Emerging Opportunities for Interdisciplinary Application of Experiential Learning among Colleges and Teachers of Agriculture

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Abstract

Experiential learning, described as learning through participation in experiences, is often cited as a foundational tenant of teaching agriculture, food, and natural resources content. In this manuscript, the historical foundations and future potential of experiential learning within colleges of agriculture were explored. The foundational origins of experiential learning were analyzed through the works of Dewey, Lewin, Joplin, and Kolb, with specific recommendations for applying experiential learning within the context of postsecondary education. Additionally, current applications of experiential learning within colleges of agriculture were investigated, highlighting specific hurdles to widespread adoption of experiential learning. In the final section, the future of experiential learning within colleges of agriculture was considered. First, authors considered the need to educate individuals prepared to identify and implement sustainable solutions to ecological challenges as a motivation to broadly apply experiential learning. Additionally, authors described an innovative extension to experiential learning, called interdisciplinary experiential learning, as a mechanism to address the growing need for interdisciplinarity within colleges of agriculture.

Keywords: experiential learning; interdisciplinary; postsecondary education; ecological problems; interdisciplinary experiential learning

Introduction and Purpose

Postsecondary education exists, in part, to develop individuals prepared for success within the workplace (Stripling and Ricketts, 2016). Employers have articulated a paradigm shift in employee needs, with demands transitioning from technical knowledge, skills, and abilities to soft-skills like critical thinking and effective communication (Barron and Darling-Hammond, 2008). Following this paradigm shift, measurable dysfunction exists between student definitions of career-readiness and employer needs (Lawson, 2014). Notably, employers require traits *"such as adaptability, having a good attitude, being respectful and maturity in their definition of preparedness,"* (Lawson, 2014, p. 6) while most students rank these skills as low priorities in terms of employability. As desired workforce skills have changed, so too must the objectives and strategies of education, necessitating a reconceptualization of what is meant by meaningful and engaged learning environments. These new learning environments must be characterized by students actively constructing knowledge through relevant experiences in collaborative, project/problem-based, and authentic educational settings (Barron and Darling-Hammond, 2008; Clark et al., 2010).

Unfortunately, postsecondary education has been slow to transition to these new, student-centered learning environments, with many classrooms maintaining an emphasis on memorization and regurgitation of facts

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(Estepp and Roberts, 2011; Estepp et al., 2012; Mills, 2012). The purpose of this manuscript is to propose interdisciplinary experiential learning as an applicable model for transitioning colleges of agriculture to more meaningful and engaged learning environments. This purpose was accomplished by (a) documenting the conceptual development of experiential learning, (b) discussing current applications of experiential learning within colleges of agriculture, and (c) identifying two critical areas for future research and teaching to advance the use of experiential learning within colleges of agriculture.

Conceptual Development of Experiential Learning

Experiential learning is not a new concept, in fact, early apprenticeship models of education were experiential in nature (Furco, 1996). However, our thinking about experiential learning has evolved since the early years of education. In this section, we document the progression of thinking on experiential learning through the foundational scholars of this educational approach. This information will provide a framework for experiential learning as well as highlight practical strategies for educators in colleges of agriculture to implement within their classrooms.

Dewey

John Dewey, the foundational thinker behind experiential learning, resisted the educational system of the late 1800s and early 1900s (Rugg and Shumaker, 1928). The educational system Dewey challenged, referred to as the traditional approach, was characterized by classrooms full of neatly organized rows of desks, obedient learners, and teachers reciting information for students to memorize. As an alternative, Dewey (1897) argued for an educational approach that utilized learner interest and experiences to guide the learning process, often referred to as a learner-centered approach. Learner-centered environments were characterized by students freely participating in individual activities exploring unique interests (Rugg and Shumaker, 1928). Within the learner-centered approach, students constructed individual meaning from active participation with their social and physical environment. Learner-centered education was a stark juxtaposition to the traditional approach, in which all learners received the same instruction.

