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## Creativity Doesn't Develop in a Vacuum

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### Abstract

*The skills, knowledge, attitudes, motivations, and personality traits that lead to creative thinking and creative behavior do not exist—and do not develop—in a vacuum. They are inextricably tied to content, to domains, in particular, and they therefore vary by domains. The more we learn about creativity, the more we discover how domain specific creativity is. This means we cannot nurture creativity, or any of the skills or attributes that contribute to creativity, without thinking about content. One cannot become physically fit by doing just one kind of exercise that trains a single set of muscles; all-around fitness requires diverse exercises that use and train many different sets of muscles. So it is with creativity. Different domains require different creativity-relevant skills, knowledge, attitudes, motivations, and personality traits. If we want to help children and adolescents become more creative, then we need to attend to the domains we use in the development of creativity. © 2016 Wiley Periodicals, Inc.*

The development of creativity is something almost all educators agree is important, but most creativity educators would argue that disturbingly little is being done to promote creativity (Baer & Kaufman, 2012; Beghetto, 2013; Besançon, Lubart, & Barbot, 2013; Plucker & Beghetto, 2015). In an introductory essay for a special issue of *Psychology of Aesthetics, Creativity, and the Arts* on “Creativity and Education,” a long-time observer of schools noted that:

There are hundreds of books and thousands of articles on how to teach children to think creatively. If one walks into a classroom, however, one is not likely to see a lot of teaching for creative thinking. (Sternberg, 2015, p. 115)

Why the absence of creativity-focused education? Some will argue that the standards and accountability focus of recent decades have driven creativity education from schools. To the extent that this is true, it is based on a misunderstanding of both how to teach for creativity and how best to promote the acquisition of skills and knowledge (Baer, 1999, 2002). Creativity *requires* a great deal of domain-based skills and knowledge, so the need to meet content standards is not a barrier to creativity development (Baer, 2015); and the best ways to acquire domain-based skills and knowledge involve using them constructively and in diverse ways, which makes assignments to promote creative thinking natural allies with the goals of the content standards movement (Beghetto, Kaufman, & Baer, 2015).

Content standards like the Common Core are not—or should not be—roadblocks to teaching creative thinking skills. The obsession with testing that both preceded and now accompanies the Common Core, however, has become just such an obstacle:

Another unfortunate misconception is the belief that we must be able to *measure* every outcome that we care about. Valid and meaningful assessment is hard, especially if we want to assess complex kinds of thinking, but the fact that we may not be able to test, in a standardized format, some of the things that we want to teach should not prevent us from teaching or valuing those things. For this reason, Common Core *testing* may be a genuine roadblock and the use of such tests for any high-stakes decisions (e.g., who gets a diploma, or who gets—or gets to keep—a teaching job) should be reconsidered, but that is no reason to avoid using the Common Core (or another set of rigorous content-based standards) as guides in education. We can (and should) teach things that matter whether or not we can test them adequately (Baer, in press-b).

The fact that creativity may be impossible to test in the kind of standardized format that will allow valid cross-district and cross-era comparisons does not mean that creativity in many domains cannot be assessed in any way. Experts in a domain can very reliably assess the creativity of

artifacts produced in that domain, as Amabile and others have shown convincingly (Amabile, 1982, 1983, 1996; Baer, Kaufman, & Gentile, 2004). But attempts to assess creativity in a standardized format have had little success. As Csikszentmihalyi (2013) observed:

If one turns to the literature of creativity research and asks the simple question: What is being measured? What is creativity? One soon realizes that the entire research enterprise moves on very thin ice. (p. 143)

Sawyer's (2012) summary of the results of more than a half century of work in creativity test development is similarly pessimistic:

Different tests, each designed to measure creativity, often aren't correlated with one another, thus failing to demonstrate convergent validity. Another problem is that even though some of these tests correlate with creative achievement, the tests might in fact correlate with *all* achievement. Rather than measuring creativity, they might be measuring success and social achievement more generally—and IQ tests probably do a better job of that. (p. 61; original italics)

Attempts to assess creativity in a standardized way have mostly taken the form of divergent thinking tests, with the Torrance Tests the most widely used, but these tests have been under attack for many years for lack of validity. Anastasi wrote in 1982 that any “evidence of relation between the Torrance Tests and everyday-life criteria of creative achievement is meager” (p. 391), and a decade earlier Crockenberg (1972) reviewed the evidence that Torrance (1972a, 1972b) had offered for his tests and concluded that “given the creativity criteria used . . . [the results of his validity studies] should not be taken too seriously” (p. 35). Sternberg (1985) opined that “Such tests capture, at best, only the most trivial aspects of creativity” (p. 618). In 2009, Division 10 of the American Psychological Association (Psychology of Aesthetics, Creativity, and the Arts) held its first ever debate with the topic “Are the Torrance Tests still relevant in the 21st century?” (Baer, 2009; Kim, 2009).

