



The Effect of Schooling on Students' Out-of-School Experience

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With the premise that schooling should make a difference in students' everyday experience, the authors synthesize research on the influence of school learning on students' out-of-school experience by addressing the contributions and shortcomings of four research areas: (a) transfer, (b) out-of-school learning environments, (c) school-prompted interest, and (d) transformative education. They conclude the following: (a) Little research investigates the influence of school learning on out-of-school experience; (b) the existing research suggests that school learning has less of an influence on out-of-school experience than one would hope for and expect; and (c) under the right conditions, school learning *can* enrich students' out-of-school experience.

Given the abundance of education research, it is surprising that little research investigates one of the key purposes of schooling—what students do with their learning outside of school. Despite calls for research on continuing motivation (Maehr, 1976), assertions that a key justification for education is transfer “beyond the world of academia” (Barnett & Ceci, 2002, p. 613), and attacks on the notion that learning transfers at all (Detterman, 1993), few education researchers have investigated what students do with their school learning outside of school.

In this article, we discuss “experience” as a goal of education, link it with what is known about the effect of school learning on out-of-school experience, and make recommendations for future research. We begin with a discussion of experience as an educational outcome. Learning should not be viewed merely as an end unto itself, or solely as a means for achieving material success, but also as a means for living a life full of rich experience. This philosophy is one that we share with the prominent American pragmatist, John Dewey.

Experience as a Goal of Education

A common theme found throughout Dewey's work is the preeminence of experience. 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 a worthwhile philosophy was one that rendered ordinary life-experiences more significant and more luminous (p. 7). Likewise, he believed that the significance of art is found in the way that it introduces us “into a world beyond this world which is nevertheless the deeper

reality of the world in which we live our ordinary experiences” (1934/1980, p. 195). Moreover, he was afraid that both formal philosophy and art would render themselves insignificant by becoming separated from everyday experience (Boisvert, 1998; Dewey, 1934/1980).

These same views about philosophy and art also apply to education. Dewey was concerned that, in “traditional” education, learning had become separated from everyday experience. He argued that a theory of experience was needed to guide education, one that acknowledged the reciprocal, “organic” relationship between personal experience and education (1938, p. 25). Experience provides a foundation for learning and gives it meaning. In addition, learning in the form of educative experience expands the possibility for richer experience in the future (p. 26). Hence, learning should not be viewed merely as an end unto itself or as a means to some distant disconnected outcome (the mistake made by traditional education), but as a means for contributing to *general growth*. That is, education should enrich and expand immediate and future experience: “[T]he 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).

One way in which education can contribute to the expansion of experience is through the development of general attitudes and abilities, such as an ability to regulate action and an interest in learning. In addition, Dewey believed that education should have an immediate influence on everyday experience through the learning of subject matter. He explained 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. (1902/1990, p. 201)

What does modern research have to contribute to Dewey's ideas regarding a reciprocal, organic relationship between experience and education? Quite a bit, actually. For instance, research on conceptual change (e.g., Posner, Strike, Hewson, & Gertzog, 1982) and constructivism (e.g., Smith, diSessa, & Roschelle, 1993) describes particular ways in which learning is dependent upon ideas constructed through students' prior experience. There are also a number of lines of research that investigate ways in which education can contribute to general attitudes and abilities that are likely to expand the potential for future rich experience. Research on life-long learning, development of self-regulation, and development of critical thinking are a few examples. Despite the abundant research on experience and learning, a significant gap exists in that little research

investigates the immediate impact of learning subject matter on students' everyday, out-of-school experience. It is this gap in the literature that we address in this article.

What does current research contribute to our understanding of how studying school subjects can expand and enrich students' current out-of-school experience? Research on this topic is scarce, but four research areas have emerged that at least peripherally address the issue and can serve as entry points for research programs: (a) transfer, (b) out-of-school learning environments, (c) school-prompted interest, and (d) transformative education. Our goal is not to provide a comprehensive review but rather to comment on each of these areas and highlight promising future directions. We do not mean to imply that enrichment of current experience is the only educational outcome that matters. However, we see it as an important one that is in need of further attention.

