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Experiential Learning in Agricultural Education: A Philosophical Discussion

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Abstract

While all learning and knowledge can be attributed to experiences, not all experiences are educative. Experiential learning is a highly utilized theory and pedagogical practice in agricultural education and has been since its inception as a discipline. The purpose of this research is to examine the theory of experiential learning as it applies to agricultural education. Therefore, this philosophical discussion aims to continue the work conducted by Roberts (2006), and aid in further understanding the phenomenon of experiential learning. Specifically, this study includes a synthesis of recent empirical research on experiential learning, especially in agricultural education settings. We also offer considerations from seminal literature by experiential learning theorists. A revised process model that emphasizes experiential learning is not a stepwise process is presented. Also, we provide revisions to the model for contextualizing experiential learning. Lastly, we present a holistic model of experiential learning that includes both the process and context of experiential learning.

Introduction

While all learning and knowledge can be attributed to experiences, not all experiences are educative (Dewey, 1938). The act of having an experience does not necessarily result in knowledge acquisition or complex understanding by the learner. In fact, human experience is so complex that theorists have examined the phenomenon and still find, after numerous decades, an immense need to continue to study the relationship between experience and learning (Baker et al., 2012; Kolb, 2015; Roberts, 2006). Even John Dewey, arguably the most prolific author on the subject of American education, published multiple works on experience because he felt his prior work had been largely misunderstood. Dewey grappled with the term *experience* in his 1951 draft of *Experience and Nature*. He pondered whether it was the most appropriate and encompassing term with which to refer to his philosophic work, suggesting the term *culture* might be more appropriate (Kolb, 2015). The complexity among the relationships between experience and learning is so enormous and nuanced that its continual study and examination is required so we may best understand its use in agricultural education and beyond.

Roberts (2006) examined the theory of experiential learning and offered a philosophical framework for its use in agricultural education. Experiential learning is a highly utilized theory and a pedagogical practice in agricultural education and has been since its inception as a discipline (Baker et al., 2012; Estepp & Roberts, 2011; Hughes & Barrick; 1993; Knobloch, 2003; Moore, 1988; Phipps et al., 2008; Roberts, 2006). At the secondary school level, experiential learning is embedded into the very framework of

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agricultural education (Baker et al., 2012; Phipps et al., 2008). Phipps et al. (2008) suggested experiential learning as a pedagogical backbone for agricultural education stating that, "the relationship of experience to learning cannot be overemphasized" (p. 443). Experiential learning lends itself naturally to agricultural education, and agriscience teachers have hundreds of opportunities to provide active learning experiences for their students (Phipps et al., 2008). Historically, experiential learning was foundational to agricultural education through the use of project-based learning (Moore, 1988; Phipps et al. 2008; Stimson, 1915). Such learning was often a cornerstone of instruction through the implementation of supervised projects in agriculture, which are now referred to as supervised agricultural experience (SAE) programs. In addition, experiential learning is often reflected in direct instruction and FFA activities, both of which are important components of agricultural education (Phipps et al., 2008). In fact, Baker et al. (2012) purported that Kolb's (1984) experiential learning cycle could be overlaid with the tri-pillared model of agricultural education (i.e., classroom and laboratory instruction, SAE programming, and FFA). The authors suggested that while agricultural education is well-positioned to implement experiential learning across its three components, this requires intentional efforts by agricultural educators. Specifically, agricultural educators should "include purposeful reflection, gentle guiding toward abstraction, and an opportunity for students to experiment actively with their newfound learning" (Baker et al., 2012, p. 12). Therefore, practitioners seeking to implement experiential learning should be well informed about the theory and should utilize appropriate conceptual models to drive their pedagogical practices (Baker et al., 2012; Kolb, 2015; Roberts, 2006).

Experiential learning is also foundational to post-secondary models of agricultural education. Estepp and Roberts (2011) offered a pedagogical model for implementing experiential learning in undergraduate agricultural education settings. The model reflected the tri-pillared, traditional model of secondary agricultural education, but also emphasized experiential learning in three areas. In the first area, classroom/laboratory instruction, students engage with curricular information via learning strategies such as active, cooperative, and problem-based learning. In the second area of co-curricular activities, learners engage in out-of-class experiential learning in real-world settings through internships, projects, research, study abroad, or other real-life applications. Lastly, extra-curricular activities serve as the third area of learning, where students apply concepts in different contexts through service learning, community engagement, and/or student organizations (Estepp & Roberts, 2011). Eyler (2009) suggested that experiential learning would be beneficial across higher education settings because it deepens learning, expands learners' capacity for critical thinking, allows learners to utilize concepts in applied settings, and fosters a desire to be a lifelong learner. For all the same reasons, experiential learning is also considered foundational to post-secondary agricultural education (Andreasen, 2004; Estepp & Roberts, 2011; Phipps et al., 2008; Roberts, 2006).

Purpose

The purpose of this research was to examine the theory of experiential learning as it applies to agricultural education. Roberts (2006) contended that while the *practice* of experiential learning is widely researched in agricultural education settings, the *theory* of experiential learning has been researched far less. Nearly two decades later, this is still largely the case; therefore, further examination of experiential learning theory in agricultural education settings is warranted. Furthermore, the continued practice and empirical examination of experiential learning has transpired over the past decade. The results of such research and practice have several implications for the process and context models of experiential learning developed by Roberts (2006). Therefore, this philosophical discussion aimed to continue the seminal work conducted by Roberts (2006), and to aid in further understanding the phenomenon of experiential learning. Specifically, this study will review recent empirical research on experiential learning, especially in agricultural education settings. Second, we will offer considerations from seminal literature by experiential learning theorists. Third, we will present a revised process model that emphasizes that experiential learning is not a stepwise process. Fourth, we will provide revisions to the model for contextualizing experiential

learning. Fifth, we will present a holistic model of experiential learning that includes both the process and context of experiential learning. And finally, we will offer considerations for the use of such models in agricultural education. Given the philosophical nature of this work, discussion and implications are presented throughout this article.

From Roberts (2006) to Present Day: A Review of the Literature

The theoretical framework for the implementation and contextualization of experiential learning established by Roberts (2006) has been used extensively in agricultural education settings and beyond. While the seminal work has been widely beneficial to practitioners of experiential learning, over a decade of literature and empirical research has since been produced and should be considered alongside Roberts' (2006) framework. While much of the literature in agricultural education reported on experience-oriented activities (e.g., service learning, internships, study abroad, and classroom projects), the literature that has examined the *theory* of experiential learning was reviewed as part of this examination. Such literature has added to the profession's body of knowledge on experiential learning theory, and thus, has implications for the philosophical models proposed by Roberts (2006).

Baker et al. (2012) stated, "Agricultural education is uniquely poised to help students through an effective model of instruction that is experiential by nature. However, simply providing experiences does not constitute learning" (p. 12). Agricultural educators must consider the entire process of experiential learning (i.e., experience, reflection, conceptualization, and application) to effectively facilitate the learning cycle (Baker et al., 2012; Clark et al., 2010; Kolb, 2015). However, in their study of teachers' use of experiential learning in agricultural education laboratory settings, Shoulders and Myers (2013) found that this is often not the case. The authors found a majority of teachers did not plan for or implement all four of Kolb's (1984) stages of the experiential learning cycle. Teachers spent the most amount of planning and lesson time on learning activities for students in order to help them grasp learning experiences (experience and conceptualization). The least amount of time was spent in learning activities for students designed to transform their experiences into knowledge (reflection and application). Further, Shoulders et al. (2013) conducted a national survey of agriscience teachers and found that they perceived the incorporation of students' background knowledge to be of little importance when planning for experiential learning activities. However, when learning experientially, connecting one's experience to prior knowledge is theorized to be of critical importance (Dewey, 1938; Kolb, 2015). This evidence suggests agricultural educators may need further training and guidance on implementing experiential learning holistically (Shoulders et al., 2013; Shoulders & Myers, 2013).

