



Epistemological and pedagogical beliefs of award-winning post-secondary agriculture faculty at two agricultural universities

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Graduates of Colleges of Agriculture

Solve global challenges as a food and ag professional.

AG AREAS OF STUDY

LIFE SCIENCES



PLANT/SOIL SCIENCE



ANIMAL SCIENCES



FOOD SCIENCE & TECHNOLOGY

ECONOMICS, BUSINESS & MANAGEMENT

MECHANIZATION & ENGINEERING



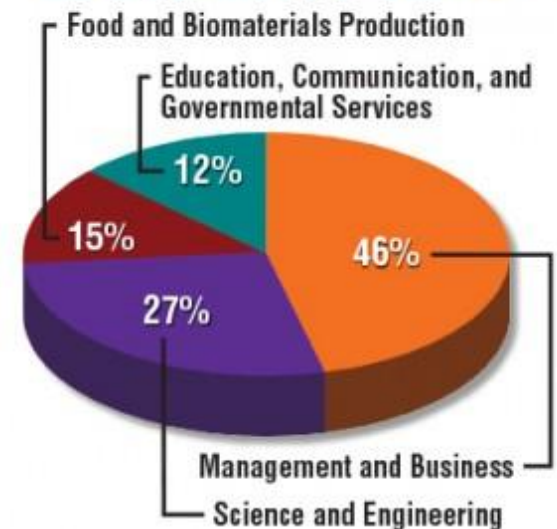
#STEMinAg

STEM Food and AG Council Annual Report (2014)

STEM Food & Ag Council 2014 Retrieved from <http://blog.stemconnector.org/report-food-and-ag-industries-educational-institutions-need-new-talent-meet-demand-stem-fields>

USDA's National Institute of Food and Agriculture and Purdue University (2015)

Employment Opportunities



USDA 2015 Retrieved from <https://www.purdue.edu/usda/employment/>

Preparing Graduates

Colleges of Agricultural Sciences are tasked with addressing our nation's societal and industry challenges by **producing graduates** that are “**prepared** for discovery science, teaching and learning, science, technology, engineering, and mathematics (STEM) integration, and application of innovation for public, private, and academic settings” (Doerfert, 2011, p. 19).



How?

- There is a **continual need** for productive research on **effective teaching**.
- Effective teaching benefits **all** undergraduate students.
 - *The National Research Agenda for the American Association for Agricultural Education points out that “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” (Doerfert, 2011, 9). University instructors must focus on the continuing need for “quality teaching and learning outcomes and life-long human capital development of our workforce” (Doerfert, 2011, 20).*

Teaching Beliefs

- It is acknowledged by educational researchers that teachers possess a **variety of beliefs**, and those beliefs **influence** how teachers teach (Khader, 2012; Brownlee, Purdie, & Boulten-Lewis, 2001; Pajares, 1992; Tickle, Brownlee, & Nailon, 2005).
- It has even been established that there is a **significant relationship** between a teacher's epistemological beliefs and their tendency to adopt specific pedagogical practices (Chan, 2003; Luft & Roehrig, 2007; Maggioni & Parkinson, 2008; Pajares, 1992).



