The Critical Need for Merging Educational Learning Theories with Experiential Learning Programs in Animal Agriculture: A Literature Review

J.L. Deslauriers[1], R.D. Rudd, D.M. Westfall-Rudd and R.K. Splan
Virginia Tech
Blacksburg, VA

Abstract

Many colleges and universities have responded to the National Research Council's (1984) call for educational reform by turning to experiential learning environments. Due to its heightened importance from this perspective, this study reviewed literature pertaining to experiential learning programs in animal agriculture. While Kolb's (1984) model of Experiential Learning is often acknowledged in the literature, it fails to recognize the importance of social interactions and its importance in program development and evaluation is often underplayed. Consequently, a perspective of experiential education is proposed to better support the experiential and social aspects of these valuable programs. Since a great deal of research on experiential learning programs neglects to make ties between program outcomes and educational theory, there is a gap in knowledge regarding how students experience a program. It is equally important to understand how they have learned, so that programs can be modified and strengthened accordingly. As time passes, the demographics of students in agriculture will continue changing, as will the needs of the agricultural industry. By maintaining an understanding of the educational, experiential, and social facets of a program, as well as programmatic outcomes, educators can more successfully prepare undergraduates in agriculture for the challenging futures that await them.

Introduction

Academic institutions must adapt and face challenges presented by a changing society and the agricultural industry. In 2009, the National Research Council called for reform to undergraduate agricultural curricula. The council discussed numerous arguments supporting this reform, including changing student demographics and needs of the agricultural industry.

Over the past century the demographics of youth entering agricultural fields have changed significantly. Today, less than 5% of the United States' population lives on farms and only 20% live in rural areas (Dimitri et al., 2005; NRC, 2009). Unfortunately, a large proportion of the U.S. population has become so distanced from agriculture that they are unfamiliar with how foods are grown and produced (NRC, 2009). Youth entering agricultural fields today are faced with a different set of challenges than those faced by youth a century ago (Splan et al., 2009). They must not only overcome agricultural unfamiliarity and outdated positions (NRC, 2009) but also gain the knowledge and experience necessary to solve complex challenges, from feeding the world to developing efficient and effective fuel sources. Undergraduate agricultural curriculum must be updated in order to adequately prepare these students. Specifically, the NRC (2009) calls for educational reform resulting in an increase of transferrable skills and additional use of problem-based learning and critical thinking strategies (Estepp and Roberts, 2011).

The agricultural industry has also seen substantial changes in the past century, presenting additional challenges that educational reform must recognize. As the baby boomer generation approaches retirement, the agricultural industry is left seeking qualified individuals to continue supporting its mission (NRC, 2009). Additionally, the agricultural industry's foci have shifted away from traditional interests to areas such as energy production and natural resource management (NRC, 2009, pg. 32). There has been a substantial increase in international operations, consequently introducing more complex logistics, heightened regulations, and a need for bridging social and cultural differences (NRC, 2009). Today's agricultural industry needs a talented new generation of employees possessing a strong knowledge

[1]Department of Agricultural, Leadership, and Community Education, 214 Litton Reaves Hall, Blacksburg, VA 24061-0343. Phone: 757-771-3276, Email: jld@vt.edu

base and a myriad of social and technical skills (Splan et al., 2009). Without these abilities, students may find themselves entering a complex workforce without the tools necessary to be successful.

The National Research Council (2009) suggests that undergraduate experiences in agriculture are in need of a change, stating that *"The changes include new curricula and content, but it will also be vital to improve how teaching and learning occur"* (pg. 35). The NRC (2009) highlights a number of steps that can be taken to help achieve this goal: skills development, teamwork, working across disciplines, communication, critical thinking and problem-based learning, just to name a few. Each of which contribute to producing more prepared, knowledgeable and well-rounded undergraduate students.

Many colleges and universities have responded to this call for reform by turning to experiential learning programs. By helping students connect crucial classroom knowledge with invaluable hands-on experiences in real-world settings, experiential learning opportunities can help answer the demands of the modern agricultural industry.