Other research in agricultural education has tested the effectiveness of the experiential learning process and some of its theoretical components (Baker et al., 2014; Baker & Robinson, 2016; Baker & Robinson, 2017a; Baker & Robinson, 2017b; Baker & Robinson, 2019; Blackburn et al., 2015; Bradford et at., 2019; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017; Smith & Rayfield, 2017). Some researchers have examined the order in which the experiential learning process is implemented and its effects on students' knowledge, knowledge retention, scientific reasoning, and learning preferences (Baker et al., 2014; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017; Smith & Rayfield, 2017). However, results have been fairly inconsistent across the studies. Researchers have also examined modes of reflection on student learning in agricultural education (Baker et al., 2014, Blackburn et al., 2015; Coleman et al., 2020; Coleman et al., 2021a; DiBenedetto et al., 2017), and results have also varied across these studies. Such inconsistencies suggest the specific nuances, such as order and methods, by which the process of experiential learning is implemented may be of less importance than the combined effects of the grander, holistic theory of learning by experience. Studies that have examined experiential learning in comparison to more traditional methods of pedagogy (i.e., direct instruction) have found significant effects in favor of experiential learning approaches or no difference between the two approaches (Baker & Robinson, 2016; Baker & Robinson, 2017a; Baker & Robinson, 2017b; Bradford et at., 2019).

This suggests that the process of experiential learning is equally, if not more, effective as a pedagogical approach for use in agricultural education settings. However, this does not mean that providing concrete experiences alone constitutes a pedagogical approach for agricultural education. Educators must "move beyond the 'doing' and ensure that all learning is connected to thinking and knowledge…" (Knobloch, 2003, p. 31). Moreover, research studies have evidenced positive outcomes when learning experiences have been tailored to meet the preferred learning style of students (Baker & Robinson, 2019; Lamm et al., 2011; Moore et al., 2010; Smith & Rayfield, 2019), suggesting that a balanced delivery of the holistic experiential learning model can be an ideal method through which multiple learning style preferences can be delivered.

Experiential Learning Theory

Seminal Contributions to the Theory of Learning by Experience

The theory of experiential learning is rooted in a constructivist epistemology. Jean Piaget is known as an early pioneer of constructivism through his work on the theory of cognitive development (Piaget, 1952). Piaget's work focused on one's ability to make meaning of their experiences by connecting them to abstract ideas. Piaget proposed that one's cognitive ability develops over time during approximate life stages, and such stages affect one's internal cognitive functions and their perceptions of experiences and interactions.

Lev Vygotsky also contributed to the field through his theory of social constructivism and the zone of proximal development (Vygotsky, 1978). Vygotsky emphasized that social interactions are critical to learning, and that knowledge is often the product of the interaction of two or more people. The zone of proximal development is the potential one has to learn new knowledge and skills based on the individual's current developmental level (i.e., a child's developmental level is likely not the same as that of an adult). Further development occurs when one can connect their current knowledge and ability to new knowledge and skills through the guidance of another person (Vygotsky, 1978). Vygotsky emphasized how critical other people involved in a person's environment and experiences are to their development of knowledge and behavior.

John Dewey is one of the most influential and prominent philosophers of American education and his work has important, yet lofty, implications for experiential education. First, Dewey believed the fundamental principle of education was to prepare learners for a democratic society and to have the ability to adapt to a continuously changing world (Dewey, 1938). This consideration was reflected in his article, *My Pedagogic Creed*, when Dewey (1897, Article I, para. 3) stated, "…it is impossible to foretell definitely just what civilization will be twenty years from now. Hence it is impossible to prepare the child for any precise set of conditions." Dewey was pragmatic, and preferred education that was realistic and adaptive to student and societal needs (Dewey, 1897).

Second, Dewey (1897, 1938) expressed that learning experiences needed to be accompanied by real-life applications. Dewey found traditional schools to be inadequate at accomplishing this due to their inability to foster the freedom and experiences learners needed to be successful. He criticized the experience offered by traditional schooling because it isolated subject matter and separated learning experiences from one another (Dewey, 1897). For Dewey, learning experiences that were clinical and isolated could not be further from being educative.

Third, Dewey (1938) recognized that our experiences are situated in the context of all human experience which has come before them, which influences all educative experiences that may come after. Engaging with, and understanding, the experiences of others was critical for Dewey (1938), because "…the principle of continuity of experience means that every experience both takes up something from those which have gone before and modifies in some way the quality of those which come after" (p. 35). For Dewey, experience was not separable from culture; rather, it was saturated with the traditions, customs, beliefs,

reflections, and interpretations which have come from before. (Dewey, 1938, 1958). As such, the vicarious understanding of others' experiences and perspectives, and the comparison of such to our own, was critical for education. Dewey believed that for an experience to be truly educative, it should be interdisciplinary in nature, bridging connections between social contexts and one's personal experiences (Dewey, 1897, 1938).

Lastly, Dewey emphasized the vital role the teacher has in providing experiences to students. He believed it was up to the teacher to assess the needs and prior experience of their students so they could provide them with appropriate subsequent learning experiences (Dewey, 1938). In assessing the needs of their learners, teachers could facilitate meaningful learning experiences that would stimulate their personal, holistic growth and further their curiosity. For Dewey, it was imperative for the teacher to motivate students to analyze concepts deeply and to think about them critically. Simultaneously, the teacher should be an authority figure in the classroom, but not be overly authoritarian. Dewey (1938) described the teacher as a facilitator of experiences and the social process. Education should be a communal exchange of ideas and experiences. When this was achieved, "The teacher loses the position of boss or dictator but takes on that of a leader of group activities" (Dewey, 1938, p. 59).

Kurt Lewin was also a prominent contributor to the theory of learning by experience. Lewin was widely known for his action research and laboratory training processes, which have heavily influenced experiential learning theory (Kolb, 2015; Lewin, 1951). In fact, Kolb's (1984, 2015) model of experiential learning closely aligns with the Lewinian model of action research and laboratory training. The model begins with here-and-now concrete experiences used to test abstract concepts in concrete, empirical settings (Kolb, 2015; Lewin, 1951). Moving further, the model continues with feedback processes such as one's observations and reflections of the concrete experiences, and the formation of abstract concepts and generalizations. The last step in the process is to test implications of the abstract concepts in new settings, which leads back to a concrete experience.

Process of Experiential Learning

Many theorists have developed models to depict the process of experiential learning (Joplin, 1981; Kolb, 1984; Roberts, 2006). Such models have been cyclical in nature, designed to reflect Dewey's (1938) sentiments that all experiences are connected to previous and subsequent experiences. Joplin (1981) presented a cyclical model composed of five stages: focus, challenging action, support, feedback, and debrief. The model was presented as a continuous spiral to represent each experiential learning cycle to be connected to previous and future iterations of the cycle. Stage one, *focus*, is the beginning of the process where a learner is exposed to a phenomenon. Next, in the *challenging action* stage, learners have direct interaction with the phenomenon. Finally, in the *debrief* stage, learners reflect on their experiences and observations and draw connections to existing knowledge and experiences. The *support* and *feedback* stages of Joplin's (1981) model occur throughout all stages of the process. Support and feedback are provided as needed by the learner and they encourage the learner to evaluate their progress throughout the learning process.

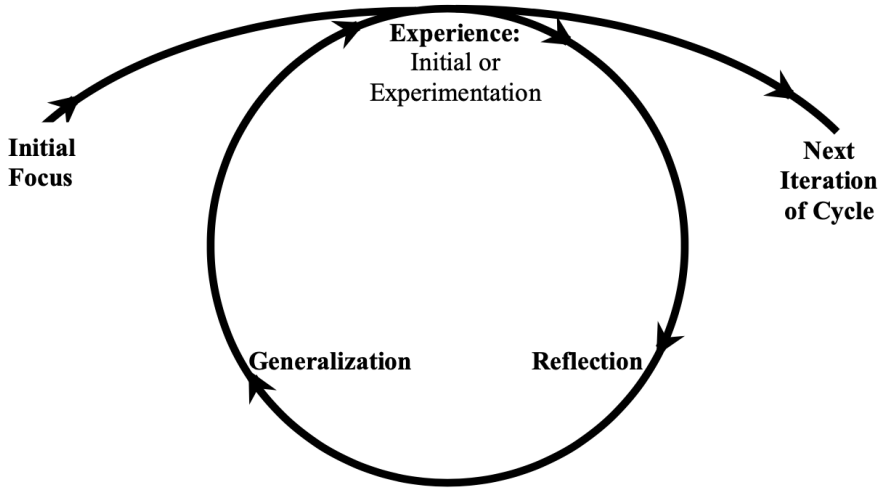
Kolb (1984, 2015) summarized experiential learning as the cyclical learning process by which experience is transformed into knowledge. In his 1984 model, Kolb purported there are two modes by which to grasp experience: concrete experience and abstract conceptualization. There are also two modes by which to transform experience into knowledge: reflective observation and active experimentation (Kolb, 1984). Further, Kolb (2015) suggested that while the process is cyclical and has four distinct stages, no one stage is always the starting point for the process. Roberts (2006) presented a model (Figure 1) of the experiential learning process that synthesized the work by Dewey (1910/1977, 1938), Kolb (1984), and Joplin (1981).

