

2011-2015 Agricultural Education¹ National Research Agenda Priorities, Key Outcomes, and Major Research Teams

PRIORITY 1

Public and Policy Maker Understanding of Agriculture and Natural Resources

Key Outcome: *Consumers and policy makers will have an accurate understanding of and informed opinions about agriculture and natural resources. Further, policy decisions at all levels will reflect win-win solutions that ensure the long-term sustainability of agriculture, natural resources, and quality of life in communities across the nation.*

Major Research Teams/Programs:

- Youth, consumer, and policy maker knowledge of agriculture and natural resources
- Effective messaging for public and policy groups

PRIORITY 2

New Technologies, Practices, and Products Adoption Decisions

Key Outcome: *Agriculturists, rural landowners, homeowners, and consumers will embrace new technologies, practices, and products derived through agricultural and natural resources research.*

Major Research Teams/Programs:

- Agriculture technology adoption drivers and inhibitors
- Interventions that enhance successful technology adoption

PRIORITY 3

Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century

Key Outcome: *A sufficient supply of well-prepared agricultural scientists and professionals will drive sustainable growth, scientific discovery, and innovation in public, private, and academic settings.*

Major Research Teams/Programs:

- Student academic and career decision making
- Quality, diversity, and number of students

PRIORITY 4

Meaningful, Engaged Learning in All Environments

Key Outcome: *Learners in all agricultural education learning environments will be actively and emotionally engaged in learning, leading to high levels of achievement, life and career readiness, and professional success.*

Major Research Teams/Programs:

- Highly engaged and motivated learners
- Educator preparation, practice, and professional development

¹ includes formal and nonformal education, leadership development, and communication in agriculture and natural resources

PRIORITY 5

Effective and Efficient Educational Programs

Key Outcome: *Highly effective educational programs will meet the academic, career, and developmental needs of diverse learners in all settings and at all levels.*

Key Outcome: *Accurate and reliable data that describe the quality and impact of educational programs and outreach efforts at all levels will be distributed to respective decision groups (e.g. students, parents, administration, industry, policy makers).*

Major Research Teams/Programs:

- Attributes of exemplary agricultural education programs
- Program adaptability, change, and improvement

PRIORITY 6

Vibrant, Resilient Communities

Key Outcome: *Local communities will have effective leaders and engaged citizens who ensure high quality educational and career development opportunities for youth and adults and proactively sustain an environment conducive to positive community change.*

Major Research Teams/Programs:

- Sustained dynamic community leadership and civic engagement
- Educational dimensions of vibrant rural communities

Note: The research priorities and key outcomes listed above were drawn from the National Research Agenda released in 2011 as a special project of the American Association for Agricultural Education (edited by Dr. David Doerfert at Texas Tech University).

NATIONAL RESEARCH AGENDA

American Association for Agricultural Education
2011- 2015 Research Priority Areas

Scientific & Professional Workforce

Sufficient Scientific and Professional Workforce That Addresses the Challenges of the 21st Century

Key Outcome: A sufficient supply of well-prepared agricultural scientists and professionals drive sustainable growth, scientific discovery, and innovation in public, private, and academic settings.

Informed Choices

Background

Recently, the National Academy of Sciences (2009) report titled *Transforming Agricultural Education for a Changing World* stated that: "Our world is changing at an increasing pace and unleashing a complicated set of problems and opportunities" (p. 1). The report further commented on the challenges this present to the human resource needs of U.S. agriculture:

Because agricultural production is embedded in social and natural systems, it is affected by changing circumstances in those systems, such as increasing international competition in agricultural products, changing consumer demands and expectations of agriculture and food, declining levels of public research support, evolving immigration and labor policy, growing demands to regulate the environmental externalities of agriculture, and emerging constraints of the natural resource base. In addition, rising rates of obesity are leading to increased incidence of preventable disease while structural and economic issues affect access to fresh fruits and vegetables in many communities. How will we respond to these challenges? Do we have a pool of individuals capable of navigating us through these changing waters? (p. 3)

The answer to their question is no. A recent report by Purdue University and the U.S. Department of Agriculture's National Institute of Food and Agriculture predicts more than 54,000 agriculture-related job openings annually between 2010 and 2015 (Goecker, Smith, Smith, & Goetz, 2010). But despite the promising employment outlook, there is a talent shortage in the applied agricultural sciences. Challenging our profession's ability to respond to this need is a changing higher education environment highlighted by universities that have dropped or consolidated programs in the agricultural sciences because of low enrollment and dwindling funds.

