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Teaching Future Middle Level Educators to Craft Learning Activities that Enhance Young Adolescent Creativity

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As social and academic forces begin to collide for young adolescents at the beginning of the middle level experience, students experience an unfortunate drop in their creativity. Appropriately trained middle level teachers have the potential to lessen this problem through the use of carefully selected open-ended learning activities that increase the divergent thinking capacities of their students. This article argues for the use of divergent thinking activities in the teaching of young adolescents and discusses both their creation and their assessment in an effort to allow future middle level educators to respond to 21st century challenges.

For young adolescents in middle level settings, quality learning should include exposure to challenging classroom activities that force them to engage in more meaningful problem solving and creative enterprises. Unfortunately, as a consequence of high stakes testing, a return to traditional means of instruction, which often focuses on convergent thinking tasks, seems to largely limit students to activities designed to increase knowledge, understanding and application. While these are certainly important as foundational elements of learning, for students to reach higher, they need to analyze, evaluate and – ultimately – create, requiring a different type of learning. Middle level teachers can incorporate divergent thinking tasks into their lessons to disrupt this heavy reliance on learning oriented toward convergent thinking. Educating teacher candidates in middle level programs about divergent thinking as well as how to craft and assess appropriate divergent thinking activities ensures that future middle level learners will be able to acquire skills that are essential for success in the 21st century. In the age of information, creativity has become more important than ever before (Kwon, Park, & Park, 2006; Lin, 2011; Mishra, 2012) and middle level learners stand to gain the most from exposure to and practice with divergent thinking activities.

The notion of divergent thinking has dominated scholarship on creativity following Guilford's 1950 presidential address and subsequent article in *American Psychologist* (Baer, 1998). Divergent thinking is closely linked to creativity and recognized as a powerful tool for later problem solving; however, a substantial decrease in divergent thinking ability occurs in the middle level setting (Claxton, Pannells, & Rhoads, 2005). Assisting future teachers of middle level learners to better understand divergent thinking and helping them to develop the capacity to craft learning activities that enhance the divergent thinking capabilities of their future students presents an opportunity for middle level teachers and teams to embrace a curriculum that is indeed more challenging, exploratory, integrative, and relevant (Association for Middle Level Education, 2010).

Divergent Thinking

From both a theoretical and empirical standpoint, discussions of creativity often reference divergent thinking as foundational to the creative process. Divergent thinking was first described by Guilford (1950, 1967) as an act of seeking multiple solutions to a problem without one specific answer, or thinking from multiple perspectives. Over time this definition has remained largely intact, more recently defined by Vincent, Decker & Mumford (2002) as, "the ability to generate multiple alternative problem solutions, [representing] a key capacity underlying creative thought" (p. 163). While discussions of creativity remain largely theoretical due to challenges associated with measurement of such an attribute (Guilford, 1950), the notion that divergent thinking is the foundational process of creativity is widely accepted (Runco & Acar, 2012; Silvia, et al., 2008), having been empirically studied in a variety of ways across a range of subjects (Kwon, et al., 2006; Runco & Okuda, 1988; Silvia, et al., 2008). From an educational standpoint, greater capacities for divergent thinking are predictive of elevated teacher evaluations of students' creativity and openness to new experiences, as well as children's increases in writing and artistic achievements (McCrae, 1987; Runco & Okuda, 1988).

For many, divergent thinking – or the larger creativity – is often confused with intelligence and/or expertise, so a brief differentiation of these concepts is warranted. "Intelligence," which refers to overall mental capacity, and "expertise," which refers to accumulated knowledge and skills, are each connected to and commonly associated with divergent thinking (Vincent, et al., 2002). Indeed, a certain amount of intelligence and expertise are precursors to the successful use of divergent thinking in idea gen-

eration (Vincent, et al., 2002), although it is important to note that intelligence and expertise are not causally related to divergent thinking. A more nuanced understanding of intelligence and expertise is that each is a connected element, both contributing to divergent thinking. As a consequence, divergent thinking has the strongest effect on the generation of novel useful ideas – or "creativity" – with only a very limited effect stemming from expertise (Vincent, et al., 2002). This relationship may be best understood through figure 1 below.