The process begins with an *initial focus*, which is the learner's exposure to the phenomenon of interest. The learner then has an *initial experience* in which they engage with the phenomenon. This is followed by *reflection* upon what the learner has experienced or observed, which allows the learner to draw

generalizations regarding the phenomenon. The learner then applies those generalizations in similar or new experiences though *experimentation*. The on-going cycle continues through *future iterations* of the process where learners continue to reflect, generalize, and experiment with the phenomenon in future settings.

Figure 1

Roberts' (2006) Model of the Experiential Learning Process

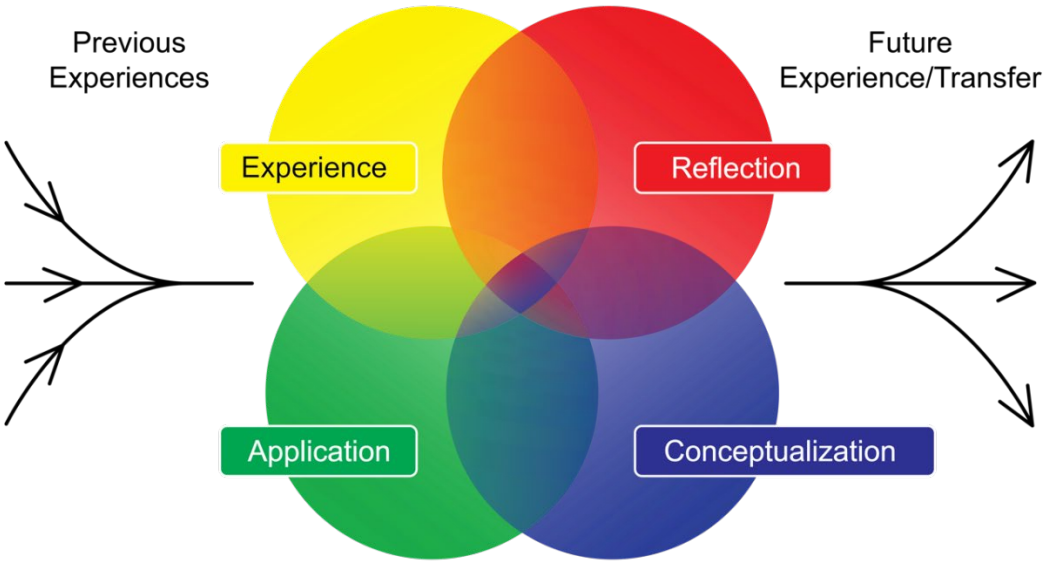


Seaman (2008) contended that the representation of experiential learning as a stepwise cycle or sequence should be ended, suggesting that, "the pattern of 'experience-reflect-learn' might be considered an *ideology* of experiential learning rather than a *philosophy* or a *theory* of experiential learning" (p. 15). Others have also viewed stepwise models of experiential learning as oversimplified (DeCantis & Kirton, 1996; Fenwick 2001; Holman et al., 1997; Morris, 2020; Quay, 2003), including Kolb (2015), who explained that while his model was initially created as a simplistic model, learning from experience is, in reality, more complex. Providing a reconsidered process model will reflect the complexities that lie within the theory of learning by experience, while also providing a theory-based model to guide how practitioners can holistically implement the experiential learning process.

Figure Two is a revised model of the process of experiential learning. This model begins with one's previous experiences and existing knowledge. Dewey (1938) emphasized that all experiences are connected to those which have come before them. When discussing the quality and effectiveness of learning experiences, Dewey posited, "Just as no man lives or dies to himself, so no experience lives and dies to itself. Wholly independent of desire or intent, every experience lives on in further experiences" (1938, p. 27). Educative experiences are those which are framed with one's previous experiences, and the collective experiences of humankind. Dewey (1938) discussed this as the principle of the continuity of experience. For learning to occur, one must be able to make meaning of their experiences and transform them into abstract knowledge which can be reapplied in future learning and contexts. To do this, we look to our past experiences, learning, and knowledge in order to draw connections to what is new.

Figure 2

Revised Model of the Experiential Learning Process



Moving on to the center of the model, there are four overlapping circles that include the four components of experiential learning suggested by Kolb (2015) and Roberts (2006): experience, reflection, conceptualization, and application. The overlap of the components is the primary revision we suggest to the experiential learning process model, specifically to avoid the stepwise isolation of such variables. In reality, components of experiential learning are not often isolated, nor should they be depicted as such (Seaman, 2008; Quay 2003). Researchers in agricultural education have also evidenced this when experiential learning variables have been tested, and significant interaction effects between two independent variables were found (Coleman, 2022; Coleman et al., 2020; DiBenedetto et al., 2017). Therefore, this model showcases the blending of the four components with one another. It is important to note that this model depicts the possibility of multiple components of experiential learning occurring simultaneously.

None of the four circles served as a starting point to the experiential learning process because a learner could begin at any phase of the process; however, we will begin by discussing experience. Concrete experiences occur when our physical experiences are absorbed and interpreted by our sensory organs (Kolb, 2015). However, not all experiences are concrete; therefore, the *experience* circle is labeled as such as to be more inclusive of all learning experiences that may fall on the continuum of concrete to abstract. The next component, *reflection*, can be defined as, "a conscious exploration of one's own experiences" (Silver, 2013, p. 1). Quay (2003) criticized Kolb's model because it depicts reflection occurring *after* a concrete experience where learners, "step out of experience to reflect and process, then we step back in. Experience exists as a memory to be processed via reflection" (p. 108). While this is the case sometimes, it is not always the case. Experience and reflection are not separate tasks to be checked off a list one-by-one. Schön (1983) discussed the idea of reflection-in-action by suggesting that our thoughts cannot always be separated from our actions. Reflection-in-action leads to problem solving that is situational in nature, when reflection occurs in the simultaneous context as our concrete experiences. It is possible that both reflection-in-action and reflection-on-action can occur (Schön, 1983), and research suggests a variety of reflection modes should be implemented around an experience (Blackburn, et al., 2015; Coleman et al., 2020; Coleman et al., 2021a; Lamm et al., 2011). In Figure 2, this is depicted by the overlap between the experience and reflection circles.

In some instances, learners may be engaged in an experience (e.g., a laboratory activity, field trip, or project) where they reflect-*in*-action. While participating in a laboratory activity, learners may think, "What am I seeing/doing/feeling?" or "Why might this phenomenon be occurring?" Reflection is often embedded within, and occurs naturally as part of, our experiences (Hutchinson & Bosacki, 2000; Quay, 2003; Schön, 1983). However, learners may also reflect after the conclusion of an experience, or reflection-*on*-action, which would also be an experience in and of itself. Lastly, Akyol and Garrison (2011) included pre-task reflection as part of their synthesis of the metacognitive process associated with one's learning experiences, suggesting that reflection and metacognition can occur before, during, and after an experience. This reinforces the notion that the experiential learning process does not always "begin" with a concrete experience.

