CREATIVITY:
THE STATE OF THE DOMAIN

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MEASURING
WHAT
MATTERS

A PEOPLE FOR EDUCATION PROJECT

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CREATIVITY: THE STATE OF THE DOMAIN

This paper establishes the essential need to measure creativity in schools. By measuring creativity, the fundamental importance of creativity as an embedded aspect of schooling is underscored. Scholars postulate that the act of measuring creativity inspires the development of better curricula and teaching practices (Lucas, Claxton, & Spencer, 2012). Others claim that teaching creativity brings schools into alignment with workplaces where creativity is practiced and valued (Adams, 2005), and provides formative feedback so that students can continue to develop their creative strengths over the lifespan (Black & Wiliam, 2000). While there are challenges associated with measuring creativity in schools—such as oversimplifying creativity or using measurement inappropriately—this paper is based on the premise that it is both possible and desirable to foster and assess creativity in schools.

WHAT IS CREATIVITY?

It is widely agreed that creativity involves the generation of *novel* and *valuable* ideas or products (Meusburger, 2009; Mumford, 2003). While other terms are used in association with creativity, such as divergent thinking (Guildford, 1967) and fluid intelligence (Cattell, 1971), the complementary notions of novelty and value are pervasive (Craft, 2005).

One of the earliest models of the creative *process* was proposed by Graham Wallas (1926). Many of his ideas persist in contemporary discourse. Wallas identified five stages of the creative process: *preparation*, where the dimensions of the problem are explored; *incubation*, where the problem is internalized but there are no external signs that the problem is being addressed; *intimation*, where there is a sense that a solution is forthcoming; *illumination*, where the idea becomes evident; and *verification*, where the idea is elaborated, tested, and applied (Wallas, 1926). Aspects of Wallas's theoretical model have been tested empirically over the past century. For example, a recent study provides evidence that the incubation period aids in creative problem-solving (Ward, 2003).

Another approach to defining creativity involves gauging the scope of the creative act. In recent years, much has been written about *Big-C* and *little-c* creativity, originating from the work of Kaufman and Beghetto (2009) who popularized a "four C" model of creativity. Kaufman and Beghetto characterize *mini-c* creativity as personally meaningful interpretations of experiences (e.g. learning to play the guitar), *little-c* creativity as everyday problem-solving and creative expression (e.g., writing a beautiful Haiku poem), *Pro-C* as creative professional acts (performing in a Jazz band at a regional festival) and *Big-C* as those forms of creativity considered to be substantial or even legendary in a particular domain or genre (e.g., discovery of penicillin or the work of a classical composer like Mozart or Chopin).

These different degrees of creativity have been applied to educational contexts, with the argument that *mini-c* and *little-c* creativity should be an important part of the school experience (Beghetto & Kaufman, 2007, 2013; Craft, 2001, 2002, 2005; Kaufman & Beghetto, 2009; Spencer, Lucas, & Claxton, 2012).

Craft (2002) has written about how *little-c* creativity can be shaped in the early years, and demonstrates that while this form of creativity manifests differently across knowledge domains or subjects (e.g., *little-c* creativity in mathematics

could involve developing several solutions to a math problem while *little-c* creativity in language acquisition might manifest in a child who develops novel ways to memorize new vocabulary), as a concept, *little-c* creativity is domain free, and therefore, a potentially transferable phenomenon. Further, Craft (2002) claims that by developing *little-c* creativity in children, children can develop resilience, resourcefulness, and confidence, thereby preparing them to deal with life's challenges, helping them develop the capacity to act resourcefully and to feel confident that they may find ways through challenging situations. More will be said about *little-c* creativity later in the paper, including ways that *little-c* creativity can be cultivated every day.

WHERE DO WE FIND CREATIVITY?

Creativity is not subject or domain specific. While creativity is obviously present in the *fine and performing arts*, such as playing an instrument, drawing, dancing, or film-making, it also exists in the *outdoor and domestic arts*, including swimming, hiking, cooking, gardening, quilting, and carpentry. So too is creativity valued in *design, architecture*, and *engineering,* as evidenced by bridge designs, building plans, and smartphone app development. Creativity is prized in the fields of *business and entrepreneurship*—in product design, marketing, and communicating through social media. Less obvious, perhaps, but equally compelling is the notion that creativity is—and ought to be—a way to approach the so-called core disciplines, such as *mathematics and science*. Mathematicians and scientists who have made great breakthroughs in their fields often describe their thinking in creative terms, speaking about mental imaging, and seeing entire solutions to problems at once (Brian, 1996; Hadamard, 1954).

Although it is agreed that creativity exists in all domains, there has been debate about whether the quality of creativity is different across domains or whether creativity is domain general. Theorists who claim that creativity is domain general suggest that extremely creative people are broadly creative (Root-Bernstein & Root-Bernstein, 2004), and that creativity might appear to be domain specific simply because creative individuals have committed themselves to particular domains of work (Plucker & Beghetto, 2004). Others have proposed the notion that creativity has both domain-specific and domain-general components, taking into account the vast array of factors that influence creativity, including abilities, knowledge, personality, and motivation (Sternberg, 2006; Sternberg & Lubart, 1996). Plucker and Beghetto (2004) summarize the debate by suggesting that whether creativity is domain specific or domain general, the distinction is unimportant in practical terms—creativity, as a way of generating novel and valuable ideas—is something to be fostered.

WHAT DOES CREATIVITY LOOK LIKE AT SCHOOL?

When a teacher says to a student, "Oh, that's so creative," what does that statement mean? Often the teacher is responding to something novel or original in the child's work or way of thinking. Perhaps she sees something imaginative—a way of using colour in drawing that she has not seen before. In this way, creative acts—that is, *mini*-c and *little-c* creative acts—can be fulfilling in and of themselves. But there is more. Creative approaches to teaching and learning provide a plethora of ways to learn, make meaning, and express ideas, thoughts, and feelings. This means that disciplines, and links between disciplines, can be understood more deeply.

As noted at the outset, creativity is associated with turning novel ideas into valuable or compelling products. This focus on a valuable outcome brings the

dimension of innovation into the definition. As we have already seen, creativity can be present in a variety of disciplines and contexts. But the context alone does not make something or someone creative. One can play music in a rote and uncreative fashion, even though creativity is readily associated with the performing arts. And conversely, one can be creative with the most seemingly mundane activities—such as chopping and stacking wood. Creativity in schooling, then, can be seen as an approach that is brought to an activity—a mindful, open, flexible, critical, and experimental way of being. Creativity manifests both in the processes and products of learning.