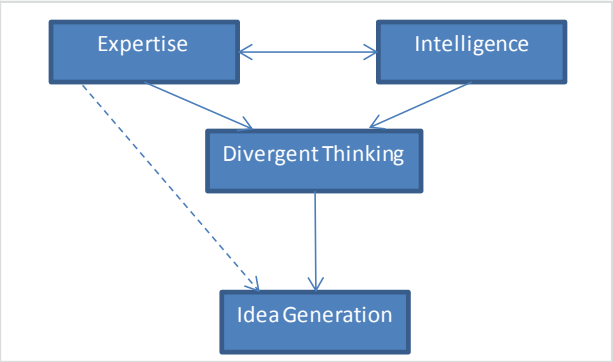

Figure 1. Relationships toward Idea Generation (Adapted from Vincent, et al., 2002)

As a concept, divergent thinking is often broken down into three elements. *Fluency* – the ability to put forward many ideas, *flexibility* – attempts to devise new strategies where others fail, and *originality* – clever and unexpected ideas (Claxton, et al., 2005; Guilford, 1950; Kwon, et al., 2006). Figure 2 below captures the three interrelated areas of divergent thinking. Teachers who use appropriately designed open-ended problems in their classrooms can produce significant positive differences in all three elements of divergent thinking, thus improving their students' divergent thinking abilities within their content area (Kwon, et al., 2006).

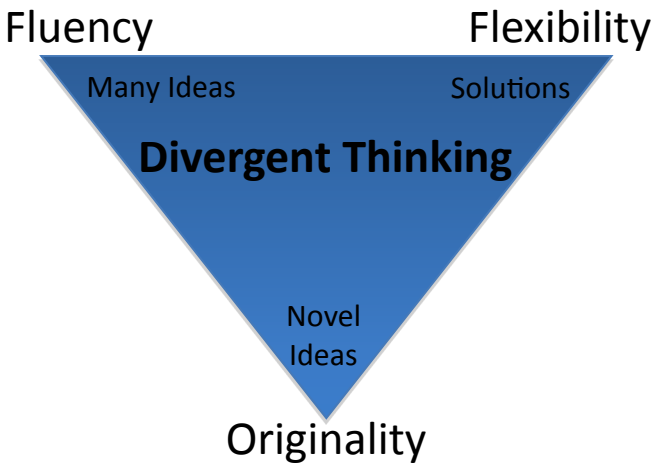

Figure 2. Three elements of Divergent Thinking

Because divergent thinking capacity can vary across content areas, when teachers of different content help their students to practice divergent thinking in each of their classrooms using a wide-variety of tasks, the result is an improvement to overall student creativity (Baer, 1998; Lin, 2011). Therefore, not only can individual middle level teachers incorporate practices that improve the content-specific divergent thinking capacity of their students, groups of teachers working together can make use of varied divergent thinking tasks to improve the overall creativity of their students. Educating future middle level teachers to not only execute divergent thinking tasks in their classrooms, but to also work with other teachers to increase divergent thinking exposure across the content areas, allows these future teachers to have a more meaningful and substantive impact on the creativity of their students.

Divergent Thinking at the Middle Level

In middle level education, where cognition collides abruptly with social pressure for young adolescents, attention given to divergent thinking by strong middle level educators contains great potential for improving young adolescent education. Though elementary students typically demonstrate a larger capacity for divergent thinking, during fourth grade most young adolescents begin to show declines in divergent thinking that often do not begin to recover until later adolescence or early adulthood (Claxton, et al., 2005; Gardner, 1982). This decline, often termed the "fourth grade slump," is linked to structural changes in the school environment, including: differentiation by subject, a higher reliance on convergent teaching strategies, as well as an increase in peer pressure to conform with others (Claxton, et al., 2005). As such, middle level settings represent an important location in which to counter these trends through the inclusion of divergent thinking activities within classroom lessons.

Divergent thinking tasks, when set up properly, meet all four essential attributes of successful education for young adolescents in that they are at once: developmentally responsive, challenging, empowering, and equitable (Association for Middle Level Education, 2010). As a clear area of cognitive need, addressing the decline of divergent thinking that occurs in young adolescence presents real potential for student improvement. Because divergent thinking is as much about skill development as it is about content, focusing young adolescent attention on more open-ended problems allows for the "…ability to use information in forming creative solutions" (Association for Middle Level Education, 2010, p. 19), a necessary requirement of a challenging and empowering curriculum and one which permits greater gains in creativity to be made in later adolescence (Runco & Okuda, 1988). Additionally, divergent thinking tasks lead to more active engagement of students, present more opportunities for students to participate in their own ways, offer more rational experiences, and allow for discovery learning (Kwon, et al., 2006). These combined effects promote a more equitable educational environment. Greater emphasis on divergent thinking in the middle level not only addresses an identified area of cognitive need for young adolescents, it does so in a way that combines and emphasizes the necessary attributes for successful middle level education. Future

middle level educators, confident in their ability to include divergent thinking tasks in their lessons, represent a vehicle for positive change.

