

TEACHING & LEARNING

**Contemplative Neuroscience and the Teaching of Writing:
Mindfulness as Mental Training**

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Introduction

The term “contemplative science” is relatively new, most commonly credited to Allan Wallace and his 2007 book *Contemplative Science: Where Buddhism and Neuroscience Converge*, but perhaps better explained by Robert Roeser and Philip Zelazo in their 2012 article:

Contemplative science is a transdisciplinary project aimed at understanding the effects of various kinds of mental and physical training (such as mindfulness meditation and tai chi) on the body, brain, and mind at different stages of the lifespan. As such, the goals of contemplative science are to create new knowledge regarding human plasticity and to generate new forms of human services that optimize development.¹

Contemplative neuroscience, then, is the subset of studies that deal specifically with the effects of contemplative practice on the brain and cognition. Although the term contemplative neuroscience is fairly new, the neuroscientific study of contemplative practices—as noted by Cahn and Polich—has been conducted for almost fifty years (180). Of course, the methods of data collection in these studies have changed over time, as the technology itself has advanced. While electroencephalograms (EEG) were the *modus operandi* during the 50s-80s, since the 90s, functional magnetic resonance imaging (fMRI) has become increasingly popular in contemplative neuroscience studies.

Even though some EEG studies of contemplative neuroscience date back to the 50s, up until recently, most of the studies conducted on meditation have investigated the clinical benefits of meditative practices, as opposed to the effects on cognitive functions. For example, a number of clinical trials have proven that meditation can help alleviate symptoms associated with cardiovascular health problems, cancer, chronic pain disorders, sleep disorders, anxiety disorders, substance abuse problems, and psychological trauma, just to name a few (e.g., Kabat-Zinn, Horowitz). In addition to helping people with illnesses, a large number of studies have also linked meditation to stress management. In fact, due to the work of Kabat-Zinn and the development of his Mindfulness Based Stress Reduction (MBSR) program, stress management is one of the most well-known benefits

1. See article abstract at <https://experts.umn.edu/en/publications/contemplative-science-education-and-child-development-introductio>

of meditation. However, over time, researchers have become increasingly interested in the cognitive correlates of meditation. In particular, many researchers have explored the ways in which various forms of meditation affect executive function or cognitive control, self-regulation, attention, and working memory. In addition to noting changes in behavior and performance due to the practice of meditation, these researchers have also noted that meditation can actually change the structure of the brain (Lazar et al., Pagnoni and Cekic, Vestergaard-Poulsen et al.). For example, Lazar et al. found that “the brain regions associated with attention, interoceptive and somatosensory processing are thicker in meditators compared with controls and also that the regular practice of meditation may slow age-related cortical thinning” (Guleria 462). Other studies have also shown that contemplative practice—specifically Buddhist Insight meditation—can result in increased gray matter density in the brain stem of long-term meditators (Lazar et al.).

Although all of this research falls under the umbrella of contemplative neuroscience, what I will review in this article will be specific to the studies that explore the effects of contemplative practice—specifically mindfulness practices—on the cognitive processes involved in the production of text. One caveat to this research is that it is still very new and that these studies have some limitations. The most notable of these limitations is that there may often be subtle differences between the control and experimental groups that take part in these studies, which could influence the data. In other words, no sure way can rule out the possibility that people who choose to engage in meditation don’t also have a greater ability to attend, or a greater working memory capacity, than those who choose not to engage in meditation. Some researchers have found a way around this conundrum by opting not to use experienced meditators in their experimental group, and instead, briefly train their experimental group in a particular meditative practice directly prior to conducting their experiment. Even though this research is very new and has some inherent limitations, the data mined from these experiments has provided some significant and valuable insights into how cognitive processes function within the brain, and on the brain’s ability to change—at the neuronal level—as a result of external stimuli. This quickly growing body of research should not be neglected by educators because of its “newness,” but embraced because of the great potential it holds to inform the practice of teaching.