Dewey's contributions to our understanding of experiential learning extended beyond identifying the importance of experiences in education. As Dewey sharpened his focus, he articulated a process by which experiences lead to learning which in turn led to a pragmatic model of reflective thought and action (Dewey, 1910/1997, 1916/2007, 1938). The model of reflective thought and action included five steps: (a) an individual experience an anomaly within their routine, (b) the individual defines the anomaly, including the context in which it arose, (c) the individual develops an initial hypothesis explaining why the anomaly occurred, (d) the individual refines their hypothesis through reflective thought, and (e) the individual actively tests their refined hypothesis in authentic environments leading to its acceptance or rejection. Through this process, Dewey suggested, individuals build an increasingly complex understanding of the world (Dewey, 1938). The contributions of Dewey (i.e., importance of experiences and model of reflective thought and action) laid the foundation for continued thinking about the role of experience in the learning process.

Lewin

Researchers and practitioners, like Kurt Lewin, sought to utilize and evaluate experiential learning in varying educational contexts. Lewin focused on evaluating experiential learning as a method for workplace trainings. During one such training, with the Connecticut State Interracial Commission, Lewin and his team collected extensive notes on participants and their experiences (Lippett, 1949). Each night, notes collected by researchers were discussed by the team to evaluate the efficacy of the experiential-based training. When a group of workshop participants asked to be a part of the reflection, Lewin welcomed them. With participants present, the quality of reflection increased immensely, as researchers and participants negotiated the meaning of specific experiences and collaborated to develop deeper understandings of the learning process. This experience, among others, illuminated the importance of engaging in conversational spaces where groups share feedback, reflect, problem solve, and establish commitments to action. Lewin framed this work into a process referred to as action group research and training methods (Adelman, 1993). The impact from Lewin's work on our understanding of experiential learning has been profound; specifically, the importance of feedback and collaborative conversations to encourage experiential learning among groups (Kayes et al., 2005).

Joplin

As the theoretical refinement of experiential learning continued, pragmatic models emerged detailing how to apply this educational approach. Laura Joplin (1981) presented a five-stage model providing structure to the idea of experiential learning so that teachers could deliberately include the pedagogy in their courses. The five stages include a "focus" which precedes the "hurricane cycle" of challenging action that culminates in debriefing, with the entire process accompanied by feedback and support. Joplin asserted experiential learning occurs in overlapping cycles where one begins as the previous one concludes. Thus, experiential learning is continuous throughout one's life.

In addition to the five-stage model, Joplin expounded characteristics of experiential learning that differentiate it from non-experiential education. Experiential education is (a) student based rather than teacher based, (b) personal in nature, (c) attends to both the process and

product of learning, (d) incorporates internal as well as external evaluation of student learning, (e) includes both holistic understanding along with component analysis, (f) is organized around experience, (g) emphasizes students' perception rather than regurgitation of experts or theory, and (h) is individual rather than group based. Joplin's contribution to experiential learning focused mostly with the design and characteristics of the experience itself, building upon Dewey's contention that learning is grounded in experiences and Lewin's assertion that reflection, feedback, and support are fundamental to experiential learning.

Kolb

The aforementioned works of Dewey, Lewin, Joplin, and others provided a foundation critical for the expansion of experiential learning. David Kolb sought to organize this literature into a holistic, integrative model of experiential learning applicable to research and education (Kolb and Kolb, 2005). In his synthesized model, Kolb (1984) identified four context dependent phases of the experiential learning process: (a) concrete experiences, (b) reflective observation, (c) abstract conceptualization, and (d) active experimentation. Concrete experiences describe individuals actively engaging with social and physical environments; whereby individuals "[immerse them] selves in concrete reality" (Kolb et al., 1999, p. 3). Reflective observation describes individuals observing others engaged in experiences (Kolb et al., 1999) or reflecting on their own past experiences (Roberts, 2006). Abstract conceptualization details individuals transforming reflections into new hypotheses, explaining past experiences and/or potential, future participation (Kolb, 1984; Roberts, 2006). Finally, active participation describes individuals testing hypotheses formed during abstract conceptualization in authentic environments. The four phases outlined by Kolb provided a common context and terminology for past conceptualizations of experiential learning. Kolb, like previous researchers, suggested the four phases of experiential learning are a cyclical process, whereby active participation leads to reflective observation which initiates abstract conceptualization, which provides hypotheses for active experimentation, yielding new concrete experiences (Kolb and Kolb, 2005).