Creativity also provides a bridge across disciplines, potentially making integrated investigations more powerful than their individual parts. For example, Ulbricht (1998) shows how environmental art education encompasses ecological, built, and social environments that together provide a platform for social and environmental change. He describes arts projects for elementary aged students, which enhance arts skills and bring attention to pressing social and environmental issues. Ulbricht calls for explicit connections to be made between art, culture, and the environment to promote a socially responsible curriculum that combines skills, values, and aesthetics. We will see other interdisciplinary approaches for cultivating creativity later in this paper.

WHY DOES CREATIVITY MATTER?

Developing creative sensibilities and habits enhances quality of life for teachers and students alike. Opportunities for students to be creative during the years spent in school ultimately contribute to lives that are joyful, productive, meaningful, and prosperous. Creativity also matters because of the intrinsic value of creative acts. And it matters because creative pursuits can enhance learning in other subject areas and support productive habits of lifelong learning. Further benefits of creative engagement include economic and health benefits to communities. Moreover, creativity promotes innovation and problem solving. All of these direct and indirect benefits are now examined.

INTRINSIC AND INDIRECT ACADEMIC BENEFITS OF CREATIVITY

There is ample evidence demonstrating that creative pursuits enable students to grow intellectually, emotionally, physically, socially, and spiritually (Upitis, 2010). Creative experiences in the arts nurture the imagination, which Eisner regarded (1991) as “the engine of cultural and social progress” (p. 12). Imagination and creativity are hallmarks of great thinkers and leaders: many prominent scientists and inventors are active in the arts, another form of creative expression (Zweig, 1986).

Further, creative explorations give students experiences with situations in which there is no known answer, where there are multiple solutions, where the tension of ambiguity is appreciated as fertile ground, and where imagination is honoured over rote knowledge (Eisner, 2002). When a student choreographs a dance, solves a mathematical puzzle, or designs an innovative marketing campaign, the student has a chance to imagine, to wonder, to create, and to learn. In other words, there is something intrinsically satisfying in producing something novel and valuable.

Koopman (2005) claimed that creative engagement is of fundamental importance because it calls for the sustained and complete involvement of the individual.

This notion of complete involvement is much like Csikszentmihalyi's (1990; 1996) notion of flow, that is, the sense of timelessness and absorption that can occur when one is immersed in creative work. Koopman (2005) claims that, "the quality of our life is determined by the way we give shape to the abundance of time we have at our disposal. We have to engage in meaningful practices if we are to make something of our existence. If we do not … we are doomed either to a life of boredom or to a life filled with frenetic and futile activity" (p. 93). Schools can foster conditions whereby students can take up worthwhile and engaging activities and see them through to completion—living moment to moment while engaged in those creative tasks.

There are some compelling studies demonstrating the value of creative work beyond its own intrinsic value. For example, a study conducted in Austria and Switzerland with elementary-aged students (Overy, 2000; Weber, Spychiger, & Patry, 1993) suggests a causal connection between the study of music and achievement in other subjects. The study of music is a form of creative expression, one that, in schools, has the potential to take the forms of *mini-c* creativity (learning to play an instrument), *little-c* creativity (writing music for pleasure), and even *Pro-C* creativity (reaching a level of composition where the student's works are played by others, including professional performers). The study was designed to determine the effect of music classes on academic achievement in mathematics and languages. Students received daily music classes in place of the regular schedule of one or two music classes per week. At the end of three years, these students performed as well as their peers in mathematics and better than their peers in language. This result is particularly impressive because the instructional time from mathematics and language was taken away to create the extra time for music classes.

One of the most extensive studies of the wide range of benefits associated with the arts for elementary-aged students assessed the impact of arts education for over 2,000 public school students in Grades 4 through 8 in schools in New York, Connecticut, Virginia, and South Carolina (Burton, Horowitz, & Abeles, 1999). This is an important study, not only because the arts offer many forms of creative expression for students, but also, because the study examined schools rather than individuals, and assessed the school environment for promoting creative work in the arts. All of the 18 schools in the sample were rated on three seven-point Likert scales, to identify the degree to which they were arts integrated, arts-rich, or employed external arts providers, and the schools were subsequently rated on a "high-arts" to "low-arts" continuum based on these three factors. Data were collected through surveys, perception scales, inventories, interviews, observations, and document analysis. Burton and her colleagues found significant links between rich in-school arts programs and the creative, cognitive, and personal competencies needed for academic success. The results showed that students in "high-arts" groups performed better than those in the "low-arts" groups on measures of creativity, fluency, originality, elaboration, and resistance to closure (Burton et al., 1999). The students from the "high-arts" schools were more cooperative, more willing to display learning publicly, and more likely to think of themselves as competent in the other academic subjects. The researchers identified habits of mind associated with arts learning, including the interweaving of intuitive, practical, and logical modes of thought. Burton et al. found that these habits of mind were accompanied by increased ability to exercise imagination, express thoughts and ideas, and take risks—abilities that, as we will see in a later section of the review, are associated with creativity.

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CREATIVITY, HEALTH, AND THE ECONOMY

Creativity is a hallmark of economic strength, health, and wellness. A brief prepared by the *Canadian Arts Presenting Association/l'Association canadienne des organisms artistiques* (CAPACOA) to the Standing Committee on Finance made clear that the arts, a form of creative expression that is available to the general public, help promote an engaged citizenry, promote voluntarism, philanthropy and a sense of community, and improve quality of life for Canadians. Further, the CAPACOA (2009) reported that the arts account for 3.9% of national employment, noting that the cultural sector provides jobs to more Canadians than the automotive sector, and generates an increasing contribution to Canada's GDP.

In those jurisdictions where cost-benefit analyses have been conducted to ascertain the economic impact of the arts and creative industries, it is abundantly clear that regions with thriving arts programs and industries benefit in the areas of job creation, city pride and prestige, increased property values, and support to other businesses (Economic Development Edmonton, 1997; Kelly & Kelly, 2000). Numerous non-economic benefits have also been documented in these analyses, including such social impact indicators as the development of community networks, building new skills and work experiences, contributing to the education of children, building community organizational capacity, transforming the responsiveness of public service organizations, and contributing to quality of life for people with poor health (Kelly & Kelly, 2000).

