing lesson plans and instructional materials to enhance active learning and the development of higher-level cognitive skills
8. teaching and advising on the basis of individual needs, skills, abilities, and age groups
9. teaching on the basis of institutional, community, regional, national, or international contexts and resources
10. teaching on the basis of group and individual planning, thinking, and evaluation processes
11. adult education methods and strategies (e.g., andragogy, gerontology)
12. collaborative teaching and learning processes
13. methods of teaching practical or psychomotor skills to rural young people
14. teaching students to develop the seven apperceptive levels of learning (i.e., knowledge, skills, interests, understandings, appreciations, values, and ideals)
15. applying flexible and innovative techniques in crossing traditional boundaries between secondary level and post-secondary level institutional settings whether developing formal or non-formal educational programmes
16. computer applications and use of Internet (e.g., searching, on-line learning systems)
Table 1 (continued).

**Human Resource Development Knowledge Domain:**
1. youth issues (e.g., agricultural production, post-production, leadership development)
2. people orientation when working as an agricultural/extension educator
3. leadership theory and practice, and team-building skills
4. supervising skills in agricultural education institutions
5. competence development (i.e., performance improvement)
6. goal setting and rewards (i.e., theories, principles, and practices)
7. leadership and administration in agricultural and extension education
8. management skills (i.e., skills to coordinate and supervise personnel/staff, especially subordinates; and to foster partnerships with other stakeholders, both within the private sector and public sector)
9. time management and priority development
10. vocational and technical education necessary to achieve long-term agricultural development
11. facilitation skills (e.g., helping people work together more effectively to achieve common goals)

**Instructional Design/Curriculum Development Knowledge Domain:**
1. curriculum development
2. internationalizing undergraduate and graduate curricula
3. guiding others in collaborative problem solving using original and innovative approaches
4. non-formal education concepts (i.e., types and its role in development)
5. teaching on the basis of appropriate instructional materials and technological applications
6. approaches to teaching and learning
7. behavioral measurements and methodology
8. strategies to create and manage inspiring learning environments
9. group behaviour and management among different types of learners
10. extension education approaches (i.e., principles and practices)

**Learning Theory Knowledge Domain:**
1. theory and practice of teaching—principles, processes, applications, and operations
2. adult development and learning theory
3. taxonomies of educational objectives (e.g., Anderson et al., 2001)
4. critical thinking skills
5. elements of the psychology of learning
6. learning theories (e.g., self-directed learning, critical reflection, experiential learning, learning to learn, Kolb)
7. motivation as it applies to participation and engagement
8. transformative learning theories (i.e., enable and empower graduates to think and make judgment as autonomous individuals, and yet be able to receive ideas and collaborate with others)
9. youth development and learning theory
10. educational concept, theories, types and role in rural/agricultural development
Table 1 (continued).

Organizational Development Knowledge Domain:
1. agricultural knowledge systems
2. extension’s role in natural resource management, sustainable agriculture, and a global economy
3. market-driven extension (e.g., farm income, rural employment, value-crop and livestock systems)
4. public and private extension systems (i.e., missions, roles, procedures, impacts, outcomes, stakeholders)
5. agricultural social systems
6. gender equity issues (e.g., agricultural production, post-production, leadership development)
7. effective strategies for working in different cultures (e.g., culture theories)
8. developing and building educational institutions and marketing programs
9. organisational behaviour (e.g., theories, principles, practices)
10. leadership theory and practice (e.g., principles, learning styles, paradigms and grounded theories—great man, traits, contingency, situational, behavioral, participative, management and relationship theories)
11. agricultural education programme management (e.g., logistic control, fiscal, human management)
12. mechanisms and the context in which agricultural education and extension operates (e.g., Cochrane)
13. extension management and supervision

Philosophy, History, and Policy Knowledge Domain:
1. contextual applications related to selected knowledge bases (e.g., agricultural communications, distance education and technology-enhanced instruction, extension education, leadership and community education, teacher education, international agricultural development education, technological change)
2. comparative agricultural education (e.g., developed and developing countries)
3. Stiglitz’s work on globalisation
4. ethical and positive values
5. ethical standards (e.g., trustworthiness, honesty, integrity)
6. models of agricultural and extension education (e.g., Land grant system, extension in developing world)
7. philosophies of agricultural extension
8. philosophies of education and their applications (e.g., behaviorism, humanism, pragmatism, social reconstructionism)
9. agricultural and extension education policies, processes, and impacts among different countries (e.g., farming, agriculture, agri-industry, agribusiness, rural regional development)
10. principles of agricultural extension as an organization
11. perspectives on defining and redefining extension
Table 1 (continued).

**Planning, Needs Assessment, and Evaluation Knowledge Domain:**

1. technical and practical knowledge that demonstrates proof of occupational competency
2. methods of assessing achievement (i.e., command of testing principles and evaluation models)
3. educational measurement and testing
4. evaluating educational models
5. evaluating effectiveness of programs and institutions (e.g., Stufflebeam’s CIIPPP model)
6. evaluating effectiveness of teaching and/or the application of practice
7. principles of evaluation (e.g., monitoring and evaluation skills for projects and programmes)
8. methods to identify knowledge gaps and propose education and training strategies to overcome them (i.e., to enhance the knowledge base, secure jobs, advance in occupations/careers)
9. identifying educational needs of learners
10. extension programme planning and evaluation
11. models used to identify educational needs (e.g. Borich’s Model)
12. planning, consensus building, and conflict resolution
13. programme development and evaluation model for agriculture, food, environment
14. project preparation and methodologies

