A few years ago, while attending the Learning and the Brain Conference at Harvard University, I listened to Patricia Kuhl, Director of the University of Washington-Seattle’s Institute for Learning and Brain Sciences, present her neuroscientific research findings on early childhood language development. As I scanned the crowd of hundreds in attendance, I was impressed by the number of K-12 educators. They came to learn about the emerging field of cognitive neuroscience and to find possible applications to the classroom. Later that day, I attended Marielle Hardiman’s session on her Model of Brain-Targeted Teaching (Hardiman, 2003). This highly successful middle-school principal described classroom applications of neuroscientific principles that were consistent with decades of research in educational psychology. I was fascinated with how research using brain technology had confirmed many of the principles derived from research in learning and cognition. Here I was, an educational psychologist, attending a conference where a cognitive neuroscientist and a middle-school principal were talking the same language—a language I assumed many educational psychologists (myself included) had yet to fully understand.

I recall running into another educational psychologist during the conference—Virginia Berninger, co-author of the comprehensive and meaningful text, Brain Literacy for Educators and Psychologists (Berninger & Richards, 2002). After reading her book, I was again intrigued by how many of the principals derived from brain-imaging studies were consistent with applications of cognitive psychology. I attended the conference the following year and continued to read more about research accumulated during the “Decade of the Brain” (1990–1999). I then contacted Patricia Alexander, Editor of Contemporary Educational Psychology (CEP), about the possibility of a special journal issue on brain research and academic learning and motivation. She enthusiastically supported the idea and suggested I enlist the help of Karen Murphy, another CEP editorial board member interested in the topic. Together, we set out to solicit manuscripts from authors who were knowledgeable about both cognitive neuroscience and its implications for teaching and learning. The four articles published in this special issue fulfilled that quest.

All articles in this special issue underwent thorough review by at least one person with expertise in cognitive neuroscience and at least one in the field of learning and cognition/motivation. Two of the articles (Immordino-Yang & Sylvan, this volume; Kim et al., this volume) evolved from papers presented during a session on neurobiological research held at the 2009 annual meeting of the American Educational Research Association. In this issue’s lead article, Helen Immordino-Yang, of the University of Southern California’s Brain and Creativity Institute, and Lesley Sylvan, Harvard Graduate School of Education, summarize research using functional magnetic resonance imaging (fMRI) technology to study brain and psychophysiological correlates of emotions that emanate from admireing the virtue of others. Participants in their study were scanned, using fMRI, while they viewed brief reminders of case studies presented previously about people performing either highly virtuous and admirable acts (e.g., a blind German woman invents a computerized Tibetan Braille system and opens a school in Tibet for blind children) or interesting but fairly commonplace achievements (e.g., a high school student organizes a drama production and donates the proceeds to the school library). The brain scans revealed activation of nonconscious low-level brain regions, responsible for basic life regulation, were associated with admiration for virtue. As the authors suggest, low-level physiological processes related to survival and bodily sensation may, therefore,—in addition to conscious, cognitive processes—contribute to intrinsic motivation and provide the power or “punch” behind it.

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Research and Development Center, employed electroencephalography (EEG) technology to record adult readers’ event-related potentials (ERPs) while they performed semantic judgment tasks. Adults of varying reading abilities learned previously unknown rare English words (e.g., gloaming) under one of three conditions: (a) orthography/meaning (i.e., spelling and meaning, but not pronunciation); (b) orthography/phonology (i.e., spelling and pronunciation, but not meaning); and (c) phonology/meaning (i.e., pronunciation and meaning, but not spelling). Following the learning phase, the participants’ ERPs were recorded while they performed semantic judgment tasks about the meanings of the learned words. The results indicated less-skilled readers may not be as efficient as skilled readers in recognizing they have experienced a word previously, which could impede future learning when they encounter the word again. The ERP recordings also suggested that less-skilled readers may benefit more from orthographic (i.e., spelling) information linked to the meaning of a word than from phonological information.