Health Canada has identified twelve interrelated determinants of physical health and emotional wellbeing (Cooley & Associates, 2003). These twelve determinants are: income and social status, social support networks, education, employment and working conditions, social environments, physical environments, personal health practices, healthy child development, biology and genetic endowment, health services, gender, and culture. With the exception, perhaps, of gender and biology, creativity affects and is affected by most of these determinants, particularly those that increase people's abilities to develop coping skills (e.g., social support networks), to create a sense of social connectedness (e.g., culture, social environments), and to achieve "a sense of control and mastery over life circumstances" (Cooley & Associates, 2003, p. 19).

Because we are living in an age where problem-solving is increasingly valued in the workplace (Pink, 2009; Tabet, 1998), creativity has a role to play here as well. Pink (2009) suggests that employees will find innovative solutions to 21st century problems when workplaces are designed to foster creativity by motivating employees through purposeful work rather than extrinsic rewards. Amabile and Kramer (2011) similarly argue that creativity in the workplace is enhanced when tasks are intrinsically motivating, when work teams are collaborative and idea-focused, and when supervisors create an environment with consistently positive emotions, contributing to what they term great inner work lives for employees. Students who have an education that is also intrinsically motivating and idea-focused will have the potential to succeed and grow in creative workplace environments, and in so doing, ultimately come to lead healthy and fulfilled work and home lives.

CREATIVITY AND INNOVATION

While creative acts can be fulfilling in and of themselves, creativity can also serve deeper and wider purposes. Creativity is a driver for innovation of all kinds. And it is innovation that is required to solve problems faced by individuals, by communities, and by our collective global society (Kaufman & Beghetto, 2009).

Before today is over, we who live on this planet will destroy 60,000 hectares of rainforest: this is destruction that occurs on a daily basis. Each day, over 140 species of plant and animal life face extinction (Raintree Nutrition, 2007). Current levels of CO_2 in the atmosphere are higher than they have been for 650,000 years, causing a rise in global sea level, global temperature rise, warming oceans, glacial retreat, and a variety extreme weather events, such as the record high temperatures and intense rainfalls that are becoming almost daily events (NASA, n.d.). New ways of thinking and acting are needed to alleviate the impact of human life on our planet, approaches that will call for creativity and innovation from all disciplines. Over the next few decades, schools will have a crucial role to play. In schools where creativity is fostered, students will develop the intellectual tools to innovate, and also, the passion to direct their skills to problems of global concern.

WHAT ARE THE CRITICAL COMPETENCIES?

One of the underlying premises of this paper is that creativity can be defined in concrete terms and that schools can help students develop their natural dispositions for creativity and innovation. In order to develop those dispositions, however, it is essential to delineate the critical competencies of creativity.

Although there is considerable agreement about what constitutes a creative act—big or small—there is far less agreement about the critical competencies that define creative thinking. The list is long. In the 1960s, Torrance identified a number of abilities associated with creative thinking, including fluency, flexibility, originality, and the ability to elaborate (Torrance, 1962). Gordon (1966) argued for the presence of metaphorical thinking as a critical competency for creativity. Root-Bernstein and Root-Bernstein (2001) suggested that creative thinkers were skilled at observing, visualizing (or imaging), discerning patterns, empathizing, and playing. Claxton and Lucas (2004) identified creative habits as including the ability to tolerate uncertainty, being open-minded, being able to take risks, exhibiting patience, deferring judgment, and being resilient. Habits of mind associated with creativity, as identified by Costa and Kallick (2000) also include the abilities to pose problems, gather information through all of the senses, find humour, think interdependently, communicate with precision, strive for accuracy, think flexibly, and respond with wonderment and awe. Perkins (2000) describes aspects of breakthrough thinking that lead to innovation, identifying reframing, detecting, and decentering as essential competencies.

Creativity and critical thinking can be seen to complement one another: being creative without the skills to assess the process and products of creativity is an incomplete creative act.

Coupled with these various competencies that foster creative thinking are another set of competencies—those that mark what is commonly termed *critical thinking*. Creativity and critical thinking can be seen to complement one another: being creative without the skills to assess the process and products of creativity is an incomplete creative act. What, then, are the hallmarks of critical thinking? Theorists suggest that critical thinking involves the ability to recognize and seek accuracy, be clear and seek clarity, resist impulsivity, be sensitive to others, be responsive to feedback, to plan, and to be aware of one's own thinking (Marzano, 1992).

Much has been written about how metacognition and self-regulated learning are connected to creativity. Self-regulated learning (SRL) refers to a set of mental habits that include monitoring, guiding, directing, and evaluating one's own learning (Zimmerman & Schunk, 2011). The extent to which a person recognizes what enhances his or her learning and consciously chooses strategies

to learn more effectively marks the degree of self-regulation present in the learning process. Research has demonstrated that studying the arts can support the development of self-regulation (Baum, Owen, & Oreck, 1997). Advanced musicians are able to monitor their practice by setting clear, measurable, and timely goals, focusing on aspects of their playing that can be improved, persisting during times of struggle, and by seeking help from others when facing difficulties (McPherson & Renwick, 2001; Oare, 2011).

HABITS OF CREATIVITY IN THE EDUCATIONAL CONTEXT

How, then, can we describe the critical competencies associated with creativity and metacognition that are both comprehensive and manageable in an educational context? One model, proposed by Lucas, Claxton, and Spencer (2012) identifies 5 habits and 15 sub-habits of creativity. In addition to being a comprehensive model—incorporating aspects of both creativity and critical thinking—there is empirical evidence suggesting that this framework has the potential to be useful for teachers for assessing and tracking the development of students' creativity in schools.

Lucas, Claxton, and Spencer (2012) propose that the creative individual is inquisitive, persistent, imaginative, collaborative, and disciplined, the latter of which encompasses the critical thinking skills so essential to ensuring that creative acts are both novel and of value. Below are both the five habits (in bold) and the three sub-habits associated with each habit:

- INQUISITIVE (wondering and questioning, exploring and investigating, challenging assumptions)
- PERSISTENT (sticking with difficulty, daring to be different, tolerating uncertainty)
- IMAGINATIVE (playing with possibilities, making connections, using intuition)
- COLLABORATIVE (sharing the product, giving and sharing feedback, cooperating appropriately)
- DISCIPLINED (developing techniques, reflecting critically, crafting and improving)

It is of note that these five habits, along with the sub-habits, roughly parallel the creative stages proposed by Wallas (1926) nearly a century ago, as described in the opening of this paper. The first stage, *preparation*, calls upon the habits related to inquisitiveness, persistence, and imagination. The next three stages of *incubation, intimation, and illumination*, are more difficult to observe, as they are largely internal processes. However, when the idea becomes evident during the illumination stage, the collaborative habit comes into play. Finally, when the idea is verified, the habit of discipline becomes important, although the other habits also play a role during *verification*.

