Higher-order Thinking and Metacognition in the First-year Core-education Classroom: A case study in the use of color-coded drafts

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Abstract
This article seeks to provide some modest insights into the pedagogy of higher-order thinking and metacognition and to share the use of color-coded drafts as a best practice in service of both higher-order thinking and metacognition. This article will begin with a brief theoretical exploration of thinking and of thinking about thinking—the latter both in the sense of thinking more deeply about what one is learning/has been thinking about in the course (i.e. higher-order thinking) and in the sense of thinking about one’s thinking process (i.e. metacognition). Using concepts borrowed from philosopher Immanuel Kant and literary theorist Kenneth Burke, I wish to suggest that any sort of thinking about thinking, whether it be higher-order thinking about course material or metacognition about one’s learning, requires that one framework of thought be brought to bear upon the first framework of thought. This perspective will in turn illuminate how the use of color-coded drafts (in the first-year core-education classroom, at least) provides an opportunity for both higher-order thinking and metacognition. The overall conclusion is that, in the case of color-coded drafts, the act of superimposition, rather than the use of color per se, triggers higher-order thinking and metacognition.

Keywords: higher-order thinking, metacognition, core education, pedagogy, best practices

Introduction
The Focused Inquiry program at Virginia Commonwealth University is surely not unique, but in many ways atypical within the university curriculum. Focused Inquiry, unlike many college courses, is not a content-based course. Rather, Focused Inquiry is a skills-based course. As tier one of the University’s Core Education program, it seeks to prepare students for college success by developing first-year students’ academic/professional skills of critical thinking, written communication, oral communication, information fluency,
collaborative work, ethical reasoning, and quantitative reasoning. In addition, Focused Inquiry does not merely seek to teach those skills, but to assist students in the discovery, development, and broader application of those skills (to other courses, for example) for themselves, as part of its mandate to promote student engagement, foster a posture of lifelong learning, and empower students as agents of their own learning and success. So it is not enough to simply provide students with particular skills, as could be accomplished through a transmission model of education: the instructor demonstrates a skill, after which the student practices the skill until they can demonstrate proficiency or mastery in that skill. That is great, and certainly appropriate in a multitude of educational contexts, but it does not adequately emphasize the important elements of student engagement and student agency, to which the Focused Inquiry program is highly committed.

So, the Focused Inquiry curriculum seeks to develop the aforementioned academic/professional skills while simultaneously empowering students to develop those skills (and to discover the resources for the development of those skills) for themselves. Basically, as the old adage goes, we are trying to teach the student to fish rather than giving the student a fish. But, how exactly is this to be done? How does one provide a student with the skill to develop a skill as opposed to providing a student with the skill itself? What does this type of teaching require?

To begin, we should distinguish between higher-order thinking and metacognition. First is higher-order thinking, which in this context means that students need to not just memorize and mimic particular skills but to also acquire a deeper understanding of those skills and to be able to apply them to other contexts (such as the next assignment in the course or assignments in other courses, for example)—and possibly even to be able to evaluate or modify or synthesize those skills. (I am largely referring to Bloom’s Taxonomy here, as it relates to higher-order thinking.) This is the first essential ingredient in the learning objectives of the Focused Inquiry program. Second is metacognition, which in this context means that students should develop an awareness of their own learning habits and capacities in order to better self-monitor, self-assess, and self-regulate their own learning. This is another essential ingredient in the learning objectives of the Focused Inquiry program. Hence, the sort of teaching we wish to explore targets both higher-order thinking and metacognition. (Consequently, we might refer to it as higher-order teaching and meta-teaching, in so far as it seeks to get students to think more deeply about what they are learning and to reflect on whether and how they are learning it.) This article seeks to provide some modest insights into this type of teaching and to share the use of color-coded drafts as a best practice in service of both higher-order thinking and metacognition.

Specifically, answering the question of how it is done (by elucidating some best practices) promises to clarify the question of what the nature of higher-order teaching and meta-teaching (on the part of the instructor) and higher-order learning and meta-learning (on the part of the student) are. To do this, I propose to begin with a brief theoretical exploration of thinking and of thinking about thinking—the latter both in the sense of thinking more deeply about what one is learning/has been thinking about in the course (i.e. higher-order thinking) and in the sense of thinking about one’s thinking process (i.e. metacognition). Using concepts borrowed from philosopher Immanuel Kant and literary theorist Kenneth Burke, this theoretical exploration will provide a framework and insights that
will help illuminate how the use of color-coded drafts (in the first-year Focused Inquiry classroom, at least) provides an opportunity for both higher-order learning and meta-learning.