Methods

Experiential learning programs are not new in higher education and there is a great deal of research that has been done in this general area. Green et al. (2006) define narrative literature reviews, stating that *"They are helpful in presenting a broad perspective on a topic and often describe the history or development of a problem or its management"* (Day, 1998; Slavin, 1995). Consequently, a narrative literature review of experiential learning programs to summarize and draw conclusions from pre-existing theories and research studies was conducted. This review of literature primarily utilized the Virginia Tech Library, Google Scholar, ProQuest database, Journal of Extension, Journal of Agricultural Education, NACTA Journal and the EBSCOhost database to establish the literature review.

Discussion

Experiential learning is an educational model that views learning as the result of an interaction between discovery and experience. This model is based on immersing students in an environment with relevant, "real-world" experiences that allow students to build upon prior knowledge and learn in a more meaningful fashion. While this model is not ideal in every context, it often provides students with a unique realization of how their knowledge is relevant and useful.

Dewey's Perspective

Experiential learning is rooted in Dewey's (1938) work, Experience and Education. In this work, he presents two views of education: traditional and progressive. Traditional education is depicted as the structured, didactic environment that most students are familiar with, whereas progressive education is described as a comparatively unstructured, student-centered environment. Dewey proposed that neither of these educational paradigms present a solution and that educators must begin to understand human experiences in order to resolve conflict between these two paradigms.

Consequently, he proposed a need for a theory of experience and emphasized that while students in traditional settings do not have a lack of experiences, those they do have can lack quality and connection with other knowledge and experiences (Dewey, 1938). Ord and Leather (2011) cited a very specific definition of experience: *"An experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment"* (Dewey, 1938, p.43). Dewey continues to explain, *"The environment, in other words, is whatever conditions interact with personal needs, desires, purposes and capacities to create the experience which is had"* (1938, p. 44).

Dewey (1938) does not simply consider experience to be an outward act, but rather the process of considering a notion, acting upon it, observing results and consequences, and ultimately applying that knowledge towards future situations. This perspective on experience presents a process far more complex than simply "doing" (Ord and Leather, 2011). This understanding is also integrally linked to meaning, as individuals must conceptualize that specific acts lead to certain consequences. Ord and Leather (2011) cite a specific example of the link between experience and meaning:

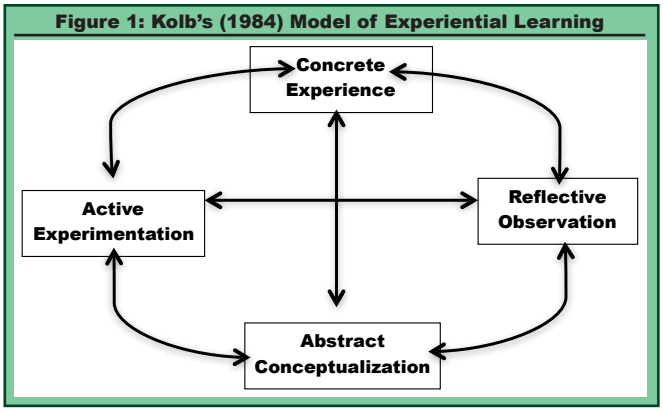
It is not experience when a child sticks his finger into the flame; it is experience when the movement is connected with the pain that he undergoes in consequence. Henceforth, the sticking of the finger into the flames means a burn (Dewey, 1916, p. 104).

This also emphasizes Dewey's (1938) argument that learning is not solely accomplished by introspective behavior, but rather requires individuals to change during and as a result of their experiences (Ord and Leather, 2011). These elements must come together in order for meaningful learning to occur, as "No experience having a meaning is possible without having some element of thought" (Dewey, 1916, p. 107; Ord and Leather, 2011). Schunk (2012) further supports this in stating: *"Learning is an enduring change in behavior, or in the capacity to behave in a given fashion, which results from practice or other forms of experience."*

Ultimately, Dewey (1938) proposes that educators might use his theory of experience to structure learning around the prior experiences of students, consequently providing more meaningful and beneficial learning environments. He stipulates that educators must accept the role of a learning facilitator rather than dictator, creating a learner-centered classroom environment. It is off of these principles that Kolb (1984) partially bases his model of experiential learning.