In addition to modeling experiential learning, Kolb provided two extensions to existing understanding on the topic. First, Kolb suggested individuals can enter the experiential learning process at any of the four phases (i.e., concrete experiences, reflective observation, abstract conceptualization, or active experimentation) and progress from their initial entry point (Kolb, 1984). Second, Kolb outlined different ways individuals can grasp and transform knowledge through experiences. Kolb (1984) suggested individuals grasp information by participating in new concrete experiences (i.e., grasping via apprehension) or by abstractly conceptualizing new ideas (i.e., grasping via comprehension). Additionally, Kolb posited individuals transform information through reflective observation (i.e., transformation via intention) or by testing hypotheses during active experimentation (i.e., transformation via extension). The work of Kolb has reignited research on experiential learning via a more universal experiential learning lexicon as well as critical insights into how individuals grasp and transform learning through experiences.

Overlapping Ideas

The progression of experiential learning, starting with Dewey (1897) and continuing to the more recent work of Kolb (1984), illuminates consistent elements of this educational approach. First, experiential learning acknowledges deeper understanding emerges from lived experiences. Additionally, scholars appear to agree on the importance of reflecting on those experiences as a way to gain deeper understanding of the world (Dewey, 1938; Joplin, 1981; Kolb, 1984; Lippett, 1949). Dewey (1938) and Kolb (1984) agree that new conceptualizations emerge after an individual reflects on lived experiences, which are then tested through additional participation in authentic experiences. Finally, all four scholars agreed on the cyclical nature of experiential learning, whereby continual interactions within their environment beget individuals with a deeper understanding of their environment.

Having provided a foundational understanding of experiential learning, this paper will now expound upon the application of experiential learning throughout colleges of agriculture. In this review, the versatility of experiential learning within colleges of agriculture, as well as challenges to applying experiential learning, are highlighted.

Experiential Learning in Colleges of Agriculture

Colleges of agriculture, especially within land-grant institutions, share a fundamental mission of education and extension. Both education and extension are rooted in experiential learning. As Seaman Knapp, the father of Extension, postulated *"What a man hears, he may doubt; what he sees he may also doubt; but what he does, he cannot doubt"* (as cited by Pigg, 1983, para. 1). Likewise, Rufus Stimson, agricultural educator and originator of the project method, believed learning could not occur solely from books or by observing others, but required learners actively participate in agricultural experiences (Moore, 1988).

Unfortunately, widespread adoption of experiential learning within colleges of agriculture has not been realized (Estepp and Roberts, 2011; Estepp et al., 2012; Roberts, 2006); however, research does highlight instances in which experiential learning is supporting meaningful and engaged learning environments within colleges of agriculture. Furthermore, research suggests experiential learning has been applied to a wide-range of learning contexts within colleges of agriculture, such as teaching arboretums and demonstration gardens

(Hansen, 2012), manure management (Bott and Cortus, 2014), student-managed farms (Perry et al., 2015), community-based leadership experiences (McKim et al., 2015), an internet-based agricultural banking game (Briggeman et al., 2012), pet training workshops (Karr-Lilienthal et al., 2013), industry interactions (Downey, 2012), and international study-abroad opportunities (Ekiri et al., 2013). This range of learning contexts, while only representing a sample of reported applications, illustrates the tremendous potential for experiential learning to enhance student learning and engagement within colleges of agriculture.