Cognitive Neuroscience, Plasticity, and Mental Training Research in Education

The research on contemplative neuroscience and education is not the only body of research to suggest that the brain can be changed as a result of external stimuli. In fact, since the 70s and 80s, the field of cognitive science has come to fully embrace the idea that neuroplasticity is a fundamental property of the brain, replacing the earlier conception of the brain as largely static and immutable. Neuroplasticity is the “capacity of neurons and neural networks in the brain to change their connections and behavior in response to new information, sensory stimulation, development, damage, or dysfunction” (“Neuroplasticity”). Recently, educational researchers have begun to apply neuroscientific findings, such as the property of neuroplasticity, to their research on learning and teaching. In short, what this research generally attempts to prove is that 1) the brain can be trained, and 2) educational researchers can use this knowledge to inform their

research and discover more effective ways of teaching. Before I conduct a review of the research on the cognitive processes involved in the production of text, I will first review some of the research that supports the practice of using neuroscience to inform education, more broadly speaking. By doing so, I will begin to establish a rationale for the use of contemplative practice as a form of cognitive training, in the next section.

The idea of neuroplasticity has quickly developed traction with a broad audience. For example—although their effectiveness is in dispute—brain-training programs like Lumosity and Happify claim to be able to “allow anyone to train core cognitive abilities” by participating in their online games and activities (“About Lumosity”). In addition to these mass-market applications, educational researchers have—on a much smaller scale—explored the ways in which the brain can be trained, as well as the benefits cognitive training can provide in comparison to traditional instructional methods. For example, Green and Bavelier lament the fact that “learning tends to be quite specific to the trained regimen and does not transfer to even qualitatively similar tasks” (692). Instead of perpetuating this learning paradigm, Green and Bavelier suggest that educators (although they are specifically talking about the education of adult learners) should adopt a “training-induced learning” model. They argue, that educators need to explore training-induced learning because: “Although myriad examples of highly specific learning exist, only a handful of training paradigms have been established where learning seems more general. These learning paradigms are typically more complex than laboratory manipulations and correspond to real-life experiences, such as action video game training, musical training, or athletic training” (693). Green and Bavelier surmise that the primary difference between these “natural training regimens” and other less authentic methods of training (e.g., some of the regimens that have been specifically designed for the purpose of brain training) is that the natural training regimens are “exceedingly complex and tap many systems in parallel” (696). Therefore, Green and Bavelier suggest that educators develop training models that are based on the principles that govern video game experience, musical training, and athletic training (i.e., training that seeks to activate a number of cognitive systems like memory, attention, motor skills, etc.). These more complex training regimens, they posit, yield more generalizable and transferrable knowledge than training models that are overly task specific.

In general, there has been an influx of research over the past fifteen years that argues for more cross-talk between the fields of neuroscience and education. For example, Katzir and Pare-Blagoev note that “cognitive neuroscience provides a window in real time to the brain’s structures and functions. Understanding the relationship between different brain structures and their functions can help scientists understand how these relate to learning and development” (54). Some educational researchers have even made explicit connections between the cognitive processes involved in the production of text and recent findings in cognitive neuroscience. For example, Berninger and Richards argue that by drawing upon “available brain imaging and developmental research,” it is possible “to propose how a writing brain might be constructed from other brain systems,” and in general, gain useful information about what happens in the brain when we write (168).

Although, up till now, brain training—within an educational context—has largely been conceptualized around a computer game model, there is no reason why it could not also be conceptualized around a contemplative practice model. In the next section, I will

review research that shows how contemplative practice does change the brain at a neural and functional level and can be understood as a form of brain training. Since “transfer of knowledge” is a concept that seems to be of great concern within composition instruction right now, the fact that brain training can lead to greater knowledge generalizability and transferability may be reason enough for writing instructors to consider implementing a cognitive training approach in their classrooms.

Contemplative Practice as a Means of Cognitive Training

In addition to the research that connects neuroscience and education, a growing amount of research connects *contemplative* neuroscience and education (Hart, Roeser and Zelazo, Waters, et al.). The primary argument made in much of this scholarship is that contemplative practice works as a form of cognitive and affective training, and the skills or traits that it enhances directly facilitate the learning process. Moreover, Davidson, et al. identify:

. . . a set of mental skills and socioemotional dispositions that are central to the aims of education in the 21st century. These include self-regulatory skills associated with emotion and attention, self-representations, and prosocial dispositions such as empathy and compassion. It should be possible to strengthen these positive qualities and dispositions through systematic contemplative practices, which induce plastic changes in brain function and structure, supporting prosocial behavior and academic success in young people. (146)

At the same time, “contemplative practice” is a broad umbrella term, under which the terms *mindfulness meditation* and *meditation* reside. In other words, although mindfulness meditation and meditation are both contemplative practices, the two terms do not have the same meaning. Whitebird, et al. explain:

Meditation is broadly defined as the intentional self-regulation of attention, with practices generally falling into two categories: those emphasizing concentration and those emphasizing mindfulness. An example of a concentrative practice is Transcendental Meditation, which includes the use of mantras (sounds or phrases used repetitively) to concentrate attention. Mindfulness practices, in contrast, focus on cultivating a nonjudgmental present moment awareness of the inner and outer world.

