Beyond Learning By Doing: The Brain Compatible Approach

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The current position of the field of experiential education within mainstream education places at a premium attempts to significantly broaden and deepen experiential pedagogy beyond mere "learning by doing." This article will explore one such attempt—the Brain Compatible Approach—and its potential linkages with experiential education. An overview of the Brain Compatible Approach will be outlined, followed by a discussion of several key principles. Linkages between these principles and experiential education will be discussed, as well as several "Quick Tips" on possible practical applications of the research. Finally, the benefits of aligning experiential education with the Brain Compatible Approach will be explored.

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Over the last ten years, experiential education has made many in-roads with the mainstream educational establishment. The success of programs such as Project Adventure and Outward Bound working within schools has been well documented. Additionally, ropes course, environmental, and outdoor education programs have become prevalent in many school districts across the country. Yet, with all these advances, there are still many barriers between our pedagogy and traditional schooling. We remain literally, and figuratively, "outside" the educational establishment. Recent initiatives toward accountability and standards have placed experiential education in the crosshairs of reform-minded politicians and school consultants. "Learning by doing" is often described as "process heavy," devoid of content, and a hold-out from 1960s progressivists' approaches. One researcher has gone so far as to say "recent history of American education and controlled observations have shown that learning by doing and its adaptations are among the least effective pedagogies available to the teacher" (Hirsch, 1996, p. 257).

The current position of the field within mainstream education places at a premium attempts to significantly broaden and deepen experiential pedagogy beyond mere "learning by doing." This paper will explore one such attempt—the Brain Compatible Approach—and its potential linkages with experiential education. An overview of the Brain Compatible Approach will be outlined, followed by a discussion of several key principles. Linkages between these principles and experiential education will be discussed as well as several "Quick Tips" on possible practical applications of the research. Finally, the benefits of aligning experiential education with the Brain Compatible Approach will be explored.

The Brain Compatible Approach

In July of 1989, President George Bush declared the 1990s the "Decade of the Brain." What followed was a revolution in research, articles, books, and television specials on what we know about how the brain functions and learns. The medical advances in particular have

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been many and remarkable. We have learned more about the brain in the past five years than the previous one hundred. Additionally, nearly 90 percent of all neuroscientists who have ever lived are alive today (Brandt & Wolfe, 1998).

While still relatively new as a field of inquiry, the Brain Compatible Approach has yielded several intriguing findings:

- *Neuroplasticity:* The brain changes physiologically as a result of experience and it happens much quicker than originally thought. The environment in which the brain operates determines to a large degree the functioning ability of the brain (Brandt & Wolfe, 1998).
- *The brain is complex and interconnected:* Just as a city or jazz quartet has many levels of interaction and connectedness, the brain has an infinite number of possible interconnections. In essence, there are no isolated, specialized areas but rather the brain is simultaneously processing a wide variety of information all at once (Caine & Caine, 1994).
- *Every brain is unique:* Our brains are far more individualized in terms of physiology, neural wiring, bio-chemical balance, and developmental stage than previously thought (Jensen, 2000).

Each of these findings suggests re-consideration of the way we currently educate. Caution must also be practiced. Much of the current research is new, and steps from research to application are inherently complex and difficult. Already, several researchers have questioned the validity of educational applications of brain research (Bruer, 1997). If nothing else, the sheer volume of new information about how the brain functions and learns forces us to question what we truly "know" about learning and educational practice.

Principles of Brain Based Learning

Drawing from the findings above, several intriguing principles and practical implications have emerged. The following principles are of particular interest to experiential educators as they support some long-standing practices within experiential education and also push the envelope of what may be possible in the future.

Principle # 1: Pattern and Meaning Making

Research supports the claim that the search for meaning is innate and occurs through patterning (Caine & Caine, 1994). Patterning refers to the meaningful organization and categorization of information (Nummela & Rosegren, 1986). The brain is designed to search for and integrate new information into existing structures and actively resists "meaningless" patterns (Caine & Caine). The process is constant and does not stop—regardless of whether or not we have stopped teaching! This principle reinforces many of the practices we attribute to experiential learning including emphasis on context and framing, learner involvement in the teaching of the material, alternating between details and big picture (whole/part), reflection components, and relevancy (i.e., relating information to students' previous experience and learning).

Quick Tip #1: Chunking can be an effective tool for presenting the learner with information in an organized, meaningful way. Look at the following list of letters: IBFVTNOJBLKFJ. Try to memorize them as presented. Now look at the next list of letters: JFK, LBJ, ON, TV, FBI. The second list is much easier to memorize even though they are the same letters. They have simply been chunked and arranged in a meaningful way that draws on previous experience and information. Consider how you might chunk small activities (lessons or even directions) and large, multi-day experiences. How can you arrange the information in a more meaningful, patterned way?

