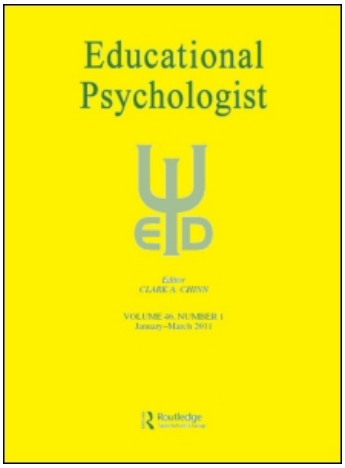

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Transformative Experience: An Integrative Construct in the Spirit of Deweyan Pragmatism

Kevin J. Pugh[a]
[a] School of Psychological Sciences, University of Northern Colorado,

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Transformative Experience: An Integrative Construct in the Spirit of Deweyan Pragmatism

Kevin J. Pugh
School of Psychological Sciences
University of Northern Colorado

A sentiment held by Dewey and shared by other educators is that learning should enrich and expand everyday experience. However, this goal has not been a focus of research. In this article, I propose *transformative experience* as a construct capable of reflecting this goal and functioning as an empirical research construct. I discuss the theoretical grounding for this construct in the work of Dewey and define it in terms of three characteristics: (a) motivated use, (b) expansion of perception, and (c) experiential value. In doing so, I describe how transformative experience integrates current research constructs such as transfer, conceptual change, and task value in a holistic way. I then provide illustrations of transformative experiences and review the existing research.

> I used to think, oh, it's just a cloud, you know, who cares . . . But now it's more, it's like rain is happening because of air pressure and heat . . . and it's really affected me . . . Like, I can't help it, when I see something that involves weather, or the heat transfer . . . It's stuck in my head and I can't get it out. That's good information though . . . because it happens in my everyday life. (sixth-grade earth science student)

This quote illustrates a particular kind of learning outcome that I term a *transformative experience* (Pugh, 2004). Transformative experiences occur when students actively use curricular concepts in everyday life to see and experience the world in a new, meaningful way. Unfortunately, we know little about this kind of experience. We don't know if such experiences are common or whether the Las Vegas slogan "What happens here, stays here" applies all too well to learning that takes place in the classroom.

For progressive educators such as Dewey, a central goal of education was to enrich and expand everyday experience. However, this goal never developed into a focus of research for educational psychologists, likely because the concept of "enriching and expanding experience" is a bit fuzzy. Educational psychologists like to work with concepts that have greater conceptual clarity and are more easily operationalized in empirical research. Consequently, they reduce complex phenomena into more manageable components. This approach has been very productive, but it also has its limitations. As Salomon (1995) pointed out, reduction of real-world phenomena to discrete components results in some loss of connection to the original phenomena of interest. He proposed that the field of educational psychology would be well served by research paradigms focused on investigations of "composites." Such composites could be at the situational level and encompass individuals in particular activity settings within particular social contexts (e.g., situated learning research). Or they could be at the individual level and encompass particular cognitive, motivational, and behavioral components (e.g., self-regulated learning research). Whereas progress has been made in researching composites, we still lack a composite that represents what it means for learning to enrich and expand everyday experience. We do have concepts like "meaningful" or "authentic" learning, but such constructs are vague and do not specifically target the *consequences of school learning on everyday experience*. In addition, we have constructs that represent discrete components of this phenomenon, including the constructs of transfer, conceptual change, task value, and individual interest. I propose transformative experience as a composite at the individual level that integrates these discrete components and represents the phenomenon of school learning transforming everyday experience.

Correspondence should be addressed to Kevin J. Pugh, School of Psychological Sciences, University of Northern Colorado, 63 McKee Hall, Greeley, CO 80639. E-mail: kevin.pugh@unco.edu

In this article, I define and illustrate the construct of transformative experience.[1] Further, I show how it has practical value as a measurable construct that uniquely focuses on the consequences of learning on everyday experience. Finally, I review the research on transformative experience including such issues as the development of a measure of transformative experience, individual factors related to transformative experience, the development of instruction to foster transformative experiences, and the relation between transformative experience and learning. But first I provide a philosophical grounding and rationale for the construct.

WHY PHILOSOPHY STILL MATTERS

In a special issue of *Educational Psychologist* titled "Rediscovering the Philosophical Roots of Educational Psychology," Alexander (2003) bluntly stated, "Educational psychology has, in many ways, lost its ties to philosophy" (p. 130). Unless you are one of the dwindling number of educational philosophers, you may be wondering why this matters. What does philosophy have to offer modern educational psychology, anyway? I propose that it has much to offer, not the least of which is that philosophy provides an overarching perspective for charting the direction or evaluating the worth of a particular enterprise. Take the story of Bhutan as an example. Jigme Singye Wangchuck was once the king of this small Himalayan country. Inspired by Buddhist philosophy, King Wangchuck radically reconceptualized the idea of national well-being. Instead of adopting gross domestic product as the primary indicator, as other nations do, he developed the construct of gross national happiness (GNH) as a holistic and nonmaterialist alternative. When I first heard about this idea, I must admit I thought it was a bit bizarre and even naive. How do you measure GNH? What do you do with it? Is Bhutan any happier than other countries (turns out it is; see Weiner, 2008)? But upon reflection, the idea became intriguing. Doesn't our own constitution list "pursuit of happiness" rather than "pursuit of wealth" as an unalienable right? Do we obsess over gross domestic product just because it's more concrete and measurable than happiness? Have we lost sight of what matters most?

Would King Wangchuck have thought up the idea of GNH without the influence of Buddhist (or some other) philosophy? It is certainly possible, but I think unlikely. It is so hard for us to reconceptualize an existing situation that a tool is needed to help us along. Philosophies often function as tools for stepping back from immediate situations and seeing larger purposes. In doing so, they become catalysts for new ideas and fresh perspectives.

One of my concerns with the field of educational psychology is that we get so caught up in the details of how learning works that we lose sight of the larger purpose, that is, we fail to consider how learning contributes to and expands the quality of life. For instance, we critique, debate, and microanalyze the process of conceptual change (e.g., diSessa, 2008; Dole & Sinatra, 1998; Pintrich, Marx, & Boyle, 1993), but how often do we consider its experiential consequences? How often do we investigate its potential to enrich and expand everyday experience? If this sounds like a Deweyan perspective, it is. The very fact that I am making this argument is a result of how my thinking and perception have been shaped by Dewey's pragmatist philosophy.

One of the things I find remarkable about Dewey's work is that, despite its depth and breadth, it all comes back to a simple, central principle: Life is about having rich, meaningful experiences and expanding our future capacity for rich, meaningful experience. This unerring focus on meaningful experience as a life goal could provide educational psychologists with a holistic perspective for conceptualizing educational well-being in a similar way that GNH provides Bhutanese leaders with a holistic perspective for conceptualizing national well-being. A good place to start in developing this holistic perspective is Dewey's writings on the nature of aesthetic experience. As Murphy (2003) elegantly put it,

> Dewey (1934) had a deep and meaningful understanding of the aesthetic appreciation of life, schooling, and learning. Indeed, Dewey called on the community and schools to gain an appreciation of the everyday beauty in life—the idea that individuals are surrounded by art in their everyday lives. It seems that research and practice could be reconsidered through this same aesthetic lens. (p. 144)

I agree, and in this article I present my own view of what research looks like when reconsidered through the lens of Dewey's aesthetics. Specifically, I present transformative experience as a modern research construct that captures an essence of Dewey's aesthetics and philosophy of education. I use the term "an essence" deliberately to indicate that it captures one vital aspect but certainly not the full essence of Dewey's aesthetics and philosophy of education, because no single construct could possibly do this. In the sections that follow, I discuss the aspects of Dewey's work that gave rise to the concept of a transformative experience and how transformative experience has been defined and conceptualized. In doing so I provide illustrations of transformative experience and clarify how the construct is similar to and different from related constructs such as transfer, conceptual change, and task value. Further, I show how transformative experience provides a unifying framework, or composite (Salomon, 1995), that integrates such constructs and connects them to the Deweyan focus on enriching and expanding everyday experience.

[1] Prior work has provided initial conceptualizations of transformative experience (see Pugh, 2002, 2004; Pugh, Linnenbrink-Garcia, Koskey, Stewart, & Manzey, 2010a). This article synthesizes prior work and provides a more extensive philosophical grounding and theoretical analysis of the construct.

THE RELATIONSHIP BETWEEN EXPERIENCE AND LEARNING

Before presenting my conceptualization of transformative experience, I provide a broader theoretical framing by discussing the relationship between experience and learning. This relationship is foundational to the major learning theories. However, most of the work focuses on *the impact of experience on learning* and has much less to say about *the impact of learning on experience.* Dewey's work provides an exception.

