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Testing: Room for Creativity

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Abstract

This literature review examines the placement of formative assessment as pedagogy to foster creative learning in our classrooms. Formative assessment and its features are contrasted with those of summative testing. Formative assessment theory, methodologies, and outcomes are presented. Theories and evidence on the negative impact of standardized testing on creativity are discussed, as well as principles of good instructive practices in creativity learning. The specific characteristics of formative assessment that support creativity learning are detailed. It is shown through work of researchers such as Pintrich and Schunk, that formative assessment fosters a student goal structure which emphasizes the healthy motivational beliefs, positive learning attitudes, perseverance, and openness to academic challenge that is also supportive of creative learning. Finally, acknowledgement of the challenges of implementing policy to use more formative assessment are balanced by a call for criticality in developing the important 21st century skills of innovation, critical thinking and creativity.

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"Formative assessment is not a tool, but a process true to the practice of effective teaching and learning."

--Gene Wilhoit, Executive Director Council of Chief State School Officers

Introduction

Innovators and creative thinkers are crucial to the well-being of a society. These contributors solve difficult problems that often have been in a state of stagnation, insurmountability, or even unconscious disregard. These problems might derive from diverse areas such as social justice, economics, politics, engineering, environmental concerns, aesthetics, and psychology. Such problems require new solutions that have not yet been conceived and often have been pushed aside as implausible. "If we are to survive and flourish, we have to think differently about our own abilities and make the best of them (Robinson, 2011). Since the world is changing rapidly and it is impossible to predict what knowledge will be needed, creative critical thinking skills are crucial tools that should be endowed to our students. It is essential to examine our pedagogy and find methods that allow us to strengthen these skills.

Among candidate methods, formative assessment has been put forth as a positive practice achieving good results in students reaching goals established by both student and educator (Rushton, 2005). This review examines the potential of formative assessment as pedagogy to facilitate acquisition of student creative critical thinking skills.

What is formative assessment?

In this age of standardized testing, we are very familiar with the use and debate over the use of summative testing. The most familiar footprint of the No Child Left Behind Act of 2001 (U.S. Department of Education, 2001) has been the standardized, summative testing that has become a common feature of American education. Standardized testing has sparked debates among state policy makers, educators, and U.S. Congress. Many arguments against standardized testing have included the idea that the tests consume too much time that should be devoted to curricular content and other learning goals. Several organizations encourage opting out of testing, including United Opt Out and FairTest.Org (http://www.fairtest.org/get-involved/opting-out). Often such assessment is issued at the end of a curriculum content section to certify mastery of content. Frequently, the student's results have little impact on learning of the material, although the summative assessment outcome may have profound effect on the student's progress through his academic career (Sadler, 1989).

In remainder of this section, we move forward to describe an alternative and very different form of assessment, namely formative assessment. The basic idea of formative assessment is to provide students frequent interim feedback about their learning by providing information about their performance so that adjustments in ongoing teaching and learning can be made.

Benjamin Bloom was among the first to use the term "formative evaluation". He referred to a process of breaking up a course or subject into small units of learning. Frequent formative tests would be provided for each of the smaller units. "For students who have thoroughly mastered the unit, the formative tests should reinforce the learning and assure the student of his present mode of learning… For students who lack mastery of a particular unit, the formative tests should reveal the particular points of difficulty – the specific questions they answer incorrectly and the particular ideas, skills, and processes they still need to work on…The diagnosis should be accompanied by a very specific prescription if the students are to do anything about it" (Bloom, 1965).

According to Sadler, formative assessment should be focused on how the quality of student responses in the form of written works, performance, or projects can be used to improve student learning. The emphasis is on providing informative feedback during the learning process to guide the student toward competency. Feedback is a key element in formative assessment and requires a supportive environment in which the teacher is proficient in recognizing which skills are to be learned and how skills can be improved (1989).