How to Craft Divergent Thinking Learning Activities

Understanding the power of divergent thinking as a foundation of creativity and realizing both the need and opportunities present in the middle level setting, educating future middle level teachers about crafting *appropriate* divergent thinking tasks for young adolescent learners becomes paramount. For crafting divergent thinking tasks, of high importance is a teacher's skill in selecting an appropriate task that allows their students to practice divergent thinking skills while being able to generalize these skills to other learning assignments within the same discipline (Kwon, et al., 2006; Mishra, 2012). Indeed, it is important that each teacher craft discipline-specific divergent thinking exercises instead of more generic divergent thinking tasks, as Baer (1996, p. 186) reminds, "…all divergent-thinking exercises must have some specific content; one cannot train general, content-neutral divergent-thinking skills."

Across all disciplines, while the content will differ, tasks that foster divergent thinking may best be thought of as open-ended or loosely-defined tasks, referred to by Collard and Looney (2014) as "open-learning" in which the outcome is typically unknown. Although there is no one recipe for an open-learning task, Guilford (1950), in his original description of divergent thinking, described a number of different examples of tasks designed to be completed in a short period of time that would allow one to improve their divergent thinking capacities. Four of these tasks readily translate into classroom use:

1) Given a paragraph of writing, generate as many applicable questions as possible

2) Given a common item, create a list of its flaws

3) Given a common item, list how many possible uses it has

4) Given one object, transform it into another

Though Guilford's examples are meant to be generic, it is important to educate future middle level teachers to insert content specific connections for their own classroom. For instance, given the preamble to the US Constitution, generate as many questions as possible in 60 seconds or given a high-powered electron microscope, list as many possible uses as you can in two minutes.

Because it is often viewed as the most convergent of disciplines, examples of divergent thinking tasks for use in middle level mathematics classrooms may be the most insightful as exemplars. In middle level mathematics settings, teachers should employ open-ended approaches to problems while ensuring that such problems are both familiar and of interest to students (Kwon, et al., 2006). These math problems should allow for many solutions, enhancing students' originality and flexibility (Kwon, et al., 2006). Two examples of such problems can be found in figure 3 and figure 4 below.

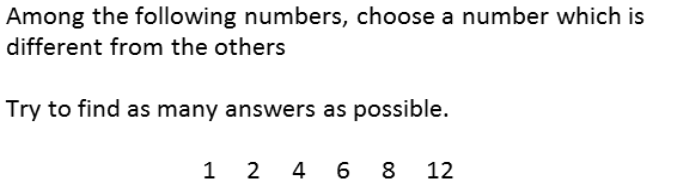

Figure 3. Sample open-ended task 1 - Mathematics (Adapted from Kwon, et al., 2006)

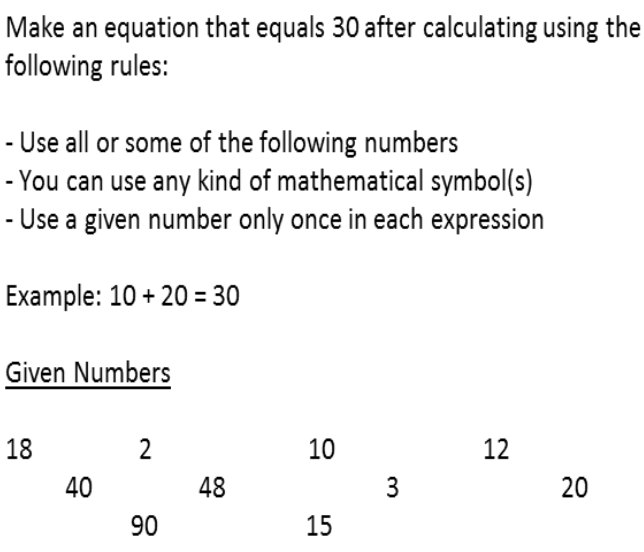

Figure 4. Sample open-ended task 2 - Mathematics (Adapted from Kwon, et al., 2006)

As a general process for creating a divergent thinking task, four steps are necessary and useful as a guide for assisting middle level teacher candidates through this process. First, the teacher must identify a content-specific case or problem that presents an opportunity for a wide variety of answers, including the possibility for creative solutions that fall outside of conventional ways of approaching issues within the content area. Fortunately, the teacher is not required to determine every possible answer here, just to ensure that the task presents the opportunity for unforeseen solutions. Second, it is important that students possess the basic knowledge (expertise) needed to be able to formulate frequent, flexible, and/or original answers, which may require some prior foundational instruction. Third, because efficiency is an important factor in divergent thinking, an appropriately short period of time for problem completion must be determined. There is no set rule here in regard to the amount of time. However, students working under the pressure of the clock more effectively engage the divergent thinking skills. Often, for short tasks these times range in the one to two minute time periods, while for more involved tasks the time would certainly scale up. Finally, teachers must select an appropriate assessment strategy to determine student capabilities and progress, an area that this article will turn to shortly.