**Preliminary Thoughts on Higher-order Thinking**

‘So, can you explain the definition of a derivative to me?’ Within seconds of the student asking me this question, I became embarrassingly aware that I could not. I had memorized the definition of a derivative several times in various calculus classes, and I knew damned-well that I could reproduce it from memory right there and then. ‘Give me a piece of paper and I’ll write it down,’ I thought to myself. But explain it? That was a different matter altogether. I struggled for a few minutes, stammering some gibberish and staring awkwardly at the calculus textbook on the table in front of me, before finally admitting that I would need to think about it more carefully and could hopefully explain it to him the following week—this particular student was a regular at the tutoring center, so I was not just dodging his question.

The year was 1990 (or thereabouts, in geological terms—when you get to be my age, you start to think in terms of decades and quarter-centuries), and I was a graduate student in the Biophysics doctoral program at the University of Virginia, tutoring undergraduate students in math and physics for the Office of Afro-American Affairs. We have all heard the adage about how you do not really understand something until you have to teach it. I had heard that before too. Sure, whatever, right. But now I knew that it was true. Before our next tutoring session, I spent a couple hours trying to understand the definition of a derivative—to not just reproduce it but actually explain what it meant. I was quite proud of the fact that I was able to figure it out and explain it, with some degree of clarity, to that same student the following week.

Why am I telling you this story? Because it makes supremely evident, at least to me, the difference between sort of knowing something and really knowing something. It demarcates the difference between what we might call superficial knowledge and deep knowledge, a distinction Plato discusses in Book V of *The Republic* (and in the *Meno*, and likely elsewhere) as the difference between ‘knowledge’ and ‘true opinion.’ In Bloom’s Taxonomy, it is the difference between memorization of information and understanding of that information—and perhaps even, in the context of needing to teach it, a sort of application of that information. The difference is between a knowledge resulting from familiarity with the material and perhaps memorization of it and a knowledge resulting from higher-order reflection on the material—a reflection that demands answers to the question of why?: for example, not just ‘What is the definition of a derivative?’ but ‘Why is the definition of a derivative what it is?’ To answer that, you have to know what you know. That requires higher-order thinking. Moreover, such higher-order reflection seems to demand at least a small degree of metacognition—reflection not just about what one knows (or does not know) but also how one came to learn it (or not learn it) in the first place. For me, this experience revealed that mere memorization of the definition of a derivative had not constituted deep knowledge, but that a more systematic critical reflection on why it was (in addition to what it was) had been necessary. In other words the higher-order thinking that was needed to explain (rather than merely reproduce) the
definition of a derivative triggered metacognition about how I had been learning (and more importantly, not really learning).

So while the shortcoming of my college calculus classes becomes apparent, the larger question remains as to how we can foster both higher-order thinking and metacognition in the college classroom, be it a calculus class or Focused Inquiry. What particular pedagogical strategies can be used that will lead to deep knowledge as opposed to superficial knowledge (i.e. that will require higher-order thinking) and that will help increase students’ awareness of how they are learning? Of course there are a myriad of ways in which this can be achieved. In this essay, I wish to share one successful strategy, the use of color-coded drafts. But before I turn to that, I wish to explore a little more fully the ideas of higher-order thinking and metacognition. In particular, I wish to suggest that any sort of thinking about thinking, whether it be higher-order thinking about course material or metacognition about one’s learning, requires that one framework of thought be brought to bear upon the first framework of thought. This perspective will in turn illuminate how the use of color-coded drafts (in the first-year core-education classroom, at least) provides an opportunity for both higher-order thinking and metacognition.

What is Cognition?