Research on Transfer

If subject matter is to expand and enrich students' ordinary, everyday experience, then students must be able to transfer their learning, that is, apply their in-school learning to an out-of-school context. Many significant reviews and critiques of transfer have already been written (e.g., Anderson, Reder, & Simon, 1996; Detterman & Sternberg, 1993). Hence, we do not provide a comprehensive review of transfer, but rather focus on how the transfer literature informs us about the potential out-of-school impact of education.

Salomon and Perkins (1989) made an important distinction between *low-road* and *high-road* transfer. According to Salomon and Perkins, "the low-road mechanism involves the spontaneous, automatic transfer of highly practiced skills, with little need for reflective thinking" (p. 118). In contrast, "the high-road mechanism involves the explicit conscious formulation of abstraction in one situation that allows making a connection to another" (p. 118). Some school learning involves the acquisition of routinized skills that can be transferred to everyday experience via the low-road mechanism (e.g., reading and writing). These skills readily transfer and clearly expand and enrich everyday experience. However, much of school learning involves the development of complex skills and conceptual understanding that cannot be reflexively applied. Instead, the high-road mechanism of transfer is required and appears to be more complex. As a result, this type of transfer has been the focus of most transfer studies. Here, we summarize general findings from this research and identify key factors related to successful high-road transfer.

A general finding in transfer studies is that students are often unable to apply their in-school learning to real-world problems or in novel contexts—a problem often referred to as the inert knowledge problem (Bereiter & Scardamalia, 1985; Brown & Campione, 1981). The daughter of one of the authors provided an example of this disconnect between school learning and everyday experience. When she was 11, she was baking cookies and asked her dad, "Do two one-quarters make two fourths? I know it does in math, but what about in cooking?" Some scholars (Beach, 1999; Bransford & Schwartz, 1999) have argued that the degree to which students are able to transfer learning has been underestimated because of the way transfer has been conceptualized and defined in transfer studies. This is likely true. Nevertheless, most transfer

scholars would agree that educators cannot assume that students will be able to freely transfer their in-school learning of concepts and complex skills to their everyday, out-of-school experience. Instead, for students to experience transfer, their initial learning should include certain qualities.

Salomon and Perkins (1989) proposed that active learning and deep-level processing (including metacognitive activity) are necessary for high-road transfer. Similarly, reviews by Renkl, Mandl, and Gruber (1996) and Prawat (1989) concluded that the development of connected, deep-level knowledge structures and metacognitive knowledge relevant to the subject matter is central to overcoming the inert knowledge problem (see also Anderson, Reder, & Simon, 1996; Georgiades, 2000). Therefore, learning that involves the development of deep-level, connected knowledge structures and metacognitive knowledge in relation to the subject matter is more likely to be accessible in novel contexts and when solving real-world problems than learning that is superficial and disconnected. However, it is important to recognize that little research has actually examined the transfer of school learning to the out-of-school domain. In their lengthy review of types of transfer, Barnett and Ceci (2002) commented, "For most of the studies reviewed here, transfer and training were conducted in the same macrocontext, usually the school" (p. 623). They could name only one study that tested transfer to the home environment (Fong, Krantz, & Nisbett, 1986). One exception is research on transfer from the situated learning perspective (Brown, Collins, & Duguid, 1989; Greeno, 1997; Greeno, Collins, & Resnick, 1996), which takes activity as the unit of analysis and has been concerned with in-school *and* out-of-school activity.

The issue of transfer arises in the situated learning perspective when individuals move from one activity to another, and transfer is defined as the influence of participation in one activity on participation in another activity (Greeno, 1997; Greeno, Smith, & Moore, 1993). Transfer studies in this tradition have examined the potential influence of in-school learning on out-of-school experience, and will be discussed in the following section. Here we simply note that the situated learning perspective has emphasized the importance of context to transfer success. That is, in-school activity is more likely to influence out-of-school experience when continuities between the contexts exist (Greeno, 1997) and when, in the social and cultural context, transfer is deemed to be appropriate (Pea, 1987).

