Chapter 7
Theory in Creativity Research: The Pernicious Impact of Domain Generality

John Baer

Abstract This chapter considers how misguided theoretical assumptions influence both creativity research and teaching. There are many kinds of theories, ranging from unconscious and vague beliefs to explicit and clearly articulated principles, but no matter their nature or how they are acquired theories guide research and teaching practice. A key question about the nature of creativity—how domain-specific are the skills and traits that underlie creativity?—is explored in detail both as an example of how theory impacts practice and as a key determinant of the kinds of creativity research and creativity training that are possible. Domain specificity argues that (a) creativity as a general concept is an abstraction, (b) we can learn little about the nature of creativity as long as we focus on that abstraction rather than concrete instances of creativity, and (c) both creativity research and teaching for creativity must be done domain by domain, just as teaching content knowledge and teaching many skills must be done. This chapter concludes not with a call for more teaching of theory, but with a discussion of the theory-practice connection and the importance of an awareness of the theories that actually guide one's practice.

7.1 Introduction

Theory has a bad reputation in teacher education, at least among teacher education critics. The complaint that schools of education value theory at the expense of practice is an especially common one, even among many who teach in those schools. In a chapter of *Educating School Teachers* ominously titled "The Pursuit of Irrelevance," Arthur Levine (2006), who was just then stepping down from a 12-year stint as President of Teachers College, Columbia University, USA, summarized what many believed to be true about the over-emphasis of theory in teacher education:

> In their effort to obtain acceptance, teacher education programs attenuated their ties with P-12 schools and the people who work in them. They attempted to remake themselves in the

J. Baer (✉)
Rider University, Lawrenceville, NJ, USA
e-mail: baer@rider.edu

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> image of arts and sciences colleges, emphasizing theory over practice and the education of academicians over practitioners. (p. 23)

It is not the goal of this chapter either to challenge or to refute this indictment. My interest is in the impact that theories have on creativity research and educational practice, not in the theory-practice balance in teacher education. I will show how theories about the nature of creativity shape, and sometimes misshape, the work of both creativity researchers and teachers.

But, first we must consider what it is to be a theory, and why theories matter. I am using the term *theory* in a very broad sense to include many things, including principles, ideas, concepts, opinions, views, assumptions, and beliefs. A theory (as I am defining it) can be any set of principles upon which a behavior, decision, or activity might be based. It can also be any idea or system of ideas used to explain something. A theory can be explicit or implicit, and it may have been intentionally taught and adopted or passed on and acquired unknowingly.

Teachers and researchers do things for reasons. Those reasons may be ones they can clearly articulate, or they may be entirely subliminal (or some combination of the two). A teacher may have a single reason for an action, or her choices may be determined through a complex combination of reasons. Generally, those reasons can be thought of as theories: theories about teaching and learning, beliefs about child development, hunches about what "works" in different contexts. These may not be theories we have studied or can name, and they may not have the same kind of status as the theories that might appear in a textbook. But, the beliefs and assumptions that undergird our decisions as teachers and researchers amount to theories that direct our practice.

We can, of course, hold beliefs that do not influence what we do, either because they do not relate to the decisions we must make or because we are acting hypocritically (which, given the complexity of personal beliefs, it is almost impossible not to do sometimes). And what we claim to believe may sometimes not match what our actions suggest we actually believe. It is the beliefs, principles, and opinions—the theories, broadly defined—that actually guide our actions, explanations, and decisions that are my concern here.

Theories range in extent from what Kuhn (1962/1970) termed paradigms at the most comprehensive level to notions, biases, and hunches at a much more pedestrian level. All shape what we do, what we look for, and even what we are able to see. An uncountable array of theories guide the actions of teachers, including a large subset that relate to nurturing students' creativity. It is one such theory—a theory about creativity long shared by most creativity researchers and teachers—that is this chapter's focus: domain generality (defined below). I have chosen the theory of domain generality for two reasons:

1. It is an excellent example of a theory that can influence research and teaching both as an explicitly held theory and (perhaps more commonly) as an implicit, and often largely unconscious, belief about creativity.
2. It is probably the most important and powerful theory of creativity because it influences everything else one might think (or theorize) about creativity.