For the purposes of this paper, the model developed by Lucas, Claxton, and Spencer (2012) is considered an appropriate framework for assessing creativity, as it was specifically developed with, and for, teachers. When Lucas and his colleagues validated their creativity framework, they did so with a number of criteria in mind. First, they sought to determine whether the framework would be deemed useful by teachers in that it was seen as valid and relevant. Further, they felt that the framework should encompass *learnable* dispositions. Evidence

from studies conducted over a two-year period indicate that, indeed, teachers embraced the framework as a valid and relevant tool for assisting students to develop dispositions associated with creativity. The assessment approaches delineated by Lucas at al. will be considered in the final section of the paper.

WHAT LEARNING OPPORTUNITIES ENHANCE CREATIVITY?

Thus far, the argument has been made that creativity is important to individuals, schools, and society. Further, we have seen that there are critical competencies associated with creativity and its sister skill, critical thinking, and that there are frameworks—notably of the type offered by Lucas, Claxton, and Spencer (2012) that help group those competencies into a three part structure, which will be considered later again in the paper. The advantage of such a structure—rather than a long list of attributes—is that it provides a framework that teachers can use both for designing learning activities and for evaluating student work.

This section of the paper examines the kinds of opportunities that can enhance creativity in students. It is based on the premise, of course, that creativity can be taught. Indeed, there is empirical evidence indicating that this is the case (Williams, Markle, Brigockas, & Sternberg, 2001). For example, Sternberg and his colleagues (Sternberg, Torff, & Grigorenko, 1998) demonstrated that Grade 3 and Grade 8 students who were taught in ways that emphasized creative, analytical and practical thinking, in contrast to students who were taught in ways that only emphasized analytical thinking, scored significantly higher on memory tests and performance assessments that called upon creative, practical, and analytical tools. In another study, involving middle and high school students, it was demonstrated that student performance was similarly enhanced when reading instruction involved creative, analytical, and practical approaches in contrast to teaching that included one of the three approaches and/or the regular curriculum (Grigorenko, Jarvin, & Sternberg, 2002).

In the opening pages of this paper, we also explored the idea that there are different types of creativity, ranging from small, almost daily creative acts to major breakthroughs in a discipline, driving many forms of innovative thinking and acting. The four types of creativity identified by Kaufman and Beghetto (2009) manifest in a variety of ways in both learners and teachers. Four examples, below, are given by Beghetto and Kaufman (2013). The first two show how learners can be creative in daily acts at school; the latter two are examples of creative acts by adult educators:

- mini-c, or interpretive, creativity (such as a 2nd grade student's new insight about how to solve a math problem).
- little-c, or everyday, creativity (such as a 10th grade social studies class developing an original project that combines learning about a key historical event with gathering local histories from community elders).
- Pro-C, or expert, creativity (for example, the idea of the flipped classroom pioneered by teachers Aaron Sams and Jonathan Bergmann).
- Big-C, or legendary, creativity (for example, Maria Montessori's

> new approach to early childhood education). (Beghetto & Kaufman, 2013, p. 12–13)

Even though all four types of creativity can be evidenced in the educational context, most students will be involved in *mini-c* and *little-c* endeavours. But even these forms of creativity need the right kind of learning environment in order to thrive. Hennessey and Amabile (2010) noted that creativity is most likely to thrive in classrooms that support personal interests, are marked by enjoyment and student involvement, and set the stage for students to become engaged with challenging tasks. Conversely, conditions that impede creativity include comparisons between peers and contingent rewards (Beghetto & Kaufman, 2013)—not unlike the extrinsic rewards that inhibit creativity in the workplace (Pink, 2009).

Another key aspect in supporting creativity in schools is for teachers to help students develop creative metacognition, that is, the ability to evaluate one's own creative strengths and limitations as well as when and where to be creative (Beghetto & Kaufman, 2013). Developing creative metacognition, Beghetto and Kaufman argue, is part of the long-term goal of moving from *little-c* to *Pro-C* creativity, which takes years of development (Ericsson, 2006). That said, one should always bear in mind that simply setting appropriate conditions does not ensure that creativity will be cultivated in students. Hattie (2009) reminds us that while teachers yield considerable influence on the success of their students, it is not the methods they employ alone that engender success. Rather, successful school experiences and high student achievement are a combination of strong teaching methods along with high student expectations and the creation of positive student-teacher relationships. Against this general background, further ways of cultivating creativity during the schooling years are now explored.

BEING CREATIVE AT SCHOOL

There are many ways that schools can contribute to the cultivation of creativity in students. Some of the approaches that teachers can take to foster creativity involve everyday activities that teachers can employ to cultivate creativity in their students. Others are more project or program based, such as integrated programming with a problem-solving teaching approach, or musical theatre. There are compelling reasons for nurturing a multiplicity of approaches in providing creative opportunities. First, students often learn in profoundly different ways, even within a subject area, and therefore require more than one avenue to be creative. Second, cultural differences require flexibility in teaching in order to maximize opportunities for students to thrive in the communities in which they belong. Third, because teachers also bring different strengths to their work, there should be opportunities for teachers to express those strengths as well as learning from others where they lack experience or abilities. Sloboda (2001) concluded that the key approach to a viable arts education for today's students is variety—variety in providers, in funding, in locations, in roles for educators, in activities, and in routes to teacher competence. The same can be said for providing opportunities for an education rich in creativity. Fox (2000) makes a similar plea for what she calls an integrated delivery system, where there is a shared responsibility to provide the best possible experiences for young learners by bringing together funding sponsors, researchers, educators, parents, and families.