To achieve widespread adoption of experiential learning, four critical barriers must be overcome. First, postsecondary educators in colleges of agriculture must be trained to use experiential learning within their teaching (Estepp et al., 2012). Most postsecondary educators have little to no teacher training, leaving them to teach as they have been taught, reinforcing traditional educational practices as opposed to educational innovations. Second, educators must facilitate student engagement beyond concrete experiences (Mazurkewicz et al., 2012; Retallick, 2010). Experiential learning, regardless of its application, must include opportunities for students to reflect on their experiences, develop new conceptualizations for their experiences, and apply these new conceptualizations in authentic ways (Dewey, 1938; Joplin, 1981; Kolb, 1984; Lippett, 1949). Finally, educators must be willing to identify experiential learning opportunities in variable learning contexts, allowing *"experiential education [to be] dependent upon each person and each situation"* (Arnold et al., 2006, p. 31). For example, educators must be willing to try experiential learning in large lecture classrooms (e.g., Downey, 2012), on computers (e.g., Briggeman et al., 2012; Murphrey, 2010), and across the globe (e.g., Ekiri et al., 2013). Finally, we must consider the future of agriculture, as well as the learners who will enroll in colleges of agriculture, and consider how experiential learning can evolve to address the changing needs (e.g., technology-based education), interests (e.g., international development), values (e.g., sustainability), and goals (e.g., participation in emerging careers) of future professionals in agriculture, food, and natural resources.

Emerging Opportunities for Experiential Learning in Colleges of Agriculture

Experiential learning provides a viable context to transform instruction within colleges of agriculture to facilitate more meaningful and engaged learning environments. Additionally, experiential learning provides a context for how colleges of agriculture can continue to meet the ever-changing needs of students, industry, and communities. To consider the future application of experiential learning within colleges of agriculture, we evaluated past applications of experiential learning. From inception, researchers and theorists have used experiential learning to address important challenges throughout education. Dewey (1897), in his seminal work, used experiential learning as a method to transition education away from dehumanizing methods to a learner-centered educational approach. More recently, Kolb developed an experiential learning model to address the critical need for active learning in postsecondary classrooms (Kolb, 1984). In accordance with tradition, we suggest the extension of experiential learning as a critical method for addressing two important challenges within colleges of agriculture: (a) developing the human potential to solve ecological problems and (b) developing interdisciplinary mindsets among students.

Experiential Learning and Ecological Problem Solving

As we consider the future of colleges of agriculture, one of the highest priorities must be acknowledging and addressing the increasingly complex web of ecological problems. The global population of today and tomorrow is faced with a plethora of interrelated challenges unlike any other in human history. These "wicked problems" are as numerous as they are daunting and include such challenges as designing new energy systems to reduce dependence on nonrenewable resources, reshaping intensive agricultural practices to replenish depleted soil and water resources, developing new food distribution systems to ensure equitable food access for an ever-increasing global population, and confronting social norms that put economic growth at the expense of ecological sustainability (International Assessment of Agricultural Knowledge, Science, and Technology for Development, 2009).

Solving the network of wicked problems is not the sole responsibility of agriculture; however, colleges of agriculture are positioned, due in part to the orientation and association with multiple contexts spanning both bench and social sciences, to develop individuals who can identify, communicate, and implement sustainable solutions to ecological challenges (Andenoro et al., 2016). Uniting in a multidisciplinary effort to empower ecological problem solvers through colleges of agriculture would better position us in the future to identify and implement sustainable solutions to global ecological challenges.

If experiential learning is to thrive within colleges of agriculture, we must understand the relationship between experiential learning and developing the human capacity to solve ecological problems. In the American Association for Agricultural Education (AAAE) National Research Agenda, authors provide a valuable analysis of ecological problem solving (Andenoro et al., 2016). Self-awareness, moral decision-making, and design-thinking emerged as three capacities of ecological problem solvers. Additionally, authors noted the critical need for interdisciplinary thinking to understand and address the multiple components of wicked ecological problems. Continued research is needed to further articulate the knowledge and skills of ecological problem solvers;

however, the identified competencies (i.e., self-awareness, moral decision making, design thinking, and interdisciplinary problem solving) provide a valuable foundation to begin connecting experiential learning and ecological problem solving.

Unfortunately, a dearth of literature has explored the relationship between experiential learning and ecological problem solving (Galt et al., 2012). This literature gap creates a critically important opportunity for researchers in agriculture and education. Research exploring how experiential learning can develop the human potential to solve ecological problems would refine our understanding of experiential learning; explore an educational approach for developing ecological problem solvers; and contribute to the broader educational, ecological, and agricultural literature seeking to understand, and address, complex ecological problems. In the following section, we propose an innovative approach to experiential learning with the potential to lead research and application of experiential learning in the development of sustainable problem solvers.