In the beginning … OK, let us not go back that far. But let us go all the way back to Immanuel Kant. In the seventeenth century, perhaps the most significant debate raging within the halls of academia was that between empiricists and rationalists concerning the nature of knowledge. Empiricists such as Kevin Bacon… sorry, Francis Bacon, John Locke, and David Hume argued that knowledge resulted from empirical observation of the world around us: knowledge was arrived at through the process of induction. The human mind, they assert, is essentially a tabula rasa onto which sense-impressions are written (‘Empiricism’, 2014). Conversely, rationalists such as Rene Descartes, Baruch Spinoza, and Gottfried Leibniz argued that knowledge resulted from the operation of the mind: knowledge was arrived at through the process of deduction. The human mind, they assert, contains certain ‘innate ideas’ upon which all further knowledge is erected by the operations of the mind itself (‘Rationalism’, 2014). Basically, they could not seem to agree.

Then came Immanuel Kant, who brought about one of the greatest paradigm shifts in the history of Western philosophy. Kant effectively synthesized the two apparently mutually-exclusive views by arguing—allow me to oversimplify his several-hundred-page magnum opus—that knowledge resulted from the operation of the mind upon the world around us. In other words, knowledge was the result of both empirical sensory observation and rational mental operation … but not as a sometimes-this-way-and-sometimes-that-way/both-are-valid-forms-of-knowledge sort of deal, but instead as always and necessarily a symbiosis of the two.

Metaphorically speaking, Kant asserted that the human mind was pre-wired to experience the world in particular ways. Wikipedia offers a helpful summary:

Kant argued that our experiences are structured by necessary features of our minds. The mind shapes and structures experience [such] that … all human
experience shares certain essential structural features. Among other things, Kant believed that the concepts of space and time are integral to all human experience, as are our concepts of cause and effect. We never have direct experience of things, the noumenal world, and what we do experience is the phenomenal world as conveyed by our senses’. (‘Immanuel Kant,’ 2014, original emphasis)

In other words, human beings never experience the world as it is in-itself, but always through the filter of those pre-wired mental structures.

As summarized by T. Z. Lavine (1984), the ‘Kantian turn in philosophy’ opposed the empiricists’ ‘reduction of knowledge to sense impressions’ (p. 196). Kant’s contribution was to argue that ‘knowledge is a complex, composite affair’ (p. 196). According to Kant:

Knowledge consists not only of the sensory element in which the mind is passive but also of a rational element, the twelve pure, rational concepts of the understanding with which the mind actively synthesizes, unifies, organizes the sensory flow … [Kant] emerges as one of the great synthesizers in the history of philosophy, a synthesizer of rationalism and empiricism, the two great conflicting philosophies of the seventeenth and eighteenth centuries. (Lavine, 1984, pp. 196–197)

Lavine (1984) concludes by stating that ‘After Kant … whatever is experienced or known will be shown in part to be due to the mind itself, to the concepts by which the mind understands things’ (p. 197).

A helpful analogy here is to think of the human eye. It is tempting and natural to think that our eyes see objects as they exist in the world. Yet what we ‘see’ is dependent upon the nature of our eye, of the way that it receives and focuses light and the particular wavelengths of electromagnetic radiation which it receives. Objects in the world reflect more of the spectrum of electromagnetic radiation than our eye can see, including infrared light on one end of our visible spectrum and ultraviolet light on the other. So when we look at an object, we do not see the object as it is in-itself, but rather the object as perceived through the particular sensory machinery called our eye. Other animals see the world differently, often radically so.

More generally, the Kantian turn in philosophy transformed our understanding of scientific objectivity. Just as our eye cannot see the world in its pure form, so too we cannot observe anything in the natural world except through the innate capacities (and limitations) of the human mind. Lavine (1984) again:

But what has Kant done? In order to save the truth of the sciences, Kant has had to make the laws of science dependent upon the mind and its concepts … Kant has had to say that the independently real external world of nature does not give us its laws, either through sense impressions, as Hume and the empiricists said, our through corresponding with our clear and distinct rational ideas, as Descartes and the rationalists had said. … The mind gives its own laws to nature —its own laws in the form of its own necessary concepts which organize all sensory materials. These are the concepts which form, organize, and structure all our experience, all our knowledge of nature. (p. 197)
To be sure, there is much that we learn. Children, for example, learn ‘object permanence’ by the age of two. Before that, when an adult removes a toy from a baby’s sight, the baby does not understand that the toy still exists. The baby will not reach for it, to them it is gone. Only after the baby acquires object permanence does it understand that the toy still exists when they can no longer see it. Although many such basic notions are acquired, Kant insists that there are even more basic substrata of the understanding which are pre-given, hard-wired into our brains. Even if Kant is wrong, these basic concepts are learned at such an early age that his basic philosophy is still valid: for all intents and purposes, all human experience and human knowledge is filtered through and shaped by these primordial structures of the (toddler) brain. (See ‘Object Permanence’ [2014] for more parallels between child psychological development and Kant’s categories of the understanding.)