7.2 What Is Domain Generality of Creativity?

To understand the question of domain generality of creativity it will be helpful first to think about domain generality in other areas. Consider expertise. The question "Are you an expert?" is not one easily answered without some specification of the domain in question: "An expert in what?" Expertise doesn't transcend domains. One may have expertise in many or few domains, but being an expert in one domain tells us nothing about one's expertise in unrelated domains. I may be an expert archer and an expert calligrapher, an expert in one but not the other, or an expert in neither, but knowing about my expertise in these domains provides no information whatsoever about my expertise in astronomy, French wines, or calculus. Expertise is very domain-specific, which is the opposite of domain-general (Baer, 2016; Willingham 2007, 2008).

Skill is similarly domain-specific. As a teacher, I don't assume that because my students have learned how to dribble a basketball they will also be able to diagram sentences, nor do I assume that teaching them one of these skills have any impact on their skill performing the other.

Intelligence is a more troublesome example. Standard theories of intelligence theory acknowledge domain-specific factors but emphasize the correlation among abilities, such as linguistic, logical, and spatial abilities, and typically focus on the domain-general aspect of intelligence. But MacArthur Prize-winner Howard Gardner and others have argued for a fully modular and domain-specific theory of intelligence, under which there is no *g*, or general intelligence. From this perspective, a student's logical-mathematical intelligence tells us nothing about her linguistic, spatial, interpersonal, or other intelligences. The consensus in psychology is that intelligence is a roughly equal combination of domain-general and domain-specific components. This means that a person's intelligence in any area is somewhat predictive of that person's intelligence in other areas, but only to a limited degree (Neisser et al., 1996; see also Cosmides & Tooby 2002, for an interesting theory of how general intelligence may have evolved from domain-specific abilities).

It was Gardner's theory that first introduced me to the idea that creativity might be domain-specific. Although his book, *Frames of Mind: The Theory of Multiple Intelligences,* was about intelligence, Gardner (1983) hinted that this idea would also apply to creativity. I was a creativity trainer when I first read it and although I taught a particular model of creative problem solving, I hadn't thought a great deal about creativity theory. I was interested in practice, not theory. But Gardner's book led me to understand that I *was* (unknowingly) basing my practice on a theory (domain generality). The fact that I didn't know I was doing this—that I was unaware that my practice was based on a theory that I had neither recognized or acknowledged—didn't make theory irrelevant. It meant that I might be inadvertently, but nonetheless significantly, deceiving myself (and my students). If Gardner was right, then it would be no more possible to do what I claimed to be doing—teaching generic, domain-transcending creative-thinking skills—than it would be to teach students generic, domain-transcending content knowledge and skills (expertise) that they could apply equally well in everything they did, regardless of domain.

Like every creativity trainer or teacher I knew, I assumed I was teaching my students how to be creative, full stop. Creative in whatever they did, or at least creative in any endeavor in which they chose to apply the heuristics I was teaching them. If what Gardner was arguing was true, which would mean that what I thought I was doing was in fact impossible, then knowingly teaching what I was coming to realize was a domain-general method of creative problem solving would make me a fraud, a charlatan. Now that I knew of this theory, something I had never before encountered, I either needed to change how I taught or find a way to honestly dismiss the theory. So I set out to prove Gardner wrong.

A primary way that Gardner's critics showed that intelligence was domain-general—only partially but nonetheless domain-general to a significant degree, which would be enough if I could do the same for creativity—was to show that abilities in diverse domains were inter-correlated (For a summary see Neisser et al., 1996.[1]) Assessments of people's abilities in diverse domains such as those Gardner had proposed showed evidence of a fairly strong shared core. The fact that "intelligence" in one domain predicted "intelligence" in other domains meant that there was a substantial domain-general component to intelligence.

I wanted to show the same was true of creativity, that it included a substantial domain-general component If, as I assumed, there were significant inter-correlations among creativity-relevant behaviors in different domains, that would presumably demonstrate domain generality. As Ivcevic (2007) summarized the issue decades later, "Domain generality would be supported by high intercorrelations among different creative behaviors . . . while domain specificity would be supported by relatively low correlations among different behaviors" (p. 272). If creativity was, as I believed, domain-general, finding positive and significant positive correlations among creativity measures in different domains would prove it.

As I saw it, I simply needed to assess research participants' creativity in a variety of domains and show that there were significant correlations among those measures. This would prove that creativity was, to some degree, domain-general, and that I could return in good conscience to the kinds of creativity training I had been doing. (Of course there would also be skills that would promote creativity only in one or a few domains. No one doubted that there would also be domain-specific components. But it was the domain-general creative-thinking skills that I claimed to be teaching.)