Overall, Dewey held the pragmatist view that the worth of something is determined by its impact on everyday, lived experience. Hence, Dewey (1958) argued that value of any philosophy could be determined by posing the question, "Does it end in conclusions which, when they are referred back to ordinary life-experiences and their predicaments, render them more significant, more luminous to us, and make our dealings with them more fruitful?" (p. 7). Further, he was concerned that formal philosophy was separated from ordinary people and everyday, lived experience, thus rendering it insignificant (Boisvert, 1998). Likewise, Dewey (1934/1980) believed that the significance of art was found in its impact on everyday experience: "[Art] quickens us from the slackness of routine and enables us to forget ourselves by finding ourselves in the delight of experiencing the world about us in its varied qualities and forms" (p. 104). As with formal philosophy, Dewey was concerned that formal art was separated from everyday experience and thus its potential to quicken us and illuminate the deep reality of ordinary experience was not being realized. He stated that when art becomes solely the domain of the museum, theater, or concert hall and attains "classic status," it

> somehow becomes isolated from the human conditions under which it was brought into being and from the human consequences it engenders in actual life experience. . . . Art is remitted to a separate realm, where it is cut off from that association with the materials and aims of every other form of human effort, undergoing, and achievement. (1934/1980, p. 3)

These same views about philosophy and art apply to education. Dewey believed that the power and significance of education lay in its impact on everyday, lived experience. Moreover, he was greatly concerned that formal education was disconnected from everyday experience. In traditional education, the curriculum had become an end unto itself with little thought for its experiential consequences (Dewey, 1902/1990). To address this problem, Dewey (1938) proposed a theory of experience acknowledging the "organic connection between personal experience and education" (p. 25), a theory that conceptualized experience as both a means and goal of education.

Dewey emphasized that the student's experience provides a basis for future learning and imbues it with meaning. This notion is central to nearly all learning theories. For instance, constructivist (e.g., Piaget, 1964; Smith, diSessa, & Roschelle, 1993) and conceptual change (e.g., Posner, Strike, Hewson, & Getzog, 1982) theories describe particular ways in which learning is dependent upon ideas constructed through prior experience. Likewise, research utilizing social and cultural frameworks describes specific ways in which learning is dependent upon students' experience in cultural activities such as language use (e.g., Heath, 1983).

Dewey uniquely stressed that the relationship between experience and learning is reciprocal—or at least should be. Just as experience is a means for enriching and expanding learning, so learning is a means for enriching and expanding experience. Thus, instead of being a theory that primarily looks backward at the role of experience, that is, a theory of how we can reach back to prior experience in order to build understanding, Dewey's theory is also forward looking. It considers how the understandings we build can reach forward into future experience: "The central problem of an education based upon experience is to select the kind of present experiences that live fruitfully and creatively in subsequent experiences" (Dewey, 1938, pp. 27–28). Further, he identified two ways in which learning has the potential to transform, enrich, and expand experience: (a) by developing general attitudes and capacities and (b) by connecting the subject matter to students' everyday experience. Current research constructs such as lifelong learning, self-regulation, and critical thinking are representative of the general attitudes and capacities that Dewey had in mind. Each of these expands the potential for future learning, action, and meaning making and contribute to what Dewey (1938) termed *general growth,* that is, an expansion of the potential for future rich experience. In addition to developing general attitudes and capacities, he believed education should impact experience through the subject matter itself. Dewey (1902/1990) stated that the teacher

> is concerned with the subject-matter of science as representing a given stage and phase of the development of experience. His problem is that of inducing a vital and personal experiencing. Hence, what concerns him, as teacher, is the ways in which that subject may become a part of experience. (p. 201)

As Dewey makes clear in this statement, learning subject matter is not an end unto itself or solely a means for supporting a far distant experience (e.g., work experience). Instead the subject matter needs to play an active role in vitalizing and transforming immediate, everyday experience. The construct of transformative experience is an attempt to define and ultimately operationalize what it means for subject matter to vitalize and transform immediate, everyday experience. Two other Deweyan constructs help accomplish this purpose.

"An" Experience and Ideas

In addition to emphasizing experience as a goal of education, Dewey developed constructs that can help us conceptualize what it means for learning to enrich and expand experience. These include the construct of *"an" experience* from his aesthetics (Dewey, 1934/1980) and the construct of an *idea* from his general philosophy of education, particularly his writings on reflective thinking (Dewey, 1933). The first construct illustrates what it means for experience to be particularly meaningful and transformative. The second provides insight into the role that the learning of subject matter may play in such experience.

"An" experience. It can be argued that Dewey became involved in the arts as much to understand experience as to understand art. In particular, he felt that the arts epitomized a special kind of experience—what he referred to as *an* experience. As opposed to ordinary experience, *an* experience is characterized by such qualities as meaning, purpose, unity, anticipation, and consummation. That is, like a drama, *an* experience has a unifying movement that marks it as unique and builds toward a final completion or consummation. Dewey (1934/1980) explained,

> In contrast with such [ordinary] experience, we have *an* experience when the material experienced runs its course to fulfillment. Then and then only is it integrated within and demarcated in the general stream of experience from other experience. . . . [The experience] is so rounded out that its close is a consummation and not a cessation. (p. 35)

In addition to this consummatory quality, an experience has a transformative quality, as explained by Jackson (1998):

> Our interactions with art objects epitomize what it means to undergo *an* experience, a term with a very special meaning for Dewey. The arts do more than provide us with fleeting moments of elation and delight. They expand our horizons. They contribute meaning and value to future experience. They modify our ways of perceiving the world, thus leaving us and the world itself irrevocably changed. (p. 33)

As the quote suggests, *an* experience is transformative in terms of both perception and value. With respect to perception, Dewey felt that the arts were particularly effective at allowing us to more fully perceive the world. Objects, events, issues, or people in the world that have become commonplace or overlooked are perceived in a new light and at a deeper level. For example, after seeing a production of *Les Misérables*, an individual may come to perceive everyday concepts such as loyalty, redemption, and justice from a new perspective. Likewise, after viewing an Impressionism exhibit, an individual may start to look at the world in terms of impressions of light or may start to see light and color in areas of shadow. Moreover, Dewey believed the expansion of perception resulting from successful encounters with art objects was generative. Jackson (1998) explained,

> The centrality of perception in Dewey's theorizing about the arts, and about experience in general, can hardly be overemphasized. Not only must we perceive art objects in order to appreciate their worth, but doing so is at least one means by which we come to better perceive other objects and events, including ourselves and others. (p. 113)

Hence, *an* experience is transformative in that it involves an expansion of one's perception of the world. This expansion of perception is accompanied by a related expansion of value. Individuals attach new significance and meaning to those aspects of the world more fully perceived. They appreciate them more, care about them more, and have more of an emotional (positive or negative) attachment to them. As Eisner (1991) explained in his description of connoisseurship, we develop a greater appreciation for an object as we perceive its successive layers.

In summary, *an* experience is fundamentally transformative in that it changes one's relationship with the world. Through an expansion of perception and value, the individual comes to interact with and be in the world differently.

Ideas. Dewey (1934/1980) described *an* experience in relation to the arts, because he felt that successful participation in the arts epitomized such experience. However, he acknowledged that intellectual endeavors could also engage individuals in the same aesthetic and transformative qualities (p. 55). Unfortunately, he did not explicitly describe the relationship between education and the undergoing of *an* experience (perhaps because he wrote *Art as Experience* late in his career). Nevertheless, the construct seems to be inherent in some of Dewey's educational writings, particularly in his construct of an idea.[2] Indeed, Dewey may have turned to the arts to further conceptualize the transformative qualities inherent in the experience of having an idea.

In contrast to concepts, which are established, accepted meanings, Dewey (1933) defined ideas as possibilities:

> There is a time during our investigation when meaning is only suggested; when we hold it in suspense as a possibility rather than accept it as an actuality. Then the meaning is an *idea*. An idea thus stands midway between assured understanding and mental confusion and bafflement. While meaning is *conditionally* accepted, accepted for use and trial, it is an idea, a supposal. (p. 132)

Because ideas are possibilities, they generate anticipation about the consequences of the idea. Each idea, according to

[2]The construct of an *idea* is found throughout Dewey's (1933) work but most prominently in his description of reflective thinking in the revised version of *How We Think* (Dewey, 1933). Dewey drew on Peirce's concept of abduction in developing the construct (Prawat, 1999a).

Dewey (1933), "is anticipatory of some possible future experience" (p. 117). This means that an idea suggests some courses of action and directions of inquiry, and there is anticipation (e.g., hope, excitement, curiosity) about what will occur, what will be understood, what will be seen, and what will be discovered. This anticipation then initiates action—a trying out of the idea—and it is through this anticipation and action that the idea moves out of the head and interacts with the world (Prawat, 1999b). Dewey (1933) commented, "The idea after it is formed is tested by acting upon it, overtly if possible, otherwise in imagination. The consequences of this action confirm, modify, or refute the idea" (pp. 104–105).