What is Cognition, Really?

Now can we talk about that color-coded drafts thing you mentioned earlier? Sorry, not yet. Unfortunately, Friedrich Nietzsche came along and demonstrated that ‘truth is a mobile army of metaphors,’ which pretty well mucked up everything—What? Another paradigm shift?—necessitating one more step in this preamble. Basically, what people like Nietzsche, Ferdinand de Saussure, (the later) Ludwig Wittgenstein, Jacques Derrida, Michel Foucault, and a host of others argued was that all knowledge is linguistic, that knowledge is always already constructed in and through language. Another way of thinking about this is that while Kant was correct to recognize the inevitable interaction between primordial mental structures and the physical world, he was incorrect to not recognize those mental structures as largely linguistic/ideological. That is to say, Kant thought of the mental structures solely as hardware rather than also (if not primarily) as software.

In other words, we experience the world through language—not with language, but through language. For example, if we, before birth or shortly thereafter, cannot not experience the world in terms of (our primordial categories of) spatiality, temporality, cause/effect, object permanence, and so on, we very soon thereafter cannot not experience the world in terms of (our socially-constructed categories of) gender, race, sexuality, and so on. I cannot experience another human being without the mental ‘structure’ of spatiality any more than I could experience another human being without the mental ‘structure’ of race. I can no more experience the world without race than I can hear my own native language as a series of clicks-and-clacks. Even if the former (i.e. spatiality) is an innate quality of the human brain while the latter (i.e. race) is a learned social construct, there is no difference between the two in practical terms. In each case, I cannot not experience the world or think about the world independent of that mental structure or ideological framework. (I might be able to employ higher-order thinking to somehow bracket those categories, but the initial thinking is contingent upon them.)

This post-Kantian notion of ideology as the software of the human mind is astutely interrogated by literary theorist Kenneth Burke. Burke (1966) offers the concept of a ‘terministic screen’ to describe the manner in which our linguistic constructs shape our very perception of the world:
When I speak of ‘terministic screens,’ I have particularly in mind some photographs I once saw. They were different photographs of the same objects, the difference being that they were made with different color filters. Here something so ‘factual’ as a photograph revealed notable distinctions in texture, and even in form, depending upon which color filter was used. (Burke, 1966, p. 45, original emphasis)

Moreover, any terministic screen or ‘nomenclature necessarily directs the attention into some channels rather than others’ (Burke, 1966, p. 45). Consequently, ‘Even if any given terminology is a reflection of reality, by its very nature as a terminology it must be a selection of reality; and to this extent it must function also as a deflection of reality’ (p. 45, original emphasis).

In short, all terministic screens influence both how we perceive and what we perceive in the first place. According to Burke (1966):

Not only does the nature of our terms affect the nature of our observations, in the sense that the terms direct the attention to one field rather than to another. Also, many of the observations are but implications of the particular terminology in terms of which the observations are made. In brief, much that we take as observations about ‘reality’ may be but the spinning out of possibilities implicit in our particular choice of terms. (p. 46, original emphasis)

This idea can be seen more clearly, perhaps, when placed within the context of Burke’s larger notion of ‘dramatism,’ which understands language not as referential but as ‘symbolic action.’ In other words, all language enacts dramas by summoning a network of terms that initiate particular scripts. Burke is widely attributed for the revealing aphorism: ‘To call a man a murderer is to propose a hanging.’ If you walk into a room and see someone standing over a body, if you yell out ‘murderer’ one particular drama begins, in which other people become defensive, call the police, look for the murder weapon, and so on, while the ‘perpetrator’ panics and runs away. Whereas if you walk into the same room and yell out ‘Help, help, there’s been a terrible accident’ a very different drama begins, in which other people rush over to help, call an ambulance, console the ‘witness’ and so on.