Future Directions

Research on transfer informs us of the conditions that are needed for students to apply their school learning to their out-of-school experience. However, it is important to note that ability to transfer is a necessary, but not a sufficient condition. Just because students have the *ability* to apply their learning in their everyday experience does not guarantee that they *will* so apply it. For example, Renkl et al. (1996) cited research indicating that students in statistics courses who do not like statistics will not apply the content after the final exam. Similarly, Girod and Wong (2002) described a student who could readily apply geological principles to an analysis of rocks in class but did not care to do so outside of class. In effect, transfer studies have ignored the question of what factors influence the *initiation* of a transfer attempt, particularly initiation in out-of-school contexts. Most transfer studies to date

have studied transfer in situations where initiation is the result of an investigator asking subjects to complete a transfer task. This method provides information about transfer ability but leaves unanswered many questions regarding whether transfer actually occurs in out-of-school experience.

It is our contention that research should be conducted to investigate the initiation of task-driven transfer and free-choice transfer. Task-driven transfer refers to situations where the primary reason for initiating a transfer attempt is to complete a task that is not intrinsically motivated but is a means to an end, such as completing an assignment or fulfilling a job function. Typical transfer studies in which subjects are asked to complete a transfer task fit in this category. Studies conducted from the situated learning perspective involving naturalistic investigations of individuals encountering transfer tasks in their everyday experience often fit in this category.

Free-choice transfer occurs in situations where the context affords transfer but transfer is not needed to engage in the activity. For example, the zoo is a context that affords the transfer of ideas learned in a biology class. However, if one is on a casual visit to the zoo, there is no task that *requires* one to apply biology ideas. One can visit the zoo without attempting, for instance, to think about the animals in terms of their adaptations to the environment. In a free-choice transfer situation such as this, the issue of initiation is more complex. One mechanism that may be involved is forward-reaching transfer.¹ According to Salomon and Perkins (1989), forward-reaching transfer occurs when “[t]he principle is so well learned in the first place as a general principle that it simply suggests itself appropriately on later occasions. That is, the general formulation occurs initially and finds new application spontaneously later” (pp. 118–119). Our friend at the zoo may have learned biology ideas sufficiently that, when looking at animals, ideas about their adaptations simply pop into her head.

However, it is also possible that initiation of transfer in free-choice transfer situations is a more deliberate process influenced by motivational factors. That is, constructs such as interest and anticipation may play vital roles in the initiation of transfer attempts. It is possible that our friend at the zoo was intrigued by the idea of species adaptations and had a conscious goal of trying to understand animals in terms of their adaptations while at the zoo. In this case, there is a motivation to transfer that potentially transforms the dynamics of the transfer process (Pugh & Bergin, 2003).

Research addressing free-choice transfer is rare but particularly relevant to understanding the impact of school learning on out-of-school experience. Much of what is learned in school is not needed for engagement in everyday tasks, even though it may be applicable. The transfer of many concepts (e.g., democracy, ecology) and skills (e.g., goal setting) will only occur if the concepts pop into students’ heads in appropriate situations via forward-reaching transfer or if the students actively seek out opportunities to apply them. Free-choice transfer is an area ripe for investigation.

Research on Out-of-School Learning Environments

There is a growing body of research that examines learning in out-of-school contexts, particularly with respect to mathematical practices (e.g., Nunes, Schliemann, & Carraher, 1993; Scribner, 1984). A portion of this research examines how in-school learning affects out-of-school learning and, hence, is relevant to this review. As mentioned earlier, some of the research conducted from the situ-

ated learning perspective has looked directly at the relationship between in-school learning and out-of-school activity. For instance, Lave, Murtaugh, and de la Rocha (1984) studied the application of mathematics by grocery shoppers and found that their use of mathematics did not closely resemble the mathematical practices of school. In contrast, Beach (1995) provides evidence that in-school learning can affect out-of-school mathematics activities. In his study of school students in Nepal who were becoming shopkeepers, he concluded that instead of fully adopting the traditional mathematical practices used by the shopkeepers (most of whom had not received formal schooling), the students applied school-learned procedures and algorithms. Over time, these procedures and algorithms changed and a more context-specific set of mathematical practices developed. Thus Beach emphasized that the activity of schooling influenced the students’ mathematical practices related to shop keeping and that the activity of shop keeping influenced the application of school learning. Saxe (1988, 1990) also provides evidence that in-school learning can affect out-of-school mathematics activities.