EVERYDAY OPPORTUNITIES

Teachers can bring *mini-c* and *little-c* creativity into the classroom on a daily basis (Beghetto & Kaufman, 2010; Craft, 2002; Sawyer, 2011; Tan, 2007). More

generally, teachers can adopt strategies for "teaching for creativity" (Craft, 2005), which may, in turn, lead to *Pro-C* or even *Big-C* accomplishments in learners. Teaching for creativity is not about imaginative or interesting approaches to teaching, or even about being effective as a teacher. Rather, teaching for creativity involves "encouraging innovative contributions, valuing learners' ownership and control, encouraging [students] to pose questions, identify problems and issues, offering [students] the opportunity to debate and discuss their thinking, and encouraging [students] to be co-participant[s] in learning" (Craft, 2005, p. 42). By adopting these approaches, students can experience *little-c* creativity in the classroom, namely, by "acting effectively with flexibility, intelligence and novelty in the everyday rather than the extraordinary" (Craft, 2005, p. 19). Craft (2002) claims that *little-c* creativity can be both ordinary and lifelong, a form of what she terms personal effectiveness in coping well with life in the classroom and beyond, identifying and making appropriate choices, and self-shaping an attitude towards life that is driven by "possibility thinking" (p. 43)—that is, imagining possibilities rather than being closed-minded when it comes to innovation and new solutions to complex problems.

An example of *little-c* creativity described by Beghetto and Kaufman (2013) that is more directly related to curriculum than to possibility thinking as described by Craft (2005) is the elementary student who writes a highly creative science fiction piece, for which she receives first prize in a school-wide literary contest. Beghetto and Kaufman contrast this *little-c* science fiction story to a *mini-c* story, produced by another child in the contest who meets all of the criteria by writing an original and novel work, but where the work lacks the unusually high level of originality displayed by the first student. The student creating the *mini-c* story could be encouraged by his teacher to develop *little-c* creativity in the domain by learning more about science fiction stories and storytelling techniques, and by critically examining other stories in the domain. Similarly, the *little-c* science fiction writer could learn more about the science fiction genre and begin submitting her stories for publication, in time moving to *Pro-C* creativity within the science fiction domain. While she may not reach to status of a science fiction writing legend such as H. G. Wells, the *Big-C* science fiction greats still have a place in the classroom when teachers include "biographies of *Big-C* creators across various subject areas to illustrate the work, setbacks, and supports involved in becoming a legendary creator" (Beghetto and Kaufman, 2013, p. 14).

In addition to helping students move from *mini*-c creativity to higher levels of creativity, some scholars that suggest that there are general strategies for teaching for creativity, across levels. These strategies include (a) introducing students to key ideas and processes so that there is a platform for exploration and sense making of "ill-defined problems," where there is no single and obvious answer, (b) allowing extensive opportunities for practical explorations, so that students can make sense of the phenomena under exploration over an extended period of time, (c) helping students recognize and characterize problems and errors, and (d) identifying community practitioners who can bring further expertise to the classroom (Craft, 2005; Sawyer, 2011, Tan, 2007). Sawyer (2011) claims that effective teaching for creativity involves a balance between structure and improvisation, that is, while the teacher can—and must—provide structure for student learning, it is equally important for the teacher to recognize when to push the limits of those structures to lead to new understandings on the parts of both students and teacher alike.

It is of note that the first three of these strategies are among the most salient features of some of the most effective forms of teaching in general, including

reciprocal teaching and direct instruction (Hattie, 2009). It is a misconception that teaching for creativity means leaving students to their own devices. Rather, teachers with a "strong personal understanding of the subject they are teaching" (Craft, 2005, p. 124) who combine that understanding with explicit teaching and modeling of cognitive strategies, along with time to practice and explore, formative feedback, and opportunities to transfer knowledge to new situations (Sawyer, 2011), are most likely to create classroom conditions that foster creativity and student success.

Support for teaching for creativity can already be found in some provincial curricula. For example, the Ontario Curriculum reinforces structures and approaches for creating conditions that enhance creativity in the classroom. The Grades 1 through 8 Ontario Arts Curriculum document (2009), for example, gives a clear structure for teaching the arts in a multiplicity of ways. The process of self-regulation described earlier in the paper is embedded throughout the curriculum in what is called the creative process, where the teacher is encouraged to model, provide formative feedback, and give ample opportunity for exploration and reflection. The importance of parental and community involvement is also stressed. And there is considerable scope for creating school-community partnerships embedded in the document as well, an approach that will be explored later in the paper.

FINE AND PERFORMING ARTS COURSES AND PROGRAMS AND COURSES IN CREATIVITY

Certainly it is the case that the arts subjects themselves offer opportunities for students to experience *little*-c and even *Pro-C* creative undertakings in school. Earlier in the paper, we encountered empirical work indicating that schools with extensive arts programs were associated with students who achieved well in others subjects, too. While learning *in* the arts is arguably best taught by arts specialists, learning *about* and *through* the arts have been successfully taught by generalist teachers, especially in the elementary grades (Upitis, Smithrim, & Soren, 1999). Both types of teaching strength are integral to fostering creativity in students. Simply put, the more opportunities students have to engage with the fine and performing arts, the more opportunities they will have to be creative at school, as long as their teachers approach the teaching of those courses by supporting the habits of creativity (Lucas, Claxton, & Spencer, 2012)—exploring and investigating, sticking with the pursuit in the face of difficulty, playing with possibilities, giving frequent formative feedback, and reflecting critically on the craft of improving learning.

Of course, it is also possible to teach creativity directly rather than through other curricular domains. Ever since interest was generated in divergent and creative thinking in the 1950s and 1960s, teaching techniques have been developed to improve creative thinking skills such as approaching tasks with fluency, flexibility, and openness (Cohn, 1986). Hattie's (2009) assessment of meta-analyses related to achievement indicate that creativity programs are highly successful in enhancing creative processing, cognitive outcomes, affective outcomes, and meta-cognition. Hattie references a meta-analysis by Higgins, Hall, Baumfield, and Moseley (2005) emphasizing the importance of teaching strategic and reflective thinking in schools.

STUDENT-DIRECTED LEARNING: THE 20% PROJECT

A teaching innovation that has the potential to foster creativity in students is called the 20% project. Modeled after 3M and Google, this method supports student-driven, problem-based learning. Inspired by Pink's (2009) book, *Drive,*

proponents of the 20% project recognize that to encourage students to take on work with creativity, innovation, and passion, it is not extrinsic motivation that nurtures these qualities, but rather, autonomy, opportunity for mastery, and a sense of purpose.