Kolb's Perspective

Kolb's (1984) model provides a structure for meaningful learning environments in which students



can apply prior knowledge within a real-world hands-on setting. Based on fundamental constructivist theory, Kolb's model proposes that knowledge and experience are shaped through reflection into concepts, which are then used as a basis of experimentation. Kolb (1984) presents an ongoing cycle of concrete experience, reflective observation, abstract conceptualization and active experimentation (Figure 1). Through this process, students can participate in meaningful learning and higher-order thinking while gaining invaluable skills and life experiences.

The four stages of Kolb's (1984) model represent two continuums proposed in his work: perception and processing. The perception continuum is learning through thinking or feeling, and is stimulated by the learner's intellectual or emotional response. This continuum includes the first and third stages of Kolb's model – concrete experience and abstract conceptualization. The processing continuum, however, references a learner's approach to a task, where learning is stimulated by doing. This continuum involves the second and fourth stages of the model – reflective observation and active experimentation. It is essential to consider these two continuums when considering Kolb's (1984) model, as they begin to provide the "bigger picture."

It is important to recognize that Kolb does not present a straightforward, sequential cycle through which learning occurs. On the contrary, he proposes that learning is sparked by an observation, leading to continued consideration and ultimately beginning the process that encompasses all four of Kolb's (1984) key principles. There is not, however, a starting or ending point to Kolb's proposed model – learning can begin at any phase of the model, and does not terminate after an individual has actively experimented with generalizations of a concept. Not unlike his theoretical predecessors, Kolb (1984) proposes that learning is a lifelong process, rooted in personal experiences.

Kolb's (1984) model is, in many ways, cut from the same cloth as Dewey's (1938) theory of experience. Both Kolb and Dewey agree that learner-centered environments can facilitate meaningful learning spawned by facilitated experiences in a real-world setting. If higher education is to meet the NRC's (2009) call for reform, it is essential that undergraduates be provided this type of learner-centered environment, where classroom knowledge and hands-on experience are undoubtedly connected. What Dewey and Kolb neglect to address, however, is the pervasive social influence present within modern society and programs in higher education.

Social Cognitive Theory

Social cognitive theory lends further explanation and insight into the importance of social factors when designing educational programs. This theory posits that individuals will learn by doing, sensing and observing the actions of others (Bandura, 1986; Ormrod, 2008; Schunk, 2008). By making observations within their environment, individuals acquire knowledge that can then influence future behaviors. Albert Bandura challenged behaviorism with this comprehensive theory of observational learning, where reciprocal interactions occur among individuals, their behaviors and their surrounding environments (Bandura 1982, 1986, 2001; Schunk, 2008).

Social cognitive theory views learning as the processing of information from behaviors and environmental factors which ultimately serve as a guide for action (Bandura, 1986, p. 51). Learning can occur in one of two ways: enactively or vicariously. Enactive learning, not unlike the theory of experience proposed by Dewey (1938), involves learning by doing, whereas vicarious learning occurs primarily through observation in some form. A majority of human learning occurs vicariously, allowing individuals to learn more rapidly than would be possible if humans only learned from behavior (Schunk, 2008). Complex skills and theories are typically learned through a combination of vicarious and enactive learning – students can learn some components of a skill through observation and continue learning via practice, which models can then be used to provide corrective feedback.

Humans learn a great deal through observation, and models of all shapes and sizes play an important role in learning. Schunk (2008) defines modeling as "…behavioral, cognitive, and affective changes deriving from observing one or more models" (Rosenthal and Bandura, 1978; Schunk, 1987, 1998; Zimmerman, 1977). Models provide valuable data points to process, which individuals can then translate into behavior. In a classroom setting, teachers and peers can all serve as models, providing multiple perspectives for an individual to consider. Bandura (1977, 1986) noted four necessary conditions for an individual to model the behaviors of another person: attention, retention, motor reproduction, and motivation. Prior to successfully modeling another individual's behavior, one must attentively watch and observe the behavior being performed. The individual must also remember the behavior that he/she has observed, and then be able to replicate the demonstrated behavior. Lastly, an individual must be motivated to model the learned behavior. If any of these four conditions are not met, the likelihood of exhibiting the behavior decreases (Ormrod, 2008).