Research on free-choice science education and informal science education provides valuable information on learning in museums, zoos, and other out-of-school environments (Crane, Nicholson, Chen, & Bitgood, 1994; Falk, 2001), but only a small percentage of the research examines the impact that in-school science learning has on learning and experience in these out-of-school contexts. The few studies that have been conducted in this area are nonetheless important because they show that students on school field trips experience museums and zoos with increased understanding and interest when carefully prepared in school prior to the field trip. However, such preparation typically is not provided. For example, research in Sydney, Australia (Griffin & Symington, 1997), concluded that many teachers did not communicate learning goals to their students. Even if the teachers provided the students with worksheets to guide their visits, students tended to fill out the worksheets without adopting the learning goals that they implied.

One reason why it is difficult to induce students to apply school learning during field trips is that when children enter a new environment, they want to explore it (Falk, Martin, & Balling, 1978). They may ignore the teacher’s learning goals for them and pursue their own exploration goals. Orion and Hofstein (1991) found that students’ attitudes toward a geology field trip were “influenced more by the social and adventure aspects of the field trip than by the learning aspects” (p. 518). Nespor (2000) found that elementary students loved field trips, mainly because of pizza lunches, going to gift shops, and the like rather than any learning opportunities, perhaps partly because the trips were seldom designed to afford strong learning opportunities. Martin, Shirley, and McGinnis (1988) examined ecology lessons and found that while students did display application of ecology principles on in-school transfer tasks, spontaneous application during a school-sponsored trip to the park was low. Upon entering the park, the children immediately ran off, shouted, and scattered into groups of friends. Novelty and lack of learning goals may partially explain why students were not inclined to apply their in-school experiences to the field trip.

The above-noted studies suggest that school experience often has little effect on students’ out-of-school experience. It seems that when students could engage in free-choice transfer and apply their

school learning to an out-of-school setting, they chose not to do so. Characterizing this as a choice made by the students is probably not entirely accurate. Rather, it may simply be that the students did not consider applying school learning to a setting that they viewed as designed for fun.

Key components of preparation for field trips include activating learning goals and reducing novelty (Ramey-Gassert, 1997). Orion and Hofstein (1994) contrasted three types of preparation for a 1-day geology field trip and found that pre-trip classroom preparation including hands-on activities, together with post-trip summary activities, led to higher achievement and more positive attitudes than did less comprehensive preparation and follow-up. The treatment reduced novelty before the trip and provided knowledge, skills, and psychological preparation that facilitated learning. Kubota and Olstad (1991) also found that pre-trip preparation improved student experience in a museum.

In the field of environmental education, researchers have studied the influence of out-of-school programs on students' everyday attitudes and behavior. Rickinson (2001) argued that "there is evidence that learning outcomes in terms of changes in students' environmental knowledge and/or attitudes, and, in a few cases, behaviour can be generated by certain programmes" (p. 274). However, Rickinson notes that the research has assessed only relatively short-term effects. In a meta-analysis, Zelezny (1999) also found environmental education programs to be effective in fostering environmentally responsible behavior, but noted that few studies actually measured behavior, relying instead on self-report. Finally, an evaluation of an out-of-school environmental education program by Dettmann-Easler and Pease (1999) found that parents of some students in the program reported that their children had become more aware of the nature and wildlife around them. That is, the program not only changed some verbal attitudes and specific behaviors (e.g., recycling) but also seemed to enrich and expand the students' experience of the natural world.

Future Directions

Research investigating the initiation of application attempts in out-of-school environments is needed. When students are confronted with tasks and assignments in school, they generally must at least try to apply their learning in order to avoid adverse consequences (e.g., low grades). But when individuals are confronted with a task outside of school, they can usually choose not to engage in the task without suffering tangible consequences. For instance, Lave et al. (1984) found that when math-related tasks were complex or mentally taxing for shoppers (e.g., difficult price comparisons), they simply avoided them. Thus the application of learning in out-of-school environments is not just a matter of whether individuals can perform a task but whether they think it is worth the effort. Research is needed to investigate factors that influence decisions to engage in tasks that require the application of learning.