The name of the method alludes to Google's policy of expecting employees to work on something other than their job description for 20% of their work time. There is a range of approaches to the 20% project in educational settings, differing mostly in terms of assessment and student autonomy. However, the core elements include requiring students to work on a project that they are passionate about, asking students to document their learning, and expecting students to present their frustrations and accomplishments to their peers. Many teachers using the 20% project approach do not give grades for the projects, although they do hold students accountable for their learning through presentations and other forms of documentation. The types of projects undertaken might include building a tutoring network, starting a business to sell originally designed clothing and accessories, or making a stop-motion animated movie (Brookhouser, 2012).

One of the criticisms of this type of approach, that is, where learning is student-centered and students are encouraged to solve authentic problems, is that this form of problem-based learning can be less effective than more traditional modes of instruction for some learners (Dochy, Segers, Van den Bossche, & Gijbels, 2003). Hattie (2009) concludes that problem-based learning can have limited effects when surface knowledge is considered. However, where deeper learning occurs, problem-based learning can be effective, especially in terms of application of knowledge derived through creative explorations. It would follow, then, that the success of the 20% approach lies, in part, in committing enough time to problem-based learning so that deep understanding on the part of students can emerge through what is essentially teacher supported or facilitated self-directed learning. The importance of providing adequate time for creative explorations is also emphasized by Craft (2005), who notes that providing adequate time can be particularly difficult where curriculum content is "heavily specified" (p. 39).

INTEGRATED PROGRAMS AND INTERNSHIPS

Another approach that is more established and also promising in terms of creating the conditions for students to be creative is the integrated program, where students complete the requirements for several credits over the course of a semester or a year while undertaking a single complex task and thereby engage in cross-curricular and interdisciplinary work. While Craft (2002, 2005) argues that all subjects in the school curriculum are inherently conducive to developing creativity in students, she also notes that for larger acts of creativity, often there is a merging of ideas from more than one discipline. Thus, if we seek to create conditions for the continuum of creative acts, there is an argument to be made for cross-curricular or interdisciplinary work in schools.

A cross-curricular approach often involves what is called problem-solving teaching, where students are engaged in solving a particular problem (e.g., building a house) and the teaching and learning involves "identifying, prioritizing and selecting alternatives … using multiple perspectives to uncover the issues related to a particular problem, designing an intervention plan, and then evaluating the outcome" (Hattie, 2009, p. 210). The outcome measures for problem-solving teaching are very positive, according to Hattie's (2009) examination of meta-analyses on student achievement. For example, the research

has documented large effects on verbal flexibility, on mathematics skills, and on problem solving methods.

These combined credit offerings, adopting a problem-solving teaching approach, usually involve internships or co-op placements with experts in the community. The first integrated four-credit programs that were offered in Ontario were developed in the early 1980s (Russell & Burton, 2000). Examples of multiple credit interdisciplinary programs now include new house construction, environmental leadership, renewable energy technology, and musical digital media. Typically, these programs take place in the latter years of high school, and teachers bundle the learning expectations from several courses into a single interdisciplinary program. Because there is no course-based timetable, students and teachers are free to follow a flexible schedule, both in the school and the community, as they pursue the complex work that they collectively undertake to solve and see to completion.

Learning opportunities where creativity and innovation are key can also happen beyond the walls of the school, when teachers and other adults form collaborative relationships and are willing and able to create conditions to foster creative competencies and critical thinking.

SCHOOL-BASED EXTRA-CURRICULAR ACTIVITIES: MUSICAL THEATRE

One of the most long-standing and effective creative extra-curricular activities, at both the elementary and secondary levels, is that of musical theatre. Taking part in musical theatre gives students opportunities to learn skills, take risks, become part of a larger community, interact effectively with their peers, form a sophisticated sense of creative identity, and gain ownership over the creative process and product—encompassing all aspects of the creative competencies outlined earlier (Ogden, 2008; Ogden, DeLuca, & Searle, 2010; Upitis, 1990, 2010).

Musical theatre is one of the most comprehensive forms of art-making that is possible in the school context. Students act, dance, sing, learn to tell a story, and interact with one another in rehearsal and on the stage (Ogden, 2008; Upitis, 1990). Additionally, musical theatre requires the coordination and creation of sets, costumes, props, and lighting design—and these forms of construction and design fit well with the broad definition of creativity used in the present paper. The magnitude of musical productions, including the costumes, the marketing, the rehearsals, the make-up, and the overall detail provides many opportunities for different levels of creativity to emerge. The social interaction and collaboration that accompanies this learning is also important; interdependence of the performers is key (Ogden, DeLuca, & Searle, 2010). Musical theatre requires effective negotiations between the cast and crew, the children and the adults, the school and the community. Musical theatre is collaborative learning at its best: group members must work interdependently in order to create magic in the performance.

CREATIVE OPPORTUNITIES BEYOND THE WALLS OF THE SCHOOL

Learning opportunities where creativity and innovation are key can also happen beyond the walls of the school, when teachers and other adults form collaborative relationships and are willing and able to create conditions to foster creative competencies and critical thinking. Some examples include cultivating community gardens, contributing to programming for senior associations, and being mentored through internships with business owners. The idea of school theatre, described above, also has the potential to go well beyond the walls of the school, becoming a seamless part of the cultural fabric of the school and community.

SCHOOL-COMMUNITY PARTNERSHIPS

Several programs have been developed to diversify and deepen the curricula in public schools through school-community partnerships. The range of these partnerships vary in terms of the capacity that they build between schools and communities, as captured by the continuum delineated by Gradel (2001). On the

one end of this capacity framework, professionals contribute to school culture by giving demonstrations or creating exhibits for students and teachers, but the community partner is not expected to engage students and teachers in interactive learning experiences. At the other end of the continuum, the community member takes part in curricular planning and delivery with the school partners.

All forms of partnership along the continuum have potential value to creativity. For example, a business entrepreneur who provides a workshop on creating a business plan may spark an interest for students and teachers that later leads to a more involved school-community partnership. One example in Ontario of such a school-community partnership comes from the Government of Ontario's Summer Company program, where students can apply for funding to start summer businesses (Summer Company, 2014). Successful students often develop their business plans as part of a high school course (e.g., in Business or Technology), and then receive coaching and mentoring from local community business leaders as well as student peers who have had previous success as young entrepreneurs.