Conceptualization is the next component. This occurs when learners form ideas, theories, or concepts around a phenomenon. Conceptualization overlaps with reflection because the act of reflection often leads to or encompasses the process of conceptualization. As learners reflect about their experiences, they may simultaneously generate conceptualizations around a phenomenon. However, the reverse sequence could occur too. After learning about abstract concepts around a phenomenon, a learner may be prompted to reflect on how such concepts could be applied in other situations. Therefore, conceptualization and reflection should not always be viewed as separate or linear steps in experiential learning. Conceptualization should be contextually rich (Morris, 2020), and should result directly from our experiences. Conceptualization can also occur during an experience, such as participating in a lecture or while reading literature, hence the overlap between the conceptualization and experience circles. Then, as learners apply or test their conceptualizations in new or similar settings, they might also modify or adjust their conceptualizations regarding a phenomenon, which is represented by the overlap between conceptualization and application.

Application occurs when learners apply learned concepts to similar or new experiences. In many cases, learner application can be its own experience, which is represented by the overlap between the application and experience circles. Application is sometimes interchanged with the word *transfer* which Haskell (2001) defined as, "our use of past learning when learning something new and the application of that learning to both similar and new situations" (p. xiii). Following an experience, learners should reflect on how their experiences can be transferred into different contexts in the future (Dewey, 1938), which could lead to new iterations of the process (Roberts, 2006). Therefore, the far-right end of this model indicates the connection between experiential learning with *future experiences* and opportunities to transfer knowledge in new or similar settings.

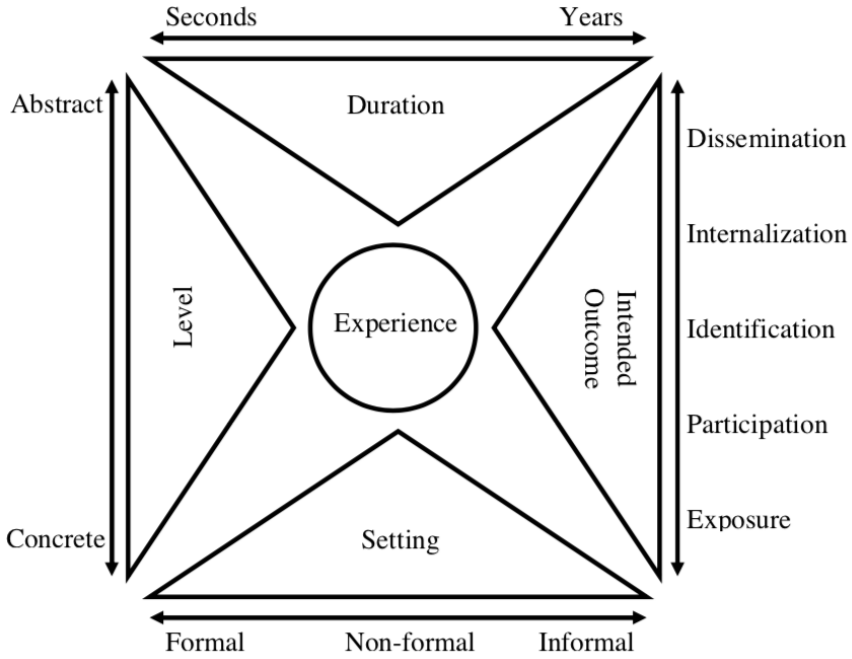
Lastly, while this model represents just one iteration of the experiential learning process, it is important to note that multiple iterations of this process may occur within one experience (Joplin, 1981; Roberts, 2006). For example, during a single lesson or class session a learner may move through several iterations of this process. Joplin (1981) referred to this as mini versus maxi experiences, and Knowles et al. (2015) discussed it as micro versus macro experiences, meaning the process of experiential learning can be a series of smaller, nested episodes within one grander experience. An internship might be viewed as one macro experience, but each week, day, or hour working within the internship might be a micro experience in which a learner completes an iteration of the experiential learning process. Therefore, where one experience ends another begins creating a continuous, nested chain of experiences, which is why multiple theories have depicted the process as a continuous, cyclical model (Dewey, 1938; Joplin, 1981; Kolb, 2015; Roberts, 2006).

Contextualization of Experiential Learning

Roberts (2006) developed a model by which to contextualize experiential learning. The model considered several theoretical works from which to draw the criterion used to contextualize experiential learning.

Figure 3

Roberts' (2006) Model of Experiential Learning Contexts



The first consideration is the *duration* of experience based on Joplin's (1981) scope of experiential learning ranging from mini to maxi experiences. Therefore, Roberts' (2006) model depicted learning experiences that occur on a continuum of duration from seconds to years. Second, the *setting* of experiential learning can be contextualized on a continuum from formal, to nonformal, and informal. This setting of an experience is based on the work by Etling (1993) who proposed these three terms by which to contextualize educational settings. Third, Roberts' (2006) model included the *level* of an experience which ranges from abstract to concrete. This process is based on Dale's (1946) *Cone of Experience*. Dale (1946) proposed a continuum of learning experiences that ranged from abstract experiences such as verbal or visual symbols, and then moved on to observation experiences such as exhibits or demonstrations. The base of the *Cone of Experience* continuum included concrete experiences where the learners participate in physically doing something (Dale, 1946). The final criterion used for contextualizing experiential learning is *intended outcome*. The intended outcome ranges on a continuum from exposure to dissemination and is based on the work by Steinaker and Bell (1979).

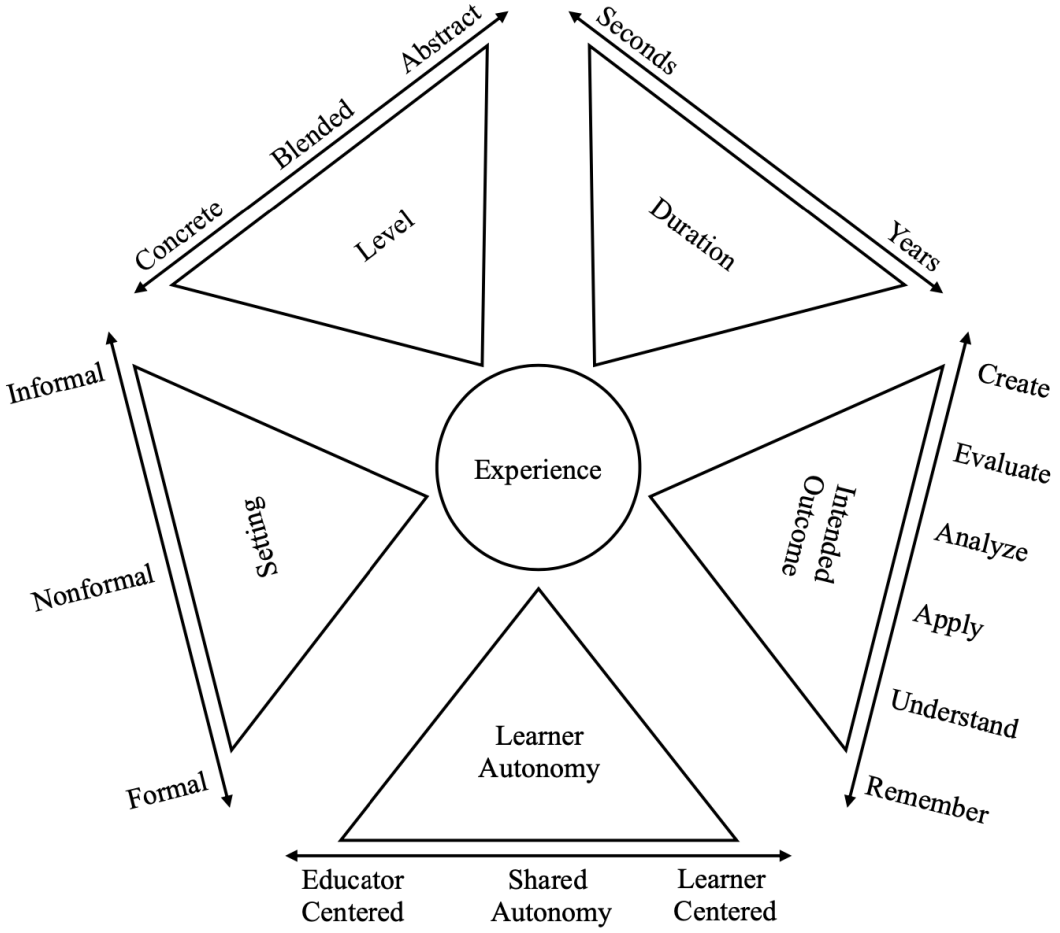
Researchers have used Roberts' (2006) model to contextualize learning experiences in order to conceptually frame studies focused on experiential learning (Coleman et al., 2021b; Heinert & Roberts, 2016). While the contextualization of learning experiences is critical to understanding the theory of experiential learning, Roberts' (2006) process model has been referenced far more in research than the model of learning contexts. This philosophical study will offer three modifications to the 2006 context model to increase its utility and relatability to educational practitioners, researchers, and contexts. The first modification focuses on the context of *intended outcome*. Roberts' (2006) model proposed five taxonomic