There are many things that schools try to teach that cannot be assessed in standardized ways, however, and this assessment failure has not prevented schools from trying to teach those things anyway. What school mission statement doesn't say something about such hard-to-assess goals as creating socially responsible citizens, lifelong learners, and students who respect and value diversity? The fact that some kinds of skills, knowledge, attitudes, and traits are hard to measure (and especially hard to measure when the relevant skills, knowledge, attitudes, and traits that matter for creativity vary from domain to domain) is not a reason to abandon them as goals. If, like respect for diversity and other important goals, creativity

is hard to assess, that is not a reason for schools to dismiss it as not worth promoting and teaching.

One problem that creativity education has faced—a self-imposed problem—is the erratic success of creativity training programs. Far too much creativity training has been time wasted, mostly because of poorly designed programs based on a fundamental misunderstanding of the nature of creativity (and its development).

Scott, Leritz, and Mumford (2004) conducted a quantitative meta-analysis of creativity training research covering a half century of research—70 published and peer-reviewed studies on the effectiveness of creativity training. There was good news: they found that “well-designed creativity training programs typically induce gains in performance” (p. 361). But there was also bad news, which was encapsulated in the phrase “*well-designed* creativity training programs.”

What constituted good design, the kind that led to positive outcomes?

[M]ore successful programs were likely to focus on development of cognitive skills and the heuristics involved in skill application, using realistic exercises appropriate to the domain at hand. (p. 361)

The key issue was that the training exercises needed to be “appropriate to the domain at hand.” Creativity training worked when the training and the goals of the training (and the ways the effectiveness of the training was assessed) were *in the same domain*. “The most clear-cut finding to emerge in the overall analysis was that the use of domain-based performance exercises was positively related ( $r = .31$ ,  $\beta = .35$ ) to effect size” (p. 380).

Barbot, Besançon, and Lubart (2011) suggested the need for an even tighter focus than domain specificity in arguing for *task* specificity: “the most effective training programs will be those tailored to enhance creativity in a specific domain, and even better in a specific task” (p. 130). This call for task or subdomain specificity echoes Pretz and McCollum’s (2014) caution about the need for extremely domain-specific analyses: “Perhaps prior studies of domain-specific creativity were not specific enough” (p. 233) to uncover effects that more specific assessments might have revealed.

For those who have followed creativity research over the past two decades, these results should come as no surprise. It was almost two decades ago that the *Creativity Research Journal* published the only point-counterpoint debate it has ever featured. The topic of that 1998 debate was the domain specificity of creativity, and even the debater arguing for domain generality acknowledged that the outlook for domain generality was already looking rather grim:

Recent observers of the theoretical (Csikszentmihalyi, 1988) and empirical (Gardner, 1993; Runco, 1989; Sternberg & Lubart, 1995) creativity literature

could reasonably assume that the debate is settled in favor of content specificity. In fact, Baer (1994a, 1994b, 1994c) provided convincing evidence that creativity is not only content specific but is also task specific within content areas. (Plucker, 1998, p. 179)

Research looking at actual creative performance has consistently shown that creativity in one domain does not predict creativity in other domains (see Baer, 1998b, 2010, 2013, 2016 for summaries of this research). In a typical experiment of this kind, researchers ask subjects (who have ranged from kindergarten age to adults) to create several different kinds of things in different domains. Creating short stories, collages, interesting math word problems, drawings, structures, paintings, and poems have been favorite tasks in these studies, although many other domains have been tapped as well. Experts in those domains rate them for creativity using Amabile's Consensual Assessment Technique (Amabile, 1983, 1996). The two sides of this debate make different key predictions, as summed up by Ivcevic (2007):

Domain generality would be supported by high intercorrelations among different creative behaviors and a common set of psychological descriptors for those behaviors, while domain specificity would be supported by relatively low correlations among different behaviors, and a diverging set of psychological descriptors of those behaviors. (p. 272)

The results have been consistent: low to nonexistent correlations between creativity ratings of subjects' creations in different domains.