Objectives



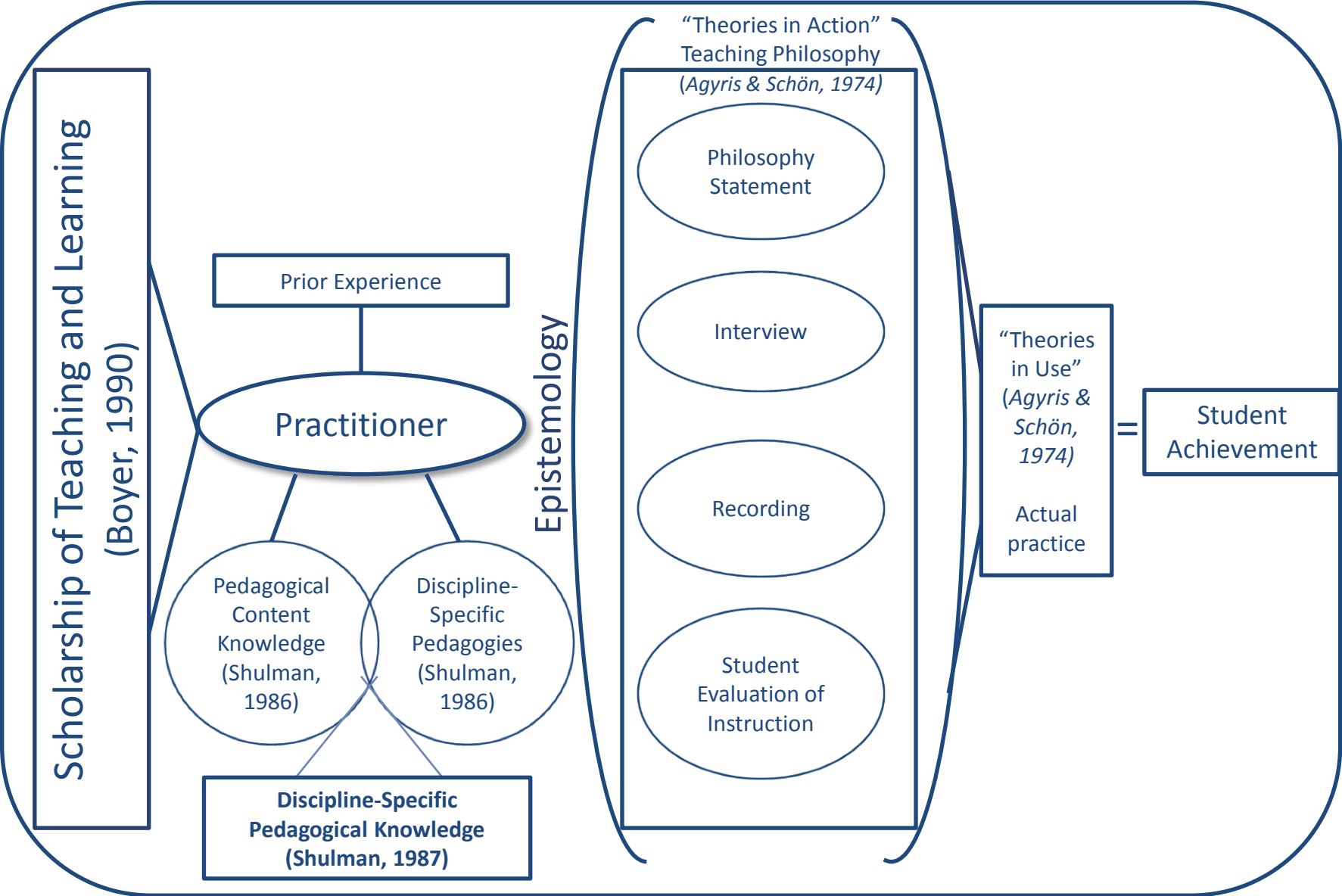
1. Identify the epistemological teaching beliefs of faculty in two colleges of agricultural sciences.
2. Identify the pedagogical teaching beliefs of faculty in two colleges of agricultural sciences.

Conceptual Framework

Post Secondary Instruction in Agriculture, Food and Natural Resources

Post Secondary Instruction in Agriculture, Food and Natural Resources

Post Secondary Instruction in Agriculture, Food and Natural Resources



Post Secondary Instruction in Agriculture, Food and Natural Resources

SLU Results & Findings

Epistemological and Pedagogical Teaching Beliefs (Objective One and Two)

Summary of Epistemological and Pedagogical Themes of SLU Faculty

| Themes | Descriptions |
|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The SLU faculty held a range of epistemic attitudes that were more or less contextualistic in orientation. | Contextualists see themselves as facilitators, who along with the learners collaboratively construct shared understanding. Teachers who are Contextualists view knowledge as temporary, specific to a given situation, and constructed collaboratively. The knowledge can be evaluated by criteria which depend on the context of the situation (Schraw & Olafson, 2002). |
| The SLU faculty held a range of pedagogical beliefs that were more or less learner-centered in orientation. | Learner-centered belief emphasizes student responsibility for learning and is focused on knowledge construction and how students are induced to work and learn together. |
| The SLU Faculty equally engages in reflection-in-action and retrospective reflection-on-action on their teaching practices. | Reflection-in-action, which occurs continuous and synchronous with teaching, and reflection-on-action, which occurs asynchronously at some point after class, and disconnected from teaching actions. |
| The SLU Faculty feel confident in their teaching abilities. | Individual faculty members belief about their ability to perform specific teaching skills in the classroom which affect their practice through the selection of teaching methods, their motivation to follow through with those methods, their persistence when they encountered difficulties in the classroom environment, and their ability to recover after perceived failure |

Teacher Beliefs and Instructional Practice (Objective Four)