The overall point here is that cognition is always already embedded in language; cognition itself occurs within a particular terministic screen that shapes both perception and knowledge. We do not have cognition of the world independent of language, to then translate our mind’s pure cognition into language for the purpose of communication. Rather, the terministic screens, the dramatistic scripts, are the post-Kantian categories of understanding through which and in which cognition occurs. When we synthesize Burke’s postmodern notion of terministic screen with Kant’s foundational notion of innate concepts of the mind, we conclude that just as our mind only perceives the world through the literal lens of the human eye (in a manner consistent with the eye’s sensory capability), so too is all knowledge figuratively filtered through an ideological/terminological lens. The human mind can only perceive the world through the filter of its own perceptual hardware (à la Kant) and terminological software (à la Burke). All cognition occurs through some or other linguistic apparatus.
What, then, is Cognition about Cognition?

If cognition is always already experienced in language—that is, through a particular terministic screen—then what is cognition about cognition? (Here, we are concerned generally with any thinking about some previous thinking. We will return later to the specifics of higher-order thinking and metacognition.) It might be tempting to think of cognition about cognition as some manner of awareness of that terministic screen through which cognition occurs. But if our cognition about cognition can be unmediated by language, then why could not our cognition be unmediated in the first place? It cannot be. Hence, any cognition about cognition must similarly exist always already within a second terministic screen. In other words, awareness of our first terministic screen/conceptual apparatus must of necessity be arrived at through the imposition of a second terministic screen/conceptual apparatus. And, if you are still following me, while the student will be provided with that second terministic screen in order to recognize and better understand the first terministic screen, the instructor must understand the second terministic screen through yet another, third terministic screen, in order to be intentional about the lesson they are providing to the student. Egad!

OK, it is definitely time for an example. Let us say that we are teaching our students how to compose an effective introduction for a research paper or argumentative essay. We might instruct them to include an attention-getter, a clear statement of their paper’s thesis, a preview of the main parts of the paper, and some brief explanation to the reader about why the paper matters. This is a way of understanding an introduction, hence it is a particular terministic screen—or if you prefer, a particular structure or framework or model. Of course there are other ways to discuss, other frameworks through which one can understand, what an effective introduction is and what it ought to contain. But one cannot have cognition of an introduction without some such framework. If one were to read hundreds of essays, one could not have cognition of an ‘introduction’ as a distinct part of the essay without imposing some structural framework upon the essay, such as, most simply, a framework of ‘parts’—that an essay has a beginning, a middle, and an end. If one were to further examine the essay as a sort of object, one might develop a more complex framework which distinguishes sub-parts of an introduction and so on. This would be a theory of effective introductions, which is, of course, a terministic screen. With such a framework in place, one can no longer look at an introduction but through that framework—or some other framework, if one has learned several models of effective introductions (for different genres of writing, for example). Recalling Burke, this simply means that one cannot have cognition of such a thing without a set of terms with which to name and describe it.

But how then could we become more self-aware of that theory? How could we engage in a second, higher-order cognition about that first cognition/theory of introductions? Well, we would need to envelop it with another theory or terministic screen, such as a framework concerning authorial purpose. Why would one include an attention-getter, thesis, preview, and rationale in an introduction? One framework in which to better understand those elements would be a theory of audience, in which one must attend to the needs and expectations of one’s audience. If your reader is distracted by other thoughts, you, as a writer, need to include an attention-getter. If your reader wants to
know what this is all about before they commit their precious time to read the whole essay, you, as a writer, need to include a thesis. And so on. This theory of audience, therefore, makes the theory of introductions more clear by providing a second, higher-order framework from which to view the first framework. Alternatively, one could of course teach students how to write effective introductions without any discussion of audience. But if the student is to achieve a deeper understanding of introductions, they need to understand why it should include those different parts rather than having just memorized them. (This is the same as the earlier calculus example, for which understanding required grasping the why in addition to the what.) In short, there must be super-imposition of a second terministic screen/cognitive framework upon the first terministic screen/cognitive framework.