Even research that has tried to find evidence for domain generality in performance assessments has found (as domain specificity predicts) only positive correlations on tasks in the same domains. For example, Conti, Coon, and Amabile (1996) had young adults in an introductory psychology class complete a total of four story-writing tasks (using different prompts) and three rather different kinds of art activities. The intercorrelations they reported among the story-writing creativity ratings were indeed both high and statistically significant, suggesting that these measures were largely measures of the same domain-based ability. The correlations among the ratings of the art-related tasks were also positive, but weaker, because unlike the writing tasks, which were all very similar, the art tasks varied considerably from one task to the next. These positive correlations showed a within-domain consistency of creativity ratings, as both domain specificity and domain generality predict, although with significantly lower correlations on different tasks, even those in the same domain. The test for domain generality came from the cross-domain correlations, of which there were 13 in all. Of those 13 correlations, some were positive, some were negative, and none—not a single one—of those 13 was statistically significant. The results were exactly what domain specificity predicted and not at all what domain generality predicted. The fact that even within the same domain

the correlations were much lower when the tasks were more varied supports (a) Pretz and McCollum's (2014) argument about the need not just for domain-specific analyses, but for subdomain or task-specific analyses and (b) Barbot et al.'s (2011) suggestion that in teaching for creativity, the proper unit of analysis is the specific task.

Dow and Mayer (2004) showed the importance of such subdomain focus in their study of teaching students how to solve different kinds of insight problems. They addressed the issue of domain specificity/generality in creativity training very directly:

The purpose of this research was to investigate whether insight problem solving depends on domain-specific or domain-general problem-solving skills, that is, whether people think in terms of conceptually different types of insight problems. (p. 389)

Training of creative problem solving has a somewhat disappointing history, because learning to solve one kind of problem rarely supports solving of other types of problems. (p. 397)

Dow and Mayer trained their subjects in ways to solve either verbal insight problems or spatial insight problems. The training worked: subjects improved their skill in solving whichever kind of insight problems they were given. But when they compared the effects of training on skill in solving the other kind of insight problems, their results were "consistent with the domain-specific theory of insight problem solving, namely, the idea that insight problems are not a unitary general category but rather should be thought of as a collection of distinct types of problems" (p. 397). There was simply no evidence of transfer or generalization: subjects' increased ability to solve one kind of insight problem had no effect on their ability to solve other kinds of insight problems:

What is learned when someone learns how to solve spatial insight problems? Our research suggests that students learn a general strategy that applies only to a subcategory of insight problems—that is, learning to overcome self-imposed constraints in solving spatial insight problems. (p. 391)

There is no transfer within the domain of solving different kinds of insight problems, so it should come as no surprise that there is no transfer to other kinds of creativity-relevant tasks either, including real-world creative behavior. Beaty, Nusbaum, and Silvia (2014) looked at the correlations between success at solving classic insight problems and real-world creative achievement and concluded that there was "no evidence for a relationship between insight problem solving behavior and creative behavior and achievement" (p. 287). Insight problem solving, they concluded, was

unrelated to other kinds of creativity, and Dow and Mayer's (2004) study showed that even within the domain of insight problem solving, further domain specificity was called for. Creativity training can work, as all these studies demonstrate. But the success of the training is limited to the domain, or subdomain, in which the training occurs.

Does this mean that creativity training doesn't work? Not at all. But it does mean that creativity and creativity training don't operate in vacuums. They must focus on specific content. For example, Baer (1996) trained middle school students using a variety of divergent-thinking activities related to poetry-writing creativity, such as brainstorming words that could stand for other words or ideas (metaphor production) and brainstorming words with similar beginning sounds (alliteration), whereas a matched control group received unrelated training. A week later the students' regular English teachers assigned poetry- and story-writing activities without reference to the training. The students who had a week earlier received the poetry-relevant creativity training wrote poems that earned higher creativity ratings from experts than poems written by the matched control group. This training did not lead them to write more creative stories than did students in that same control group, however, even though poetry writing and story writing are from the same larger domain of writing.

Think about how students learn other kinds of things. If we want students to learn calculus, world history, and biology, we don't assume some general kind of study will help them learn all three. We understand that these are different domains, that each requires domain-specific instruction and study, and that there is little reason to expect much transfer among them. Ditto for creative-thinking skills.

Alternatively, think about other kinds of thinking skills, such as those outlined in Bloom's eponymous *Taxonomy of the Cognitive Domain* (Bloom, Englehart, Frost, Hill, & Krathwohl, 1956). The "higher order" skills of analysis, synthesis, and evaluation are certainly important and need to be taught, but like creative-thinking skills (which often rely on analysis, synthesis, and evaluation, as well as Bloom's other cognitive skills—knowledge, comprehension, and application), Bloom's cognitive skills also need to be taught (and learned) within the context of domains.