Quick Tip #2: Use a "Big Picture." Remember that your students do not have the same view of the course, lesson, or program that you do. Provide them with a big picture as soon as possible at the beginning of the experience. Rather than an exhaustive outline or itinerary, the big picture gives your students a taste of what's coming and allows them to begin making patterns, connections, and frames for the experience. Re-visit the big picture a few times throughout the experience to further solidify the link. In this regard, it is helpful to have it on a flip chart or other visual aid. Try using a "you are here" map with a movable arrow.

Principle #2: The Brain as a Parallel Processor

The human brain is the ultimate, multi-tasking machine, constantly doing many things at once. This is because the brain is geared toward survival and is, in actuality, poorly designed for linear, lock-step instruction (Jensen, 2000). Consider how you learned to ride a bicycle. Did you learn through reading a book or hearing a lecture on the separate topics of bike parts, safety, and operation? No. It is more likely you learned through a more dynamic and complex series of experiences. Current research supports the notion that the brain learns best through rich, complex, and multi-sensory environments (Jensen). In this sense, the teacher is seen more as an *orchestrator* of learning environments rather than an instructor of linear lesson plans or even a facilitator of experiences (Deporter, Reardon, & Singer-Nourie, 1999). Practical applications for parallel processing include the use of multi-modal instructional techniques (visual, auditory, kinesthetic) and multiple intelligence activities (Gardner, 1985). Simulations and role-plays mimic our natural learning environment and encourage complex processing. Lastly, enriched learning environments can be orchestrated through the components of challenge, novelty, choice, high feedback, social interaction, and active participation (Diamond & Hopson, 1998). If the benefits of enriched, multi-sensory, complex learning environments continue to be supported by the research, experiential theory and practice can and must play a larger role in the classroom of the future.

Quick Tip #3: Use the EELDRC (Enroll, Experience, Label, Demonstrate, Review, Celebrate) design frame (Deporter et al., 1999) to create a dynamic, complex, multi-sensory lesson plan. In the *Enroll* segment, seek to engage students in the material through intrigue and answering the learner question "What's In It For Me?" Give them a brief *Experience* to immerse students in the new information. Use the *Label* segment to punctuate the most salient points with a "lecturette" or de-brief. Provide an opportunity for the participants to *Demonstrate* with the new information to encourage connections and personalization of the material. *Review* the material to cement the big picture and, finally, find a way to *Celebrate* the experience to reinforce positive associations with the learning.

Principle # 3: Stress and Threat

Learning is enhanced by challenge and inhibited by threat (Jensen, 2000). Paul MacLean offers a model for considering this principle through his Triune Brain theory (1978). MacLean categorizes the brain into three main regions or separate brains—the Reptilian (or R-complex), the Mammalian (or Limbic), and the Neo-Mammalian (or Neo-Cortex). The reptilian brain controls physical survival and basic needs (flight or fight responses). This is our most primitive "brain." The second brain—the Mammalian—houses both the hippocampus and amygdala—the primary centers for emotion and memory. Lastly, the most advanced part of our brains, according to MacLean, is our Neo-Cortex. It is here where we use higher order thinking skills—synthesizing, logical and operational thinking, speech, and planning for the future (Caine & Caine, 1994).

In this model, the brain has the capacity to "shift" up or down depending on perception of the immediate environment. Perceived threat can force the brain to "downshift" to lower order thinking (Hart, 1983). Yet, heightened challenge and stress, referred to as eustress, can invite an up-shift response into higher order thinking skills in the neo-cortex. Recent research has suggested that the chemical and physiological responses to stress and threat are radically different (Caine & Caine, 1994). Psychological models also support a difference between perceived challenge and threat (Csikszentmihalyi, 1991). This idea is expressed in experiential pedagogy through the concepts of adaptive dissonance and the "comfort zone." In both cases, the facilitator or teacher intentionally places the learner in stressful situations to encourage and invite new adaptive behaviors and mental models that may be more successful or effective for the learner.