levels for intended outcome based on the work by Steinaker and Bell (1979). Steinaker and Bell suggested their taxonomy of learning experiences was more holistic than that of others such as Bloom et al. (1964), stating that their taxonomy "can be used for such purposes without dividing human experience into units or categories, particularities, or particular domains" (Steinaker & Bell, 1979, p. 2). Further, the authors offered that their five taxonomic levels "are intrinsically linked together," and learners should move through the levels "in a natural and logical progression" (Steinaker & Bell, 1979, p. 3). While we do not disagree that such a learning progression is possible and likely effective, Steinaker and Bell (1979) intended their levels to be linked, and they envisioned that all five levels would be achieved by a learner in an ideal learning experience. We believe this results in their taxonomy being less appropriate for the purpose of contextualizing individual learning experiences categorically, because not every learning experience will achieve every taxonomic level offered by Steinaker and Bell. However, this does not mean that an experience which does not attain all five levels is not an educative one.

We suggest the taxonomy by which to contextualize *intended outcome* be replaced with the seminal, cognitive taxonomy offered by Bloom et al. (1956), which was later revised by Anderson and Krathwohl (2001). Bloom's taxonomy was intended to categorize cognition and experiences into six primary classes: knowledge, comprehension, application, analysis, synthesis, and evaluation. Bloom et al. (1956, p. 10) stated this comprehensive list by which to classify learning outcomes would allow educators "to understand more completely the relation between the learning experiences provided by these various programs and the changes which take place in their students." Further, Bloom et al. (1956, p. 12) stated that the purpose of their taxonomy was "to be a classification of the student behaviors which represent the intended outcomes of the educational process." This is also our goal for including *intended outcome* as a mode by which to contextually classify learning experiences. We also find Bloom et al. (1956) more appealing for this model because the authors explicitly stated that each of their six taxonomic classes were intended to be equal to one another. That is, no class had more value or quality than another class, but rather, each class has its own unique function within education, as is the case with learning experiences. Finally, we think the inclusion of Bloom's taxonomy is most suitable for this model because it has stood the test of time and has become widely recognized and adopted by educational practitioners globally. A widely recognized revision of Bloom's taxonomy was proposed by Anderson and Krathwohl (2001), in which the synthesis and evaluation levels were to be switched, making synthesis the highest level in the taxonomy. The taxonomy was also revised to employ action verbs as labels for the six levels: remember, understand, apply, analyze, evaluate, and create (Anderson & Krathwohl, 2001). The revised model of experiential learning contexts, which includes the revised Bloom's taxonomy, is presented as figure four.

Figure 4

Revised Model of Experiential Learning Contexts

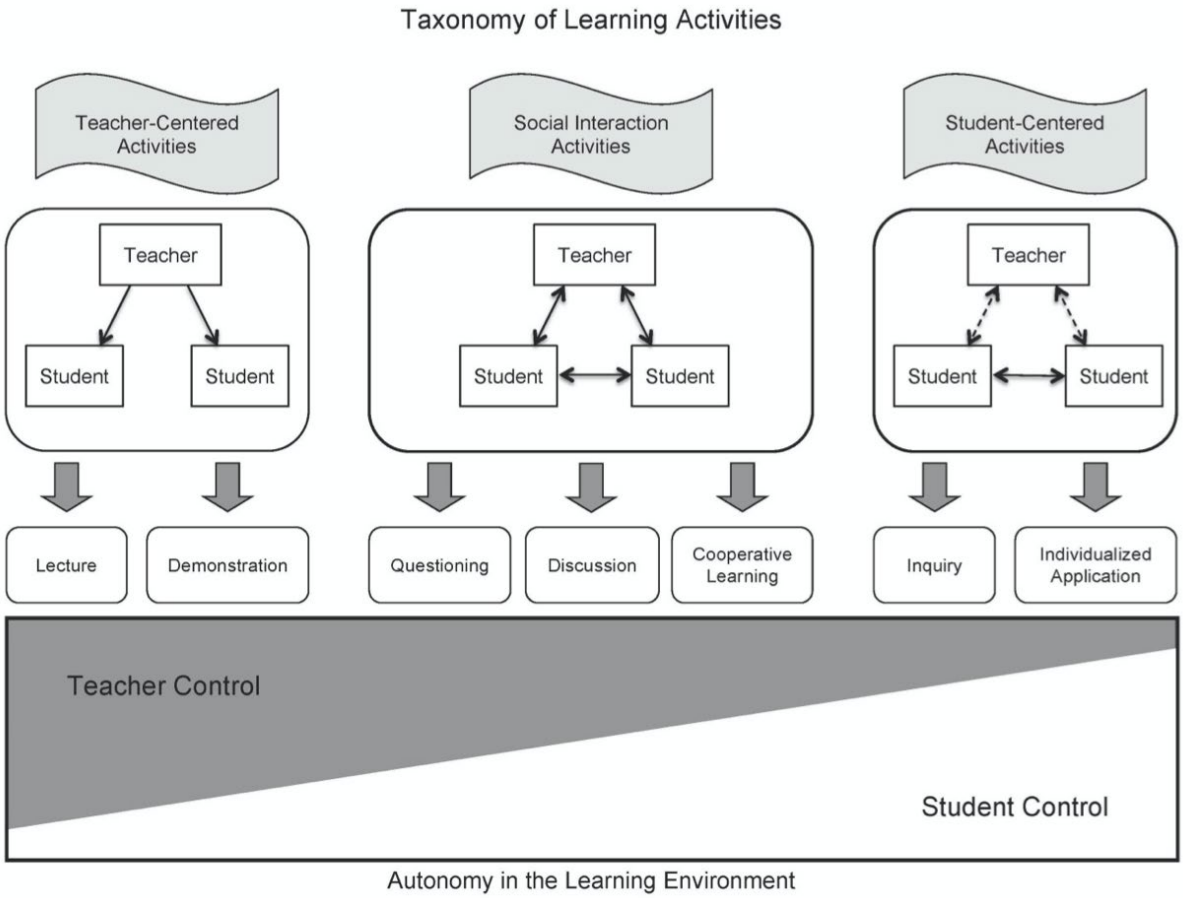


The second adjustment made to this model was made to the *level* by which to contextualize a learning experience. Roberts' (2006) model offered a continuum of concrete to abstract experiences. However, as technology and teaching advance, more and more learning experiences offer a blend of both concrete and abstract experience. For example, electronic field trips (EFTs) are being used to connect students to scientists and field experiences at a distance in situations where it may not be feasible for them to attend in-person (Beattie et al., 2021; Loizzo & Beattie, 2019). When examining Dale's (1946) cone of experience, activities such as watching demonstrations, attending field trips, viewing exhibits, watching movies, and looking at photos are all classified as *observing*, which falls somewhere in between fully concrete and abstract experiences. Therefore, to represent such experiences in this model, the word *blended* has been included on the experience level continuum in between abstract and concrete.

Lastly, the third revision made to Roberts' (2006) model was the inclusion of an additional context area: learner autonomy. Dewey (1938) emphasized the role of the educator and their influence upon a learner's experiences. However, the role an educator might play in a learning experience varies based upon the context. Roberts et al. (2010) offered a taxonomy of commonly used instructional methodologies in agricultural education settings and the level of learner autonomy associated with each (Figure 5).