**Color-coded Drafts: A Case Study in Higher-order Thinking and Metacognition**

Finally! As an illustration of what I have been discussing, I will now share a best practice from my own classroom, Focused Inquiry: the use of color-coded drafts. I started asking students to color-code certain assignments and drafts a few years ago. Before that, I had often assigned students to either outline ideas or annotate drafts. What I have found, though, is that color-coding often works much better for the purposes of both higher-order thinking and metacognition. Students seem to be more often more aware of exactly what they are doing in an assignment when they are asked to color-code their work. It fosters higher-order thinking in getting them to not just parrot the parts of the assignment but to think about the purpose and function of those parts—more on this later. And the process of color-coding very often (though not always) triggers metacognitive reflection for the student about how they have been learning—more on this later too. The idea here is quite simple. Returning to the example earlier, it would simply require students to highlight their attention-getter in blue, their thesis in green, their preview in purple, and their rationale in red—or whatever colors you choose.

At this point, you may wish to refer to Appendices A, B and C, which contain three different assignments in which I use this color-coding strategy—one from each of three units in the Focused Inquiry course that I teach. Appendix A shows a color-coded introduction for an essay in which students compare and contrast an experience from their own lives with a story from the shared reading—in this case, the VCU Summer Reading Program selection, Michael Moss’s (2013) *Salt, Sugar, Fat: How the Food Giants Hooked Us*. In this assignment, the student also color-codes their conclusion, as well as major transitions between sections of the essay. Appendix B shows an excerpt from a color-coded research report in which students put several sources into conversation with one another. The color-coding here distinguishes original source material, source introductions for the primary sources, the student’s own commentary and analysis, and transitions between sections of the report. Finally, Appendix C shows a revision assignment in which students revise an argument based on moral values—one of several arguments in an argumentative essay—in order to better articulate the moral value, provide foundation for the value itself, acknowledge some element of moral complexity or ambiguity on the issue, and demonstrate the relevance of the moral value to their central claim.
I am tempted to say the choice of colors does not matter, but it actually might, at least in terms of (i) generating adequate contrast from one another and (ii) creating an aesthetically pleasing product. Regarding (i), my limited and thoroughly anecdotal observations suggest that students do better with the assignment if the colors are distinct. If they use colors that are too similar—or some other coding system, such as printing out a copy of their paper and then trying to code the various elements by hand, for example straight-underlining one element and squiggly-underlining another element—they can get confused about which is which, and the intended higher-order thinking and metacognition do not happen quite as they should. Regarding (ii), there does seem to be some pleasure derived for at least some students when they turn in a paper that is robust with color, like a holiday gift with sparkly red wrapping and a shiny green ribbon and a fluffy gold bow. I do not think this has much to do with metacognition, but it does seem to enhance student engagement with the assignment and with the process as well as student ownership of the product and learning process for some students, so it seems worth mentioning in so far as those are also objectives of the Focused Inquiry course.

So why does this work to enhance students’ higher-order thinking and metacognition? In contrast to the earlier example, coding elements of an introduction with different colors does not seem like a theory of audience … indeed, it does not seem like a theory at all. So it would seem that either this assignment is not serving the purposes of higher-order thinking and metacognition or the theoretical foundation of this essay is fundamentally flawed. But wait. Although the application of colors is not a ‘theory’ per se, it is a framework. It is the superimposition of one structure upon another—in this case a color structure upon a conceptual structure. And although it is a simple terministic screen, it is nevertheless a terministic screen: this is part of the blue stuff, this is part of the red stuff, and so on. On the one hand, the obvious disadvantage of this approach is that it is not adding another layer of concept for the student—they are not (here, at least) getting a theory of audience. On the other hand, the advantage of this approach is that they are not getting a theory of audience. In other words, they are not receiving more course content—unless they do not already know what colors are. They are being asked to superimpose an extremely familiar structure (namely, colors) upon a new structure (namely, a theory of effective introductions), and … here comes the thesis: *it is the act of superimposition rather than the second theory itself which triggers higher-order thinking and metacognition.*

First, students become more self-aware of the theory of introductions without the distraction of another theory of something else. Typically, students ‘complete’ the assignment by revising their introduction to include the four elements discussed in class. As an afterthought, which they consider to be silly busywork, they then do the color coding, only to find that they do not actually have all four elements or cannot distinguish which is which. Higher-order thinking occurs as this realization forces them to go back to the course notes and samples provided and to think more carefully about the four elements. The result is less memorization and mimicry and more understanding of the purpose and function of an introduction—and of the craft of writing in general. It seems to compel a process of reflection similar to Davidson and Sternberg’s ‘selective encoding,’ one of ‘three distinct processes’ that comprise the ‘mechanism of insight’ (Perkins, 2000, pp. 183–187). More specifically, the use of a color scheme may qualify, at least loosely, as a sort of
‘visual tool’ and ‘visual modality’ as discussed by Hyerle (2001). At any rate, my experience suggests that it works.