[1] Readers may wish to contest Neisser et al.'s conclusion, and one needn't agree with that conclusion for the rest of this chapter to make sense. The Neisser et al. paper represented the shared conclusions of a large panel appointed by the American Psychological Association to determine the consensus of the field regarding the domain generality of intelligence. (From the introduction on p. 77: "*The Board of Scientific Affairs (BSA) of the American Psychological Association (APA) concluded that there was urgent need for an authoritative report on these issues—one that all sides could use as a basis for discussion. Acting by unanimous vote, BSA established a Task Force charged with preparing such a report.*") The concern of this chapter is creativity, not intelligence, however, and the question of the domain generality of intelligence is of interest here only because it illustrates a standard approach to determining empirically whether a skill is domain-general or domain-specific.

To accomplish this I needed tests of creativity in multiple domains, which was a problem. Most creativity assessment techniques *assumed* domain generality, which made them useless in testing for domain generality. To make matters worse, the validity of almost all available methods of creativity assessment had been severely challenged. And, the most common creativity tests, which were measures of divergent thinking, not only had questionable predictive validity. Different versions of divergent-thinking tests, even ones by the same test maker, were essentially uncorrelated with one another, so they seemed to be testing entirely different things, even though all claimed to be measuring the same thing (general creativity). Imagine two IQ tests that had a correlation of .06 with one another, which was the reported correlation of the two most widely used divergent-thinking tests (Cramond, Matthews-Morgan, Bandalos, & Zuo, 2005). No one would even consider using such IQ tests, so trusting divergent-thinking tests, which had that very problem, seemed ill-advised.

The second most common approach to creativity assessment was based on self-report scales, which had very different kinds of validity problems. For example, the self-report scales were generally very transparent and thus easy to fake. In addition there was evidence that even when responding honestly, people tended to be very poor judges of their own creativity. There is a substantial body of work that documents the limitations of self-report creativity assessments and their general lack of validity; see, for example, Amabile (1983, 1996), Anastasi (1982), Baer (1993, 2016), Barron and Harrington (1981), Crockenberg (1972), Kogan (1983), Sawyer (2012), and Weisberg (1999).

There was a new technique, however, that had been first validated in 1982 (Amabile, 1982) and would later be dubbed the "gold standard" of creativity assessment (Carson, 2006). The Consensual Assessment Technique (CAT; Amabile, 1983, 1996) was not only the most valid creativity assessment technique. It was also agnostic about the domain generality/specificity question, which meant it didn't prejudge the outcome of the studies I hoped to conduct. The CAT assessed creativity in particular domains, but the inventor of the method had herself used CAT scores as domain-general indicators of creativity, so the CAT didn't assume domain specificity.

The CAT assesses creativity the same way creativity is assessed in the real world: through the combined opinion of experts. When Nobel Prize committees make their judgments, they don't ask psychologists to design rubrics or give nominees tests of some sort. They ask experts in the field to judge the creativity of the nominees' work. The CAT works the same way in judging lower levels of creativity, the everyday, garden-variety creativity expected among participants in creativity research studies. If one were assessing the creativity of poems, the judges might be poets and poetry critics; if judging the creativity of collages, the judges could be artists or art critics. Working independently, the judges rate the creativity of a group of artifacts. With a modest number of judges (typically 5–15), the inter-rater reliabilities tend to be quite high, generally .80 and up (see, e.g., Amabile, 1982, 1983, 1996; Baer 1993, 1994a, 1994b; Baer, Kaufman, & Gentile 2004; Baer & McKool 2009, 2014;

Hennessey, 1994; Kaufman, Baer, & Cole 2009a, 2009b; Kaufman, Baer, Cole, & Sexton, 2008; Kaufman et al., 2013 for studies confirming the high inter-rater reliability of the CAT).

So, I did my first series of studies, first with middle school students and soon after with elementary, high school, and adult participants from three mid-Atlantic states. Participants created artifacts in multiple domains (such as poems, stories, collages, and math word problems) and experts in the respective domains rated them for creativity. I then computed correlations in ratings across domains.