Next, Victoria Molfese, Dennis Molfese, Kathleen M. Rudasill, Peter J. Molfese, Natalie Armstrong, and Gillian Starkey report on research conducted at the Developmental Neuropsychology Center for Research in Early Childhood at the University of Louisville. The authors used EEG technology to record ERPs of 6- to 8-year olds. The children’s brain wave signals were recorded while they performed the Directional Stroop Test (DST), intended to measure working memory and inhibitory control. Results indicated that ERP responses were related to DST performance, providing criterion-related validity evidence for the DST. In turn, the children’s DST performance was correlated with their response to the Knock-Tap Task, a low-cost and easy-to-administer assessment of executive function (EF). The authors conclude that the Knock-Tap Task may be an efficient way for classroom teachers to identify children with poor EF skills.

In the final article, Sung-il Kim, Myung-Jin Lee, Yoonkyung Chung, and Mimi Bong, all from the Department of Education and Brain and Motivation Research Institute (bMRI) of Korea University, report on fMRI scanning of college students while they performed perceptual judgment tasks. During practice trials, the experimenters manipulated each student’s perceived competence by providing bogus feedback. The experimental tasks required participants to judge whether the letter sets presented on a computer screen contained more than three instances of a target stimulus (i.e., the letter “T”). Participants were presented with either percent correct (i.e., criterion-referenced feedback) information or their percentile rank (norm-referenced feedback) following each of several performance trials. Different regions of the brain were activated depending on not only the type of feedback received but also the levels of perceived competence while receiving the feedback.

Taken together, the articles in this special issue are examples of how brain-imaging technology can inform educators and psychologists about neural processes that underlie student learning and motivation. As these researchers continue to apply this technology to investigations of academic learning and motivation, and as they replicate their findings across different individuals and tasks, new principles and applications may emerge. More importantly, perhaps, research on the brain should continue to confirm principles of learning and motivation developed from the past several decades of research in cognition. The authors in this issue represent but a handful of researchers who are engaged in this growing field of educational neuropsychology. Others include faculty and students at the University of Washington’s Multidisciplinary Learning Disabilities Center; Harvard University’s Mind, Brain, and Education Program; and John Hopkins’ graduate certificate program in Mind, Brain, and Teaching, to name a few.

As the field of educational neuropsychology expands, and as neuropsychologists continue to talk directly to teachers, educational psychologists will need to learn more about neuroscientific research methods and principles. This raises an identify question that has plagued educational psychology since its conception (Glover & Ronning, 1987). Should educational psychologists play the role of the middle-person who simply translates neuropsychological research findings to make them educationally relevant, or should they take the lead in applying neuroscientific research to educational problems? The authors of this special issue have chosen the latter, more prescriptive role, which is consistent with the view that

An effective educational psychologist would need an intimate understanding of the subject matter being investigated; the population receiving instruction; and would develop psychological principles that would be specific to those situations (Andre & Hegland, 1990, p. 246).

Most cognitive neuroscientists are probably not closely tied to the classroom; they therefore lack knowledge about K-12 students and about specific classroom situations. In contrast, some educational psychologists observe and interact frequently with K-12 teachers and students. They can do much to inform cognitive neuroscientists about important applied research questions.

Other educational psychologists, however, may prefer the middle-person role of translating neuroscientific research findings and principles to college students and classroom teachers. Because educational psychologists are knowledgeable about principles of cognition and motivation, they can communicate to educators which principles have been confirmed by brain-imaging research methods. Cautionous application of neuroscientific findings is possible when educators are fully informed about which findings “make sense” in terms of what is already known about learning and motivation. Furthermore, educational psychologists can help to dispel myths that surround applications of brain science (e.g., right-brain vs. left-brain learning styles).

Regardless of which role they choose, educational psychologists can be of great service. They can serve on cognitive neuroscience research teams that address problems in classroom learning and motivation. In time, as work in this area continues, perhaps Contemporary Educational Psychology could even adopt a journal subsection devoted exclusively to educational neuropsychology.

References