Informal learning environments such as zoos, museums, and parks provide contexts for investigating the influence of school learning on out-of-school experience. These informal environments may afford the application of learning, but they generally do not require it. That is, they represent free-choice transfer situations. A general problem appears to be that students typically do not adopt a knowledge-application mindset when in these contexts. Social and cultural norms do not identify these out-of-

school learning environments as being appropriate settings to apply school learning. A few studies provide suggestions for addressing this problem, but more student- and setting-centered research is needed. That is, research could focus on student motivation to transfer learning in informal learning environments (student-centered) and on what affordances in the environment foster application of school learning (setting-centered). Currently, there is little research on informal learning that examines how school learning can influence subsequent experience in those environments.

Furthermore, little or no research has examined how in-school learning or out-of-school learning environments may increase *non-school-sponsored* attendance and experience in informal learning environments. For instance, does school learning related to museum exhibits or a school-sponsored trip to the museum increase and enrich future museum attendance? If so, how and under what conditions? It seems logical that if students are exposed to museums and zoos through school and have good experiences, they will be more likely to initiate their own visits. If they visit a setting again, it is likely that they will learn more because the novelty of the setting and experience has been lessened. Therefore, the students may begin to construct a schema for the site and its learning affordances. It is likely that valuable insights could be gained by investigating the potential impact of various school-sponsored activities on non-school-sponsored attendance and experience in informal learning environments.

Finally, the research on out-of-school learning environments has been conducted primarily in the fields of science and mathematics. More research is needed in other fields, such as literature, music, and social studies, including studies on the relationship between training in those domains and how students engage in out-of-school learning environments such as libraries, art museums, historical battlefields, and concerts.

Research on School-Prompted Interest

Another relevant body of research addresses how school affects students' out-of-school interests. About 30 years ago, Maehr (1976) pointed out that a key outcome of school should be *continuing motivation*, which refers to a tendency to "continue working on tasks away from the instructional context in which they were initially confronted" (p. 443). *School-prompted interest* is a subset of continuing motivation and occurs when students develop an interest in a topic through school learning and continue to pursue this interest outside of school. Evidence suggests that some students experience school-prompted interest but at a relatively low rate. For example, Bergin (1992) interviewed 66 high school students and found that 47% reported no instances of school-prompted interest, and 38% reported only one. Examples included analyzing parents' bank statements because of an accounting class and drawing people because of an art class. In a later survey study, Bergin (1996) found that 50% of the students did not name a single instance of school-prompted interest. Those who did report school-prompted interest included African American students who became interested in the Civil Rights movement and read books such as Alex Haley's *Roots* and *The Autobiography of Malcolm X*, students who became interested in literature and read unassigned plays and novels, and students who became interested in art techniques and read relevant books and magazines.

Trainer (1984) also found that many students failed to engage in school-prompted interest when he surveyed Australian high school students about their out-of-school interest in school topics. In his sample, 43% indicated that they did not read about school subjects in their spare time, and 62% indicated that they were only a little or not at all interested in school subjects after they left school. Forty to forty-five percent of these students reported that they rarely or never (a) used things outside of school that they had learned in school, (b) read during leisure time about school subjects, and (c) engaged in discussions with friends outside of school about school subjects. Chandler (1999) interviewed 12 parents of high school students and found that, with the exception of one parent, who was a teacher, “not a single parent indicated reading an author for pleasure whose work would have been included in the high school curriculum at the time these parents were educated” (p. 237). Thus school learning of literature did not seem to prompt an interest in reading works by the authors studied. It is important to note that all of the abovementioned studies regarding school-prompted interest used self-report measures and not reports from parents, peers, or teachers, or alternative measures such as enrollment in out-of-school programs.

Future Directions

The research that we have reviewed suggests that students are not likely to acquire a level of interest in school-based content such that they seek to learn more about school topics on their own, outside of school. However, very little is known about this phenomenon. Although we would not expect every school experience to result in the exploration of a related out-of-school topic, it seems reasonable to assert that at least some school activities should inspire students to seek more learning.

It is particularly important that researchers investigate school-prompted interest in specific subject areas and begin to examine the environmental (e.g., teacher, peer, institutional) and individual factors that are associated with school-prompted interest. It will be important to examine how classroom experiences facilitate or undermine both individual interests that students bring to the classroom and situational influences on interest that teachers can control (Bergin, 1999). Some research should use alternatives to self-report and examine the influence of school on students' hobbies. Currently, we lack research on students' hobbies, but it seems logical to assume that students might become interested in hobbies such as art, photography, music (Rutkowski, 1993), creative writing, historical reenactment, or aviation as a result of school experiences.