The results were a disaster. In study after study, the correlations between creativity ratings in different domains hovered around zero (and were statistically insignificant, no better than chance[2]). Other researchers tried and got the same results (for a review of this work, see Baer 2016). One large study by Conti, Coon, and Amabile (1996) was designed expressly to prove that my early studies (Baer 1991, 1993, 1994a) were faulty. They used seven tasks from the domains of writing and art, which allowed them to make 20 cross-domain (i.e., writing-art) comparisons (including comparisons of overall-writing and overall-art creativity scores, a procedure that increased the reliability of the measures even further). Of the 20 cross-domain correlations, *not one* was statistically significant. (Even chance would predict that one of 20 would reach the .05 level, but none did.[3])

It is important to note that the *within*-domain correlations in this same study— correlations between products in the same domain, which both theories (generality and specificity) predict will be positive—were not only positive; they were substantial and statistically significant (mostly at $p < .001$). This means that the measures seemed to be working fine and the outcome could not be blamed on bad measures. The within-domain correlations were just as predicted (by both theories), but when it came to the *cross*-domain correlations that would show domain generality, the researchers came up totally empty handed. No evidence whatsoever was found for domain generality in this rather large study, which included 20 cross-domain comparisons and was designed by proponents of domain generality (as I had once been) to prove the existence of a domain-general component to creativity. They failed, just as I had.

I eventually had to give up on domain generality. I even tried a training study (Baer 1996) in which I taught participants key creative-thinking techniques, the same ones I had long used in my creativity training seminars, but this time in all the exercises I used content from a single domain (poetry-writing). When these participants later wrote poems, experts rated those poems significantly more creative than those written by control group participants. But the trained participants were no more creative in other domains: even the short stories they wrote were no more creative than those written by the control group!

[2] This was true even after correction for attenuation.

[3] The authors noted that a handful of the 20 correlations *approached* statistical significance ($p < .10$), but when computing 20 correlation coefficients, even totally random results will, on average, produce a few such marginally significant (but obviously false) outcomes. If one accounts for multiple comparisons in these 20 correlation coefficients, even those results that appear to be marginally significant would disappear.

This points to another consistent finding of this research: the domains that matter in creativity are much more narrow than domains as typically conceived. Poetry and fiction are from the same larger domain, but creativity training in one did not boost creativity in the other. If one wants to increase students' creativity, the more closely one matches the training to the task of interest the more effective it will be, and there is little if any transfer of creative-thinking skills across domains. As a result, creativity researchers are now examining creativity in specific areas more closely (see, e.g., the edited volumes Kaufman & Baer, 2005; Kaufman, Glaveanu, & Baer, in press, in both of which creativity researchers look at how creativity works in very specific domains).

The domain generality/specificity issue is central to creativity research because almost any study needs (either explicitly or implicitly) to endorse (or at least assume) one of the two theories. Domain specificity claims that one cannot really say anything much about creativity in general, only about creativity in domains, whereas domain generality claims that creativity is a domain-transcending factor (an ability, trait, or approach). Because of the importance of the question, the *Creativity Research Journal* published its first (and thus far only) point-counterpoint debate about whether creativity is domain-general or domain-specific (Baer, 1998; Plucker 1998). Even the debater arguing for domain specificity acknowledged that the "conclusions of researchers using the CAT are almost always that creativity is predominantly task or content specific" (Plucker 1998, p. 181). He went on to argue that "[P]erformance assessments produce evidence of task specificity, and creativity checklists and other traditional assessments suggest that creativity is content general" (p. 180).

But in fact even the most traditional of all creativity assessments—the Torrance Tests of Creative Thinking (TTCT)—have provided strong evidence for domain specificity. Plucker (1999) himself offered some of that evidence in validation studies he did later. Other evidence of domain specificity came from Torrance, the creator of the most widely used paper-and-pencil creativity tests, in which he found that his two tests (TTCT-Verbal and TTCT-figural) that use tasks from different domains were uncorrelated with each other (Cramond et al., 2005).[4]

[4] I believe my presentation of evidence regarding theories of domain specificity and domain generality in this chapter, although necessarily brief, is as even-handed as possible. (For a more detail analysis, see Baer 2016.) But as Kuhn (1962/1970, 1979) warned us, there is often no neutral ground from which competing theories can be judged or even described:

[Successive theories are] incommensurable . . . in the sense that the referents of some of the terms which occur in both are a function of the theory within which those terms appear. There is no neutral language into which both the theories and the relevant data may be translated for purposes of comparison (Kuhn 1979, p. 540).