Note also that because colors are already extremely familiar, many students are able to develop a deeper understanding of the theory of introductions precisely because they are not distracted with a second theory of something else, such as a theory of audience. They are able to reflect on the four parts of their introduction without heaping on additional, unfamiliar concepts and jargon. Of course, some students might be better served by layering on an additional theory of something else—i.e. more course content. But for students struggling a bit with the first theory, it helps them reflect on that first theory without yet more ideas to process.

Second, because students typically do the color coding after they have, so they think, completed the assignment, the horror of the realization that they have in fact not yet completed the assignment—often exacerbated by the fact that it is 1:00 or 2:00 in the morning—forces a moment of metacognitive reflection, as they attempt to grasp why they thought they had completed the assignment when it is now clear—in vivid color—that they had not. According to Chow:

> Metacognition is a person’s awareness of his or her own level of knowledge and thought processes. ... Weaker students typically have poor metacognition; they are grossly overconfident in their level of understanding. ... Once students feel they have mastered material, they will stop studying, usually before they have the depth and breadth of understanding they need to do well. (cited in Lang, 2012)

For many students, even some of my stellar students, the process of color-coding provides a moment of clarity about their own learning and misplaced confidence in their mastery of the course material. Many students describe the experience, especially the first color-coded assignment, as a ‘wake up call.’

In both cases, requiring students to color-code their writing equates to more time-on-task. Indeed, metacognition often seems as simple as to ‘make students think for just a minute about why they do not know an answer’ or ‘to take a few moments for reflection’ (Jaschik, 2011). Regarding metacognition, color-coding entails students taking a few minutes to self-assess their own work—as in: Do I have all four colors here? Wait, is this green or purple? What the hell color should that sentence be? Color-coding is in fact a simple form of ‘formative assessment’ that students can do for themselves (see Lang, 2012). Regarding higher-order thinking, color-coding also entails students taking time to (often) revisit the course notes and samples and then to revise their work.

**Pre-concluding Postscript**

Oh, and did I mention that this color-coding strategy saves time? A lot of time. Grading papers can be magnitudes more efficient when students have clearly demarcated—in color or otherwise—various required elements of an assignment. So if you remain dubious about the whole theoretical justification for this higher-order thinking/metacognition thing, it is still worth a try. There are not too many things that will captivate college instructors more than saving time. No need to thank me. Your silent praise will be thanks enough.
Conclusion

This essay has sought to provide some modest insights into the pedagogy of higher-order thinking and metacognition and, perhaps more importantly, to share the use of color-coded drafts as a best practice in service of both higher-order thinking and metacognition. Building on the work of philosopher Immanuel Kant and literary theorist Kenneth Burke, I wish to suggest that any sort of thinking about thinking, whether it be higher-order thinking about course material or metacognition about one’s learning, requires that one framework of thought be brought to bear upon the first framework of thought. This insight, applied to the experience of using color-coded drafts in undergraduate writing assignments, led to the conclusion that the act of superimposition can itself trigger higher-order thinking and metacognition. In other words, a second ‘theory’ is not necessary for students to spend more time-on-task and to reflect meaningfully upon both the course content and their own learning. In summary, incorporating color-coding into assignments can be a high-yield pedagogical strategy that not only saves the instructor time (in evaluating and grading student work) but more importantly increases students’ higher-order thinking about that material as it simultaneously enhances students’ metacognition about their own learning. Give it a try!

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Appendix A: Sample, Unit I Synthesis Essay, Arrangement Revision

When I was younger, I would fall asleep in tears thinking about how much better of a person I could be. Yet whenever I woke up, changing my life was the last thing I was capable of doing. Throughout their lives, every person will experience some sort of emotional transformation, yet I can guarantee that no one simply chooses to carry out this change without experiencing several significant and interconnected events. Human beings do not experience moral and emotional growth without substantial influence from numerous interrelated events over a period of time due to a fundamental fear of change. Both Jeffrey Dunn and I fought through a year’s worth of self-reflection after being impacted by different occurrences before transitioning from our old personalities to our new selves since an instantaneous change is too terrifying of an event to ever experience.