The advent of formative assessment followed reviews of studies addressing teachers' assessment practice, students' self-perception and achievement motivation, instructional practices, the quality of assessment, and the quality of teacher feedback. In their article in the Phi Delta Kappan magazine, Black and Wiliam proposed that effective formative assessment involves:

- Teachers making adjustments to teaching and learning in response to assessment evidence
- Students receiving feedback about their learning with advice on what they can do to improve; and
- Students' participation in the process through self-assessment (1998)

The Maturing of Formative Assessment

Over the years, it has become apparent that methodology for formative assessment has been modeled with increasing levels of complexity. Building on Sadler's ideas on the importance of informative feedback and the proposals of Black and Wiliam outlined in the previous section, Rushton underscores the idea that formative feedback should close the gap between actual and desired levels of student performance.

For example, the math student who has inferred from a presented math example of: $\frac{2x-2}{x-1} = 2$ that it follows that: $\frac{2x-3}{x-1} = 2 - 3 = -1$ benefits from immediately being shown that $\frac{2x-2}{x-1} = \frac{2(x-1)}{(x-1)} = 2$ and thereby sees that no radical simplification of $\frac{2x-3}{x-1}$ can be made. A

summative test marks the question wrong and makes no correction of understanding. Formative feedback allows the student to understand the concept.

From the constructivist perspective, the student's perceptive understanding and motivational involvement are critical to the process of formative assessment. Nothing could be more beneficial to the student than having the knowledge and powerful feeling of "Oh, I get it now!" Essentially, student self-assessment strategy is an important part of the process as well. Sadler (1998) states:

> ….it should not be assumed that [a] unidirectional practice of teacher-as-assessor is itself always justified or best. A strong case can be made that students should be taught how to change their pattern of thinking so that they know not only how to respond to and solve (externally sourced) problems but also how to frame problems themselves. They need this partly to guide their learning in between, or to prepare for, teacher assessments, but equally as part of their progressive journey into self-assessment, and at more advanced levels, as a key skill for professional life.

Torrance and Pryor (1998) discuss convergent and divergent approaches to formative feedback. The convergent approach focuses on errors and the difference between a child's performance and the expected norm (p. 157). The divergent approach focuses on a constructivist approach centering on the student understanding and motivation. This approach opens the door to student self-evaluation as part of the learning process. One restrictive factor of this approach is the metacognition skills of the student, whereby a student may lack the ability to evaluate their own learning. In such cases, the instructor facilitates the student's metacognition with appropriate feedback that helps develop the student's ability to self-assess (Rushton, 2005).

Clearly, formative assessment should not conjure a picture of quizzes and tests, but rather a process used by students and teachers to aid ongoing teaching and learning.

Creativity in Learning

In the introduction, it has been proposed that creative critical thinking skills are important for the future of our society in a rapidly changing world. The question is whether formative testing holds promise for the development of creative thinking skills. Crucial to this understanding is examining creativity and how it is supported in education.

What do we know about teaching creativity? E.P. Torrance (1987) felt that creativity could be taught and originally designed his TTCT (Torrance Tests of Creative Thinking) as a method of individualizing instruction for teaching creativity. In his article, "Teaching for Creativity", Torrance surveyed the results of 142 research studies designed to evaluate various approaches to help students think creatively. Most of his evaluations of the creativity programs were based on students' results on his TTCT tests. He placed the instructional methods into nine categories and found that "it does indeed seem possible to teach children to think

creatively….in creativity, differences seem to be the greatest and most predictable when deliberate teaching is involved" (p. 203).

Most significant was the fact that Torrance believed that creativity was a "process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies and so on, identifying the difficulty; searching for solutions, making guesses or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying them and retesting them; and finally communicating the results" (Kim, 2006).

In support of Torrance's ideas, studies have shown that creativity training does have a strong effect on creativity. In a quantitative analysis of 70 training techniques, Scott, Lertiz, and Mumford found that specific educational strategies were important in developing creative thinking. "Techniques that provide structures for analyzing problems in terms of relevant strategies, or heuristics, typically more structured techniques, can therefore be expected to have a relatively powerful impact on performance…Apparently, creativity training requires structured directed practice in the application of relevant techniques and principals" (2004).