Caine and Caine (1994), suggest that specific learning conditions can create situations of up-shifting or downshifting. Downshifting can occur when "pre-specified 'correct' outcomes have been established by an external agent; personal meaning is limited; rewards and punishments are externally controlled; restrictive time lines are given; and the work to be done is relatively unfamiliar with little support available" (Caine & Caine, p. 84). By contrast, to create up-shifting conditions "outcomes should be relatively open ended; personal meaning should be maximized; emphasis should be on intrinsic motivation; tasks should have relatively open-ended time lines; and should be manageable and supported" (Caine & Caine, p. 85). Emotions also play a critical role in both memory encoding and threat perception (LeDoux, 1996). Too little emotion and the brain has a difficult time "tagging" the material for long term memory. Too much emotion and the situation may be perceived as threatening, causing a downshift in mental functions (Brandt & Wolfe, 1998).

Practical applications of the stress/threat principle are numerous and exciting for the experiential field. Experiential pedagogy, with its emphasis on novelty, interpersonal interaction, challenge by choice, and the use of emotions such as play, fear, and humor, is uniquely suited to address stress/threat balances. Understanding how these brain compatible principles can be strengthened by experiential learning opens the possibility for meaningful dialogue with mainstream education.

Quick Tip #4: To lower threat levels early in your program, make a strong emphasis on relationship building both peer-peer and teacher-student. Work the group from the "inside-out" by making a conscious effort to spend personal time with as many students as possible, either on the trail or at water breaks. Work the group "outside-in" by facilitating highly interactive experiences like paired shares, new games, or trust activities.

Quick Tip #5: Use the 60/40 rule for planning your lesson plans. Sixty percent of your experiences should be ritual based activities that are repetitive (like morning check-ins, skill progressions, warm-ups, or post-activity debriefs) to allow your participants to experience known activities in an unknown environment. But be sure to make approximately 40 percent of activities novel. The introduction of elements of suspense, surprise, and disorder keep learners engaged and can be an effective way to manage attention spans. Instead of circling up every time, "rhombus-up" with your group every so often. Mix-up de-briefs by using paired shares, group reports, or silent journaling instead of large group discussion. Introduce skill sections playfully with characters and costumes (knots with Ivana Climbalot, or baking with Chef Boyarentyouhungry).

Conclusion

Evidence and theories from the Brain Compatible Approach support much of what we do. Understanding the human brain's tendency toward pattern and "meaning-making" reinforces the intentional use of reflection and synthesis in experiential education. Viewing the brain as a parallel processor encourages the creation of enriched environments for learners. Experiential methodology facilitates such enriched environments through challenge, social interaction, feedback, and active participation. Finally, the differences between stress and threat responses support our pedagogical approach including the effective use of emotion and the importance of novelty and choice. Recent developments in brain research should also push us toward new questions and research queries. What is the role of emotion in experiential education? How do we define, operationally, the differences between stressful and threatening experiences and responses? How is the mind-body connection supported in current brain research? What part can experiential methodology play in the creation of enriched classroom environments?

We must move beyond mere "learning by doing" for our fields' philosophical underpinnings and practical approaches to become more influential in mainstream education. Using only the learning by doing definition, experiential education becomes nothing more than activities and events with little to no significance beyond the initial experience. One educator recently told me she calls this the "Inoculation Effect" (shoot 'em up; hope it takes). This was not John Dewey's vision and it cannot be our lasting legacy. Many of us entered this field after becoming disenchanted or burned-out on mainstream educational practice. We have also seen the remarkable changes and results that can occur through experiential learning. We believe very strongly that it works. Yet, as a field, we remain long on practice and short on theory and research. The Brain Compatible Approach is one avenue for helping experiential educators articulate how and why the methodology is effective.

How can we achieve more legitimacy while holding fast to our principles? Moves toward identifying the philosophical approaches of experiential education should be encouraged (Itin, 1999). Efforts must be made to increase both qualitative and quantitative research that cross into mainstream education. As educators, we also have a responsibility to learn about our field. At a recent AEE conference, I was surprised to learn how few experiential education practitioners knew of E.D. Hirsch—one of the strongest critics of progressive approaches and a major figure in the standards-based movement. Hirsch defines learning by doing as "a phrase once used to characterize the progressivist movement but little used today, possibly because the formulation has been the object of much criticism and even ridicule" (Hirsch, 1996, p. 256). With critics like this and few legitimate platforms from which to respond, it is not surprising that experiential education remains largely locked out of our schools. Knowing some of the latest trends and movements within the fields of education, psychology, and sociology will strengthen our voice and message.

While there is value in experiential education's subversive, outside-the-mainstream persona, we must also seek ways to come in from the "outside," invite dialogue, and encourage interaction across disciplines. The Brain Compatible Approach, as a promising new area of research and study, offers an excellent opportunity to do just that. In the next 20 years, will experiential education be a program (like field trips, ropes courses, and character education) to be implemented in schools or, will it be a broader, pedagogical foundation from which to work? The future depends on how we live that question.

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