Addressing our societal and industry challenges will require a diverse workforce that includes scientists and professionals with knowledge and skill beyond today's standards. These individuals must be well prepared for discovery science, teaching

and learning, science, technology, engineering, and mathematics (STEM) integration, and application of innovation for public, private, and academic settings. Without a focus on the development of effective human capital as a life-long process, we will fail in addressing the societal challenges that lie before us.

Challenges

With the global population expected to increase to nine billion by 2050, food security is of paramount importance to countries everywhere. Failure to address food security concerns could cause political instability in many parts of the world. Riveria and Alex (2008) connected this global need to a need for change in the development of the agricultural workforce:

Greater commercialization of agricultural systems and increasing trade liberalization dictate the need for better capacity on the part of the agricultural workforce in the 21st century. Global changes in the roles of the public and private sectors and dramatic advances in technology have also strongly affected agricultural workforce development needs. These evolving changes have important policy, institutional, and programmatic implications. (p. 374)

The need to provide a highly educated, skilled workforce capable of providing solutions to 21st century challenges and issues has never been greater. The issues that face our society have grown increasingly complex and harder to solve, even with the products of sophisticated scientific discovery and application. In the meantime, our educational system is being challenged by cultural, economic and structural factors that threaten our nation's standing as a global leader in scientific and technological innovation. There is therefore a growing need to develop strategies to create a society of diverse, highly educated professionals and knowledge workers to address major societal challenges and develop innovations that drive the engines of economic growth.

If we are to be able to recruit and retain students to study in and prepare for careers in agriculture and natural resources related fields, we must be able to better understand the models, strategies,

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and tactics needed to best prepare, promote, and retain new professionals who demonstrate the requisite content knowledge, technical competence, and cultural awareness, coupled with communication and interpersonal skills. This will require that adequate numbers of well-prepared, highly effective agricultural educators, communicators, and leaders be made available to meet current and future needs.

Opportunities to Respond

The agriculture industry represents a major driver of economic growth and development. It requires a stable, qualified workforce that possesses a diverse range of skill sets suitable for employment in jobs ranging from the on farm setting to positions as Ph.D. scientists in highly sophisticated laboratories. However, attracting the best and the brightest to pursue careers in agriculture remains a challenge. According to the *Coalition for a Sustainable Agricultural Workforce* (n.d.), major obstacles exist to recruiting students into careers in the agricultural sciences, including budget constraints, student misconceptions and competition for the most talented from the basic sciences and industry.

These challenges also represent our opportunities. The National Academy of Sciences (2009) stated that:

During the next ten years, colleges of agriculture will be challenged to transform their role in higher education and their relationship to the evolving global food and agricultural enterprise. If successful, agriculture colleges will emerge as an important venue for scholars and stakeholders to address some of the most complex and urgent problems facing society. (p. 1)

Our discipline is uniquely positioned for an immediate, positive impact on this need as research outcomes are quickly communicated and integrated into K-12, pre-professional, and professional-level educational opportunities. Our profession's knowledge base is rich with cognitive, affective, psychomotor and experiential research and practical understandings. Collectively, we have a foundation towards a comprehensive theory of human learning. This includes retraining existing and developing new human capital in agriculture as part of a life-long learning system.

Our specializations in teacher education, agricultural communication, leadership development, and extension education are grounded in the applied research tradition of solving problems, and our knowledge bases focus on understanding the dimensions of human and social capital in educational and organizational settings. The research endeavors of those in the agricultural education profession are focused on discovering, testing and refining those very models, strategies, and tactics that will be needed to create a sufficient scientific and professional workforce that can effectively address current and future challenges. Our areas of scientific focus should include:

- » Developing the models, strategies, and tactics that best prepare, promote, and retain new professionals who demonstrate content knowledge, technical competence, moral boundaries, and cultural awareness coupled with communication and interpersonal skills.
- » Creation of programs that develop the skills and competencies necessary to improve the communications and knowledge sharing effectiveness of all in the agriculture-related workforces of societies.

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ADDITIONS

NATIONAL RESEARCH AGENDA

American Association for Agricultural Education
2011- 2015 Research Priority Areas

Meaningful, Engaged Learning

Meaningful, Engaged Learning in All Environments

Key Outcome: *Learners in all agricultural education learning environments will be actively and emotionally engaged in learning, leading to high levels of achievement, life and career readiness, and professional success.*

Informed Choices

Background

Early discussions of teaching and learning were primarily philosophical and epistemological debates absent of empirical research on the human mind. Recent research in the cognitive sciences, human development and behavior, and in the social and cultural aspects of learning environments have provided educators with a much more sophisticated view of learning and of the creation of environments to develop meaningful learning (Bransford, Brown, & Cocking, 2000).