There are several pedagogical ideas that indicate that the way information is taught and organized strongly influences the way in which a student is able to use the information (Bransford, Vye, & Rieser, 1986). In their 1999 study, Ruscio & Amabile compared two techniques of instruction to determine the effect of each on problem-solving creativity. They found that algorithmic instruction, which involved following a rote step-by-step lesson, was less likely to result in students' exploratory and creative learning than a heuristic instruction, which involved demonstrating the lesson in a flexible way.

Sir Ken Robinson agreed with the idea of teaching structured techniques to inspire more creative thinking in our students. He felt that the instruction in some "basic skills can free up the way people approach problems — skills of divergent thinking, for example, which encourage creativity through the use of analogies, metaphors, and visual thinking" (2009). Pedagogy should be "designed to encourage other people to think creatively. You encourage kids to experiment, to innovate, not giving them all the answers but giving them the tools they need to find out what the answers might be or to explore new avenues. Within particular domains, it's perfectly appropriate to say, 'We're interested in new and original ways you can approach these issues.'" (Robinson, 2009).

It's not only about encouragement. Children who are beginning to be creative need feedback. Beghetto and Kaufman discuss the "Goldilocks principle", in which they focus on the concept of mini-C, the creativity involved in learning. In mini-C, the student interprets and transforms incoming information based on his/her prior knowledge and unique perspective, often making a creative spark of discovery that is truly their own (2007). A small child who learns that red and yellow finger paint make orange investigates and is thrilled to discover that the addition of a little bit of white makes yet another color. Goldilocks principle states that too

much positive feedback can stunt creative growth, and too much harsh feedback will cause the child to give up the game altogether. "The goal is to provide the right level of feedback" (p. 77). Timely and appropriate formative assessment can do that.

A concept "caught" with formative assessment can progress into understanding and original ways to approach known issues. Learning a fact such as that, in its' solid state, water does not shrink in size but expands when frozen can lead to a discussion of various practical outcomes. From potholes to icebergs, a student may learn a lot and begin to think more critically based on feedback and a dialogue about conceptual misunderstanding that would be an opportunity lost in a standardized test.

The Role of Summative and Formative Assessment in Creativity and Critical Thinking

The need for accountability in education has forced us to turn to standardized testing. If we look at the focus of America education in the last several decades, we do not see an emphasis on teaching creativity and problem solving. Quite the opposite, we have seen a focus on answering rote one-correct-answer questions. The lifeblood of education is dependent upon passing standardized tests (U.S. Department of Education, 2001). The No Child Left Behind (NCLB) Act of 2001 requires states to administer assessments in reading and mathematics in Grades 3-8, and once more in high school. One clear issue is that time teaching for standardized testing, and time administering standardized tests is time away from all other forms of instruction. Beghetto states, "Efforts aimed at promoting student creativity are often marginalized and overshadowed by a myriad of other demands placed on teachers' instructional time (2005).

In a more determined criticism, K.H. Kim has argued that the emphasis on standardized testing has muted creative thought in schools. "The increased emphasis on standardized testing may have shifted the emphasis in schools toward drill exercises and rote learning, and away from critical, creative thinking. The high-stakes testing environment has led to the elimination of areas such as fine arts and physical education content areas and activities….which leaves little room for imagination, scholarship, critical or creative thinking and problem solving" (Kim, 2011, p. 293).

Again, Beghetto (2005) echoes much of this this sentiment in his article, "Does Assessment Kill Student Creativity?" Beghetto's belief is not that all forms of assessment are causing the demise of critical, creative thinking, but the form of assessment that we use in schools is essential to fostering innovative thought. Beghetto emphasizes the motivational structures that different forms of assessment create. He defines two forms of goal-related messages created by assessment. Performance goal structures are represented by "goal related messages that stress the importance of avoiding mistakes, besting others, getting the highest grades, and demonstrating one's ability in relation to others (p. 258). This is most often the focus of summative assessment; the focus is on summing up student achievement and certifying mastery of the curriculum content. Formative assessment shifts the focus from comparison to self-improvement. Students think about improving their own prior skills, rather than comparing themselves to others.