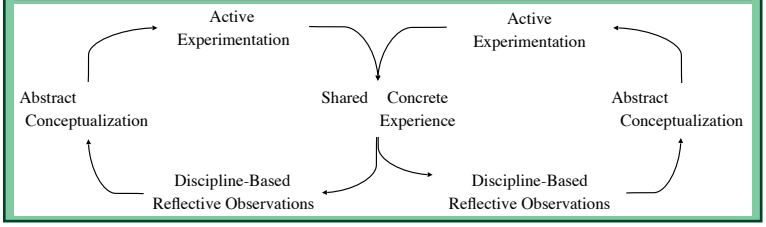
Experiential Learning and Interdisciplinary Thinking

Interdisciplinary thinking (i.e., the ability to bring together knowledge from multiple perspectives of a problem or phenomenon) is critical to solving ecological problems. In fact, Klein (1990) noted interdisciplinary thinking was required to address complex questions, address broad issues, explore disciplinary and professional relations, solve problems beyond the scope of one discipline, and achieve unity of knowledge. The notion of interdisciplinary thinking as the key to complex problem solving compels efforts to break down disciplinary boundaries in our educational approaches. As Huutoniemi put it*, "the simplistic, reductive and linear logic behind disciplinary knowledge production is portrayed as helpless in addressing wicked problems"* (2014, p. 4).

Colleges of agriculture are faced with two related challenges, (a) develop individuals able to identify and implement sustainable solutions to ecological challenges and (b) develop interdisciplinary learning environments for students. To enhance the interdisciplinarity within colleges of agriculture, and thus the ability of students to identify and implement sustainable solutions, we recommend a new way of thinking about experiential learning referred to as interdisciplinary experiential learning. This conceptualization of experiential learning extends Kolb's experiential learning cycle by considering how multiple individuals simultaneously progressing through experiential learning, can co-create a foundation of interdisciplinary knowledge and develop interdisciplinary solutions to challenges faced in agriculture.

The recommended shift is to broaden the individualized thinking of the experiential learning process to support interdisciplinary understanding. The proposed

Figure 1. Interdisciplinary Experiential Learning Model



model (Figure 1) illustrates a process whereby a group of learners participate in a shared concrete experience related to an ecological problem (e.g., analyzing an eroded crop field). Then individuals, or small groups, reflect on the shared experience by reflecting on the ecological problem through the lens of one discipline (e.g., soil type, agricultural management practices, crop cover, resource conservation, ecosystem integrity, pollution mitigation, economics). Independently, these discipline-focused groups continue progression through the experiential learning cycle by using their disciplinary reflections and learning to identify potential solutions to the ecological problem. Then, discipline-based individuals or groups are re-assigned to an interdisciplinary team (i.e., representing the multiple disciplines exploring the issue) for a subsequent concrete experience, in which individuals or groups share new knowledge and potential solutions to the identified problem. Collaborating across disciplinary boundaries–to develop solutions to problems which cannot be solved in isolation–provides multiple opportunities for students to learn within and across multiple disciplines.

Figure one illustrates two simultaneous experiential learning processes; however, interdisciplinary experiential learning can be expanded beyond just two disciplinary-based learning progressions (e.g., five discipline-based groups/individuals specific to soil type, agricultural management practices, ecosystem integrity, pollution mitigation, and economics addressing an eroded crop field). Additionally, instead of individuals progressing through the experiential learning process, groups of individuals, potentially even a course enrollment of students, could work through the experiential learning process within their discipline, only to be reconnected with other groups, or courses, to discuss interdisciplinary solutions to an ecological challenge.

Interdisciplinary experiential learning offers a unique extension to traditional experiential learning models by providing an expanded understanding of how individual disciplinary learning can merge, through shared experiences, to facilitate interdisciplinary conversations and produce innovative, interdisciplinary solutions. The future of experiential learning within colleges of agriculture relies on innovative new approaches to teach content through experiential learning. Educational approaches which engage students in interdisciplinary thinking are needed, supporting the development of individuals who can identify and implement sustainable solutions to ecological problems.

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