Both types of meditation are often associated with relaxation techniques; meditation, however, is fundamentally different in both its method and objective. Rather than seeking a state similar to deep relaxation in which bodily tension is released, the overall orientation of meditation is one of nonstriving and nondoing. (227)

While mindfulness meditation and meditation overlap in a number of ways, their primary difference resides in their distinct goals: nonjudgmental presence vs. concentrated attention. Due to the fact that the research on contemplative neuroscience and education is still relatively new, I will include studies in this section that explore the integration of both meditation and mindfulness meditation in order to illustrate the broader conversation that is taking place.

Aside from the more general research on contemplative neuroscience, which aims to

prove that contemplative practices can be used as a form of mental training within schools and education programs, another body of research explores the relationship between contemplative practice and specific cognitive processes. In order to support my claim that contemplative practices can be used as a form of mental training during the *writing process*, I will focus the rest of this section on exploring the literature that directly links contemplative practice to executive function and self-regulation, attention, and working memory—cognitive processes that have already been identified as essential to the writing process (see Baddeley, Kellogg, Hayes, Chenoweth and Hayes, Torrance and Galbraith, Quinlan, et al.). When discussing how the brain functions at a cognitive level, separations between the various cognitive processes are not always clear-cut or precisely defined.

Executive Function and Self-Regulation

Although executive function (EF) is frequently used as an umbrella term that encompasses all of the other cognitive processes—indeed, it does play a role in many of these processes—the defining characteristic of EF is its function as a monitoring and management system—in other words, cognitive control. Because EF has such a large responsibility, it is not surprising that researchers have noted that EF skills “degrade easily and are depletable” (e.g., Davidson, et al. 149). Furthermore, as Yi-Yuan Tang, et al. explain, deficits in components of EF can have “a host of negative outcomes across the lifespan, including behavior problems, aggression, antisocial behavior, inattention, attention deficit hyperactivity disorder (ADHD), problems with peers, school failure, depression, and substance abuse during childhood and adolescence” (“Improving Executive Function,” 361). On the other hand, “higher levels of these EF components have been associated with positive developmental outcomes, including improved ‘on-task’ behavior, better perspective-taking skills, and greater self-efficacy, mastery, self-esteem, professional attainment, and relationship success, as well as positive social, emotional, behavioral, economic, and physical health outcomes” (362). Fortunately, many researchers in contemplative neuroscience have been able to discover positive correlates between meditative practices and EF that can serve educators, especially instructors of writing. Tang et al. review research which indicates that the practice of Integrative Body-Mind Training (IBMT—a mindfulness-based rather than traditional meditation) is associated with improvements in EF (“Improving”). A number of studies corroborate Tang et al.’s findings (e.g., Wenk-Sormaz, Bowen, et al., Moore and Malinowski, Chiesa and Malinowski).

Also referred to as “self-control,” this cornerstone ability is essential for things like intellectual performance (Schmeichel et al.), impression management (Vohs et al.), and even emotion regulation (Compton et al.).” Although self-control is important in its own right, it is also a key component of self-regulated learning, which is connected to motivation. Likewise, some studies show a correlation between contemplative practice and self-regulated learning and motivation. For example, Robert Roeser and Stephen Peck argue that the skills fostered by contemplative practice are:

. . . relevant to motivation and self-regulated learning because of the functions they serve, including (a) the conscious inhibition of undesirable but dominant (and activation

of desirable but nondominant) response tendencies, (b) the conscious monitoring and updating of information during goal pursuit and learning, and (c) the conscious reflection on existing, and reconstruction and encoding of new, representational content. (128)

In general, there are a number of studies that support the claim that contemplative practice aids EF/self-control—be it through increasing self-awareness or fostering motivation—and that EF is very important in the learning process.