Faculty Beliefs and Instructional Practice Comparison of SLU Faculty

| Participant | Teaching Philosophy | Epistemological Beliefs | Stated Instructional Pedagogy | Observed Classroom Practices |
|-------------|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------|
| Professor R | Challenge students to think and develop their own understanding; Inspire; Facilitate; Explain | Relativist theory of knowledge/ Philistinian | Questioning/ Class Discussion | Lecture with questioning/small group discussions |
| Professor C | Fun; engaged students; | Active learning strategies; Honesty; Sincere interest | Traditional Lectures | Lecture |
| Professor D | Personal experience; activate students; positive environment; equality | Learning by doing; trial and error | Traditional Lecture with questioning | N/A - Entered into an administrative role with no teaching appointment |
| Professor E | Meet students where they are/meet their learning needs | Pragmatism; personal experience and student reactions | Traditional Lecture; Modified problem-based learning | Lecture |
| Professor A | Create a conducive learning environment; Believe in students; Active students | Social Cultural Theory/Learning Together; Problem-based Learning; Work Place Learning | Blended Learning; Lecture/ Discussion/ Reflection | N/A – No longer employed at SLU |
| Professor M | Constructivism; increasing complexity/ confusion | Include language and discussion; group work and lab exercise | Traditional Lecture with questioning | Lecture |
| Professor P | Personal experience | Organization; Respect; Time; | Traditional Lecture | N/A – Did not respond to communications to set up a day and time to record class |

PSU Results & Findings

PENNSYLVANIA STATE UNIVERSITY



Epistemological and Pedagogical Teaching Beliefs (Objective One and Two)

Summary of Epistemological and Pedagogical Themes of PSU Faculty

| Themes | Descriptions |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The PSU faculty held a range of epistemic attitudes that were both contextualistic and relativistic in orientation. | Contextualists posit that students must construct their own knowledge and that the teacher serves as a facilitator for this collaborative, shared construction of knowledge. Relativists also indicate that students need to construct their own knowledge and teachers should build an environment where students construct their knowledge and learn to think independently. |
| The PSU faculty held a range of pedagogical beliefs that were more or less learner-centered in orientation. | Student-centered teachers have been found to use a wider repertoire of teaching methods, than teachers who adopt a teacher-centered approach to teaching. In student-centered teaching, transmission may be a component, but not an aim, as the focus is more on the students and their learning, rather than on teacher and his or her teaching. Teaching is interactive in a way that observes students' existing conceptions. Teaching is about facilitating students' learning: |
| The PSU Faculty equally engages in reflection-in-action and retrospective reflection-on-action on their teaching practices. | Reflection-in-action, which occurs continuous and synchronous with teaching, and reflection-on-action, which occurs asynchronously at some point after class, and disconnected from teaching actions. |
| The PSU Faculty feel confident in their teaching abilities. | Individual faculty members belief about their ability to perform specific teaching skills in the classroom which affect their practice through the selection of teaching methods, their motivation to follow through with those methods, their persistence when they encountered difficulties in the classroom environment, and their ability to recover after perceived failure |

Teacher Beliefs and Instructional Practice

Faculty Beliefs and Instructional Practice Comparison of PSU faculty

| Participant | Teaching Philosophy | Epistemological Beliefs | Stated Instructional Pedagogy | Observed Classroom Practices |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Professor G | Socratic method; cultivate inquisitive component; encouraging students to challenge and investigate | Knowledge is constructed collectively; Pragmatist; Knowledge emerges when it is discussed/challenged | Socratic method | Facilitates class discussion through questioning/allows students to pose questions/challenge information; provides valuable information; utilizes short videos to encourage deep thought of class topic |
| Professor J | Comfortable learning environment; stated student expectations; student-centered; student success; create excitement and be enthusiastic; scaffolding; equip students with useful knowledge and skills | Successful students; Care for students | Class discussion; Hands-on project-based | Lecture; Class discussion; practical exercises/hands-on activities; questioning |
| Professor D | Mentor; one-on-one interaction; develop student rapport; organized; knowledgeable; provide valuable opportunities | Knowledge is part science, morals, and art; job preparedness; role model | Process oriented; experiential learning; hands-on; project based | Instruction; student engaged in projects; individual guidance; questioning; class discussion; practical exercises |

Teacher Beliefs and Instructional Practice

Faculty Beliefs and Instructional Practice Comparison of PSU faculty

| Participant | Teaching Philosophy | Epistemological Beliefs | Stated Instructional Pedagogy | Observed Classroom Practices |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Professor B | Provide tools and lessons for success; student success; oral and written communication; problem solving and critical thinking skills; provide opportunity | Lifelong learning; spirit of youth; excited; student interaction/rapport | Lecture; discussion/conversation; Laboratory exercises | Lecture; questioning; discussion; hands-on/practical exercises |
| Professor K | Strong student/teacher relationship; student success; career success | Students engaging with one another; creating a learning environment that encourages discussion/challenge/co-learning | Short lectures; class discussions; in-class work; active learning strategies | 20 minute lecture; questioning; student group discussion; whole-class discussion; role-playing |
| Professor N | Equip students with practical information, practices and application | People learn in different ways; Learning is valuable; enjoy learning | Lecture with PowerPoint slides and hand-outs; case studies; short videos | Lecture with PowerPoint and hand-outs |
| Professor H | Loves learning; make learning fun; creative; provide opportunity to student to analyze, interpret, and problem solve | Seek a higher level of understanding; make our lives and world a better place; help students | Lecture with active learning strategies; field trips; lab components; case studies | Skit/role-playing; Lecture; questioning; discussion |