Consider dissection, which is a kind of analysis. Being able to dissect a frog, dissect an argument, dissect a triangle, and dissect a villanelle are all wonderful skills, but they are unrelated skills that share a generic name and little else (and the fact that a student can do any one of these tells one nothing about her ability to do any of the others). Ditto for being able to synthesize chemicals, synthesize musical sounds, synthesize columns of data, or synthesize two philosophical arguments. Cognitive skills at the level discussed by Bloom are remarkably domain- and content-specific. (Baer, *in press-a*)

There are simply no domain-general, decontextualized thinking skills, only domain- and content-specific thinking skills, whether those skills are the ones outlined by Bloom or the ones more frequently associated with creative thinking (Baer, 1993; Kaufman & Baer, 2005, 2006; Owen et al., 2010; Redick et al., 2013; Thompson et al., 2013; Willingham, 2007, 2008). Like expertise, and like creativity, higher level thinking skills are very domain specific.

Does this mean we can't teach creativity? Of course not. It only means that trying to use shortcuts—trying to teach creativity in a vacuum, as if content didn't matter—will be no more effective than trying to teach fractions and physics by studying something other than fractions and physics. We teach content by domain, and we need to teach thinking skills—including creative thinking skills—within the context of domains.

It isn't just the skills and knowledge needed for creativity that vary by domain. Different kinds of motivation, attitudes, and personality traits are also needed. It has been persuasively argued by Amabile and others, for example, that intrinsic motivation is conducive to creativity (Amabile, 1983, 1996; Baer, 1997, 1998a; Hennessey, 1995; Hennessey & Zbikowski, 1993). But intrinsic motivation isn't fungible across domains. One cannot cash out an interest in sports as an interest in history, and a motivation to write fiction is not readily convertible into an interest in filling out one's tax return. Similarly, there is evidence from personality testing that conscientiousness—one of the Big Five personality traits—has a significant positive impact on creativity in some domains (such as some scientific fields) and a significant negative impact in others (such as some artistic fields; Feist, 1998, 1999).

But what about interdisciplinary thinking? Does teaching with a domain-based focus ignore the power of interdisciplinary thinking? Not at all. But interdisciplinary thinking isn't simply taking what one knows (or knows how to do) and applying it in some other domain. Trying to do that without understanding the target domain is a ticket to failure. The concept of interdisciplinary thinking suggests thinking and problem solving that draw on the work of more than one discipline. It doesn't suggest that disciplines don't matter. If anything, it suggests just the opposite; without disciplines, there can be no interdisciplinary anything. "Just as creativity requires the kinds of skills and content knowledge that the Common Core is designed to promote, interdisciplinary thinking requires the kinds of expertise that disciplines develop" (Baer, in press-b).

Interdisciplinary thinking and problem solving require expertise and creative problem-solving skills in *multiple* domains. Having multiple areas of expertise and diverse domain-specific problem-solving skills may make it possible to recognize ways of solving problems that expertise and skill in only one domain would not allow. Domain specificity puts a premium on having *multiple* domain-based skills and areas of expertise. This makes it possible to solve problems in one domain that might benefit from ideas rooted in other domains as well as problems that are multidisciplinary in



nature (e.g., global warming, a problem that will require expertise in many domains to solve).

So we need to teach creativity, but trying to do it in a vacuum will only invite failure. And failure in creativity training not only means time wasted (although it certainly does mean that). It also means that less time will be devoted to teaching for creativity in the future, because, based on past failures, it hardly seems worth it. The poor results teachers and administrators have observed from poorly designed creativity-training programs will unfortunately hinder future creativity-training efforts. We need to stop making the same mistakes.

We need to heed to results of research, which shows that creativity training can be very successful—if, as Barbot et al. (2011) reminded us, if it is “tailored to enhance creativity in a specific domain, and even better in a specific task” (p. 130) and “take[s] into account the multidimensionality and domain specificity of the construct of creativity” (p. 128). Doing poor creativity training poisons the well for future, better designed creativity training. We need to listen to the clear message that research that is sending us: Creativity doesn’t exist, and can’t be taught, in a vacuum. But if we teach it in the context of content, content that matters to us and our students, then we will not only succeed in helping our students become more creative thinkers, we will also be helping them acquire the skills and content knowledge that the standards and accountability movements value so highly. Standards (like the Common Core) are not the enemy of creativity. The two are natural allies, but we need to design programs in ways that allow them to complement each other, not ones that set them at odds.

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