I don't believe the theories of domain specificity and domain generality are *that* difficult to compare to one another, however (and not at all like the differences between, say, the Copernican and Ptolemaic world views). Such deep revolutions as the Copernican, which may well have been unintelligible from a Ptolemaic world view, are actually quite rare in science. As McMullin (1998) argued, most scientific revolutions are "shallow" (p. 122) and require only small modifications of the "disciplinary matrix" (Kuhn 1962/1970, p. 182) that hold together a field of study. The differences between domain specificity and domain generality are therefore not incommensurable, but

7.3 The Impact of Domain Specificity Theory on Creativity Research

The issue of domain specificity is, in one sense, simply about an error in creativity theory. But it goes much deeper than this, because whether creativity is domain-specific or domain-general has implications for *every* creativity theory (and these theories, as I had learned, impact how one teaches for creativity). The generality-specificity question reflects a belief about the fundamental nature of creativity or whether creativity even has a "fundamental nature." If creativity is entirely domain-specific, then there is no such thing as general "creativity," in the same way there is no such thing as general, domain-transcending "skill" or "expertise." Skill, expertise, and creativity can be conceptualized as domain-general abstractions, but the components of any actual instance of skill, expertise, or creativity will depend on the domain and vary accordingly. If one thinks of each kind of creativity as a circle in a Venn diagram, there is no place that all the circles, or even most of the circles, overlap.

The implications of domain specificity for most creativity research are therefore almost paradigm-shifting in their potential impact. If creativity, whether understood as a set of skills, personality traits, or ways to approach problems, were something that transcended domains, then it wouldn't much matter the domain one chose to conduct a study. For example, consider the relationship between creative genius and mental illness. Much ink has been spilled about this connection (or lack of connection), and different studies have come to starkly different conclusions. But that's because different researchers have looked at possible connections in different domains, and the relationship is a very domain-specific one. For some domains there is a connection, whereas in others there is no connection. As Simonton (2010) explained, "geniuses in the natural sciences tend to be more mentally healthy than in the social sciences; geniuses in the social sciences, more so than those in the humanities; and geniuses in the humanities, more so than those in the arts" (pp. 226–228).

The same is true in other areas of research. Consider a less fraught issue, conscientious, which (unlike creativity) appears to be a fairly general trait. This means that people who are conscientious doing activities in one domain tend to be conscientious doing other, unrelated activities in other domains. The impact of conscientious on creativity is a different matter, however, because although conscientiousness is domain-general, creativity is domain-specific. Conscientiousness has a significant positive impact on creativity in some scientific fields, but a significant *negative* impact in some artistic fields. Conscientious scientists tend to be more creative,

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they are nonetheless very real and important; the viewpoints, meanings, and assumptions of domain-general and domain-specific theories can be quite pronounced, and as Kuhn showed us, defenders of competing theories often fail to understand each other's arguments as a result. What counts as evidence under the theories of domain specificity and domain generality are not so different, however, which provides room for discussion and comparison—and for the field to continue to move, albeit slowly, toward embracing domain specificity ever more fully.)

whereas conscientious artists tend to be less creative. The effect varies not just in size, but also in direction (positive or negative) depending on the domain (Feist, 1998, 1999). Many domain-general traits (like conscientiousness) can, despite their domain generality, be domain-specific in their impact on creativity.

McKay, Karwowski, and Kaufman (2017) measured a number of abilities, beliefs, and personality attributes commonly believed to be predictors of creativity, searching for associations between these and creativity in five domains. For example, they predicted that domain-general traits like openness to experience, creative self-efficacy, and creative personal identity would be related to creativity in all five domains. Their evidence, however, forced them to reject this hypothesis. Some of the abilities, beliefs, and personality attributes were indeed related to creativity in some of the five domains, but none was linked to creativity in all five domains. None, that is, was truly domain-general.

Consider what such an outcome says about creativity research in general. The overall creativity index that most so-called creativity tests provide—and that are the criterion measures used in hundreds if not thousands of past research studies —are typically sums of scores on a variety of subtests. Had McKay et al. (2017) assumed domain generality and simply summed the creativity ratings in the five domains into a single measure of creativity, they would have found positive associations between this generic estimate of creativity and some of the abilities, beliefs, and personality attributes they had measured. In doing so they would have totally missed the fact there is no such association for many domains. Or had they assumed, as domain-generality theory would suggest, that domains don't matter and had simply sampled a single domain and used it as a overall general creativity measure (also a common practice in past research), their results would have been quite different, depending on the domain they happened to choose. Had they chosen one domain they might have found one thing, but had they chosen a different domain the result could have been entirely different. As domain specificity predicts.