A goal structure which focuses on the goals of self–improvement, skill development, and understanding is supported in formative assessment. "Assessment practices in classrooms with a mastery goal structure are used to provide students with useful information and feedback on how they are progressing relative to their own prior achievement" (p. 258). As mentioned here, formative assessment fosters these goals, with its emphasis on informative feedback and closing the gap between actual and desired levels of student performance. There is strong evidence in the literature that this type of assessment fosters healthy motivational beliefs, an increase in positive learning attitudes, academic engagement, perseverance and openness to academic challenge (Pintrich and Schunk, 2002).

Beghetto advises teachers that they should consider the messages they send about reasons for engaging in learning tasks. The motivation for student academic endeavor should be because students find the work interesting, personally challenging, attainable, and personally meaningful (2009, p. 261). People who are more driven by enjoyment and passion are more likely to be creative than those driven by praise or grades (Amabile et. al., 1996).

There is evidence that formative assessment encourages the self-motivation, personal enjoyment and passion needed to support creativity in learning. In contrast to summative feedback, which praises ability and draws attention to peer competition, formative assessment focuses on the task at hand. In Butler's study (1988), he demonstrated that students' interest in learning was increased when students were given feedback comments instead of grades. Using the feedback comments, students worked on trying to improve their skills rather than reflecting on their ability with regard to others. In an interpretation of research on formative assessment and feedback, Nicol and McFarlane-Dick note that "motivation and self-esteem are more likely to be enhanced when a course has many low-stakes assessment tasks, with feedback geared to provide information about progress and achievement, rather than high-stakes summative assessments" (2007,p. 212).

Research in formative assessment

It has been well established that a major goal of education must be to foster creativity and critical thinking. And yet, it has been argued here that summative assessment – so much a part of the mainstream of public education today - is a deterrent to fostering creativity. Research supports the fact that formative assessment is a valuable learning strategy to support these higher level thinking skills. In spite of its proven benefits, we have seen misuse and misunderstanding about formative assessment. In Margaret Heritage's comments to the Council of Chief State School Officers, she comments that "we already risk losing the promise that formative assessment holds for teaching and learning. " (2010, p. 1).

One problem may be that formative assessment has been limited by a scarcity of good research supporting the practice. "Given the wide use and potential efficacy of good formative assessment practices, the paucity of the current research base is problematic. A call for more

high quality studies is issued" (Kingston & Nash, 2011). Good quality research in formative assessment is hampered by the teaching environment in which it is examined. Research on formative assessment has focused on the use of such assessment as a process merely involving more frequent fine-grained assessments in the system. In fact it is noteworthy that research on the use of more frequent interim assessment has failed to show any significant improvement in student achievement resulting from their use (Goertz, Olah, & Riggan, 2009).

Thus, Sadler's comments from 1998 still hold true today: findings on the beneficial effect of feedback on student learning may be "delayed or masked by other factors". Other problems involve the fact that students have been exposed to poor quality formative education in which formative assessment was merely more frequent summative assessment. There is inconsistency in the use of formative feedback among their teachers. "Transformations made within one part of the curriculum (for example, feedback enhancement in one subject area with a particular teacher) may not be accompanied by complementary, mutually reinforcing teacher behaviours in other parts of the environment where other teachers follow a low feedback route" (Sadler, 1998). These factors have at times caused formative assessment to falter in achieving the promise found in the research studies such as those in the following research study by Hattie and Timperley.

In a review of 196 studies involving different instructional effects, Hattie and Timperley reported that feedback had an average effect size of 0.79 standard deviations – an effect greater than student prior cognitive ability, socioeconomic background, and reduced class size (2007).