As may be expected, this testing focuses on the degree to which the idea has an impact on the everyday experience of individuals and communities: "Ideas are worthless except as they pass into actions which rearrange and reconstruct in some way, be it little or large, the world in which we live" (Dewey, 1929/1988, p. 111). Commenting on Dewey, Prawat (1998) added,

> Judgments about the worth of an idea are based on what the idea does for the individual, the extent to which it opens up new experiences for a person as he or she interacts with objects and events in the environment. (p. 204)[3]

Worthwhile ideas are ones that reconstruct the world we live in and open up new experiences for individuals and communities. One way in which they may do this is by expanding perception and value in a similar way that art does. Indeed, it may be that successful art encounters epitomize *an* experience precisely because art is especially proficient at conveying powerful ideas.

Moreover, the experience of engaging in an idea involves the same buildup and consummation of anticipation that is common to *an* experience. Anticipation is the force that moves the experience of having an idea forward and establishes a unity between different phases of the experience. One anticipates what will be revealed, appreciated, understood, explained, or experienced by putting the idea into action. That is, an expansion of perception and value is anticipated and savored. When the idea does provide a meaningful, new way of seeing the world, when it does illuminate some object, event, or issue, when it does create an expansion of perception and value, then the anticipation comes to a fulfillment and the experience reaches a consummation.

In summary, art was important to Dewey because he believed that successful encounters with art epitomized *an* experience—a special kind of experience characterized by consummation and transformation. But art is not the sole realm of *an* experience. The curriculum also has the potential to expand perception and value, and bring about consummatory experiences when the subject matter is engaged with as a set of ideas.

[3]According to Prawat (1998), Dewey proposed that the responsibility for testing the validity of ideas lies with the individual. However, the social context is vital to the authoring of ideas, situating them in the context of other ideas, and constituting the nature of experience itself (see also, Prawat, 1999a).

DEFINING TRANSFORMATIVE EXPERIENCE AS A RESEARCH CONSTRUCT

The Deweyan ideas just summarized provide a rich, complex, and holistic conception of meaningful experience and the role that learning can play in such experience. It is erroneous to assume that these ideas could ever be reduced to a single research construct without some loss of meaning. However, to go to the other extreme and assume that any reduction would necessarily result in total loss of meaning would be equally "hasty and dogmatic" (Bredo, 2009, p. 444). Consequently, I believe it is possible to define a research construct that is precise enough for conducting sound empirical research but holistic enough to reflect an essence of Dewey's original ideas. I propose that the construct of transformative experience is the right "grain size" for accomplishing this purpose in that it is precise enough for the development of a measure (see the Conceptualizing and Measuring Transformative Experience section) but still representative of a composite (Salomon, 1995) targeting the phenomenon of school learning transforming everyday experience.

In this section, I provide a definition of transformative experience and explicate the connection between this definition and Dewey's ideas. Further, I relate transformative experience to current research constructs such as transfer, conceptual change, task value, and individual interest. These constructs capture particular aspects of what it means for school learning to enrich and transform everyday experience. Finally, I use case studies to more fully illustrate what it means to undergo a transformative experience, how the construct provides a holistic integration of the aforementioned constructs, and the practical value of conceptualizing learning in this holistic manner.

I define a transformative experience as a learning episode in which a student acts on the subject matter by using it in everyday experience to more fully perceive some aspect of the world and finds meaning in doing so. This definition highlights three characteristics that I find important to the Deweyan theory of experience described previously: (a) acting on an idea (i.e., engaging with concepts as *ideas*), (b) experiencing an expansion of perception, and (c) developing a value for the content and the experience it affords. These characteristics constitute a definitional framework for conceptualizing transformative experience and its relation to other research constructs. My definition focuses particularly on the transformative qualities of Dewey's conception of aesthetic experience and ideas. That is, it focuses on the consequences that aesthetic experience and engagement with ideas have on subsequent experience.

The research on engagement provides a context for understanding the three characteristics of a transformative

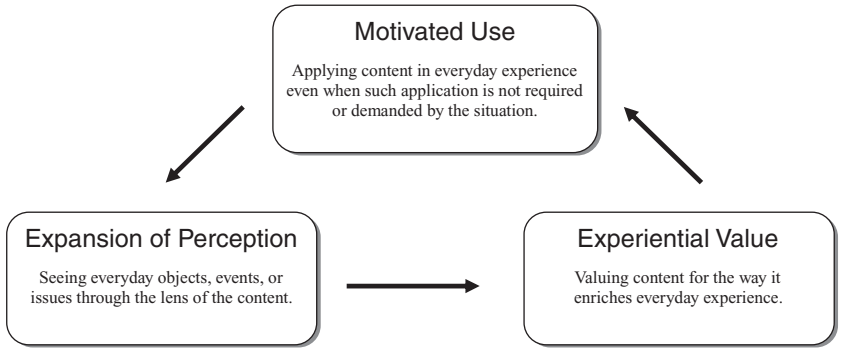

FIGURE 1 Three characteristics of transformative experience.

experience. Engagement generally refers to the intensity and emotional quality of students' involvement (Connell, 1990) and is a holistic construct having behavioral (e.g., on-task behavior, persistence), cognitive (e.g., use of deep-level learning strategies), and affective (e.g., interest, curiosity) components (Fredricks, Blumenfeld, & Paris, 2004). Transformative experience represents a form of engagement, with the three characteristics defined previously (acting on an idea, expansion of perception, and value development) roughly reflecting the behavioral, cognitive, and affective dimensions, respectively (see Figure 1). Moreover, transformative experience significantly expands the construct of engagement to include engagement with content in everyday experience. Finally, whereas transformative experience can be conceptually analyzed in terms of these three characteristics, such characteristics need to be understood as constituting a unified event in which the characteristics are interrelated.

Motivated Use

Students who undergo transformative experiences act on ideas by trying them out in everyday experience. I refer to this type of engagement as *motivated use* of school content. Specifically, motivated use involves the application of school content in contexts (particularly out-of-school contexts) where application is not required. For example, using the concept of evolution to think about the animals one sees on a weekend trip to the zoo is motivated use. Using the concept of evolution to answer a test question on evolution or complete a school assignment on evolution is not motivated use. When students engage in motivated use, they are engaging with the content as an *idea*, that is, a possibility that needs to be acted upon and experienced in everyday life. Motivated use corresponds roughly to the behavioral dimension of engagement as it emphasizes the action component of a transformative experience, however, such action is not limited to overt behavior making the correspondence imperfect.

Motivated use is a special case of transfer. Transfer is typically defined as the application of learning to a novel task or in a novel context (Marini & Genereux, 1995). Moreover, in most transfer situations studied by researchers, subjects are presented with a problem that requires the application of prior learning, and the question is whether they will recognize the relevance of the prior learning to the problem and be able to accurately draw on that learning to solve the problem. However, there are many situations, such as the weekend visit to the zoo, where the application of prior learning is possible but is not required. Pugh and Bergin (2005; see also 2006) referred to such situations as *free-choice* transfer situations. Similarly, Engle (2006) argued from a situative perspective that transfer often requires an act of agency, "transfer involves not just knowing but doing, and that doing inherently involves an exercise of human agency. Thus, if transfer is going to happen, I argue, it is necessary that learners choose to use what they have learned" (p. 455). Motivated use is defined as exercising the choice to apply learning in a free-choice transfer situation.

The choice to transfer learning may result from an intentional goal or it may be a spontaneous reaction to the environment.[4] As an example of the former, McKinley may be so interested in evolution that she goes to the zoo with the deliberate goal of seeing and understanding the animals in terms of their evolutionary history. Alternatively, she may visit the zoo without such a goal. However, when she sees a penguin exhibit, the idea of evolution suddenly jumps into her mind and she starts asking herself questions such as, "What bird did they evolve from? How did it happen? Why are they black and white? How is that an adaptive characteristic?" This application event becomes more intentional as it develops. However, it starts out as a more spontaneous reaction to the environment. The intentional goal example more clearly fits with Dewey's model of an idea generating anticipation that leads to action. However, even in spontaneous events, anticipation plays a role in moving the experience forward once the idea is triggered.

Maehr's (1976) construct of *continuing motivation* represents another form of motivated use. Continuing motivation is

[4]This intentional transfer parallels intentional conceptual change (see Sinatra & Pintrich, 2003). The spontaneous transfer process is representative of *forward-reaching transfer* (see Salomon & Perkins, 1989).

> the tendency to return to and continue working on tasks away from the instructional context in which they were initially confronted. This return is presumably occasioned by a continuing interest in the task and *not* by external pressure of some kind. (p. 443)

Thus, McKinley may choose, on her own, to learn more about evolution by reading about it on Wikipedia. Such action represents another way of trying out an idea—one that focuses on understanding the idea and how it can be used to explain the world.