Attention

Before discussing the connections between attention and contemplative practice at length, it is important to understand that almost all meditative practices can be categorized as either focused attention or open monitoring meditation. Kozasa, et al. explain the difference between the two categories as:

. . . focused attention meditation (FA), which entails the voluntary focusing of attention on a chosen object, such as mindfulness of breathing and mantra meditation; and, open monitoring meditation (OM), which involves non-reactive monitoring of the content of experience from moment to moment such as “zazen,” the Zen traditional sitting meditation. FA and OM are often combined, whether within a single session or over the course of a practitioner’s training (Lutz et al., 2008). Regular meditators usually have different levels of expertise in both categories. (746)

In this sense, meditation is *always* an activity that trains attention. This constant is undoubtedly why there is so much research that discusses the effects of meditation on attention. I will discuss just a few of these studies in order to provide an overview of some of the more significant findings.

One of the most salient findings of recent research which has been substantiated by a number of studies is that experienced meditators not only tend to develop a greater ability to focus and maintain attention, but that they also activate fewer of the brain regions associated with attention when engaged in an attentional task, as compared to non-meditators (Brefczynski-Lewis et al., Jha, Jha, et al. “Mindfulness,” Lutz et al., MacLean). Lutz et al., explain this phenomena by saying that, initially, the meditator’s brain must engage a number of different neural systems associated with attention to maintain attention on a given task, such as noticing the breath (Lutz, et al., “Attention Regulation”). However, over time, as the meditator becomes more practiced at her art, she requires less cognitive effort to focus and sustain attention, “resulting in a form of effortless concentration” (“Attention Regulation” 164). Other researchers, such as Kozasa et al., have conducted similar studies which corroborate and expand on these findings. In addition to linking experience in meditation with decreased effort in focusing attention, Kozasa, et al.’s research indicates “that this ability can also be generalized for attention tasks outside formal meditation practice. If this is the case, meditation can have sustainable effects in brain circuitry and behaviour related to attention abilities” (749). In other words, Kozasa, et al.’s findings indicate that practicing meditation can, over time, change the neural substrates of the brain and allow for more ease in focusing and maintaining

attention in general.

One important thing to note in this body of research is that most of these studies were conducted with “experienced” meditators—that is, meditators who have practiced for years or months, not novice meditators. A growing body of research, though, does study the effects of short-term meditation practice on cognitive processes such as attention (Zeidan et al.). For example, Tang, et al. found that “a group randomly assigned to 5 days of meditation practice with the integrative body–mind training method show[ed] significantly better attention and control of stress than a similarly chosen control group given relaxation training” (“Short-term,” 17152). This study implies that even short-term experience with meditation could change neural networks, thereby having a lasting effect on one’s ability to attend. Other studies corroborate this claim by showing that practicing meditation can actually alter the “baseline” or “default” mode of brain functioning (Lutz et al. “Mental,” Hasenkamp et al.).

Hodgins, et al. provide another interesting study on attention connecting one’s ability to visually perceive stimuli with meditation experiences. They first reviewed previous studies and data to show that 1) certain cognitive factors—like self-related beliefs or constructs—can directly affect how we perceive visual stimuli, and 2) meditation contributes to the “gradual de-construction” of self-related beliefs, which may affect perceptual bias. Their hypothesis, then, was that “meditation is associated with superior visual perception” (873). In order to test this hypothesis, the researchers used five separate measures of “perceptual attentional processing in adults who were regular meditators and in age-matched non-meditators,” including “change blindness, sustained inattention blindness, visual concentration, perspective-shifting, and selective attention” (873-4). Their results showed “substantial support” for this hypothesis. Additionally, this study was unique because—unlike some other studies, which tested participants while they were meditating or immediately afterward—this study tested participants outside of the context of meditation, thereby “demonstrating that meditators’ better attentional processing [was] stable enough to manifest itself beyond the immediate practice context, or in other words, ‘off the cushion’” (877). Thus, this study and the others reviewed in this section illustrate that meditation—even short-term meditation—can have positive, lasting effects on the brain’s ability to attend, and these beneficial effects can transfer to other contexts in which a person needs to focus and maintain attention.