Figure 5

Taxonomy of Learning Activities by Roberts et al. (2010)



At the bottom of the figure, the spectrum of autonomy between the teacher and the learner was depicted and fluctuated based on the context. However, it is important to note that 100% autonomy does not reside with either party, educator or learner, at either end of the spectrum. On the left side of the taxonomy, teacher-centered activities included direct instruction that flows from the educator to the learners, with no interaction between the learners. Examples might include lecture and demonstration methodologies, and these provide little autonomy to the learner. Moving along the taxonomy, social interaction activities included instruction that was reciprocal between the educator and learners, meaning interactions occur as educator-learner, learner-educator, and learner-learner. Examples of this include questioning, discussion, and cooperative learning methodologies. In some contexts, examples may include the exchange of ideas or approaches among practitioners. For example, Ochago et al. (2023) described the value of social interaction activities to prompt experiential learning among coffee farmers. Ultimately, the autonomy in these contexts is shared between the educator(s) and learner(s).

On the right side of the taxonomy, student-centered activities include instruction where the learner creates knowledge from their own experiences. Examples of this include inquiry-based learning and other individualized methodologies. In these contexts, the learner has a large amount of autonomy over their learning. Therefore, in the revised model of experiential learning contexts (Figure 4), learner autonomy ranges from educator-centered autonomy to learner-centered autonomy, with shared autonomy in between.

Holistic Model of Experiential Learning (Process and Context)

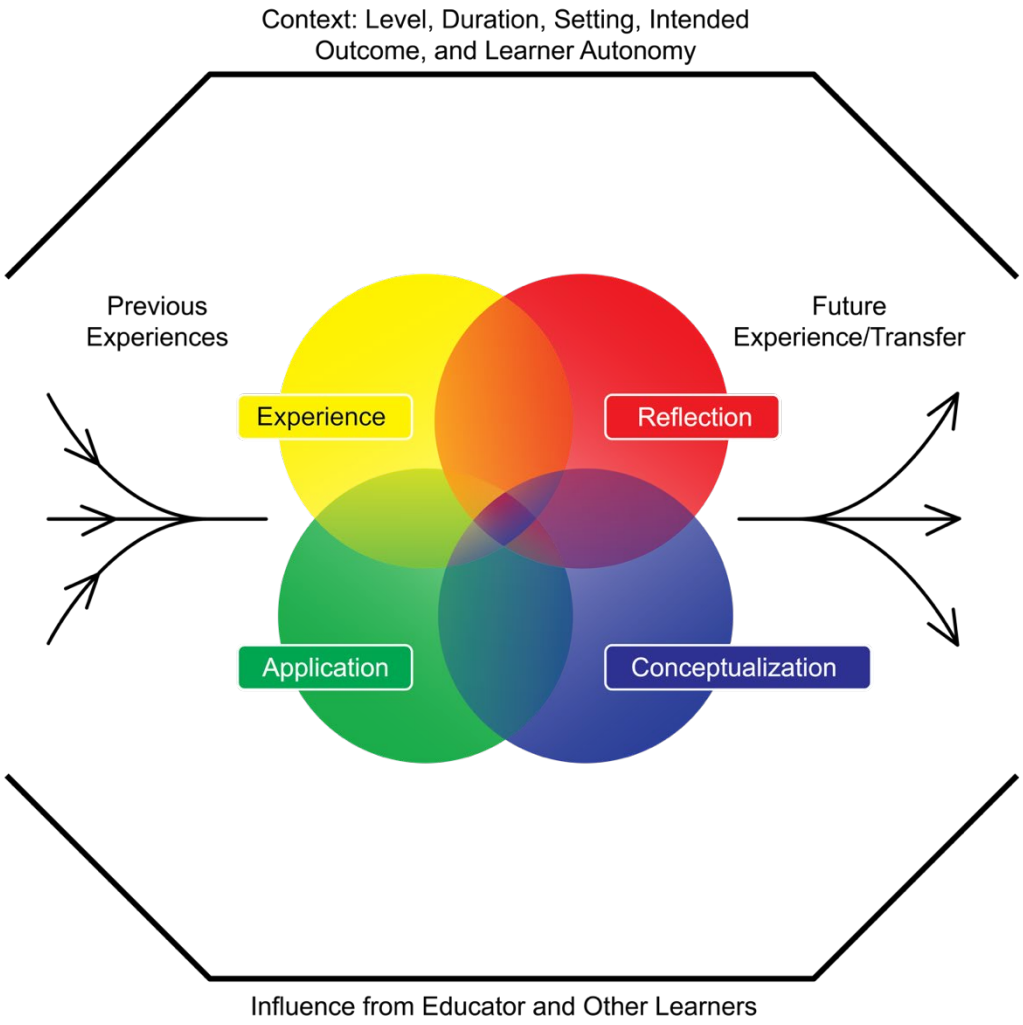
Thus far, we have presented two models which were used to describe the process of experiential learning and by which to contextualize learning experiences. While both have their own merit and purposes as independent models by which to explain, frame, and research the phenomenon of experiential learning, theorists of experiential learning have suggested true, real-life experience does not occur without its accompanying context (Dewey, 1938; Kolb, 1984, 2015). Hutchinson and Bosacki (2000) discussed the concept of embeddedness which emphasizes "the transactional relationship between student, teacher, and environment which is so critical to experiential education" (p. 180). Other theorists suggested that Kolb's (1984, 2015) conceptualization of the theory does not sufficiently describe experiential learning as "a process in which learners are immersed in learning experiences that contain the fullest contextual information possible" (Morris, 2020, p. 1071). The process of experiential learning does not occur without context; therefore, we present a third, holistic model, that includes both the process and the contexts of experiential learning (Figure 6).

In this holistic model, the process of experiential learning occurs through the contextual frame. Any given experience is framed by its level, duration, setting, intended outcome, and level of learner autonomy. In addition, Dewey (1897, 1938) explained how critical the educator was for education. This notion is reflected in Dewey's (1938, p. 58) remark, "[The educator] must survey the capacities and needs of [their learners] and must…arrange the conditions which provide the subject-matter or content for experiences that satisfy these needs and develop these capacities" (Dewey, 1938; p. 58). Therefore, this model also includes *influence from educator and other learners* as contributing factors that frame a learning experience. This also aligns with Vygotsky's (1978) theory of social constructivism, which highly emphasizes the influence educators and other learners might have on one's learning experiences. Other theorists concur, citing the educator as one of the most critical influencers of a student's learning. Nussbaum (1997), whose work was heavily influenced by John Dewey and William James, suggested the educator was "the most important ingredient" to a student's learning (p. 41). Nussbaum (1997) built a case for the educator as instrumental in designing experiences that foster students' ability to argue critically, justify their views, and analyze complex problems.

Noddings (2013) has also referenced the educator as incredibly influential over students. She suggested that educators should be caring, moral, and supportive of the learner, and in doing so, they have great power and influence over a student's learning (Noddings, 2013). Further, Joplin (1981) included *support* and *feedback* as critical components of experiential learning. Support and feedback should be a continual component that are included throughout a learning experience (Joplin, 1981). As such, support and feedback are an important part of the influence provided by an educator and other learners. Therefore, the *influence from educators and other learners* is essential to one's learning experience, and it is visualized in this model as part of the contextual frame of a holistic learning experience. Finally, it is important to note that the *context* and *influence* components intentionally encapsulate the experiential learning process used to showcase the way one's learning experience is framed, and that the process of experiential learning does not occur separately from its context.

Figure 6

A Holistic Model of Experiential Learning



As previously mentioned, Dewey (1938, 1958) emphasized the strong connection between experience and culture. While not visually depicted in Figure 6, culture is very much part of the holistic model of experiential learning. By design, culture is not depicted in the model, because how can it be? Culture influences all previous experiences which have come before, which frame all experiences that come after, as Dewey (1938, 1958) described in his principle of continuity. Culture influences how the learner may perceive, reflect upon, internalize, and draw conclusions upon learning experiences (Channer, 2000; Dewey, 1958; National Academies of Sciences, Engineering, and Medicine [NASEM], 2018; National Research Council [NRC], 2000). Culture influences other players in the learning process, such as the educator and other learners (NASEM, 2018) Culture influences how knowledge may be applied in future settings and contexts (NRC, 2000). Culture even affects the way in which knowledge and intelligence are defined (Merriam et al., 2007). Therefore, in this holistic model, culture is like an invisible thread which ties everything together, and upon which everything is dependent. Even more reason that, when depicting the model of experiential learning, the process should not be separated from its context.