A study of the cost effectiveness of formative assessment was conducted to weigh its' justifiable benefits from a pecuniary standpoint by Yeh in his 2009 study. He reported positive formative assessment effects were documented by interviews with teachers and administrators:

"…teachers and administrators who implemented rapid formative assessment systems suggest that these systems allowed teachers to individualize and target instruction, provide more tutoring, reduce drill and practice, improve student readiness for – and spend more time on – critical thinking activities, resulting in a more balanced curriculum" (p. 11).

The cost of formative testing is largely borne by the cost of teacher training. In a literature search, it seems that professional training in formative assessment has been sparse and limited, although some progress has been achieved in professional development for educators. In 2008, the Educational Testing Service (ETS) sponsored research into diverse contexts in teacher professional development. One segment of their research studied formative assessment training and was directed by two of the most well-known formative assessment researchers, Paul Black and Dylan Wiliam. Researchers performed a case study of teacher development aimed at implementing formative assessment strategies (known in this case as Assessment for Learning or AFL) in entire school districts. The professional development approach developed key strategies, as follows:

1. Sharing learning expectations: Clarifying and sharing learning intentions and criteria for success,

2. Questioning: Engineering effective classroom discussions, questions, and learning tasks that elicit evidence of learning,

3. Feedback: Providing feedback that moves learners forward,

4. Activating self: Activating students as the owners of their own learning, and,

5. Activating peers: Activating students as instructional resources for one another (Wylie, et al., 2008).

Implementation of these strategies involved establishing a strong foundational base presented to teachers by Dylan Wiliam. A cornerstone of the implementation encompassed the belief that teachers' professional judgment should be used to choose techniques to operationalize the foundational strategies. "Each teacher knows his or her students, learning goals, and classroom context better than anyone else and thus should know best how to choose appropriate strategies and techniques to further his or her needs" (Wylie et al., 2008, p. 46).

So why not formative assessment?

In an environment in which teachers already feel burdened by the demands of summative assessment, teachers are unlikely to welcome the need for extra time to utilize or train for formative assessment. Clearly training is required. As a nation, we have dedicated a great amount of time and money in analyzing, evaluating and perfecting standardized testing: a redirection of such resources into the promotion of formative assessment into America's classrooms would be well placed.

The No Child Left Behind (NCLB) Act of 2001 requires states to monitor and improve student subgroup performance and issue publicly accessible report cards for all schools. While in one breath the NCLB asks schools to reform and prepare students to acquire skills and problem solving abilities required in the fast paced innovative 21st century environment, in the next it also requires states to monitor and improve performance and issue publicly accessible report cards for all schools.

> The pressing need to be innovative and to prepare students with 21st century skills while complying with and meeting the many mandates of NCLB creates tension among school leaders and teachers who feel as though they are being pulled in opposite directions. Many conscientious school leaders are trying to be simultaneously responsive to calls for innovation, critical thinking skills, adaptability, and creativity (21st century skills) yet still meet the demands and adequate yearly progress (AYP) testing targets of NCLB. The ever present threat of failing to make AYP, with its public embarrassment, stigma, and outcomes or else philosophy, produces fear and conformity among educators, both of which stand in stark contrast to the objectives of 21st century schools (Schoen & Fusarelli, 2008).

American education has focused a great deal of resources on ensuring that progress was made in the form of standardized testing. However, with regard to "innovation, critical thinking skills, adaptability, and creativity" (Schoen & Fusarelli, 2008) – goals central to American education - we are failing. It has been shown here in several research studies (Kim, Bransford, Vye, & Rieser, Ruscio & Amabile), that standardized testing has done little for these types of skills, and perhaps has even weakened them. As noted by Amabile et. al., creative skills are fostered by self-motivation and passion (2009), and Butler showed that formative assessment improved students' self-motivation.

In our haste to ***prove*** that we have made strides in developing critical thinking skills, we have muted them. Ironically, standardized testing has become a major roadblock to achieving these 21st century skills.

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