Working Memory

Although up till now, attention has been the primary focus of much of the research on the effects of contemplative practice on the brain, researchers are increasingly turning their sights toward working memory. This turn may in part be due to the fact that researchers have begun to better understand the interrelationship between attention and working memory (Awh et al., “Interactions”), and specifically between visuospatial attentional processing and spatial working memory (Awh and Jonides, “Overlapping”; Jha, “Tracking”; Smith and Ratcliffe). What these researchers have found is that visuospatial processing is intrinsically linked to working memory. As Jha explains, “Spatial working memory is a cognitive brain mechanism that enables the temporary maintenance and manipulation of spatial information. Recent neuroimaging and behavioral

studies have led to the proposal that directed spatial attention is the mechanism by which location information is maintained in spatial working memory” (“Tracking” 61). Visuospatial processing accordingly links attentional processes to working memory. Therefore, many of these studies suggest that improving one’s ability to attend may also improve their capacity for working memory. Smith and Ratcliffe note that “attention increases the efficiency of VSTM [visual short-term memory] encoding, either by increasing the rate of trace formation or by reducing the delay before trace formation begins” (283). Contemplative neuroscience research has also made connections between visuospatial processing and working memory. Kozhevnikov, et al. discuss the results of their study, which indicate that: “Deity Yoga practitioners demonstrated a dramatic increase in performance on imagery tasks compared with the other groups. The results suggest that Deity meditation specifically trains one’s capacity to access heightened visuospatial processing resources, rather than generally improving visuospatial imagery abilities” (645).

Findings like these may have significance for instructors who are interested in developing their students’ working memory capacity through the use of contemplative visualization practices.

In addition to the research that brings together visuospatial processing and working memory, a number of other studies have been conducted that also discuss the effects of contemplative practice on working memory, more broadly speaking. Chambers, et al. conducted a study in which twenty novice-meditators participated in a ten-day intensive mindfulness meditation retreat. At the end of this retreat, “the mindfulness training group’s working memory capacity was significantly enhanced,” a finding which “suggests that mindfulness practice may increase working memory capacity” (315). A number of other studies have had similar findings, including the study conducted by Mrazek, et al., who showed that “Mindfulness training improved both GRE reading-comprehension scores and working memory capacity while simultaneously reducing the occurrence of distracting thoughts during completion of the GRE and the measure of working memory” (776). In other words, improvements in the performance of these tasks seem to correlate with improvements in working memory capacity. This is a significant finding because it highlights the fact that “training studies frequently target a single ability” (e.g., see Klingberg 317), yet performance might be enhanced more generally by interventions that target a cognitive process underlying performance in a variety of contexts” (Slagter, Davidson, & Lutz 776).

Other studies have addressed different aspects of the relationship between contemplative practice and working memory (e.g., van Vugt and Jha). Instead of just determining whether or not mindfulness training would have an impact on working memory, they also wanted to know *why* meditation appeared to have an effect on working memory. Their findings suggested that meditation improves working memory capacity because “MT [mindfulness training] leads to improved information quality and reduced response conservativeness” (344). In other words, MT positively impacts the way that information is perceived and stored, as well as the time it takes a person to respond to a question, hit a button, etc. These improvements in perception, storage, and response time (RT) are widely believed to be a result of the improved attentional orientation that correlates to MT. Another study, conducted by Jha and Stanley, indicates that MT

can have a “protective” effect on working memory capacity. Jha and Stanley, who were interested in the effects of MT on people operating under great stress, conducted this study with pre-deployment military service members. Their findings suggest that:

MT practice might serve as a way to cultivate a WMC ‘reserve’ that could be used in demanding contexts to protect against such functional impairments [as cognitive failures and emotional disturbances]...In sum, the current study suggests that WMC may be bolstered by MT practice and that MT practice-related improvements in WMC may mitigate negative affect (62).

Although the college composition classroom does not necessarily constitute a high-stress environment, undoubtedly some stress is inherent in composing at the college level. The findings of this study may be useful to writing instructors seeking to ameliorate some of this stress while improving working memory capacity.

Contemplative Practice in the Writing Class

As stated earlier, the correlations that can be made between contemplative neuroscience and the writing process are—at this point in time—primarily speculative because we still don’t have enough empirical research that explicitly tests and measures the links between the two. This is one area of composition research that is in dire need of attention. Despite the lack of empirical support, interest is growing among writing instructors to implement contemplative practices in the writing class. The increasing number of panels on contemplative practice and writing at the College Conference on Composition and Communication over the past few years bears witness to the interest, as well as the development of a new Contemplative Practice and Writing Special Interest Group at this national conference.