Research on Transformative Education

Jackson (1986) identified and described two alternative outlooks in education: the mimetic and the transformative. The mimetic relates to a “transmission” model of teaching and focuses on transmitting predetermined, measurable information to students. The transformative focuses on transformation of the individual, particularly transformation of values, character, morals, attitudes, outlooks, and so on.

The transformative tradition encompasses the Deweyan perspective presented at the beginning of this article and has a clear focus on the power of education to make a difference in students' everyday, out-of-school lives. There are a variety of current per-

spectives related to this tradition, including work on transformative learning (Marsick & Mezirow, 2002; Mezirow, 1997; O'Sullivan, 1999) and transformative or critical pedagogy (e.g., Banks, 1996; Freire, 1970; McLaren, 1999). These perspectives focus on how education can be empowering in the sense that it liberates individuals from existing frames of reference or ideologies and allows them to imagine new possibilities, ideas, and actions—particularly with respect to issues of race, gender, income, and power. While these perspectives are clearly pertinent to the issue of how education can expand and enrich experience, they also tend to focus on education's global effects on the development of general attitudes and abilities, as opposed to the influence of particular subject matter, which is the focus of this article.

Recently initiated work on transformative experience (Pugh, 2002, 2004; Wong et al., 2001) and aesthetic understanding (Girod, Rau, & Schepige, 2003; Girod & Wong, 2002) is based on an application of Dewey's aesthetics to science education and looks at how the learning of particular subject matter can be transformative. One of the key assertions in Dewey's (1934/1980) theory of aesthetics is that the arts have the potential to transform everyday experience by expanding perception and value (Jackson, 1998). They teach individuals to see the world differently and to attach new meaning to it.

Girod et al. (2003), Pugh (2002), Wong et al. (2001), and Cavanaugh (2005) have argued that science concepts have the same potential to transform everyday, out-of-school experience. Girod and Wong (2002) and Pugh (2004) have used case studies to illustrate how science learning can be aesthetic and transformative. For example, Girod and Wong (2002) described the experiences of fourth-grade students who came to perceive rocks differently as they learned geology. One student explained,

I think about the rocks I have differently than I did before. 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. . . . I wasn't all that interested in rocks before, but now I am. I used to pick them up on the beach and throw them in the water. Now I couldn't throw all those stories away. (pp. 211–212)

For this student, learning geology transformed her everyday experience with rocks.

Pugh (2002, 2004) has used the term *transformative experience* to refer to such experiences and has used three qualities to assess transformative experience: motivated use, expansion of perception, and experiential value. *Motivated use* occurs when students apply learned concepts in contexts (particularly out-of-school contexts) where application is not required (i.e., free-choice transfer situations). *Expansion of perception* is a result of motivated use and occurs when a person uses a concept to see some aspect of the world in a new way. For example, a high school student in a biology class 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” (Pugh, 2002, p. 1128). Finally, *experiential*

value refers to the valuing of content for the experience it provides. For example, another student in the biology class 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, pp. 1120, 1122).

Girod and colleagues (Girod et al., 2003; Girod & Wong, 2002) have used the term *aesthetic understanding* to refer to a similar type of experience and have used the concepts of *transformative*, *unifying*, and *compelling and dramatic* to define aesthetic understanding in their research. The term *transformative* suggests that the understanding involves a transformation of one’s experience and perception of the world. A *unifying* understanding involves a bringing together of parts into a meaningful whole. *Compelling and dramatic* understanding has a consummatory quality. In aesthetic understanding, the individual is compelled to apply an idea in his or her everyday life (i.e., to engage in motivated use).

Transformative experience and aesthetic understanding both emphasize acting on subject matter ideas in everyday contexts and undergoing an expansion of perception and value. These conceptualizations can function as research tools for investigating the influence of learning on out-of-school experience because they provide definitions of what it means for learning to make a difference in students’ everyday experience. Initial research in this area suggests that students can undergo transformative experiences and engage in aesthetic understanding, but they often fail to be transformed in a significant way even when they learn the content and enjoy the class (for examples, see Girod & Wong, 2002; Pugh 2004). Furthermore, transformative experiences appear to be rare and more difficult to achieve than in-class engagement (Pugh, 2002; Pugh, Kleshinski, Linnenbrink, & Fox, 2004).