**Research Methods and Tools Knowledge Domain:**

1. multi-disciplinary science methods (e.g., new issues in math and statistics with application in research methodology and statistical analysis)
2. participatory methodologies (e.g., PRA, PTD, community-based natural resource management, participatory communication)
3. ways to clearly and succinctly state the aims and objectives of research
4. statistical analytical methods for research in education and extension to extract, synthesize, analyze, and communicate quantitative and qualitative information (e.g., Excel, SPSS, SAS statistical packages)
5. collecting quality data and analyze according to established and atypical procedures (i.e., instrumentation, procedures for data collection, analyses)
6. creation, innovation, searching for answers and solutions, critical thinking, independent and responsible reporting
7. designing an experimental program to resolve researchable problems (e.g., biophysical sciences, social sciences, socio-economic)
8. identifying and prioritizing research needs that have current and future programmatic implications
9. statistics (e.g., introductory, descriptive and inferential, parametric and non-parametric)
10. qualitative and quantitative research methods in social sciences
11. research paradigms and processes to solve practical problems
Table 1 (continued).

Scholarship and Communications Knowledge Domain:
1. open-mindedness (i.e., considers alternative explanations and is willing to investigate them)
2. synthesizing, analyzing, and communicating basic information
3. ways to participate in science (research and extension) activities in the wider community (i.e., beyond the home research institute and/or as part of a larger research team)
4. one’s research in the context of appropriate literature, including reporting and publishing findings
5. agricultural communications (e.g., concepts, models, theories, functions, listening, speaking, interviewing, debating, and writing skills appropriate for various audiences and stakeholders)
6. methods for critical review and analysis of literature
7. developing research and grant proposals
8. international scientific and extension dialogue and research activities
9. value of originality in thinking

Conclusions, Implications, and Recommendations
A Delphi panel of engaged international scholars, representing the expert international agricultural and extension education community, reached consensus on 126 knowledge objects that coalesce into 12 knowledge domains. Fifteen panel members generated 335 knowledge objects—statements that were offered by one or more scholars as being important to doctoral-level professionals in agricultural and extension education—2010. The Delphi panel concurred on 126 knowledge objects that fit within 12 knowledge domains. The domain categories were (a) agricultural/rural development; (b) agricultural/biophysical systems; (c) change and technology adoption; (d) delivery strategies; (e) human resource development; (f) instructional design/curriculum development; (g) learning theory; (h) philosophy, history, and policy; (f) planning, needs assessment, and evaluation; (g) research methods and tools; and (h) scholarship and communications.

These findings have implications for the redesign of curriculum, courses, self-directed study, professional development, and collaboration among professionals in agricultural and extension education. Concurrently, the knowledge objects have implications for doctoral-level content, professional development, and certification.

Radhakrishna & Xu, 1997; Shinn, Briers, & Baker, 2008; Williams, 1991) on the importance of the following domains: (a) change and technology adoption; (b) delivery strategies; (c) instructional design and curriculum development; (d) learning theory; (e) philosophy, history, and policy; (f) planning, needs assessment, and evaluation; (g) research methods and tools; and (h) scholarship and communications. However, the international panel of scholars recognized and embraced four domains beyond previous findings: (a) agricultural and rural development; (b) agricultural and biophysical systems; (c) human resource development, and (d) organizational development.

Drucker, Dyson, Handy, Saffo, and Senge (1997) warned, “Knowledge is different from all other kinds of resources. It constantly makes itself obsolete, with the result that today's advanced knowledge is tomorrow's ignorance. And the knowledge..."
that matters is subject to rapid and abrupt shifts. . . ” (p. 20). Professionals in agricultural and extension education, along with peer universities, should carefully examine the 126 knowledge objects. Faculties of doctoral-granting universities should compare, contrast, and debate these knowledge objects against current doctoral courses of study.

Similarly, graduate students planning to pursue doctoral-level education should examine the knowledge base as a guide for their preparation (course work) and research. This examination should encourage public and persistent dialogue.

The 15 international scholars submitted a total of 335 statements. The 209 statements that failed to reach consensus may reveal important content for specialties, emergent knowledge, or unique contextual settings within the field of study.

Given an increasingly connected world faced with disequilibrium in food, environmental, and human systems, the authors encourage increased collaboration, cooperation, and coalitions among international universities and professional societies which have a commitment to international development and agricultural and extension education.

In research focused on agricultural education in the United States, Shinn, Briers, and Baker (2008) identified 10 knowledge domains and 67 knowledge objects essential for professional practice at the doctoral level. A cross-examination of the content and structure, logic, ontology, and epistemology of the two studies would be instructive.

This knowledge base is not prescriptive, rather descriptive and comparative as described by Carlile and Christensen (2005). The knowledge base is intended to be useful in planning, organizing, delivering, and evaluating doctoral-level content in international agricultural and extension in the near term. In a call to action, Walker, Golde, Jones, Conklin-Bueschel, and Huchings (2008) challenged, “there is no shortage of ideas about what we need to change. We have to decide whether or not we want to change” (p. 144). If we choose to change, Golde and Walker (2006) offer a four-step process: Step 1. Look ahead at the discipline. Step 2. Identify what a Ph.D. in the discipline must know and be able to do” (p. 424). These first two steps are what this research sought to accomplish. To continue the change, faculties must Step 3. Construct the goals of the program. . Step 4. Design the program” (p. 424).

“As ‘stewards of our disciplines’ (and of the commonality of human learning), we can do no less” (p. 428).

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