The *Learning Through the Arts* (LTTA) program of The Royal Conservatory involves school-community partnerships where the artists plan and deliver curricula along with classroom teachers (Smithrim & Upitis, 2005). Similarly, the national initiative *ArtsSmarts*, a program long-supported by the J.W. McConnell Foundation, sought "to promote the active participation of young people in the arts…through local school-based and community-based projects" (Vagianos, 1999, p. 26). These kinds of programs have increased in number over the past several decades bringing new energy and life to schools with depleted arts programs, and also providing arts experiences in greater breadth and depth to schools already strong in the arts (Burnaford, Aprill, & Weiss, 2001; Hanley, 2003; Irwin & Chalmers, 2007).

While it may seem, at first blush, that school-community partnerships are most likely to prosper in affluent urban centers, this is not necessarily the case. In a study by Brook (2011; 2013), the data convincingly demonstrated how teachers in two rural communities (Bella Coola, British Columbia and Winkler, Manitoba), were able to foster rich music education programs. Celebrating and cultivating the cultural contexts afforded by both communities achieved this richness. Each music program was reflective of the musical practices in the communities, and all of the schools examined had established affiliations with many individuals and groups within their respective communities to ensure that students had opportunities to learn, perform, and create original music.

In addition to arts partnerships, another powerful form of school-community partnership is manifested in school-based garden programs. These types of alliances are gaining traction throughout North America, in both urban and rural settings. One stunning example is that of the Troy Howard Middle School (THMS) in Belfast, Maine, a town of just under 7,000 people. For well over a decade, the THMS has modeled a district-wide agricultural program to promote healthy living, community engagement, and an integrated curriculum (Stone, 2009). The program provides endless opportunities, across subject areas, for teaching for creativity, for learners to experience *mini-c*, *little-c*, and even *Pro-C* creativity, and to experience the production of novel and valuable artifacts and ideas by being engaged physically, intellectually, socially, and emotionally.

Teachers at the school use the garden and greenhouse to teach art, biology, math, earth science, history, language, health and economics. The garden provides food

for students in the school, for a district-wide school lunch program, and for a local soup kitchen as well (Manson, in press). The Seed Division, which involves marketing the open-pollinated, organic heirloom seeds that students grow and harvest in the gardens and greenhouse, has had long-term success both in the school and community. The students design and produce hand-printed packets for the seeds, using environmentally friendly linoleum cuts, ink, and paper (*mini-c* and *little-c* creativity) (Brown, 2010). Seeds are sold to parents, through bookstores, and at the local food co-op, the proceeds of which are returned to the THMS garden project, a form of *Pro-C* creativity. One of the policies of the garden project is that they do not sell anything that they do not grow or make themselves, and the students do not sell anything that the local businesses sell. Thus, while the THMS garden project provides food for the local co-op, they only provide produce that the local farmers cannot grow, such as greens in the winter, which the school is able to provide because of their heated greenhouse (Manson, in press). The THMS weaves connections throughout the community, sometimes in what might seem like unlikely (but creative!) ways. A Facebook post in the middle of January 2014 revealed that inedible old dried beans were donated to the "bean box" at a local daycare—a version of a sandbox, except filled with dried beans instead of sand.

It is the intermingling of institutional, curricular, pedagogical, and relational factors that contribute to the success of school-community partnerships (Fullan, 1991; Oreck, 2002; Stone, 2009; Upitis, Atri, Keely, & Lewis, 2010). Cultivating these kinds of partnerships are important for a culture of creativity to be established both within the school and within the community that supports the school, students, and teachers, especially since these partnerships give students more opportunities for authentic *little-c* creative acts as well as the possibilities of *Pro-C* creativity through the community partners (e.g., orchestras, food co-ops, local businesses).

HOW DO WE MEASURE CREATIVITY?

CLASSICAL MEASURES OF CREATIVITY IN INDIVIDUALS

A typical approach to measurement is to determine how an individual student ranks in a particular domain or attribute in terms of performance or potential performance. The approach to measuring creativity is no different in intent. But measuring an individual's potential for creativity is notoriously difficult. Some theorists have attempted to devise a creativity quotient (CQ), similar to the intelligence quotient (IQ) measure, with limited success (Kraft, 2005). Even those who have devised CQ scoring methods admit that the "only proven test for creativity is the creation itself" (Snyder, Mitchell, Bossomaier, & Pallier, 2004, p. 415).

Other measures of creativity involve divergence tests, for example, asking test-takers to identify how many possible uses they can imagine for a familiar item, such as a pencil. One of the most common tests of this type is the Torrance Tests of Creative Thinking, first developed by Torrance (1974), building on Guilford's work on divergent thinking and creativity (Guilford, 1950; 1967). In the Torrance Tests of Creative Thinking, scores are based on such factors as fluency (the total number of meaningful and relevant ideas suggested), originality (the statistical rarity of the responses), and elaboration (the amount of detail in the responses). The Torrance tests continue to be used in assessing both individual and program outcomes (Hattie, 2009), and for that reason alone, bear mention. However, while the Torrance tests are arguably more established than the CQ approach, they still

have limitations. One of the limitations of these types of measures is that even though an individual might have the potential for creativity as measured by a divergent thinking test, for example, it is not a given that creative acts will ensue. Recalling the creative competencies identified in an earlier section of the paper, it is clear that part of the capacity for creativity is also related to social and personality elements, such as the willingness to take risks and the ability to work interdependently with others. For this reason, some researchers have taken a social-personality approach to the measurement of creativity. A meta-analysis of various personality traits and creativity across scientific and artistic disciplines demonstrated that creative people tend to be open to new experiences, and are self-confident, self-accepting, and ambitious (Feist, 1998).

Interesting as these measures of individual creativity might be, it is a different form of assessment that is required for students and schools—not so much of the creative potential of students, but of the ways that reflect whether the conditions for creativity are present to flourish, regardless of the predilection that any single student might have to creative work. It is this kind of assessment that is now explored.

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MEASURING CREATIVITY IN SCHOOLS

One of the issues to determine when discussing the measurement of creativity in schools is the whether we are best served by assessing students, schools, or the broader community—or a combination of all three. Typically, measurement in school focuses on the achievement of individual students. But measurement for creativity might be best served by considering not only measures of individual student work, but by also evaluating/assessing the student's learning environment, with the unit as the school and even the community as a whole.

In this section of the paper, ways of assessing the creative work of individual students across levels and disciplines will be first considered. Next, the learning opportunities that are available for students, both within school and beyond, that are seen to foster creativity as introduced as a potential measurement of the creative cauldron surrounding students.