Expansion of Perception

Expansion of perception corresponds to the cognitive dimension of engagement. Expansion of perception occurs when a person uses an idea to see some aspect of the world (e.g., an event, object, person, issue) in a new way. Expansion of perception is the potential result of motivated use. An example comes from a study of students learning about adaptation and evolution in a high school biology class (Pugh, 2002). After the unit, one student reported applying the ideas of adaptation and evolution many times in his everyday life (motivated use) and provided an account of expansion of perception:

> I now don't just look at [an] animal and say, "That's cute." I stop and think a little harder. . . . I wonder if they are closely related to me as a human. I also think about their markings and how it helps them. . . . [The concept of adaptation] made me look past the animal and made me try to understand more about it. (p. 1128)

As another example, a student of Walter Lewin (an exemplary physics professor) commented, "I walk with a new spring in my step and I look at life through physics-colored eyes." Another stated, "He made me SEE . . . and it has changed my life for the better!!" (Rimer, 2007, p. 1).

The issue of perception is a mainstream topic in educational psychology. For instance, Piaget's (1969, 1970) work on schemes and the related work on schema theory (Anderson, 1984; Bransford, 1979) and conceptual change (e.g., Posner et al., 1982) address the issue of perception, generally defined. Schemes, schemas, and conceptions are mental constructs that influence how we perceive information and make sense of a situation. Current research provides a wealth of information about the processes involved in developing and fostering such constructs. Transformative experience contributes to this research by placing the topic of perception in the context of motivated use and experiential value (see next). That is, the construct of transformative experience focuses attention on whether such processes as schema development and conceptual change have a meaningful, transformative effect on students' everyday experience. These processes are now considered in light of their potential to enrich and expand everyday experience, rather than being studied as ends unto themselves. This focus on connecting perception with action parallels some of the theorizing by Greeno and colleagues (Greeno, 2006; Greeno, Smith, & Moore, 1993) about the role of perception (i.e., attunement to affordances) in transfer.

Experiential Value

Experiential value refers to the valuing of content for the experience it provides. Specifically, it involves attachment of additional meaning to those aspects of the world more fully perceived and to the concepts that brought about the expansion of perception. It corresponds to the affective dimension of engagement.

For example, another student in the biology class just mentioned commented, "Before we learned about adaptations and evolution of species, I really didn't know much about animals. Now that I know this, I find it more interesting to learn about animals" (Pugh, 2002, p. 1120–1122). This student developed a deeper value for an aspect of the world (animals) that was illuminated by an idea (the possibility of seeing the world in terms of adaptation and evolution).

Experiential value represents a unique intersection of *intrinsic value* and *utility value* (Wigfield & Eccles, 1992). Intrinsic value refers to a subjective sense of enjoyment, fulfillment, or interest associated with engagement in a task. Utility value refers to the perceived usefulness of the task in terms of one's future goals (e.g., career, getting into college) or immediate life experience. Experiential value encompasses aspects of each construct. Specifically, intrinsic value associated with applying content in everyday experience is representative of experiential value. Likewise, utility value centered on the usefulness of content in immediate, everyday experience is representative of experiential value. Other forms of intrinsic and utility value would not be representative of experiential value. Thus a student who enjoys watching a science demonstration but does not develop an interest in the actual content or value applying it in everyday experience would not exemplify experiential value. Likewise, a student who values the content because it is perceived as useful for getting into college but does not find applying the content in current, everyday experience to be interesting or useful would not be displaying experiential value.

Similarly, there is an overlap between experiential value and *individual interest*, commonly defined as a relatively stable and enduring attraction to, value of, and liking of a particular domain (Hidi & Renninger, 2006; Krapp, 2002; Schiefele, 2001). Individual interest includes a feeling component (i.e., a sense that a domain is enjoyable) and a value component (i.e., a sense that a domain is personally useful and central to the self). These components parallel the constructs of intrinsic value and utility value, respectively. As previously explained, experiential value has similar feeling and value components; however, the construct focuses more selectively on feeling and value associated with *application of content in everyday experience*. For example, displaying interest in content outside of school is more representative of experiential value than displaying interest solely in the

classroom. Both task-value and individual interest may involve immediate, everyday experience (see Barron, 2006, for an example); however this is not the exclusive focus of these constructs.

An Integrative Construct

It is important to keep in mind that the three dimensions of transformative experience are interrelated. A review of case studies presented in research by Girod and Wong (2002) and Pugh (2004) may help illustrate the integrative nature of a transformative experience and clarify how it is a composite (Salomon, 1995), which encompasses aspects of transfer, conceptual change, and task value but cannot be reduced to any one of these constructs.

Girod and Wong (2002) presented case studies of two fourth-grade students (Brieana and James) learning how to tell rock stories, that is, they were learning to tell the history of rocks by examining features like crystal size and patterns of erosion. Learning about rocks was more than just a classroom experience for Brieana. Outside of school, she created her own "rock book" (this was not a class assignment) and explained in an interview,

> I think about rocks differently than I did before. Now when I don't have anything to do, I look at a rock and try to tell its story. I think about where it came from, where it formed, where it's been, what its name is. (p. 211).

She later commented, "I used to skip rocks down at the lake but now I can't bear to throw away all those stories!" (p. 212). Rocks were no longer dull and ordinary. They had taken on new meaning and beauty as their secrets were revealed.

In contrast, learning about rocks was not transformative or moving for James. He explained,

> Thinking about rock stories is interesting but I don't really think about rocks differently than I did before. . . . I used to look for good rocks to skip but that's about it. . . . Now, I can say what kind of rock it is and even tell my parents about it if they want but mostly I just skip them. (p. 214)

Although James was successful in traditional ways (he attained one of the highest scores on the end-of-unit test), his learning failed to make much difference in his everyday life.

Pugh (2004) presented similar case studies of two seventh-grade students (Ed and Sarah) learning physics. Ed, like Brieana, illustrated engagement representative of a transformative experience. He made the content part of his everyday experience as he came to perceive events of motion through the lens of Newton's Laws. Commenting on seeing his young niece run across the recently mopped kitchen floor in her socks, Ed explained, "[The event] made me think of inertia because she's running and running and running and she tries to stop and she just keeps going until the door, until the door acts on her" (p. 189). Ed reported a number of similar examples ranging from analyzing a car ride with his grandma in terms of inertia to thinking about events of a movie in terms of force pairs. In the end, Ed not only took more interest in ordinary events (such as a car ride) but also developed an intrinsic value for Newton's Laws: "I think they're kind of fascinating. . . . [They] made me think about things I hadn't thought about before. . . Made me think about stuff that I'm not used to thinking about in that way" (p. 187). He commented that learning Newton's Laws was worthwhile,

> Not just because I want to get a passing grade and go into eighth, but because it's telling me that I can look at, like, when two cars crash into each other, I can look at that in a different way, and when I watch a movie I can look at that in a different way. Now I'm going to see things that I'm used to seeing in a different way. [I: Has this happened for you?] Yeah, it really has. (p. 189)

On the other hand, Sarah displayed engagement similar to James's. Like James, she was a good student who learned the content and even found the class activities to be exciting. However, this learning did not carry over to her everyday experience. She explained that she never really applied Newton's Laws in her life and, when asked if she cared about the content taught, she replied, "Not really. It's not like a big thing, Newton's laws. It's not so much that it was boring, because it wasn't. It was actually kind of exciting [the class], but it's just that I don't sit there and think about it" (p. 187).

Rather than illustrating differences in learning per se, the aforementioned case studies illustrate differences in engagement with one's learning. All four students demonstrated knowledge of the content and, although conceptual change was not assessed in these studies, we can infer they experienced some change in conceptions of rock formation or events of motion. However, Brieana and Ed actively applied their new conceptions in their everyday lives and used them to perceive aspects of the world (rocks, events of motion) in a new way, thus displaying the qualities of motivated use and expansion of perception, respectively. On the other hand, James and Sarah applied their new conceptions only in class or when working on class assignments. On most measures of conceptual change (e.g., a pre- and postinterview probing the nature of the students' conceptions of the topic), it is likely that differences between these students would not be noted. It is only when we look at the transformative nature of their learning that the differences become apparent.[5]

Brieana and Ed also displayed an interest and task value that is particular and different from that displayed by James and Sarah. James expressed some content interest, and Sarah

[5]Genuine conceptual change is typically viewed as involving a universal change in perception. For example, if a student has an impetus theory of motion and genuinely transforms this theory into a theory based on Newton's Laws, we would expect this student to use the new theory whenever she explains the motion of an object. However, as the case of Sarah illustrates, she may not care about explaining the motion of objects at all. Consequently, her perception of events of motion in everyday experience may remain unchanged even though her theory of motion did change.

experienced interest in the class activities (i.e., situational interest). However, neither placed value on the potential of the content to expand their everyday perception and experience, that is, neither expressed experiential value. In contrast, Ed explicitly conveyed value for how the content allowed him to perceive events differently in his everyday experience, and Brieana displayed interest in a part of her everyday world (i.e., rocks) that was brought to life by certain content ideas.