Is it any wonder that creativity research has been so plagued with contradictory research results? As long as one can simply choose a different test and get different results, which the lack of correlation among different creativity measures ensures, creativity research is doomed to being buried in inconsistent and conflicting findings. Consider the two most widely used tests of creativity, Torrance's TTCT-Verbal and TTCT-Figural. The choice of which of these two tests to use is simply a matter of convenience or suitability to the sample in that both are offered as domain-general tests (Plucker 1998). But they are clearly measuring two different things because they correlated only .06 with each other, according to Torrance's own research:

> Reponses to the verbal and figural forms of the TTCT are not only expressed in two different modalities . . . but they are also measures of different cognitive abilities. In fact, Torrance (1990) found very little correlation (r = .06) between performance on the verbal and figural tests. (Cramond et al., 2005, pp. 283-284)

When Plucker (1999) did a re-validation of these two tests, both of which measure divergent thinking (DT), he found that one of the two was associated with his measures of creative performance whereas the other was not. He explained this outcome as the result of domain specificity:

> The importance of verbal DT relative to figural DT may be due to a linguistic bias in the adult creative achievement checklists. For example, if a majority of the creative achievements required a high degree of linguistic talent, as opposed to spatial talent or problem solving talents, the verbal DT tests would be expected to have a significantly higher correlation to these types of achievement than other forms of DT. (Plucker 1999, p. 110)

This failure of the TTCT to predict creativity across domains was a key issue in the first-ever debate sponsored by the American Psychological Association's Division (APA) 10, which focuses on creativity. The title of the debate was "Are the Torrance Tests Still Relevant in the 21st Century?" Note that the debate title was not "How Valid Are the Torrance Tests?" but instead asks if they are still even *relevant.* (For the debate itself, see Baer 2009; and Kim 2009; or see Baer 2011a, 2011b; and Kim, 2011a, 2011b for a follow-up written version of the same debate that was solicited by the APA journal *Psychology of Aesthetics, Creativity, and the Arts.*)

Thus, if one conducted creativity research using one of the two Torrance tests, one should expect that the results would be different had the other test been chosen, even though they are both supposedly measuring the same thing, domain-general creativity. The same would be true if instead of divergent-thinking tests one used performance measures, which researchers have often in the past interpreted as general measures of creativity (Amabile 1983) even though they have now been shown to be valid only for the specific domain of the performance task. So whether one uses performance-based measures of creativity or paper-and-pencil creativity tests, the results of any test of creativity that assumes domain generality can be expected to vary considerably depending on which test(s) one uses. (Want a different result? Just use a different test. As an example, in 2008 Baer and Kaufman published a review of research about gender differences in creativity. They found 47 studies that compared divergent-thinking test scores of boys and girls. Some results favored girls; some favored boys; some had mixed results because they used more than one test and girls scored higher on one and boys on the other; and some showed no difference.[5])

I don't mean to suggest that creativity researchers are unethical in their choices of tests or that they are fishing for specific results by trying different tests and then reporting only the ones that fit their hypotheses. But whether such choices of tests are made by chance or by design, the results obtained in any given study will depend

[5] Divergent-thinking tests are the most common form of creativity measures, but Baer and Kaufman (2008) found the same kind of conflicting results when other kinds of measures were used to compare gender differences in creativity. The only area in which consistent gender differences were found was in creative productivity, and those differences were attributable not to gender differences in ability but to differences in the environments in which males and females live, work, and produce creative things and ideas:

> There continue to be large gender differences in creative productivity, and these differences represent the most significant unanswered questions about gender and creativity. It is clear that a large part of those differences is environmental, including differences in adult expectations of girls and boys, differences in opportunities available to male and female children and adults, and differences in the kinds of experiences women and men are likely to have. There are also differences in how different kinds of creative works—including those more typically produced by women and men—are valued by society. (p. 28)

on the choice of creativity measure (and the domains it includes), so that if a researcher had happened to use a different test a positive result might have instead been negative (or vice versa). This is no way to get valid answers to important questions about creativity.

The only way to assess creativity validly is domain by domain. That makes creativity research hard, much harder than it would be if creativity were domain-general. This difficulty perhaps explains the reluctance of some researchers to give up domain-general research programs.[6]

As Feist (2004) suggested:

> [It is] a very appealing, and ultimately firmly American, notion that a creative person could be creative in any domain he or she chose. All the person would have to do would be to decide where to apply her or his talents and efforts, practice or train a lot, and *voilà*, you have creative achievement. On this view, talent trumps domain and it really is somewhat arbitrary in which domain the creative achievement is expressed."