In the following section, I will share some writing-class activities I have created that implement contemplative practice at least to the degree that I believe they engage students in forms of cognitive training. Until we collect empirical evidence on the potential for these practices to foster specific cognitive processes—and in turn facilitate the writing process—I will remain speculative about their effects. Specifically, I will share three assignments: an observation essay, an essay that explores a metaphor, and a reflective research journal.

The “Mindfully Observing Your World” Essay

The first assignment I will discuss is a creative non-fiction assignment I adapted for a fall 2014 upper division composition course titled “Writing into Awareness”—which could be easily modified for a first-year composition course as well.² Essentially, the assignment asks students to do one of two things. Option one requires students to immerse themselves in a familiar, everyday routine (e.g., going to the gym or walking the dog), but instead of going about that routine on auto-pilot, students must observe

2. This assignment is an adaptation of an assignment developed by Tammie M. Kennedy at the University of Arizona for use in her English 306 course

the routine with contemplative awareness. Option two allows students to observe an intriguing person, place or event, (e.g., a trip to the zoo) through mindful eyes. Both options culminate in the writing of a descriptive essay about this experience, including anything they learned about themselves or their subject during the process of observation. Figure 1 abbreviates the assignment sheet I developed for this essay.

Choose one of the following:

1. Immerse yourself in a familiar, everyday routine. Be truly mindful of your actions and the world around you.
2. With complete awareness and mindfulness, pay attention to an intriguing person, place, object, or event.

Whichever you choose, observe fully. Write an essay describing the experience of being fully present. What did you see, smell, taste, hear, feel? Then reflect. How was observing your subject different from other times you've observed/ engaged? What new perspectives did you gain? What did you discover about yourself or the world? What new insights did you gain? What was it like to live truly in the moment?

Figure 1: Basic Instructions for “Mindfully Observing Your World” Essay

This assignment is useful for a number of reasons. First of all, it provides students with the opportunity to hone their powers of observation, a necessary skill for both effective thinking *and* writing. Although this assignment requires students to “make sense” of their observations by becoming mindful of their significance, it first requires students to simply observe their subject *without* judgement. This practice of suspending judgement is a kind of mindfulness meditation that may foster all of the cognitive processes discussed in the previous chapter, but perhaps especially attention (see Kozasa, et al.). While the development of attention is important for learning in general, research has indicated that it is especially important for the writing process (Altemeier, et al., Quinlan, et al.). Additionally, this assignment allows students the opportunity to cultivate their descriptive writing skills, and practice writing in the often under-utilized genre of creative non-fiction.

The class activity I designed to help students begin drafting their “Mindfully Observing Your World” essays is an invention activity I call “Guided Visualizations for Descriptive Writing.” In this activity, as the name implies, I lead students through a series of guided visualizations. For each visualization (five in total) I ask students to close their eyes, create a mental image of the topic they have chosen to write about for their essay, and then mentally observe and gather any data they can on the sight, feel, sound, smell, and taste of their topic. After each visualization, the students have two minutes to free-write on whatever it was that they “observed.” From a cognitive standpoint, this contemplative activity may be helpful to students by engaging their visuospatial faculties. As noted previously, visuo-spatial processing is closely linked to the cognitive processes of working

memory and attention. In fact, Kozhevnikov et al.'s study on Buddhist deity meditation suggests that engaging in visualization practices may improve working memory because of the extremely interconnected relationships among visualization, attention, and memory. Additionally, this activity enables students to get writing down on paper that they may be able to use in the first draft of their essay.

The “Metaphors We Write By” Essay

The next assignment I will discuss is what I call the “Metaphors We Write By” essay. This assignment asks students to contemplate upon what metaphor best describes their writing process. They then write an essay which both describes this metaphor and explains how it represents their writing processes. As an introduction to this assignment, I have students read the first chapter of Lakoff and Johnson’s book *Metaphors We Live By*, and we discuss how metaphors are much more than simply literary devices; they also shape the way we think about ourselves and our worlds. Figure 2 summarizes the assignment sheet I developed for this essay.

“...we seek out *personal metaphors* to highlight and make coherent our own pasts, our present activities, and our dreams, hopes, and goals as well. A large part of our self-understanding is the search for appropriate personal metaphors that make sense of our lives.” –from *Metaphors We Live By*

1. Mindfully discuss what metaphor could best describe your writing process in the past and present. What is this metaphor? Give examples of how this metaphor helps explain the writing you’ve done.
2. Deeply reflect on this metaphor. How could it help you understand the choices you’ve made as a writer? How could it inform or influence your thinking about your writing, about your life as a writer, and about how you could continue to improve?