Finally, the transformative experiences of Brieana and Ed represent wholes whose meaning is partially lost when the experiences are analyzed in terms of single components such as action, perception, or value. For example, solely describing Ed's experience in terms of individual interest in Newton's Laws or intrinsic task value misses an important part of his experience—the way in which he applied Newton's Laws in his life. Likewise, solely describing his experience in terms of such application or a change in perception, as may be done in a transfer or conceptual change study, neglects the important motivational component to the experience. I am not suggesting that researching individual components such as transfer, conceptual change, and task value is any less valuable. Rather, I am proposing that the construct of transformative experience provides a means for integrating these components into a complex that more accurately represents what it means for learning to enrich and expand everyday experience.

Studying educational experience in this holistic way has practical value for a few reasons. First, it brings attention to an underappreciated outcome—that of enriching and expanding everyday experience. Greater attention has been focused on outcomes that more purely reflect the instrumental value of education (i.e., how learning leads to employment, productivity, citizenship, etc.) or the value of learning for its own sake. Less attention has been focused on how learning transforms experience in a meaningful way and how life becomes richer as a result of school learning. Second, this holistic approach has the potential to unite different lines of research on transfer, conceptual change, and motivation. Bringing such research together yields a more comprehensive picture of the learning experience and provides an opportunity for synthesizing knowledge across research communities. Third, the holistic approach simplifies the cognitive load on teachers by providing a framework for considering action, cognition, and value jointly.

EXISTING RESEARCH AND FUTURE DIRECTIONS

As transformative experience is a newly proposed construct, the empirical research base is still in the developmental stage. Nevertheless, distinct lines of research on transformative experience have emerged. These lines include research focused on (a) conceptualizing and measuring transformative experience, (b) identifying individual factors related to engagement in transformative experience, (c) developing instructional methods effective at fostering transformative experience, and (d) investigating the relationship between transformative experience and learning. Next I review these lines of research and identify fruitful areas of future research.

Conceptualizing and Measuring Transformative Experience

Theoretical analysis (Wong, Pugh, & The Deweyan Ideas Group at Michigan State University, 2001) and case study research (Girod & Wong, 2002; Pugh, 2004; see prior section) have been used to conceptualize transformative experience[6] and identify key characteristics. Recent work has focused on developing a measure of transformative experience. Such a measure is valuable because it makes possible a broader range of research on transformative experience. However, it must be acknowledged that operationalizing transformative experience in a quantitative measure necessarily involves some loss of meaning. To combat such loss, Pugh and colleagues (Koskey, Stewart, Pugh, & Linnenbrink-Garcia, 2008; Pugh et al., 2010a) developed a holistic measure and used Rasch analysis[7] (Rasch, 1960, 1980) to investigate the coherence of items. Specifically, they developed a survey measure to assess the degree to which high school biology students engaged in transformative experiences with the concepts of adaptation and natural selection. The survey was comprised of Likert scale items targeting the three defining characteristics of a transformative experience. For example, an item targeting motivated use was "I apply the stuff I've learned about adaptation and/or natural selection even when I don't have to." An item targeting expansion of perception was "I can't help but see animals and/or plants in terms of adaptation and/or natural selection now." An item targeting experiential value was "I find that the ideas of adaptation and/or natural selection make my current out-of-school experience more meaningful and interesting." A Rasch rating scale analysis and principal components analysis was then used to assess whether the items represented a single construct and fit the Rasch model. The results supported that the items fit the Rasch model and represented a unidimensional construct. Thus, a Rasch composite score could be calculated for each student. This composite score represents transformative experience as a whole and cannot be directly reduced to the three characteristics. Thus, the measure is more holistic than measures of related constructs such as individual interest. It is a measure at the level of the intersection of action, perception, and value. This

[6]Girod and colleagues (Girod, Rau, & Schepige, 2003; Girod & Wong, 2002) have used the term *aesthetic understanding* in place of transformative experience. However, the constructs are similar. For a discussion, see Pugh and Girod (2007).

[7]The Rasch Model is a psychometric model used to create measures. It is beneficial for research involving integrative constructs, because it has tools to test whether items function as a unified construct and, if so, provides composite scores representing levels of performance for this construct.

is one of the key characteristics that distinguishes research on transformative experience from other motivation research.

Results of the Rasch analysis further suggest that transformative experience may be conceptualized as an engagement continuum. Specifically, the Rasch ordering of items suggested a continuum ranging from engagement in the classroom (e.g., applying and being interested in the content when in class) to engagement outside the classroom (e.g., applying, noticing examples of, and being interested in the content outside of school) to an active and intentional form of out-of-school engagement (e.g., seeking out opportunities to apply, think about, and perceive examples of the content in everyday experience). Pugh et al. (2010a) explained,

> The qualities of motivated use, expansion of perception, and experiential value may first emerge as in-class forms of engagement. Students may initially apply learning, perceive the world through the lens of science ideas, and display interest when these actions are deliberately supported in the classroom. Over time, these in-school forms of engagement may develop into the out-of-school forms of engagement that typify a mature transformative experience and the kind of idealized purpose of education envisioned by Dewey (1938). (p. 5)

As mentioned previously, most engagement research focuses on in-school engagement or engagement in school-dictated activities (e.g., homework). Expanding the scope to include engagement in everyday experience is one of the contributions of the transformative experience research.

Future directions. Whereas the existing research has confirmed the validity of conceptualizing transformative experience as a single construct and expanded the conceptualization to encompass a continuum of engagement, further validation studies are needed. Specifically, the degree of accuracy with which the measure reflects the complex conception of transformative experience presented in this article is unknown. As mentioned previously, there is always some meaning lost in the operationalization of a construct. The question is whether there is enough meaning retained that the operationalization is still a useful approximation. A fruitful approach to answering this question would be to compare performance on the measure to responses given in interviews probing students' engagement with the content. Such research would help determine the accuracy with which the measure identifies transformative experiences and could also lead to further refinement of the measure.

Finally, research is also needed on the generalizability of the measure to other content domains and other contexts. One question that needs to be explored is whether topic-specific measures are necessary or whether a generic measure could be developed.

Individual Factors Related to Transformative Experience

An important step in understanding transformative experience is to investigate what makes someone more or less likely to engage in a transformative experience. One likely factor of significance is the individual's identity. Identity refers to the goals, values, and beliefs to which an individual commits (Waterman, 2004). It encompasses one's sense of "this is who I am" as well as one's possible selves or sense of "this is who I could become" (Markus & Nurius, 1986). It seems probable that students who identify with a particular subject matter domain will be more open to transformative experiences in that domain, because they are more likely to develop content-related interest and appreciation (Bergin, 1999; Brophy, 1999, 2008).

Existing research supports this supposition. In the case studies described previously, both Brieana and Ed displayed an identity inclusive of science. For example, Ed described himself as a "science person," and Brieana talked about her future self as a geologist: "I can imagine myself being a geologist. I have this backpack on and wearing this cool safari outfit with this cool hat, and then I pick up rocks, and I have a partner named Moe" (Girod & Wong, 2002, p. 212).

A recent study by Pugh et al. (2010a) further investigated the relationship between science identity and transformative experiences in the context of high school biology courses. In addition, they examined achievement goal orientation (Ames, 1992; Dweck & Leggett, 1988) as a potential predictor of transformative experience and mediator of the relationship between science identity and transformative experience. Specifically, they proposed that students endorsing a mastery orientation (i.e., a focus on developing competence) would be more likely to undergo transformative experiences than those endorsing a performance orientation due to the focus on learning. In addition, they proposed that a mastery goal orientation would mediate the relationship between science identity and transformative experience. In contrast, they proposed that students endorsing a performance orientation, either approach or avoidance (i.e., a focus on demonstrating competence or avoiding the demonstration of incompetence, respectively; Elliot, 1997), would be unlikely to undergo transformative experiences.

Using hierarchical multiple regression, they found that science identity was significantly related to transformative experience, controlling for prior knowledge. Moreover, they found that this relationship was mediated by mastery orientation according to the criteria established by Baron and Kenny (1986) for a mediational relationship. Specifically, the results suggested that students with a strong science identity were more likely to adopt a mastery goal orientation, and having a mastery goal orientation predicted engagement in transformative experiences. Both performance orientations were unrelated to engagement in transformative experiences.