Social cognitive theory further expands on the concept of motivation, as its presence is often key to an

individual's learning. Self-efficacy, or an individual's belief regarding whether or not they are capable of executing a behavior correctly, is a significant component of motivation (Ormrod, 2008; Schunk, 2008). For instance, if an individual believes that they won't perform well on an upcoming test, he or she has low self-efficacy regarding that task and may not be motivated to study, as they may already feel it is hopeless. Self-efficacy is largely developed as a result of successes and failures and can have a powerful effect on an individual's behavior, including goal setting, activity choices, persistence and ultimately learning (Bandura, 1997, 2000; Ormrod, 2008; Schunk and Pajares, 2004; Zimmerman, 1998).

Bandura (1997, pg. 1) stated that *"A key assumption of social cognitive theory is that people desire 'to control the events that affect their lives' and perceive themselves as agents."* Individuals with higher overall self-efficacy also exhibit an increased sense of agency. Self-regulation, or the process through which individuals perform specific behaviors oriented towards achieving goals, is key to this agentic perspective. According to Ormrod (2008), the social cognitive perspective of self-regulation involves at least four key components: goals, self-observation, self-evaluation and self-reaction (Bandura, 1986; Schunk, 1989c, 1998; Zimmerman and Schunk, 2004). Individuals set goals for themselves based on peer or model observations and personal self-efficacies regarding a task. Individuals then observe themselves in action and evaluate whether their behaviors were adequate based on the standards they have set. Finally, an individual will react to their self-evaluation, typically by exhibiting pride for accomplishing a goal, or punishing themselves for not having met their expectations.

As a whole, social cognitive theory provides a framework to support the numerous social interactions that occur in any educational environment, and how those interactions impact an individual's learning. Social cognitive theory supports the notion that students who succeed in a given environment may ultimately exhibit indicators of increased self-efficacy or even perhaps self-regulation. These lifelong learning traits feed into the NRC's (2009) call for more prepared young professionals, capable of tacking the complex quandaries that inevitably lay ahead of them.

A Perspective of Experiential Education

As we have previously discussed, Kolb's (1984) model of experiential learning provides an outlined structure to consider when designing experiential learning programs. While the four key principles of Kolb's (1984) model are a good starting point and certainly hit on key components of experiential learning, they also leave a great deal to be desired when considered on their own. For instance, Kolb (1984) neglects to address the social interactions present in educational environments.

Consequently, one might propose adopting a modified version of Kolb's (1984) model of experiential learning. So as not to confuse the two, let this updated perspective be referred to as experiential education. Beginning with Bandura's (1986) concept of reciprocal causation, the interactions between an individual, their environment, and resulting behaviors creates knowledge that is later used as a guide for action (Bandura, 1986, 2006; Ormrod, 2008; Schunk and Pajares, 2004; Zimmerman and Schunk, 2004).

In essence, these reciprocal interactions create an experience – the first key tenant of Kolb's (1984) model. When an experience occurs, it often draws attention from participating or observing individuals, the first key component in Bandura's (1977) modeling process. Focused attention can lead to goal-setting behaviors, the first component of Bandura's (1986) concept of self-regulated learning. From there, individuals oftentimes proceed to a period of reflection, the second tenant in Kolb's (1984) model. This aids in an individual's retention of an experience, the second key process in Bandura's (1977) modeling process. Furthermore, this provides individuals with an opportunity for self-observation, the second component of self-regulated learning (Bandura, 1986).

From this reflective period, individuals naturally move to conceptualizations of their experience, the third key tenant of Kolb's (1984) experiential model. These conceptualizations can be a motivating factor for students, addressing the third key component of Bandura's (1977) modeling process. This can also stimulate self-evaluation, the third component of self-regulated learning (Bandura, 1986), where an individual can evaluate behaviors or conceptualizations resulting from their experience. The last tenant of Kolb's (1984) model posits that an individual will proceed to actively experiment with new conceptualizations of their experience, which creates a type of reproduction, the final component of Bandura's (1977) modeling process. Results of this experimentation or reproduction lead an individual to self-reaction, the last component of Bandura's (1986) concept of self-regulation.

These models and concepts may not always occur simultaneously. However, this perspective provides a logical way to help educators recognize the importance of social interactions in learning environments. Furthermore, facilitating personal experiences and social interactions in a learning environment works to answer the calls for educational reform by providing students with strengthened processing, observation, and self-regulatory abilities.