Identity—one’s sense of “this is me” or “this is who I am”—appears to be an important fostering or constraining factor in undergoing a transformative experience or achieving aesthetic understanding. In case-study analyses, Girod and Wong (2002) and Pugh (2004) observed that students who underwent transformative experiences or engaged in aesthetic understanding reported that they saw themselves as a “science person” or could picture themselves in a science-related career.

Two intervention studies have explored the influence of instructional methods on transformative experience/aesthetic understanding. In one study of high school biology classrooms (Pugh, 2002), an intervention presented adaptation and evolution as ideas for appreciating the world of animals and modeled transformative experience. The intervention was found to be more effective in fostering transformative experiences than a comparison condition that focused on inquiry (for more information on the intervention pedagogy, see Pugh & Girod, in press). Girod et al. (2003) used a similar intervention to teach science in a fourth-grade classroom and found that it was more effective in fostering aesthetic understanding than a comparison method that focused on developing conceptual understanding.

Future Directions

Further research is needed to better understand the factors that influence engagement in transformative experience and aesthetic understanding. As mentioned earlier, identity seems to be an important factor, but more research is needed to confirm its influence

and to explore the myriad ways in which one’s identity may afford and constrain transformative experiences and aesthetic understanding in various contexts. Moreover, research is needed on successful ways to interact with students who may not identify with the subject matter being learned.

Motivational factors also seem likely to have an influence on whether students undergo transformative experience/aesthetic understanding. For instance, goal orientation may be important (Ames & Archer, 1988; Dweck & Leggett, 1988). It seems reasonable to suggest that students with mastery goals (i.e., a goal of mastering the content) are more likely to undergo transformative experience/aesthetic understanding than are students with performance goals (i.e., a goal of demonstrating normative competence or avoiding the demonstration of incompetence). Likewise, constructs such as interest (Bergin, 1999; Hidi, 1990), self-efficacy (Bandura, 1997), and intrinsic motivation (Deci & Ryan, 1985) are likely to influence whether students undergo transformative experience/aesthetic understanding. Research is needed that examines these potential relationships.

Finally, more research should be conducted that explores the effectiveness of instructional methods at fostering transformative experiences. Descriptive studies of exemplary teachers who are successful in making the subject matter transformative could assist in the effort to further identify effective instructional methods.

Conclusions

Three primary conclusions emerge from this review. First, little research has investigated the presumed and sometimes stated goal of school—to influence out-of-school activity. There is considerable research on many types of transfer, but too little of it examines learning in school that is transferred outside of school. We have identified a few areas of inquiry that hold potential for addressing the question of whether subject matter learned in school makes a difference in out-of-school experience, but the question remains largely unanswered. This is a serious gap in the education research literature. We recognize that not every research study should have a goal of investigating out-of-school activity, but when the entire research enterprise cannot begin to answer a fundamental question, something is wrong with the enterprise.

In fairness, we acknowledge that there are considerable methodological challenges to investigating the influence of in-school learning on out-of-school experience. One challenge is simply conceptualizing what is an influence on out-of-school experience. The constructs cited in this article, such as school-prompted interest and transformative experience, provide a partial solution to this problem, but further refinement of these constructs and the development of others would be helpful. In addition, the issue of what is in school and what is outside of school can be ambiguous. For example, is a lunchtime science discussion group (Seiler, 2001) in school?

A second challenge is the consideration of ethnicity, social class, gender, and related constructs. Students’ perceptions of school in general, of particular subjects, and of instructional methods vary radically and may be partially attributed to their group memberships. Relevant group memberships can include “jocks” and “burnouts” (Eckert, 1989), White and Black (Bergin & Cooks, 2002; Fordham & Ogbu, 1986), rich and poor (Lubienski, 2003; Luther & Becker, 2002), male and female (Fennema, Carpenter,

Jacobs, Franke, & Levi, 1998). To some degree, each group responds differently to school environments and will differ in transfer, school-prompted interest, transformative experience, and use of out-of-school learning environments. In addition, some groups have more access to out-of-school learning environments (e.g., museums, aquariums, planetariums) than others. Research that fails to consider such group memberships is likely to miss key influences on in-school and out-of-school effects.