Discussion



Epistemological Teaching Beliefs

- **Conclusion:** The SLU faculty held contextualist epistemological teaching beliefs. The PSU faculty held both contextualist and relativist epistemological teaching beliefs.
- **Implication:** Development of epistemological beliefs can influence student engagement and understanding. Contextualist epistemological stance helps create a conducive learning environment that encourages student ownership of their education and knowledge acquisition.
- **Recommendation:** Professional development opportunities that encourage educators to reflect and formulate their personal epistemology. Also, faculty are encouraged to develop a better understanding of their students' epistemological beliefs to utilize appropriate instructional strategies.

Discussion



Pedagogical Teaching Beliefs

- **Conclusion:** The SLU and PSU faculty both held learner-centered/student-centered pedagogical beliefs.
- **Implication:** Each teacher holds a set of beliefs that determine priorities for pedagogical knowledge and how students acquire knowledge. The beliefs of the participating faculty are that of, the teacher does not function only as the primary source of knowledge in the classroom. Instead, the professor wishes to be viewed as a facilitator who assists students who are seen as the primary designers of their learning.
- **Recommendation:** Faculty development should be offered in pedagogical training to further develop instructional capacity. A recommendation would be for administrative bodies eliminate barriers which prevent the teacher from translating his/her pedagogical beliefs into practices in the classroom. Lastly, training courses for teachers related to how to translate the pedagogical beliefs into practices in the classroom should be offered.

Discussion



Differentiation between teachers' beliefs and instructional practice

- **Conclusion:** The findings indicate that there is agreement between the stated instructional pedagogy and the actual instructional practice for both the SLU and PSU faculty. However, the pedagogical practice does not necessarily align with the beliefs of the SLU faculty members. There was complete agreement for the PSU faculty of their teaching philosophy, epistemological beliefs, stated instructional pedagogy, and the observed practices.
- **Implication:** Faculty face various factors that impact and affect their teaching approaches. To meet the demands of the types of learners and to meet societal demands, faculty must be provided more support to meet their instructional needs.
- **Recommendation:** Current research only informs of the fixed relationship between existing conceptions and teaching practice, but lacks findings relating to the dynamics of the way changes in teaching conceptions are transferred to changes in teaching practices and at what rate. More empirical studies are therefore needed for researchers to build better understanding about which belief is affecting which action, and subsequently how to address or change teachers' beliefs (Ertmer, 2005).

Recommendations

PENNSTATE



- The pace of change around the economy's knowledge revolution associated with the economy and the type of learner of this generation impact the way in which **university teachers' approach teaching**.
- It is critical for post secondary teaching faculty to assess **what and how students are taught**. Choosing discipline specific teaching strategies can and will impact student success and achieving intended student outcomes. Student success will not only be achieved in the classroom, but continue on into their careers.

Questions?

- Thank you!

Participant Demographics

SLU Faculty

| Variable | n |
|---------------------------------------|---|
| Gender | |
| Female | 3 |
| Male | 4 |
| Rank | |
| Associate Professor | 1 |
| Senior Researcher | 1 |
| Director of Studies | 1 |
| Assistant Researcher | 1 |
| Project Leader | 1 |
| Senior Lecturer | 2 |
| Department | |
| Economics | 3 |
| Soil and Environmental Sciences | 1 |
| Food Science | 1 |
| Ecology | 1 |
| Anatomy, Physiology, and Biochemistry | 1 |

PSU Faculty

| Variable | n |
|------------------------------------------------------|---|
| Gender | |
| Female | 2 |
| Male | 7 |
| Rank | |
| Instructor | 1 |
| Associate Professor | 6 |
| Professor | 2 |
| Discipline | |
| Rural Sociology and Science, Technology, and Society | 1 |
| Agricultural and Extension Education | 1 |
| Agroecology | 1 |
| Landscape Architecture | 1 |
| Agronomy | 1 |
| Small Animal Sciences | 1 |
| Soil Biochemistry/Environmental Science | 1 |
| Dairy Cattle Genetics/Dairy Science | 1 |
| Equine Science | 1 |

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