Experiential Learning Programs in Agriculture

Despite an extraordinary amount of research making mention of experiential learning's importance in agricultural education (Anderson, 2009; Andreason, 2004; Marshall et al., 1998; Parr and Trexler, 2011; Roberts, 2006), there is a surprising lack of literature discussing program ties to educational theory. Reiling et al. (2003) published a study where researchers collected demographic and experience information from cohorts in an introductory animal science course over a three-year

period. Having assessed student backgrounds, it was determined that students needed hands-on experience with livestock. Consequently, a multispecies large-animal management and production practicum course was designed and implemented. Reiling et al. (2003) concluded that a program *"that primarily involves experiential learning activities to teach basic applications of animal science principles and animal husbandry skills has proven successful."* However, the study made no mention of underlying educational theories, or how the program can continue to be improved. In similar fashion, other studies have acknowledged educational theories and models in support of experiential learning programs without drawing conclusions regarding how theoretical applications have affected program outcomes (Anderson, 2009; Guay and Oshel-Shultz, 2009; Marshall et al., 1998), much less how applications of teaching and learning theory can be used to further strengthen student learning experiences.

Another surprising gap in current literature is the lack of discussion regarding the evaluation of experiential learning programs. It is not uncommon to solely evaluate an experiential learning opportunity by providing a survey to participants. Reiling et al. (2003) utilized the University of Florida's standard course and faculty evaluation form as the sole method of evaluation for the program. Although the information collected from this method was informative and useful, it could be greatly strengthened with an explanation of how the program currently applies theory, and how altered or additional applications could further strengthen program outcomes. Parr and Trexler (2011) utilized a focus-group method to evaluate student farm experiences in higher education. Due to the in-depth data collected, the researchers were able to connect reported program outcomes with applications of educational theory. Knowledge of how educational theory is being applied in a program is crucial, as it provides insight as to how those applications can be modified to further strengthen experiential programs.

Summary

While Kolb's (1984) model of Experiential Learning is often acknowledged in the literature, its importance in program development and evaluation is often underplayed, if recognized at all. Furthermore, Kolb's (1984) model does not consider the significance of social interactions in regards to learning (Seibel et al., 2012). Consequently, a perspective of experiential education is proposed to better support both the experiential and social aspects of these valuable programs in higher education. Since a great deal of research on experiential learning programs neglects to make ties between program outcomes and educational theory, there is a gap in knowledge regarding how participating students truly experience a program. While it is undoubtedly important to assess what students gain from participating in a program, it is equally important to know how they have learned, so that programs can be modified and strengthened where needed. As time passes, the demographics of students in agriculture will continue changing, as will the needs of the modern agricultural industry. To ensure that programs continue successfully preparing students for their futures, experiential education programs must be periodically evaluated. By acknowledging the educational, experiential, and social facets of a program, as well as the outcomes produced by those facets, educators can more successfully prepare undergraduates in agriculture for the challenging futures that await them.

Literature Cited

Anderson, K. 2009. Undergraduate horse industry study tour enhances experiential learning. NACTA Journal 53(4): 18-22.

Andreasen, R.J. 2004. Integrating experiential learning into college of agriculture capstone courses: Implications and applications for practitioners. NACTA Journal 48(1): 52-57.

Bandura, A. 1977. Self-efficacy: Toward a unifying theory of behavioral change. Psychological Review 84: 191-215.

Bandura, A. 1982. Self-efficacy mechanism in human agency. American Psychologist 37(2): 122-147.

Bandura, A. 1986. Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. 1989. Human agency in social cognitive theory. American Psychologist 44(9): 1175-1184.

Bandura, A. 1997. Self-efficacy: The exercise of control. New York: Freeman.

Bandura, A. 2000. Exercise of human agency through collective efficacy. Current Directions in Psychological Science 75(9).

Bandura, A. 2001. Social cognitive theory: An agentic perspective. Annual Review of Psychology 52: 1-26.

Bandura, A. 2006. Guide for constructing self-efficacy scales. Self-efficacy Beliefs of Adolescents. 5: 307-337. Greenwich, CT: Information Age Publishing.

Dimitri, C., A. Effland and N. Conklin. 2005. The 20th Century transformation of U. S. Agriculture and Farm Policy The 20th Century and Farm Policy.

Day, R. 1998. How to write and publish a scientific paper. Oryx.