Learning is the active, goal-directed, construction of meaning. Meaningful learning occurs when learners go beyond a rote memorization of facts to the ability to interpret the interconnectedness of facts or material, regulate their understanding, transfer the understanding of concepts to new situations, and think creatively, solve problems, and/or experience a change in attitudes, opinions, skill development, and knowledge constructed (Darling-Hammond, George Lucas Educational Foundation, Barron, & Pearson, 2008). Further, meaningful learning is embedded in authentic environments or include real-world tasks or applications.

The role of the teacher in meaningful learning is to move from being the sole source of knowledge to becoming a facilitator of a holistic learning environment and engaged learning process. Successful learners in meaningful environments take responsibility for their learning, and they are active and goal-directed. Successful learners approach learning as a problem-solving process whereby they advance from novices to experts, they reflect on the process and the development of their expertise, and adjust the learning goals to advance in their thinking. In meaningful learning contexts, learners are metacognitive or can think about their own thinking, they can transfer knowledge and skills to new contexts, and are thereby prepared to meet the challenges required of the complex environments in the 21st century.

Challenges

Despite a very solid base of research on how people learn and of principles for transferring the science of learning to the practice of teaching, many

learning environments still rely heavily on rote memorization of narrow facts. While it's useful for learners to have a solid foundation in factual knowledge, the skills needed to be successful in the 21st century workforce are much more complex. Today's employees must be able to communicate effectively, work in teams, and develop creative solutions to complex problems while synthesizing a large and ever-changing base of information.

Today's learners are more diverse than ever. They come from differing cultural and socio-economic environments. They display diverse preferences for learning and they possess different levels of prior knowledge and academic preparation. Learners are motivated differently through extrinsic factors as well as intrinsic needs. Learners who are not engaged in meaningful learning are either at risk for failure or become adept at memorizing rote facts, but are not proficient at solving complex problems with an ever changing knowledge base. Given these variables and constraints, one of the challenges for teachers in engaging learners for meaningful learning is the problem of how to reach all students.

Whether due to a lack of preparation, ineffective models of preparation, or a reliance on personal assumptions versus evidence-based practice, a gap still exists between the science of meaningful learning and the practice of teaching for meaningful learning. Thus, a second challenge for developing meaningful learning environments involves the problem of preparing and developing teachers as adaptive experts in all learning contexts.

A final challenge to the problem of creating meaningful engaged learners involves the design, implementation, and assessment of pedagogies and models for meaningful learning. Learners, teachers, the subject matter, the context of the classroom, the cultural dynamics both inside and outside of the classroom, and the opportunities, constraints, and resources of the specific learning context all influence meaningful learning. Given such complexities, agricultural education professionals are challenged by the designing, developing, implementing, and assessing pedagogies for meaningful learning. Further, agricultural education professionals should measure the learner, teacher, and environmental

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outcomes associated with a variety of meaningful learning pedagogies.

Opportunities to Respond

Designing, developing, and assessing meaningful learning environments that produce positive learner outcomes is essential to properly educating the citizens of the 21st century. Yet, this task is complex. First, many teachers rely on their own beliefs and assumptions regarding “what works” in classroom teaching through their own contexts and prior experiences. Further, teachers who are best able to teach meaningfully are those who have developed adaptive expertise (Crawford, et al., 2005). They are metacognitive, self-regulated, reflective learners who have reflected on the problems of their practice and applied solutions from evidence-based practices. Further, teachers who are adaptive experts have managed to develop such expertise in complex, ever-changing classroom environments (Darling-Hammond & Bransford, 2005).

Scholarship in learning and teaching has been a primary focus for research in agricultural education throughout its early disciplinary roots. Further, agricultural educators as a whole are engaged heavily in the practice of teaching and focus on fostering excellent teaching, and meaningful learning environments in their own teaching contexts. The design, development, and assessment of meaningful learning environments that produce

positive learner outcomes are essential to properly educating the citizens of the 21st century. Research is needed to achieve the goal of having all learners in all agricultural education learning environments actively and emotionally engaged in learning, resulting in high levels of achievement, life and career readiness, and professional success. Our areas of scientific focus should include:

- » Deepen our understanding of effective teaching and learning processes in all agricultural education environments.
- » Examine the role of motivation, self-regulation, metacognition, and/or reflection in developing meaningful, engaged learning experiences across all agricultural education contexts.
- » Examine the role of diversity and multiple perspectives in meaningful learning across agricultural education contexts.
- » Develop and assess various learning interventions and delivery technologies to increase problem-solving, transfer of learning, and higher order thinking across all agricultural education contexts.
- » Examine various meaningful learning environments in assorted agricultural education contexts for their impact on specific cognitive, affective, and psychomotor learning outcomes.

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ADDITIONS