Although the idea is, indeed, appealing—it was part of my attraction to the kinds of creativity training I used to do believing this would give participants the kinds of skills for doing creative things in any field—Feist concluded, "this is a rather naïve and ultimately false position and that creative talent is in fact domain specific . . . creativity and talent are usually not among the domain general skills" (p. 57).

It would make creativity research not only easier, but also grander, if creativity were domain-general. But as Silvia (2014) argued:

> The history of psychology shows that "big theories" inevitably fail to fulfill their promise. Instead, as George Kelly argued long ago, complex problems with many facets are better served by a mix of big and small theories. Likewise, the diversity of creativity research is a sign of healthy pluralism. (p. 233)

Grand theories are enticing (Do creativity researchers and theorists have physics envy?), but they inevitably distort, distract, and disappoint:

> It is the attempt to build grand, domain-transcending, all-encompassing theories that has crippled creativity research and led to a field in which it is the norm for research results to contradict each other (Baer 2011c, p. 200).

There are many other areas where creativity research has been plagued by conflicting research results. One such area of special interest to teachers is intrinsic motivation (which generally leads to higher levels of creative performance) and the impact of rewards (extrinsic motivators) on creativity (which often, but not always, lower creative performance). Teachers have many reasons to value intrinsic motivation, only one of which is its associated with greater creativity. But teachers also use rewards and other extrinsic motivators (like evaluations) that have been shown to depress creativity. The use of such extrinsic motivators is sometimes elective, but at

[6] Kuhn suggested (quoting Planck) that new paradigms only get widely accepted as those who held earlier views leave the field: "Max Planck, surveying his own career in his *Scientific Autobiography*, sadly remarked that 'a new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it'"(Kuhn 1962/1970, p. 151).

times it is simply unavoidable. It's hard, for example, to give feedback in a way that does not impact extrinsic motivation. Feedback is necessarily evaluative, so if students anticipate feedback on their writing, then they are expecting that their work will be evaluated.

Research on the impact of extrinsic motivators like rewards on creativity has led to conflicting findings (Amabile 1996; Baer, 1997a, 1997b, 2016; Eisenberger & Cameron, 1996). Some studies show that rewards depress creativity, while others show that rewards can increase creativity and still others suggest that it depends on the age and gender of the participants in the study! The key idea is that intrinsic motivation is linked to creativity and extrinsic motivation tends to drive out intrinsic motivation. It is impossible to know (yet) if one factor in these confusing findings might be the domain specificity of creativity because the needed research has not yet been conducted.

But, whatever those studies might show, it is important to note that there is at least one crucial kind of domain specificity involved in the connections between intrinsic motivation and creativity: intrinsic motivation varies greatly within individuals from domain to domain. A person may be interested in math, art, science, cooking, basketball, woodworking, poetry, theater, dance, and history; interested in any possible combination of these diverse areas of interest; or interested in none of them. A person's intrinsic interest in different activities isn't a general personality trait. It depends, almost entirely, on the kind of activity, so we shouldn't be surprised if creativity-motivation links vary as well.

As teachers, we can't promote intrinsic motivation *in general* or assume that if we nurture students' intrinsic motivation in one domain, such as poetry, it will naturally increase their intrinsic motivation in other areas, such as math, science, or art. The same is true of teaching for creativity. Teaching art-related creative-thinking skills will not in most cases have any impact on creativity in math, science, or writing.

7.4 Impact of Domain Specificity Theory on Teaching for Creativity

What does the domain specificity of creativity mean for the teaching of creativity? The answer is simple:

> It means we simply can't do it:
> We can't teach creativity.
> It's impossible.

"Creativity" doesn't exist if we think of it as a *general* skill, approach, trait, or strategy in the same way that "expertise" doesn't exist (except as an abstraction) apart from domains. I can't teach you "expertise." But I *can* teach you how to become an expert in X, Y, & Z, just not all at the same time. Teaching content knowledge can be done only one domain at a time. Ditto for creativity.

It's kind of like teaching "skill." I can't teach "skill"—just as I can't teach "appreciation" or "expertise." They're too abstract, and each kind of skill, appreciation, and expertise is different. Each kind of skill, appreciation, expertise, and creativity is different. We *can* teach them, just not all at the same time.

Many of the skills like divergent thinking that researchers think might be related to creativity *can* be taught. But only domain by domain, like in the study of teaching poetry-relevant divergent-thinking skills, which increased poetry-writing creativity but not story-writing creativity.