We will discuss how to answer these questions more fully in class.

Figure 2: Basic instructions for the “Metaphors We Write By” Essay

This assignment was created as an alternative to the “standard” essay given at the end of the first-year writing class, asking students to reflect on what they have learned over the course of the semester. The difficulty with such an assignment is that (at least for some students) it seems to encourage disingenuous or inauthentic responses, which are not very useful to the students. On the other hand, I have found the “Metaphors We Write By” essay to be more successful in helping students engage in the degree of contemplation that the end-of-the-semester essay genre strives for. Not only is the ability to engage in contemplation on a “metaphor to write by” important on a personal level, but it is also important in terms of developing as a writer. The research that most closely informs this assignment is the research on executive function and self-regulation. Executive function and self-regulation appear to be the cognitive processes governing what Flower and Hayes have called “the monitor.” In other words, Flower and Hayes and others suggest that one

of the key cognitive functions responsible for the production of text is the mind's capacity to oversee, delegate, and self-correct, as needed. This assignment fosters that capacity by providing students with the opportunity to contemplate upon and make sense of their writing process—and hopefully—to identify places where their writing and writing process can continue to improve.

The Reflective Research Journal

The last assignment I want to discuss—the Reflective Research Journal—is an academic research project I created for the second semester sequence of a first-year writing course. This project is devised to help students approach the *entire* research project from a mindful perspective. This assignment comes prior to a concluding dialogue they write that includes different stakeholders in a controversy that emerges from their research topic (when students have become more heavily involved in the research process). The journal lasts for the duration of the research process. Basically, this assignment entails students answering a set of questions periodically, throughout the research process, in the form of journal responses that can be posted directly to a learning management system like D2L or Blackboard. Figure 3 provides some of the questions I have frequently asked.

Questions for your Reflective Research Journal:

- What stage of the research process are you in at this moment?
- What are you discovering about your controversy at this point?
- How do you feel at this moment in the research process? (frustrated, excited, bored, capable, challenged, etc.)
- Why do you think you feel this way?
- How do you think you will use the information you have gathered to inform the writing of your Controversy Analysis paper?
- What other ways could you conduct research at this point that might prove to be more fruitful and helpful to you?

Figure 3: Instructions for the Reflective Research Journal

As the other assignments I have developed, this assignment is informed by research on the benefits of engaging in activities intended to foster attention and self-awareness. Specifically, I have found that this assignment encourages students to be more mindful of their research process than they would have been otherwise, and that, in general, it encourages mindful engagement with their topic.

Conclusion

I make two primary arguments in this essay. One, composition studies should pay attention to contemplative neuroscience because of the potential benefits provided to writing instruction by bringing these two fields into communication with each other. Recent findings from contemplative neuroscience indicate that contemplative practice supports

and facilitates cognitive functioning. Yi-Yuan Tang and other researchers suggest that engaging in mindfulness meditation can improve executive function because—among other reasons—it can help subjects become more self-aware and better able to attend to their emotions. This, in turn—as Robert Roeser and Stephen Peck point out—can also help to increase motivation, a key factor in self-regulated learning. A number of researchers (e.g., Kozasa, Lutz, Tang, and Hodgins) have also found that mindfulness meditation can develop a person's ability to attend. Other studies by researchers such as Chambers, et al. and Mrazek, et al. conclude that mindfulness meditation can also improve a person's working memory capacity. Each of these cognitive processes—executive function, motivation, self-regulation, attention, and working memory—are highly instrumental to the writing process. Furthermore, they are all placed under a great deal of strain, and are easily depleted, by the writing process. These studies indicate that implementing contemplative practice in the writing classroom may help to ameliorate some of the cognitive and affective stress caused by the writing process.

The second argument I make in this article is that cognitive training (in general) may prove superior to other forms of instruction because studies show that brain training is more effective at training the underlying processes responsible for learning across contexts—or in other words, for transferring knowledge. Research from contemplative neuroscience that talks about motivation and self-regulated learning may be able to shed some new light on this discussion and provide writing instructors with new means of fostering motivation in students. Furthermore, in a discipline such as composition studies—where teachers and writing program directors are frequently asked to justify their courses' validity within the larger institutional context—the ability to connect our instruction and research to training in cognitive processes will prove substantially valuable.



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