Considerations Moving Forward

We maintain that the process of experiential learning is cyclical in nature. That is, each iteration of the process is connected to the next in an on-going fashion (Dewey, 1938; Joplin, 1981; Kolb, 2015; Roberts 2006). However, the experiential learning process should not be viewed as a stepwise recipe. This is not to say that the components of experiential learning (i.e., experience, reflection, conceptualization, and application) cannot be performed in steps one after another, but the components need not be conducted in the same order every time for learning to take place. It is important to recognize that many components of experiential learning may overlap, occur simultaneously, or occur at multiple points in the process, and are not held in isolation of each other or time and space (e.g., reflection-pre-experience, reflection-in-experience, and reflection-on-experience). Thus, the experiential learning *process* model (see figure 2), could be used by researchers as a lens from which to examine experiential learning. Such examinations could employ experimental and quasi-experimental designs to determine main and interaction effects among components of this model.

We offer the model of experiential learning *contexts* (see Figure 4) as a measurement tool for practitioners and researchers to describe learning experiences. We recommend that researchers test the effects of varying contexts of learning experiences and utilize this model as a frame by which to taxonomize the contextual nature of said experiences and associated phenomena. For example, a researcher could use this model to design a study to examine the effects of level of experience on student learning. Are there differences between different levels (i.e., concrete, blended, and abstract) of experience and student learning outcomes? The context of an experience is critically important, and experience cannot be separated from its context (Dewey, 1938; Morris, 2020). Therefore, we included the holistic model of experiential learning (see Figure 6), which includes variables from both the process and context models. The influence of culture on learning experiences should not be overlooked. Researchers should examine models of experiential learning across various cultural settings to further understand the influence of culture on learning experiences. In addition, this holistic model includes the critical influence from the teacher/facilitator, as well as other learners. As a result, it is imperative that practitioners understand experiential learning holistically, especially in agricultural education. Those seeking to teach about experiential learning (e.g., teacher educators, Extension educators, instructional coaches, etc.) may use the models presented within this discussion as an additional graphic by which to illustrate the theory. Presenting models, such as Figures 2 and 6, alongside the models of other theorists (i.e., Joplin, 1981; Kolb, 1984; Roberts, 2006, among others) could provide a visual that expands discussion and deepens learners' understating of the theory.

As a profession of agricultural educators, we embrace experiential learning, and claim it as foundational to our practice. However, if we are to continue to do so, experiential learning must be facilitated with intentionality for the experiences to be educative. It is not enough to simply provide hands-on activities and expect learning to occur – all aspects of experiential learning ought to be considered. It is also up to agricultural teacher educators to ensure that preservice teachers are well informed about the theory that drives their practice. Continued research should be conducted on the theory of experiential learning, and how the theory informs pedagogical practice. As we continue to explore and test the complexity that is experiential learning, we build a stronger future for agricultural education, and increase our profession's ability to provide impactful educational experiences.

References

Akyol, Z., & Garrison, D. R. (2011). Assessing metacognition in an online community of inquiry. *Internet and Higher Education, 14*(3), 183–190. https://doi.org/10.1016/j.iheduc.2011.01.005

Anderson, L. W., & Krathwohl, D. R. (Eds.) (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives*. Pearson Education.

Andreasen, R. J. (2004). Integrating experiential learning into college of agriculture capstone courses: Implications and applications for practitioners. *North American Colleges and Teachers of Agriculture Journal, 48*(1), 52–57.

Baker, M. A., & Robinson, J. S. (2016). The effects of Kolb's experiential learning model on successful intelligence in secondary agriculture students. *Journal of Agricultural Education, 57*(3), 129–144. https://doi.org/10.5032/jae.2016.03129

Baker, M. A., & Robinson, J. S. (2017a). The effects of an experiential approach to learning on student motivation. *Journal of Agricultural Education, 58*(3), 150–167. https://doi.org/10.5032/jae.2017.03150

Baker, M. A., & Robinson, J. S. (2017b). The effect of two different pedagogical delivery methods on students' retention of knowledge over time. *Journal of Agricultural Education, 59*(1), 100–118. https://doi.org/10.5032/jae.2018.01100

Baker, M. A., & Robinson, J. S. (2019). The interaction of learning style on measures of successful intelligence in secondary agriculture students exposed to experiential and direct instruction. *Journal of Agricultural Education, 60*(3), 14–31. https://doi.org/10.5032/jae.2019.03014

Baker, M. A., Brown, N. R., Blackburn, J., & Robinson, J. S. (2014). Determining the effects that the order of abstraction and type of reflection have on content knowledge when teaching experientially: An exploratory experiment. *Journal of Agricultural Education, 55*(2), 106–119. https://doi.org/10.5032/jae.2014.02106

Baker, M. A., Robinson, J. S., & Kolb, D. A. (2012). Aligning Kolb's experiential learning theory with a comprehensive agricultural education model. *Journal of Agricultural Education, 53*(4), 1–16. https://doi.org/10.5032/jae.2012.04001

Beattie, P. N., Kent, K. W., Suits, T. E., Loizzo, J. L., & Bunch, J. C. (2021). Bats and beyond: Communicating wildlife and climate change empathy to youth through an electronic field trip. *Journal of Southern Agricultural Education Research, 71*, 1–16. http://jsaer.org/2021/02/09/bats-and-beyond:-communicating-wildlife-and-climate-change-empathy-to-youth-through-an-electronic-field-trip/

Blackburn, J. J., Robinson, J. S., & Kacal, A. (2015). Determining the effects of reflection type and cognitive style on students' content knowledge. *Journal of Agricultural Education, 56*(3), 195–209. https://doi.org/10.5032/jae.2015.03195

Bloom, B. S., Engelhart, M. D., Furst, E. J., Hill, W. H., & Krathwohl, D. R. (1956). *Taxonomy of educational objectives: The classification of educational goals.* David McKay Company.

Bradford, T., Jr., Hock, G., Greenhaw, L., & Kingery, W. L. (2019). Comparing experiential learning techniques and direct instruction on student knowledge of agriculture in private school students. *Journal of Agricultural Education, 60*(3), 80–96. https://doi.org/10.5032/jae.2019.03080

Channer, Y. (2000). Understanding and managing conflict in the learning process: Christians coming out. In V. E. Cree, & C. Macaulay (Eds.), *Transfer of learning in professional and vocational education* (pp. 176–187). Routledge.

Clark, R. W., Threeton, M. D., & Ewing, J. C. (2010). The potential of experiential learning models and practices in career and technical education & career and technical teacher education. *Journal of Career and Technical Education, 25*(2). http://doi.org/10.21061/jcte.v25i2.479

Coleman, B. M. (2022). *Examining the effects of reflection mode and transfer level on students' content knowledge, post course retention, and transfer skills while learning experientially* [Doctoral dissertation, University of Florida]. University of Florida Digital Collections. https://ufdc.ufl.edu/UFE0058601/00001

Coleman, B. M., Bunch, J. C., Thoron, A. C., & Roberts, T. G. (2020). Examining the effects of reflection type and abstraction order on content knowledge and content knowledge retention during experiential learning. *Journal of Agricultural Education, 61*(3), 308–320. https://doi.org/10.5032/jae.2020.03308

Coleman, B. M., Bunch, J. C., Thoron, A. C., & Roberts, T. G. (2021a). Examining the effects of reflection type and abstraction order on students' scientific reasoning skills during experiential learning. *Journal of Agricultural Education, 62*(2), 13–26. https://doi.org/10.5032/jae.2021.02013

Coleman, B. M., Orsini, J., Bunch, J. C., & Greenhaw, L. L. (2021b). Students' application of team leadership skills in an undergraduate agricultural leadership course when learning experientially. *Journal of Leadership Education, 20*(2), 28–39. https://doi.org/10.12806/V20/I2/R3

Dale, E. (1946). *Audio-visual methods in teaching*. The Dryden Press.

DeCiantis, S. M., & Kirton, M. J. (1996). A psychometric reexamination of Kolb's experiential learning cycle construct: A separation of level, style, and process. *Educational and Psychological Measurement, 56*(5), 809–820. https://doi.org/10.1177/0013164496056005007

Dewey, J. (1897). My pedagogic creed. *The School Journal, 54*(3), 77–80.