Key: attention getter (blue), relevance phase (red), thesis statement (green), preview (purple)

Appendix B: Sample, Unit II Research Report, Source Integration Revision

... The lights and sounds of the strip club’s stage can transform a normal, unassuming college girl into a lustful temptress, but this illusion of sexual promiscuity disappears once she is off the stage (Schweitzer). While both males and females use strip clubs as safe havens where they adopt new sexual identities and a more relaxed demeanor toward sex, the public’s gradual acceptance of strip clubs, and by extension the recreational sex associated with these locations, can be seen in the economic mainstreaming of strip clubs.

The public perception of strip clubs is best comprehended through the national economy, since individual opinions on clubs vary too much to be compiled into a useable description of the public’s views. In the book Strip Club: Gender, Power, and Sex Work, author Kim Price-Glynn worked as a cocktail waitress at a club called The Lion’s Den, where she documented the workers personal routines and, more importantly, accumulated numerous industry-wide statistics and economic reactions to strip clubs. Price-Glynn describes how stripping has become so culturally mainstreamed that strip clubs and all of their components, such as clothes, music, and dances, are normalized to the public’s perceptions while the clubs themselves are traded on the NASDAQ (Price-Glynn 35). Even if a large percentage of a society voices concerns over strip clubs and other forms of non-intimate sexual contact, a society must be accepting towards these types of sex institutions if they have become integrated into the national economy. ...

Key: original source material (black), commentary and analysis (blue), introduction of source (green), transition (red)

Appendix C: Sample, Unit III Argumentative Essay, Ethical Reasoning Revision

Finally, we should continue to teach the Cold War and the fall of the Berlin Wall in our public schools not only for the practical reasons listed earlier, but also as an act of remembrance and honor to those who fought to protect our great nation and democratic ideals. Victory came at a heavy cost. More than eight trillion dollars were spent by the United States in its war with communism (LeFeber). And nearly one-hundred-thousand
Americans lost their lives, not to mention the incalculable number of Vietnamese, Cambodians, Russians, Germans, British, Koreans, and so many others who died in the massive battles waged indirectly between the two superpowers (LeFeber). To the politicians and military strategists, these lives may have been merely lost. But to history, these lives were not merely lost; they were spent to secure freedom for our country and our children, and to ensure that the freedoms of all peoples would be protected. It is to that expenditure of life, the most sacred treasure of all, that we owe an eternal debt. Let us begin to repay that debt by remembering our past and by commemorating the great sacrifices that purchased our continued freedom.

The history of our nation has been a continual sacrifice of life for freedom: from the sacrifices of the American Revolution to secure freedom from political and religious persecution, to the sacrifices of the Civil War to secure freedom from oppression for ‘all God’s children’ (King), to the sacrifices of World War II to secure freedom against the tyranny of fascism. ‘Life, liberty, and the pursuit of happiness,’ declares our founding document (‘Declaration’), and we have learned that life and liberty are inextricably linked. Indeed, life is too often the tragic cost of freedom, and equal to the sanctity of life and liberty is our obligation to remember and honor those who sacrificed both so that we might enjoy both. Is it hypocritical of us, some might ask, to honor soldiers who took life in order to preserve it? Should we only honor the innocent victims of the struggle for freedom? Do we instead have an obligation to condemn the violence of our past? No. We must honor those who answered freedom’s cry for shelter when threatened by the storms of persecution, tyranny, or enslavement. We must honor both the innocent victims and the warriors for freedom’s cause, though never the perpetrators of oppression. And condemning violence in prayer for life does not mean that we should forget the past. Rather, we can only preserve life and liberty by remembering the past. The Cold War and the great sacrifices paid to bring down the Berlin Wall are paradigmatic of these moral requirements. Let us never falter in our obligation to repay our debt by honoring the price they paid. As Holocaust survivor and Nobel Peace Prize winner Elie Wiesel has so eloquently proclaimed, ‘I decided to devote my life to telling the story because I felt that having survived I owe something to the dead, and anyone who does not remember betrays them again’ (‘Elie Wiesel’).

Key: articulation (blue), foundation (green), moral complexity (purple), application (red), original source material (black)

Notes on Contributor

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