A third challenge is gaining access to students' out-of-school experience. The most common solution to this problem has been to rely on students' self-reports of their experience. However, self-reports are problematic in that students, particularly younger students, may have limited awareness of their experience. For instance, students may be unaware of or unable to articulate how their everyday experience has been influenced by their school learning. Also, whereas self-reports may answer questions such as whether a student applied learning in an out-of-school context, they are less likely to provide information about whether the application of that learning was accurate and appropriate for the context. Innovation in designing research studies will be needed to address these concerns. One possibility is to develop structured self-report methods such as Csikszentmihalyi's experience sampling method, also known as *beeper studies* (Csikszentmihalyi & Larson, 1984; Richards et al., 2004). The experience sampling method still relies on self-report but requires subjects to report on experiences in which they are currently engaged. Another promising possibility is to follow the example of Dettmann-Easler and Pease (1999) and supplement self-reports with reports from others who have close contact with learners in their out-of-school experience, such as parents. Fong et al. (1986) used a clever method: They telephoned, at the beginning and end of the semester, randomly selected students who were enrolled in a statistics course. Under the guise of a survey, the researchers assessed whether the students had changed their use of statistical reasoning from the beginning to the end of the semester (they had).

An alternative to self-report is to conduct naturalistic observations in out-of-school contexts where students might be likely to apply their learning. For example, Beach (1999) chose to observe the activity of shop keeping because it was a likely context for students to apply in-school mathematics learning. Likewise, observations in out-of-school learning environments such as museums and zoos may be productive contexts for observing whether students apply related in-school learning. However, this methodology is also limited. Some content may not have a clear application context, and students are likely to apply learning in unexpected contexts and at unexpected times.

In the field of nature studies, scientists have generated unique methods to gain access to the everyday experience and activity of wildlife. A recent innovation is the use of "critter cams"—small cameras that are attached to anything from an eagle to a Great White Shark—and allow scientists a unique glimpse into the world of the animal. In the field of education, we likewise need to devise unique methods that will give greater access and insight into students' everyday, out-of-school experience. This could involve collaboration with students and their parents using remote-controlled microphones and cameras, capture of Internet-related keystrokes, and monitoring of television viewing. It could also involve students-

as-researchers (Elmesky & Tobin, 2005; Farrell, Peguero, Lindsey, & White, 1988).

Nevertheless, it is important to acknowledge the design limitations on studying out-of-school experience. Designs not dependent on self-report may be resisted because of their invasive nature. In particular, it may be difficult to conduct research on out-of-school experience with populations that distrust the academy.

Our second conclusion is that school learning has less of an influence on out-of-school experience than we would hope for and expect. Existing research suggests that learning often remains inert, students often fail to apply concepts in relevant out-of-school learning environments, and students only rarely develop school-prompted interests. However, given the paucity of research on the topic, we make this assertion with few data and little certainty. Also, we note that even if learning particular content fails to have a direct impact on out-of-school experience, education may nevertheless influence experience by fostering general attitudes and abilities such as critical thinking or self-regulation.

Our third conclusion is more positive. Under the right conditions, school learning *can* have a significant influence on students' out-of-school experience. Education can foster the development of usable knowledge, it can influence and enrich experiences in out-of-school learning environments, it can prompt interests that are pursued outside of school, and it can foster experiences that transform how students experience the world. But more research and efforts need to be directed toward identifying and fostering these "right conditions."

To summarize, in contrast to the massive amounts of research and scholarly writing on literacy, motivation, multicultural education, testing, and other issues, there is amazingly little on when and how school experience affects out-of-school experience. If education researchers truly care about the power of education to make a difference in students' everyday, out-of-school experience, this topic must be considered more seriously as part of their collective research agenda.

NOTE

¹The forward-reaching/backward-reaching distinction is not the same as our proposed task-driven/free-choice transfer distinction. The forward-reaching/backward-reaching distinction focuses on when an abstraction is formed—either at the time of learning (forward-reaching) or at the time of engaging in a transfer task (backward-reaching)—not on the primary cause for initiation of transfer. Thus a task could be the impetus for a transfer attempt (task-driven transfer), even though the abstraction needed to successfully complete the task was constructed at the time of learning (forward-reaching transfer).

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