In the aforementioned study, the amount of variance explained was moderate, suggesting that other factors are important in predicting whether individuals engage in transformative experiences. An intriguing area for exploration is Wong's (2007) conception of "the opposite of control." Wong argued that many psychological learning theories are grounding in enlightenment concepts of rationality and control. For instance, concepts such as self-regulation, self-determination, metacognition, and logico-mathematical reasoning reflect the emphasis placed on the ability to stand back from the self, engage in rational reflection, and exert control as defining characteristics of effective learners. Whereas these qualities are obviously important to learning, they do not necessarily explain aesthetic processes such as passion and transformation. Wong argued that we are intuitively aware of the importance of choice and control while also realizing their limitations:

> On the one hand, we grasp tightly to the belief that we have choice and control over things. The "ideal" relationship between person and world is often embodied in the constructivist vision of student-directed learning. In this view, students control their interaction with the environment and give meaning to what emerges. They are intentional and reflective throughout the whole experience. On the other hand, we are also aware that aesthetic experiences are not "willed" into existence. In fact, an excess of conscious control and self-awareness is more likely to obstruct rather than facilitate the having of transformative experiences. (p. 204)

Drawing on Dewey's aesthetics, Wong (2007) argued that transformative experience requires an act of suffering. Suffering, as Dewey used the term, refers to an act of "surrender" to the environment. That is, an act of opening oneself to being moved by the environment. Wong explained, "Both passion and suffering mean to experience intensely while being acted upon by the world. It is to let something happen to oneself and to bear the weight of its consequences" (p. 202). For example, I have a friend who is quite adept at being critical while movie watching. Unfortunately, he rarely is transformed by a movie because he is, from the very first scene, focused on finding its faults. Is the plot plausible? Are there logical errors in its sequence? Are the characters believable? Because his experience is so "preoccupied" with these thoughts, there is little space remaining for fully taking in the movie. Instead of being caught up *in* the movie, he is maintaining a deliberate distance *apart from* the movie. In contrast, descriptions of *flow* experiences (a type of deeply engaging experience related to transformative experience) documented by Csikszentmihalyi (1991) emphasize a union of self and activity. Csikszentmihalyi stated that one of the most universal and distinctive features of a flow experience is that "people become so involved in what they are doing that the activity becomes spontaneous, almost automatic; they stop being aware of themselves as separate from the actions they are performing" (p. 53). Such an experience also involves a suspension of reflections on the self. However this suspension is only momentary and is followed by reflections on a changed self. Csikszentmihalyi put it this way:

> In flow a person is challenged to do her best, and must constantly improve her skills. At the time, she doesn't have the opportunity to reflect on what this means in terms of the self—if she did allow herself to become self-conscious, the experience could not have been very deep. But afterward, when the activity is over and self-consciousness has a chance to resume, the self that the person reflects upon is not the same self that existed before the experience. (pp. 65–66)

Of note in the previous quote is that the element of transformation is associated with the phase of experience in which self-reflection is suspended and the self and activity are merged. Dewey would likely contest the point that reflection is ever fully suspended and would assert that learning requires one to step out from an immediate experience to a mediated one characterized by deliberate, contemplative thought. However, Dewey would likely agree in principle with Czikszentmihalyi in suggesting that a moving aesthetic experience is not possible from a removed, hypercritical, self-conscious perspective.

Thus suffering, or a willful surrender to the experience, may be an essential characteristic of transformative learning experiences in the classroom. To undergo transformative experiences, students may need to momentary suspend overactive self-reflection (e.g., Is this cool? Will I look like a nerd?) and critical evaluation (e.g., Is this going to be on the test? Is this idea valid?) long enough to allow themselves to become a part of a potentially engaging teaching episode. Wong (2007) explained,

> Dewey encourages us to reconsider the essential "goodness" of suffering, in its broadest sense. Without suffering—that is, without intense, honest interaction with the world—truly transformative learning is impossible. Without suffering, we cannot be moved and, therefore, cannot be overtaken in the experience passion. Our basic humanness depends on suffering of this kind and is diminished in its absence. (pp. 215–216)

Future directions. Future research is needed that further explores and unpacks the construct of "suffering" and its relation to transformative experience. The norms, expectations, power relations, and stereotypes that comprise the social context almost certainly play a central role in an individual's willingness to surrender to the experience of a particular situation. For example, if the gender stereotype "science is a male domain" is made salient in a classroom, we may expect female students to be less open to "suffering" themselves to be moved by powerful science ideas (although they may suffer plenty in the typical sense of that term). The issues of identity and goal orientation may also be related

to suffering. Students who identify with a particular domain (e.g., science) may be more likely to surrender to experiences in that domain. Likewise, a mastery orientation may be predictive of transformative experiences, because students adopting a mastery orientation are more focused on the actual learning than the type of performance-oriented, ego-involved self-reflection (e.g., How do I look? How am I doing compared to others? What will others think of me?) that can undermine surrendering to the experience.

Consequently, a fruitful line of research would be to investigate potential ways of operationalizing the construct of "surrender" and explore its value as an empirical construct, followed by investigations of the characteristics of the social environment related to surrender and investigations of the relations between surrender, identity, goal orientation, and transformative experience.

Fostering Transformative Experiences

Perhaps the most basic research question related to transformative experience is, How do we foster them? Initial studies in science classrooms have shown that transformative experiences can be fostered; however, far more research focused on developing models of teaching for transformative experience and understanding how teachers respond to such models is needed. Pugh (2002) conducted an intervention study with high school biology students during a unit on animal adaptation and natural selection. In the experimental condition, students received instruction based on principles of teaching for transformative experiences. An inquiry model was used in the comparison condition. A statistically significant difference between conditions was found with a greater percentage of students in the experimental condition displaying engagement in transformative experiences. Girod et al. (2003) conducted a similar intervention study in the context of teaching science to fourth-grade students. The comparison condition in this study involved the use of a discourse model (i.e., a model emphasizing engagement in scientific discourse with the content). Again a statistically significant difference was found, with students in the experimental condition reporting greater levels of engagement reflective of transformative experiences.

Based on these initial studies, Pugh and Girod (2007) proposed a set of general strategies for fostering transformative experiences. These strategies have since been developed into the Teaching for Transformative Experiences in Science (TTES) model (Pugh, Linnebrink-Garica, Koskey, Stewart, & Manzey, 2010b). A full account of this model is beyond the scope of this article. At a general level, the model focuses on crafting concepts into ideas (in the Deweyan sense of the term) through such strategies as creating idea-based anticipation, emphasizing the experiential value of the content, and teaching students to "re-see" the world through the lens of the content. It also focuses on creating a culture of transformative experience by modeling transformative engagement and scaffolding student experience.

Recent work has investigated the process of learning to teach for transformative experiences. A study by Pugh et al. (2010b) provided a case study and evaluation of a high school biology teacher's implementation of the TTES model in collaboration with a conceptual change model. Results from this study illustrated that the teacher was able to readily implement strategies consist with his existing attitudes and beliefs. However, the strategies were often implemented at a shallow level and were disconnected from his other pedagogical activities. Results on the effectiveness of the intervention at fostering transformative experiences were mixed. Similar results were found in a 2-year study involving a middle school earth science teacher (Pugh, Schmidt, Russell, & Heddy, 2010). During the 1st year, the participating teacher implemented the TTES model during a weather unit. Whereas the teacher was enthusiastic about the TTES model, the intervention strategies were often disconnected from his existing practice, resulting in minimal impact in terms of fostering transformative experiences. In the model of design-based research (Brown, 1992; Design-Based Research Collective, 2003; Kelly, Lesh, & Baek, 2008), results from the 1st year were used to revise the implementation by developing more concrete strategies for integrating the TTES model with existing practice. Results from the 2nd year indicated that students in the intervention condition displayed significantly higher levels of transformative experience.

Future directions. More intervention studies are needed evaluating the TTES model in different contexts and content domains. To date, the model has been investigated only in the domain of science and questions remain about its relevance to other domains. Additional design-based research studies are needed to further develop the TTES model, particularly as it applies to various contexts and content domains.

In addition, further studies comparing the TTES model to other instructional models are needed to identify the unique effects of the TTES model. It would be productive for such studies to include investigations of the effects of combining the TTES model with established models. For instance, Pugh et al. (2010b) found positive effects of combining the TTES model with a conceptual change model in terms of particular outcomes (see next), but more research is needed.

Relation Between Transformative Experience and Learning

Given that a transformative experience involves an active and continued engagement with particular content, it seems logical that students undergoing transformative experiences would develop deeper and more enduring understandings of that content. In support of this reasoning, Pugh et al. (2010a) found that higher levels of transformative experience

positively predicted change in conceptions of natural selection at both posttest and follow-up for high school biology students. However, they found no relationship between transformative experience and conceptual change with respect to the concept of inheritance and its role in evolution. In addition, they found that higher levels of transformative experience positively predicted transfer[8] success at the time of follow-up but not posttest.