Dewey, J. 1916. Democracy and education. New York, N.Y.: Macmillan Publishing Co., Inc.

Dewey, J. 1938. Experience and education (1963rd ed., pp. 1-91). New York, N.Y.: Macmillan Publishing Company., Inc.

Estepp, C.M. and T.G. Roberts. 2011. A model for transforming the undergraduate learning experience in colleges of agriculture. NACTA Journal 55(3): 28-33.

Green, B.N., C.D. Johnson and A. Adams. 2006. Writing narrative literature reviews for peer-reviewed journals: Secrets of the trade. Journal of Chiropractic Medicine 5(3): 101-117.

Guay, K. and A. Oshel-Shultz. 2009. 31689 Inclusion of equine-science curriculum within an experiential

learning setting. Journal of Equine Veterinary Science 29(5): 442-443.
Kolb, D.A. 1984. Experiential learning: Experience as the source of learning and development (pp. 1-256). Prentice Hall.
Marshall, T.T., T.S. Hoover, B.A. Reiling and K.M. Downs. 1998. Experiential learning in the animal sciences: Effect of 13 years of a beef cattle management practicum. Journal of Animal Science 76: 2947-2952.
National Research Council. 2009. Transforming agricultural education for a changing world. Washington, D.C.: National Academies Press. www.nap.edu
Ord, J. and M. Leather. 2011. The substance beneath the labels of experiential learning: The importance of John Dewey for outdoor educators. Australian Journal of Outdoor Education 15(2): 13-23.
Ormrod, J. 2008. Human learning. New Jersey, NY: Pearson Education.
Parr, D.M. and C.J. Trexler. 2011. Students' experiential learning and use of student farms in sustainable agriculture education. Journal of Natural Resources and Life Sciences Education 40(1): 172-180. DOI:10.4195/jnrlse.2009.0047u
Reiling, B.A., T.T. Marshall, J.H. Brendemuhl, J.A. McQuagge and J.E. Umphrey. 2003. Experiential learning in the animal sciences: Development of a multispecies large-animal management and production practicum. Journal of Animal Science 81: 3202-3210.
Roberts, T.G. 2006. A philosophical examination of experiential learning theory for agricultural educators. Journal of Agricultural Education 47(1): 17-29. DOI:10.5032/jae.2006.01017
Rosenthal, T.L. and A. Bandura .1978. Psychological modeling: Theory and practice. Handbook of psychotherapy and behavior change: An empirical analysis 2: 621-658.
Schunk, D.H. 1987. Peer models and children's behavioral change. Review of Educational Research 57: 149-174.
Schunk, D.H. 1989. Self-efficacy and achievement behaviors. Educational Psychology Review 1: 173-208.
Schunk, D.H. and F. Pajares. 2009. Self-efficacy theory. Handbook of motivation at school 35-53.
Schunk, D.H. 2008. Metacognition, self-regulation, and self-regulated learning: Research recommendations. Educational Psychology Review 20(4): 463-467.
Schunk, D.H. 2012. Learning theories: An educational perspective. 6th ed. Boston, MA: Pearson.
Seibel, M.M., R.D. Rudd, D.M. Westfall-Rudd, M.M. McFerren and K.J. Redican. 2012. Community-based nutrition education through a paraprofessional model: An experiential learning perspective of peer education. Virginia Polytechnic Institute and State University.
Slavin, R.E. 1995. Best evidence synthesis: An intelligent alternative to meta-analysis. Journal of Clinical Epidemiology 48(1): 9-18.
Splan, R.K., C.A.S. Porr and T.W. Broyles. 2011. Undergraduate research in agriculture: Constructivism and the scholarship of discovery. Journal of Agricultural Education 52(4): 56-64.
Zimmerman, B.J. 1977. Modeling. In Hom, H. and Robinson, P. Psychological processes in children's early education. Academic Press; New York, pp.37-70.
Zimmerman, B.J. 1998. Academic studying and the development of personal skill: A self-regulatory perspective. Educational Psychologist 33(2-3): 73-86.
Zimmerman, B.J. and D.H. Schunk. 2004. Self-regulating intellectual processes and outcomes: A social cognitive perspective. Motivation, emotion, and cognition: Integrative perspectives on intellectual functioning and development 323-349.