Dewey, J. (1910/1997). *How we think.* Dover Publications.

Dewey, J. (1938). *Experience and education.* Simon & Schuster.

Dewey, J. (1958). *Experience and nature*. Dover Publications.

DiBenedetto, C. A., Blythe, J. M., & Myers, B. E. (2017). Effects of the order of abstraction and type of reflection on content knowledge when teaching experientially in a high school classroom. *Journal of Agricultural Education, 58*(2), 67–82. https://doi.org/10.5032/jae.2017.02067

Etling, A. (1993). What is nonformal education? *Journal of Agricultural Education, 34*(4) 72–76. https://doi.org/10.5032/jae.1993.04072

Estepp, E. M., & Roberts, T. G. (2011). A model for transforming the undergraduate learning experience in colleges of agriculture. *North American Colleges and Teachers of Agriculture Journal, 55*(3), 28–32.

Eyler, J. (2009). The power of experiential education. *Liberal Education, 95*(4). https://www.aacu.org/publications-research/periodicals/power-experiential-education

Fenwick, T. J. (2001). *Experiential learning: A theoretical critique from five perspectives* (Information Series No. 385). ERIC Clearinghouse on Adult, Career, and Vocational Education. https://eric.ed.gov/?id=ED454418

Haskell, R. E. (2001). *Transfer of learning: Cognition, instruction, and reasoning*. Academic Press.

Heinert, S. B., & Roberts, T. G. (2016). Globalizing the undergraduate experience in agricultural leadership, education, extension, and communication. *Journal of Agricultural Education, 57*(1), 42–55. https://doi.org/10.5032/jae.2016.01042

Holman, D., Pavlica, K., & Thorpe, R. (1997). Rethinking Kolb's theory of experiential learning in management education: The contribution of social constructionism and activity theory. *Management Learning, 28*(2), 135–148. https://doi.org/10.1177/1350507697282003

Hughes, M., & Barrick, R. K. (1993). A model for agricultural education in public schools. *Journal of Agricultural Education, 34*(3), 59–67. https://doi.org/10.5032/jae.1993.03059

Hutchinson, D., & Bosacki, S. (2000). Over the edge: Can holistic education contribute to experiential learning? *Journal of Experiential Education, 23*(3), 177–182. https://doi.org/10.1177/105382590002300310

Joplin, L. (1981). On defining experiential education. *Journal of Experiential Education, 4*(1), 17–20. https://doi.org/10.1177/105382598100400104

Knobloch, N. A. (2003). Is experiential learning authentic? *Journal of Agricultural Education, 44*(4), 22–34. https://doi.org/10.5032/jae.2003.04022

Knowles, M. S., Holton, E. F., III, & Swanson, R. A. (2015). *The adult learner: The definitive classic in adult education and human resource development* (8th ed.). Routledge.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development* (1st ed.). Prentice-Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson Education.

Lamm, A. J., Cannon, K. J., Roberts, T. G., Irani, T. A., Unruh Snyder, L. J., Brendemuhl, J., & Rodriguez, M. T. (2011). An exploration of reflection: Expression of learning style in an international experiential learning context. *Journal of Agricultural Education, 52*(3), 122–135. https://doi.org/10.5032/jae.2011.03122

Lewin, K. (1951). *Field theory in social science: Selected theoretical papers* (D. Cartwright, Ed.). Harper & Brothers. https://doi.org/10.1177/000271625127600135

Loizzo, J. & Beattie, P. (2019). Self-Study of a project-based graduate science communication course focused on electronic field trip development. *North American Colleges and Teachers of Agriculture Journal, 63*(2).

Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.). Jossey-Bass.

Moore, C., Boyd, B. L., & Dooley, K. E. (2010). The effects of experiential learning with an emphasis on reflective writing on deep-level processing of leadership students. *Journal of Leadership Education, 9*(1), 36–52. https://doi.org/10.12806/V9/I1/RF3

Moore, G. E. (1988). The forgotten leader in agricultural education: Rufus W. Stimson. The *Journal of the American Association of Teacher Educators in Agriculture, 29*(3), 50–58. https://doi.org/10.5032/jaatea.1988.03051

Morris, T. H. (2020). Experiential learning: A systematic review and revision of Kolb's model. *Interactive Learning Environments, 28*(8), 1064–1077. https://doi.org/10.1080/10494820.2019.1570279

National Academies of Sciences, Engineering, and Medicine. (2018). *How people learn II: Learners, contexts, and cultures*. The National Academies Press. https://doi.org/10.17226/24783

National Research Council. (2000). *How people learn: Brain, mind, experience, and school: Expanded edition*. The National Academies Press. https://doi.org/10.17226/9853

Noddings, N. (2013). *Caring: A relational approach to ethics and moral education* (2nd ed.). University of California Press.

Nussbaum, M. C. (1997). *Cultivating humanity: A classical defense of reform in liberal education.* Harvard University Press.

Ochago, R., Dentoni, D., Lans, T., & Trienekens, J. (2023). Disentangling the experiential learning process of coffee farmers in Uganda's innovation platforms. *The Journal of Agricultural Education and Extension, 29*(1), 117–148. https://doi.org/10.1080/1389224X.2021.1977664

Phipps, L. J., Osborne, E. W., Dyer, J. E., & Ball, A. (2008). *Handbook on Agricultural Education in Public Schools* (6th ed.). Thomson Delmar Learning.

Piaget, J. (1952). *The origins of intelligence in children.* International Universities Press.

Quay, J. (2003). Experience and participation: Relating theories of learning. *Journal of Experiential Education, 26*(2), 105–112. https://doi.org/10.1177/105382590302600208

Roberts, T. G. (2006). A philosophical examination of experiential learning theory for agricultural educators. *Journal of Agricultural Education, 47*(1), 17-29. https://doi.org/10.5032/jae.2006.01017

Roberts, T. G., Stripling, C. T., & Estepp, C. M. (2010). A conceptual model of learning activities for college instructors [Abstract presentation supplement]. *North American Colleges and Teachers of Agriculture Journal, 54*(2).

Schön, D. A. (1983). *The reflective practitioner. How professionals think in action.* Basic Books, Inc.

Seaman, J. (2008). Experience, reflect, critique: The end of the 'learning cycles' era. *Journal of Experiential Education, 31(*1), 3–18. https://doi.org/10.1177/105382590803100103

Silver, N. (2013). Reflective pedagogies and the metacognitive turn in college teaching. In M. Kaplan, N. Silver, D. Lavaque-Manty, & D. Meizlish (Eds.), *Using reflection and metacognition to improve student learning: Across the disciplines, across the academy* (1–17). Stylus Publishing.

Shoulders, C. W., & Myers, B. E. (2013). Teachers' use of experiential learning stages in agricultural laboratories. *Journal of Agricultural Education, 54*(3), 100–115. https://doi.org/10.5032/jae.2013.03100

Shoulders, C. W., Blythe, J. M., & Myers, B. E. (2013). Teachers' perceptions regarding experiential learning attributes in agricultural laboratories. *Journal of Agricultural Education, 54*(2), 159–173. https://doi.org/10.5032/jae.2013.02159

Smith, K. L., & Rayfield, J. (2017). A quasi-experimental examination: Cognitive sequencing of instruction using experiential learning theory for STEM concepts in agricultural education. *Journal of Agricultural Education, 58*(4), 175–191. https://doi.org/10.5032/jae.2017.04175

Smith, K. L., & Rayfield, J. (2019). STEM knowledge, learning disabilities and experiential learning: Influences of sequencing instruction. *Journal of Agricultural Education, 60*(2), 222–236. https://doi.org/10.5032/jae.2019.02222

Steinaker, N. W., & Bell, M. R. (1979). *The experiential taxonomy: A new approach to teaching and learning*. Academic Press.

Stimpson, R. (1915). The Massachusetts home project plan of vocational agricultural education. *The School Review, 23*(7), 474–478. https://www.jstor.org/stable/1076877

Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. Jolm-Steiner, S. Scribner, & E. Souberman, Eds.). Harvard University Press. https://doi.org/10.2307/j.ctvjf9vz4