Just as it would be nice if we could do domain-general creativity research that would tell us about creativity of all kinds, in all domains, it would be nice to be able to teach creativity once and have it transfer to all domains. That kind of creativity research is impossible, however, and that way of teaching creativity is equally impossible. We need to teach and to research creativity domain by domain.

Teaching creativity domain by domain might sound like a daunting task, but teaching domain by domain isn't really that unusual, is it? When we teach U.S. history we don't expect that it will lead to students knowing more physics. In fact, when we teach U.S. history, we don't even expect it will result in students knowing more ancient Japanese history, even though both are from the same domain and taught in the same department. Expertise is *very* content-specific, and so must be our teaching for content knowledge.

This is true even when teaching critical thinking skills. Analyzing a poem, applied behavioral analysis, analyzing a theorem, psycho-analysis, tree-ring analysis, and factor analysis are all types of analysis, but learning how to do one doesn't mean I can now do all (or any) of the others any better. Like creativity, we need to teach analysis domain by domain. (Teaching would be a lot easier if we could just teach analysis once and be done, wouldn't it?)

I once used as a field placement for my educational psychology classes a school that had what they called a H.O.T.S. Lab, with H.O.T.S. standing for Higher-Order Thinking Skills. Students would come there to be taught how to apply, analyze, synthesize, and evaluate, based on the very powerful ideas of Bloom's Taxonomy (Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956). But it didn't (and it cannot) work that way. Knowing when a math problem calls for multiplication and doing it correctly is application. Knowing how the grid system works and using it to find the latitude and longitude of a city is also application. But there's no way to teach both application skills at the same time (and all the other application skills in other domains as well). That's why programs to teach critical thinking have such a poor record and why, when they do succeed, it's when the outcome measures are similar to the activities used in training, that is, when success is measured in the same domain as the training (Willingham 2007, 2008).

Having a taxonomy of higher-order thinking skills (à la Bloom) is a useful framework to remind of us the kinds of thinking we want to encourage, just as it's helpful to be reminded that we want to encourage creativity. Because either we can't teach the skills that Bloom labeled or creativity *in the abstract,* we need to teach thinking domain by domain and we need to teach for creativity domain by domain. And we can do that. It's just a little harder, maybe a lot harder, than it would be if creativity were domain general. (Did anyone ever promise that teaching would be easy?)

Although I no longer run creativity training workshops, those are still possible, despite domain specificity. But one needs either to focus on a single domain (like the poetry-training study discussed earlier) or choose one's exercises from a broad range of domains and aim for modest improvements in multiple domains. Domain specificity forces us as both creativity researchers and creativity trainers to be more humble. It also makes creativity training even more important because it's something we need to do in every subject, every class, every domain.

What does the impact of theory on creativity research and theory tell us about the role of theory more generally in teacher education? I started this chapter by noting that theory has a bad reputation in teacher education. By exploring how a false theory of creativity has distorted creativity research and the teaching of creativity, however, I have shown how creativity theory—even, and perhaps especially, a theory that has been long held implicitly, and has therefore often gone unexamined and unacknowledged—has had a profound impact. Does that make theory bad? Certainly bad theory (like domain generality) is bad, and can have very harmful effects. But does the impact of theory on practice mean we need more theory, or less theory, in teacher education? Or just better theories?

I also wrote in the opening that it was not my goal either to defend or to condemn the teaching of educational theory. Although I have argued that a false theory has crippled creativity research and led to poor practices in the teaching of creativity, that is not intended to be a call for more teaching of theory at the expense of practice. It is only a call for the recognition of the impact of theory on practice. As teachers and teacher educators, we need an awareness of the theories that guide us. We cannot simply banish theory, because whether acknowledged or not, our theories (in the form of assumptions, principles, ideas, concepts, opinions, views, or beliefs) direct our work.

We need to be aware of the theories that guide us in our practice. Having such an awareness can be prevent us from unwittingly being guided by theories that may lead us astray. An awareness of the theories that guide our practice can also make it more likely that our practice will be *successful* practice, practice that leads to meeting our goals in teaching.

Theories based on wishful thinking, like the theory that drove the school I discussed to establish a H.O.T.S. Lab, can sometimes suggest that teaching is easy. And teaching *can* be easy, as long as it is only teaching, and not learning, that one cares about. If learning matters, however, we need teaching to be rooted in theories that work, theories that actually describe reality—theories like domain specificity.

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