Assessing Student Creativity

In the earlier section of the paper, it was apparent that attempts at measuring creative potential are, at best, only approximations of what might transpire for an individual student. Why measure student creativity at all? Lucas, Claxton, and Spencer (2012) suggest that despite the inherent difficulties in tracking the development of creativity, the advantages of doing so outweigh the risks. As noted at the outset of the paper, one of the main advantages of evaluating creativity in schools is that it underscores the importance of creativity to the school experience.

Because the job of education is to foster the student's abilities regardless of innate potential—the focus on measurement in this paper will be the degree to which creative habits can be nurtured and improved through the assessment process. First, we will explore how, when assessing student work, teachers can use techniques that honour the creative acts, ideas, and products themselves, that is, applying criteria that are suitable to the domain. Exemplars are also offered as a second way of assessing student work in a more global, less discipline-based approach. Finally, the presence or absence of creative habits, as identified by Lucas, Claxton, and Spencer (2012) offer a form of measurement suitable for the school context.

Student work can, and arguably should, be assessed through techniques relevant to the type of project undertaken. For example, the 20% project described

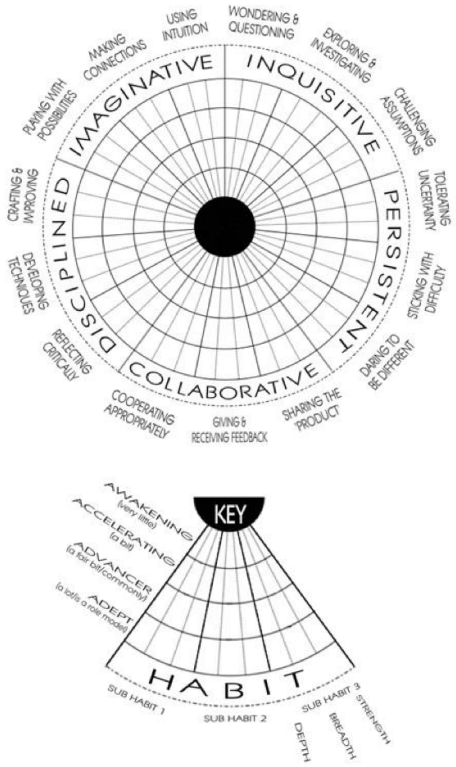

FIGURE 1. Creativity Assessment Tool (Lucas, Claxton, & Spencer, 2012, p. 17).

earlier can be assessed through documentation appropriate for the project itself. Thus, if the student is creating a business company for selling original clothing and accessories, then the assessment of her success can come from the documentation and demonstrations associated with that undertaking—business plans, public pitches, marketing campaigns, and sales. Similarly, if a student has created an artistic work, then that work should be judged by the creative standards of the domain. No one would think of assessing a Beethoven piano sonata with a rubric assessing the degree to which Beethoven understood the tenets of rhythm and tonality. Rather, the success of the composition is judged by how it evokes emotion in the listener and of how creatively Beethoven uses the theory he so clearly understood, and at times, defied. The same kinds of standards should be used in judging a student's composition as well. Is it evocative? Effective? Is the student engaged?

Another potentially valuable form of student assessment involves the development of more general exemplars for creative work that are not domain specific. A group of teachers and ministry representatives in British Columbia have developed two sets of instruments to aid in this process. First, there are the Creative Thinking Competency Profiles, which provide an overview of the three basic competencies used in this framework, namely, novelty and value, generating ideas, and developing ideas. The profiles illustrate how these three competencies become increasingly more sophisticated over time, and are expressed from the student's point of view (e.g., at the first level, "I get ideas when I use my senses to explore;" Ministry of Education, British Columbia, 2013). The second document is comprised of illustrations for each of the creative thinking competencies.

Yet another approach to evaluating student creativity is the assessment framework developed by Lucas, Claxton, and Spencer (2012) in harmony with the habits and sub-habits of creativity outlined earlier in the paper. This tool, pictured in Figure 1, invites the teacher to map students' habits graphically, thereby providing a formative assessment of creative thinking. Students also use the tool to self-assess their creative habits. Both teachers and students are provided with supporting materials for using the tool, including an online presentation and video explaining the construct of creativity, why assessment can be beneficial, and how they were expected to use the tool.

Assessing the School and Community Learning Environment

Some of the most exciting possibilities for assessing creativity are indexes or inventories of learning opportunities—both in and out of school—that have the potential for enhancing creativity and critical thinking in students. The emphasis for these learning indexes is not the "outputs"—that is, the creative products created by individual students, but rather, the "inputs"—namely, the situations in which students might be called upon to think and act creatively. This type of approach is a departure from measurement techniques that focus on the products and achievements of individual students or even of groups of students. Rather, these approaches can be seen as assessing the health of the overall system: does the school and supporting community provide an environment where creativity can flourish?

Three such learning indexes—all in the United States—share a number of common features. The Massachusetts Creativity and Innovation Index, the California Voluntary Creative and Innovative Education Index, and the Oklahoma Creative and Innovative Education Index offer ways for schools to rate their progress in providing venues for fostering creativity. These indexes, simply

put, inventory the number of opportunities that students have available to them where they might engage in creative undertakings. Examples would include fine and performing arts classes, scientific investigations, theatre and dance performances, debating clubs, independent research opportunities (Schell & Landon, 2011) as well as entrepreneurial projects, school-community partnerships, and integrated curricula. Scores of schools and/or districts are made public, with the idea that this would provide incentives for schools to promote an environment fostering creativity through the arts, science, humanities, and other opportunities (Schell & Landon, 2011).

While this approach might be criticized for being superficial, in that by providing a mere checklist of activities, it is not clear what the quality of those learning experiences might be, it is also the case that if such opportunities are not available in sufficient number, it will be difficult for teachers to instill creative and innovative habits in their students. A more refined approach, therefore, would involve not only the inventory or checklist, but also, a qualitative assessment of the value of the opportunity, coupled, perhaps, with assessments of individual student work through some of the methods described previously. In this way, a comprehensive measurement approach to creativity could be developed—comprehensive not only in its inclusion of the individual and the environment, but comprehensive, also, in the sense that it would provide direction for the continuing development of opportunities for students to become critical and creative thinkers, capable of contributing to the innovative ways of thinking that are required for us all to lead productive, joyful, and healthy lives.

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