Results from the intervention studies illustrate that teaching for transformative experiences has positive effects on learning. Girod, Twyman, and Wojcikiewicz (2010) found that fifth-grade students receiving instruction designed to foster transformative experiences displayed greater learning on posttest and follow-up measures of conceptual understanding than students not receiving the intervention instruction, with a greater effect occurring at the time of follow-up. Pugh (2002) found that high school biology students receiving similar instruction displayed greater learning on follow-up, but not posttest, measures of conceptual understanding compared to students receiving inquiry instruction. In addition, he found that students who underwent transformative experiences, in either the transformative experience or inquiry condition, achieved greater learning on the follow-up learning assessment. In another study involving high school biology students, Pugh et al. (2010b) compared the effects of implementing the TTES model in combination with a conceptual change model to the effects of implementing the conceptual change model alone. They found that adding the TTES model did not contribute to conceptual change beyond the conceptual change only model; however, it did foster significantly greater transfer at the time of follow-up (although the effect was not statistically significant for honors-level students). Moreover, they found that higher levels of engagement in transformative experience positively predicted enduring transfer success even control for transfer at the time of posttest.

The aforementioned results suggest that engagement in transformative experiences may be particularly beneficial for developing enduring learning. One explanation is that the process of trying out the new ideas in everyday experience as part of a transformative experiences allows students to practice knowledge application in multiple contexts, which is key to developing the type of flexible knowledge structures needed for transfer (Haskell, 2001; Spiro, Feltovich, Jacobson, & Coulson, 1992). In addition, this process is likely to help student integrate new ideas with existing everyday conceptions about the world. Such integration is important to enduring understanding (Georghiades, 2000).

Future directions. Research on transformative experience and learning could be used to inform theories of transfer and conceptual change. Transfer theorists have begun to acknowledge the role of agency in transfer (i.e., choice, motivation, or intention to transfer; Axtell, Maitlis, & Yearta, 1997; Engle, 2006). Agency is especially important to understanding the initiation of transfer efforts; however, scarce research has conceptualized forms of agency associated with transfer or empirically investigated the issue (Pugh & Bergin, 2006). Transformative experience provides one means of considering the role of agency. As explained earlier, the characteristic of motivated use represents active engagement in free-choice transfer situations and is characterized by anticipated action. Research is needed to further understand the role such anticipation plays in initiating transfer or choosing to continue a transfer event once an applicable idea is triggered. In addition, transformative experience potentially changes the way we think about fostering transfer. It shifts the focus from developing cognitive generalizations (Salomon & Perkins, 1989) to engaging students with compelling ideas. The former emphasizes developing cognitive structures needed for transfer. The latter emphasizes inspiring motivated action.

Modern conceptual change theories emphasize the role of affective and motivational factors in the conceptual change process (e.g., Dole & Sinatra, 1998; Murphy & Mason, 2006; Pintrich et al., 1993). Transformative experience represents a particular form of affective and motivational engagement that may be informative to the conceptual change process. As mentioned previously, some initial research links transformative experience to conceptual change and enduring understanding. However, the precise means by which engagement in transformative experiences may influence conceptual change is unknown. Pugh et al. (2010a) proposed that transformative experiences may support conceptual change because students experience the "fruitfulness" (see Posner et al., 1982) of a new conception when undergoing a transformative experience. They also proposed that transformative experiences could foster conceptual change by stimulating greater cognitive engagement. Addition research is needed that investigates these possibilities and explores additional means by which transformative experience may influence conceptual change.

CONCLUSION

In an interview, a science teacher who participated in a transformative experience intervention study explained that one of his students had taken interest in some fairy rings (a kind of fungus discussed in class) he had discovered in the woods. The teacher then commented, "That's what makes the teacher happy. . . . I love hearing those kinds of stories. . . . The more

[8] Specifically, a measure of task-based transfer (Pugh & Bergin, 2005) was used. Thus, the researchers investigated whether students who willfully applied learning in free-choice transfer contexts as part of a transformative experience would be more successful at applying such learning when required to do so by an assessment task. According to the Barnett and Ceci (2002) transfer taxonomy, the transfer items used represented far transfer in terms of the knowledge domain.

you can get the kids to do those kinds of thing, I think that's the goal of the science teacher" (Pugh et al., 2010b, p. 46). Getting students to do things with their learning in their everyday experience is likely a goal shared by many teachers. It is also a goal that was central to Dewey's philosophy of education and progressive education movements. But this goal has not been a focus of research for educational psychologists. True, considerable research has been dedicated to related constructs such as learning transfer and interest, but none of these constructs fully captures the holistic goal of enriching and expanding everyday experience. In this article, I have argued that the construct of transformative experience is the right grain size for representing this goal while still being precise enough for sound empirical research. By introducing this construct into our research activities, we can develop a more sophisticated knowledge of how to foster transformative learning and support teachers in achieving this goal.

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REFERENCES

Alexander, P. K. (2003). Coming home: Educational psychology's philosophical pilgrimage. *Educational Psychologist, 38,* 129–132.

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology, 84,* 261–271.

Anderson, R. (1984). Role of the reader's schema in comprehension, learning, and memory. In R. Anderson, J. Osborn, & R. Tierney (Eds.), *Learning to read in American schools: Basal readers and content texts* (pp. 243–257). Hillsdale, NJ: Erlbaum.

Axtell, C. M., Maitlis, S., & Yearta, S. K. (1997). Predicting immediate and longer-term transfer of training. *Personnel Review, 26,* 201–213.

Barnett, M. S., & Ceci, S. J. (2002). When and where do we apply what we learn? A taxonomy for far transfer. *Psychological Bulletin, 128,* 612–637.

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

Barron, B. (2006). Interest and self-sustained learning as catalysts of development: A learning ecology perspective. *Human Development, 49,* 193–224.

Bergin, D. A. (1999). Influences on classroom interest. *Educational Psychologist, 34,* 87–98.

Boisvert, R. D. (1998). *John Dewey: Rethinking our time*. Albany: State University of New York Press.

Bransford, J. (1979). *Human cognition: Learning, understanding, and remembering*. Belmont, CA: Wadsworth.

Bredo, E. (2009). Getting over the methodology wars. *Educational Researcher, 38,* 441–448.

Brophy, J. (1999). Toward a model of the value aspects of motivation in education: Developing appreciation for particular learning domains and activities. *Educational Psychologist, 34,* 75–85.

Brophy, J. (2008). Scaffolding appreciation for school learning: An update. In M. Maehr, S. Karabenick, & T. Urdan (Eds.), *Advances in motivation and achievement, Vol. 15: Social and psychological perspectives* (pp. 1–48). Bingley, UK: Emerald.

Brown, A. (1992). Design experiments: Theoretical and methodological challenges in creating complex interventions in classroom settings. *The Journal of the Learning Sciences, 2,* 141–178.

Connell, J. P. (1990). Context, self, and action: A motivational analysis of self-system processes across the life-span. In D. Cicchetti & M. Beeghly (Eds.), *The self in transition: From infancy to childhood* (pp. 61–97). Chicago, IL: University of Chicago Press.

Csikszentmihalyi, M. (1991). *Flow: The psychology of optimal experience.* New York: Harper Perennial.

Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher, 32*(1), 5–8.

Dewey, J. (1933). *How we think: A restatement of the relation of reflective thinking to the educative process*. Boston, MA: D. C. Heath and Co.

Dewey, J. (1938). *Experience and education*. New York: Macmillan.

Dewey, J. (1958). *Experience and nature*. New York: Dover.

Dewey, J. (1980). *Art as experience*. New York: Perigee. (Original work published 1934).

Dewey, J. (1988). The quest for certainty. In J. A. Boydston (Ed.), *John Dewey: The later works, 1925*–1953 (Vol. 4). Carbondale: Southern Illinois University Press. (Original work published 1929)

Dewey, J. (1990). *The school and society and the child and the curriculum*. Chicago, IL: University of Chicago Press. (Original work published 1902)

diSessa, A. A. (2008). A bird's eye view of the "pieces" vs. "coherence" controversy (from the "pieces" side of the fence). In S. Vosniadou (Ed.), *International handbook of research on conceptual change* (pp. 35–60). Abingdon, NY: Routledge.

Dole, J. A., & Sinatra, G. M. (1998). Reconceptualizing change in the cognitive construction of knowledge. *Educational Psychologist, 33,* 109–128.

Dweck, C., & Leggett, E. (1988). A social/cognitive approach to motivation and personality. *Psychological Review, 95,* 256–273.

Eisner, E. W. (1991). *The enlightened eye: Qualitative inquiry and the enhancement of educational practice*. New York: Macmillan.

