Why *Mind, Brain, and Education*? Why Now?

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The International Mind, Brain, and Education Society has launched *Mind, Brain, and Education* to promote the integration of the diverse disciplines that investigate human learning and development—to bring together education, biology, and cognitive science to form the new field of mind, brain, and education. Human beings are unique in their ability to learn through schooling and diverse kinds of cultural instruction. Education plays a key role in cultural transformations: It allows members of a society, the young in particular, to efficiently acquire an ever-evolving body of knowledge and skills that took thousands of years to invent. It is time for education, biology, and cognitive science to join together to create a new science and practice of learning and development.

The remarkable new tools of biology and cognitive science open vast possibilities for this emerging field. The discovery of powerful brain-imaging tools; the remarkable, burgeoning discoveries that are transforming genetics; and the growing power of methods for assessing cognition, emotion, and learning make possible an alliance that can illuminate human learning and development (Fischer, Immordino-Yang, & Waber, 2007; Stern, 2005). As hidden processes in the brain and body become visible, researchers and educators can begin to observe the biological effects of educational interventions and relate them to outcomes in learning and development. This new approach can simultaneously inform effective practice and build fundamental knowledge about the ways that children and adults learn and develop. What enables human beings to acquire cultural tools like writing and mathematics and to build and use knowledge in science and the arts that goes far beyond their personal experience? What are the principles for designing schools and other educational settings to optimize effective learning and healthy development?

Answering key questions about mind, brain, and education requires reciprocal interaction between scientific research and practical knowledge of educators and caregivers. There must be a dynamic interaction between scientific research and practical knowledge, with practice shaping scientific questions as much as research shapes practice. For example, research in neuroscience and genetics gains different meanings and values as educators and caregivers translate it to practice, connecting it to the ways that children act and learn in schools and communities. Reading a book in school or at home is not the same as reading words in a laboratory study of reaction time. Adding brain imaging or genetic analysis may illuminate the reaction-time processes, but it will not bridge the distance from reactions to words in the laboratory to reading in a classroom or a living room. "Results from such a laboratory context seldom apply felicitously to the classroom" (Fischer et al., 2007, p. 4). There can be no direct transfer of insights from neuroscience and genetics to classroom practice, but only transfer mediated through a joining of practice with research.

To connect mind, biology, and education, research must move beyond the ivory tower into real-life settings, and educational practices must be available for scientific scrutiny (Shonkoff & Phillips, 2000; Snow, Burns, & Griffin, 1998). Such a reciprocal process between research and practice is at the foundation of modern medicine, where medical practice is grounded in biology and, at the same time, medical applications of biological knowledge require independent empirical tests. For scientists to carry out useful research for education and for teachers to optimally educate based on research evidence require interweaving the perspectives of research and practice. Biology and cognitive science have as much to learn from education as education has to learn from them.

During recent decades, various scientific fields have advanced the understanding of human learning and development. Empirical research on the effectiveness of schooling and education has become more common, thanks in part to international comparisons of school achievement and classroom

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practice. Research evidence is beginning to produce a better understanding of what powerful learning environments look like as well as detrimental features of instructional interventions. Thanks to this kind of research, policy makers and practitioners can begin to base their decisions about educational practices and institutions on empirical evidence rather than opinions, fashions, and ideologies.

At the same time, society has high expectations, often unrealistic, about what neuroscience and genetics can bring to education. The exploding new knowledge in biology has led to expectations that can distort the connections between research and practice in education. Educators, scientists, and journalists energetically pursue the connections, often in the form of sound bites and overly simple messages about what "research shows" (Bruer, 1997). It is a trap to assume that scientific research by itself will answer important questions in education. New findings on brain functioning, for example, require judicious interpretation, followed up by research that tests their application to the classroom. Equally important, decisions about how to educate require not only scientific information about what is effective but also decisions about what is valuable, including both what should be taught and how communities, schools, and teachers should organize the institutions that support learning and development (Sheridan, Zinchenko, & Gardner, 2005).

Scientists sometimes argue that relating biology to education is premature: They say that science first needs to answer the deep questions about how the mind/brain works. To the contrary, we affirm that research in educational settings will shape the great discoveries to come concerning basic biological and cognitive processes in learning and development. Research in practice settings is essential for the field of mind, brain, and education, in the same way that research in medical settings is essential for knowledge about medical practice.

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