When preparing future middle level educators to make use of divergent thinking tasks in their lessons, it is important to keep in mind potentials for the inclusion of technology. Advances in instructional technology have created many opportunities for students to express themselves in a creative digital fashion. Punya Mishra, best known for her work on the TPACK framework for instructional technology (Mishra & Koehler, 2006), explains that "…teaching and learning in this emerging world needs to emphasize these twin issues – creativity and technology" (Mishra, 2012, p. 13). Indeed, "…creativity is a priority for education and is central to the discourse on 21st century learning" (Collard & Looney, 2014, p. 348). In divergent thinking, technology use can more easily permit students to gather the initial expertise required to begin a divergent thinking task. For those teachers more skilled with the incorporation of technology, the products of divergent thinking tasks can also be created in a digital fashion. As an example, for the sample science task given under flexibility in table 1, students could represent their responses through drawings/ photos on a digital whiteboard rather than a written set of solutions.

Having learners engage in a variety of divergent thinking tasks in one teacher's classroom can improve the students' divergent thinking within a single discipline. Even better, having multiple teachers of differing disciplines working together, each engaging in content-specific divergent thinking activities in their individual classrooms, can improve the overall creativity of their students (Baer, 1996; Collard & Looney, 2014). Mishra (2012) describes this phenomenon as "indisciplined" learning, meaning that creative thought requires specific knowledge of multiple disciplines and a set of general thinking tools, including divergent thinking. Effective middle level schools include a collaborative teaming approach that necessarily brings together teachers across disciplines (Association for Middle Level Education, 2010). Effective instruction of future middle level teachers should capitalize on this advantage by including discussion of ways in which to link specific divergent thinking tasks in one classroom to a team-wide implementation of divergent thinking practices. Such training for soon-to-be middle level teachers provides a pathway for them to integrate into instructional teams and to produce meaningful results for young adolescents.

How to Assess Divergent Thinking Activities

Educating future middle level teachers to craft divergent thinking tasks is only one part of the equation; teaching them how to properly assess these tasks is the other. While it is nearly impossible to measure creativity, divergent thinking is measurable by breaking it down into its constituent elements – fluency, flexibility, and originality – allowing for valid and reliable assessment (McCrae, 1987; Runco & Acar, 2012; Silvia, et al., 2008). Typically, for fluency, assessments include the counting of many ideas; for flexibility, assessment includes counting attempts to devise new strategies where others fail; and for originality, assessment relates to counting ideas that stand out as novel or different from a standard set of responses to a given task (Runco & Acar, 2012; Silvia, et al., 2008). While multiple, independent assessments in each of the three areas above would measure the divergent thinking capacities of a group of students, such an approach is often too time consuming for teachers attempting to include short divergent thinking tasks into an already tight-fitting time frame. For teachers, it is often more efficient to alternate which of the constituent parts – fluency, frequency, originality – is being measured following each divergent thinking task, or to gear each short divergent thinking task presented in the classroom to specifically address one of the three areas (as was done in the English, science and social studies examples given previously).

For those wishing to engage in more prolonged and involved divergent thinking lessons, Silvia et al. (2008) offer a "Top 2" strategy that combines elements of fluency, frequency, and originality into a valid and reliable process for measuring highly involved divergent thinking tasks. In the "Top 2" process, students would generate a wide range of answers to a given divergent thinking task and then they would select the two solutions they feel are their best work, presenting them to the teacher for assessment (Silvia, et al., 2008). Though slightly less reliable than an alternative of assessing every attempt a student makes and averaging their scores, the "Top 2" method demonstrates stronger evidence of validity than an averaging approach (Silvia, et al., 2008), while additionally creating a more time-efficient assessment process for the teacher. In addition, the "Top 2" approach has an added benefit of permitting students to improve their capacity to judge the quality of their creative work, which allows for further enhancement of the open-learning experience (Collard & Looney, 2014).

Conclusion

Increasing the inclusion of divergent thinking tasks in middle level classrooms presents an opportunity to counteract a cognitive decrease in creativity that occurs for most young adolescent learners when they enter into the early middle level grades. Representing a shift away from the more typically convergent teaching strategies employed in classrooms, divergent thinking activities allow students to build on foundational knowledge to develop multiple, alternative, and unique responses to problems within each academic discipline. Such activities not only increase the relevance of previous learning and the involvement of students in more challenging learning activities, engagement in divergent thinking tasks across multiple content areas has the potential to foster increases in overall creativity for students. In a world that is increasingly connected, both between people and to accumulated knowledge, creativity will lead to empowerment. Educating future teachers of young adolescents about divergent thinking and how to create appropriate divergent thinking activities ensures that future middle level learners will be able to improve skills that are essential for success in the 21st century.

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