Elliot, A. J. (1997). Integrating the "classic" and "contemporary" approaches to achievement motivation: A hierarchical model of approach and avoidance achievement motivation. In M. L. Maehr & P. R. Pintrich (Eds.), *Advances in motivation and achievement* (Vol. 10, pp. 143–179). Greenwich, CT: JAI Press.

Engle, R. A. (2006). Framing interations to foster generative learning: A situative explanation of transfer in a community of learners classroom. *The Journal of the Learning Sciences, 15,* 451–498.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74,* 59–109.

Georghiades, P. (2000). Beyond conceptual change learning in science education: Focusing on transfer, durability and metacognition. *Educational Research, 42,* 119–139.

Girod, M., Rau, C., & Schepige, A. (2003). Appreciating the beauty of science ideas: Teaching for aesthetic understanding. *Science Education,* 87, 574–587.

Girod, M., Twyman, T., & Wojcikiewicz, S. (2010). Teaching and learning science for transformative, aesthetic experience. *Journal of Science Teacher Education, 21,* 801–824.

Girod, M., & Wong, D. (2002). An aesthetic (Deweyan) perspective on science learning: Case studies of three fourth graders. *Elementary School Journal, 102,* 199–224.

Greeno, J. G. (2006). Authoritative, accountable positioning and connected, general knowing: Progressive themes in understanding transfer. *The Journal of the Learning Sciences, 15,* 537–547.

Greeno, J., Smith, D., & Moore, J. (1993). Transfer of situated learning. In D. K. Detterman & R. J. Sternberg (Eds.), *Transfer on trial:*

Intelligence, cognition, and instruction (pp. 99–167). Norwood, NJ: Ablex.

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

Heath, S. B. (1983). *Ways with words: Language, life and work in communities and classrooms*. New York, NY: Cambridge University Press.

Hidi, S., & Renninger, K. (2006). The four-phase model of interest development. *Educational Psychologist, 41,* 111–127.

Jackson, P. W. (1998). *John Dewey and the lessons of art*. New Haven, CT: Yale University Press.

Kelly, A. E., Lesh, R. A., & Baek, J. Y. (Eds.). (2008). *Handbook of design research methods in education.* London, UK: Routledge.

Koskey, K. L. K., Stewart, V. C., Pugh, K. J., & Linnenbrink-Garcia, L. (2008, March). *An investigation of a measure of transformative experience: Assessing in-class and out-of-class engagement.* Paper presented at the American Educational Research Association annual conference, New York, NY.

Krapp, A. (2002). Structural and dynamic aspects of interest development: Theoretical considerations from an ontogenetic perspective. *Learning and Instruction, 12,* 383–409.

Maehr, M. (1976). Continuing motivation: An analysis of a seldom considered educational outcome. *Review of Educational Research, 46,* 443–462.

Marini, A., & Genereux, R. (1995). The challenge of teaching for transfer. In A. McKeough, J. Lupart, & A. Marini (Eds.), *Teaching for transfer: Fostering generalization in learning* (pp. 1–19). Mahwah, NJ: Erlbaum.

Markus, H., & Nurius, P. (1986). Possible selves. *American Psychologist, 41,* 954–969.

Murphy, P. K. (2003). The philosophy in thee: Tracing philosophical influences in educational psychology. *Educational Psychologist, 38,* 137–145.

Murphy, P. K., & Mason, L. (2006). Changing knowledge and changing beliefs. In P. A. Alexander & P. Winne (Eds.), *Handbook of educational psychology* (2nd ed., pp. 305–324). Mahwah, NJ: Erlbaum.

Piaget, J. (1964). Development and learning. In R. E. Ripple & V. N. Rockcastle (Eds.), *Piaget rediscovered. A report of the Conference on Cognitive Studies and Curriculum Development* (pp. 38–46). Ithaca, NY: Cornell University School of Education.

Piaget, J. (1969). *The mechanisms of perception*. New York, NY: Basic Books.

Piaget, J. (1970). Piaget's theory. In P. Mussen (Ed.), *Charmichael's manual of child psychology* (3rd ed., Vol. 1, pp. 703–732). New York, NY: Wiley.

Pintrich, P. R., Marx, R. W., & Boyle, R. A. (1993). Cold conceptual change: The role of motivational beliefs and classroom contextual factors in the process of conceptual change. *Review of Educational Research, 63,* 167–199.

Posner, G. J., Strike, K. A., Hewson, P. W., & Gertzog, W. A. (1982). Accommodation of a scientific conception: Toward a theory of conceptual change. *Science Education, 66,* 211–227.

Prawat, R. S. (1998). Current self-regulation views of learning and motivation viewed through a Deweyan lens: The problems with dualism. *American Educational Research Journal, 35,* 199–224.

Prawat, R. S. (1999a). Cognitive theory at the crossroads: Head fitting, head splitting, or somewhere in between? *Human Development, 42,* 59–77.

Prawat, R. S. (1999b). Dewey, Peirce, and the learning paradox. *American Educational Research Journal, 36,* 47–76.

Pugh, K. J. (2002). Teaching for transformative experiences in science: An investigation of the effectiveness of two instructional elements. *Teachers College Record, 104,* 1101–1137.

Pugh, K. (2004). Newton's laws beyond the classroom walls. *Science Education, 88,* 182–196.

Pugh, K. J., & Bergin, D. A. (2005). The effect of education on students' out-of-school experience. *Educational Researcher, 34*(9), 15–23.

Pugh, K. J., & Bergin, D. A. (2006). Motivational influences on transfer. *Educational Psychologist, 41,* 147–160.

Pugh, K. J., & Girod, M. (2007). Science, art and experience: Constructing a science pedagogy from Dewey's aesthetics. *Journal of Science Teacher Education, 18,* 9–27.

Pugh, K. J., Linnenbrink-Garcia, L., Koskey, K. L. K., Stewart, V. C., & Manzey, C. (2010a). Motivation, learning, and transformative experience: A study of deep engagement in science. *Science Education, 94,* 1–28.

Pugh, K. J., Linnenbrink-Garcia, E. A., Koskey, K. L. K., Stewart, V. C., & Manzey, C. (2010b). Teaching for transformative experiences and conceptual change: A case study and evaluation of a high school biology teacher's experience. *Cognition and Instruction, 28,* 273–316.

Pugh, K. J., Schmidt, K., Russell, C., & Heddy, B. (2010, April). *Fostering transformative experiences in science: A design-based study.* Paper presented at the American Educational Research Association annual conference, Denver, CO.

Rasch, G. (1960). *Probabilistic models for some intelligence and attainment tests.* Copenhagen, Denmark: Danmarks Paedagogiske Institut.

Rasch, G. (1980). *Probabilistic models for some intelligence and attainment tests* (Expanded ed.). Chicago, IL: University of Chicago Press.

Rimer, S. (2007, December 19). Academic stars hone their online stagecraft. *New York Times.* Retrieved from http://www.nytimes.com/2007/12/19/education/19cnd-physics.html

Salomon, G. (1995). Reflection on the field of educational psychology by the outgoing journal editor. *Educational Psychologist, 30,* 105–108.

Salomon, G., & Perkins, D. (1989). Rocky roads to transfer: Rethinking mechanisms of a neglected phenomenon. *Educational Psychologist, 18,* 42–50.

Schiefele, U. (2001). The role of interest in motivation and learning. In J. M. Collis & S. Messick (Eds.), *Intelligence and personality: Bridging the gap in theory and measurement* (pp. 163–194). Mahwah, NJ: Erlbaum.

Sinatra, G. M., & Pintrich, P. R. (Eds.). (2003). *Intentional conceptual change.* Mahwah, NJ: Erlbaum.

Smith, J. P., diSessa, A. A., & Roschelle, J. (1993). Misconceptions reconceived: A constructivist analysis of knowledge in transition. *The Journal of the Learning Sciences, 3,* 115–163.

Spiro, R., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1992). Cognitive flexibility, constructivism, and hypertext: Random access instruction for advanced knowledge acquisition in ill-structured domains. In T. M. Duffy & D. H. Jonassen (Eds.), *Constructivism and the technology of instruction: A conversation* (pp. 57–75). Hillsdale, NJ: Erlbaum.

Waterman, A. (2004). Finding someone to be: Studies on the role of intrinsic motivation in identity formation. *Identity, 4,* 209–228.

Weiner, E. (2008). *The geography of bliss: One grump's search for the happiest places in the world.* New York: Twelve.

Wigfield, A., & Eccles, J. (1992). The development of achievement task values: A theoretical analysis. *Developmental Review, 12,* 265–310.

Wong, D. (2007). Beyond control and rationality: Dewey, aesthetics, motivation, and educative experiences. *Teachers College Record, 109,* 192–220.

Wong, D., Pugh, K. J., & The Deweyan Ideas Group at Michigan State University. (2001). Learning science: A Deweyan perspective. *The Journal of Research in Science Teaching, 38,* 317–336.