Defining and Nurturing Creative / Productive Gifted Behaviours in Students

Sarah A. Lubbe

Education and Counseling Psychology, McGill University

Supervisor Dr. Camelia Birlean

Montreal, Quebec, Canada

Table of Contents

Abstract

The scope of this paper is threefold: (a) to present a definition of a student with creative/productive gifted behaviours, (b) to describe four relevant theories of creativity, and (c) to provide identification and assessment tools that educators can utilize when evaluating potential creative/productive gifted behaviours in children. In addition the literature review will present the benefits of supporting this unique group of students, and highlight specific programs aimed at meeting the needs of these students.

Keywords: gifted education, creativity, creative/productive gifted behaviors

Defining and Nurturing Creative/Productive Gifted Behaviours in Students

In 2002, The No Child Left Behind Act (NCLB Act, 2002) defined gifted students as "those who display evidence of high capability in intellectual, creative, artistic, or leadership areas and who would benefit from services that their school does not ordinarily provide to develop their capabilities fully" (NCLB Act 2002; as cited by Kim, 2019, p.121). Nevertheless, in the USA, of the states which provide services for gifted students, only 28% support creativity. However, it is required that these services focus on intellectual and academic abilities (National Association for Gifted Children & The Council of State Directors of Programs for the Gifted, 2015; as cited by Kim 2019, p.125). Similarly, in Canada, each province has a definition of gifted students, which vary significantly in determining who is included, what is of value, and who gets access to services. Each province or state is responsible for creating and delivering programs for gifted students. The issue faced is that there are limited definitions for students who demonstrate creative/productive gifted behaviours. Of the few definitions that are available, they are ambiguous and varied. These variations increase the risks of inadequate services and "creating inequities of access for students in poverty, from racial and ethnic minority groups, English learners, and those with disabilities" (National Association for Gifted children, n.d.).

Often, gifted and talented students do not receive the appropriate curriculum adaptation they need and deserve (Renzulli, 1996). These tenacious, bright children are overlooked as school administrators, and teachers assume these students are smart enough to make it on their own (Coleman & Cross, 2000). This dangerous assumption or "quiet crisis" (Renzulli & Reis, 1991, p.26) results in a population of children not getting their needs met, becoming unmotivated, unfulfilled, and not reaching their full potential. When examining the current gifted education programs within Quebec and Canada, few gifted and talented programs support

creativity and artistic development (Ridgley et al., 2019; Smutny & Von Fremd, 2009). Creative and academic activities are placed at opposite ends of the educational spectrum (Smutny & Von Fremd, 2009). Liu et al. (2021) note that this polarized view is a disservice to students and their learning potential because teaching for creative grown and including creative techiniques within education may lead to deeper connections in learning, thinking, and expanding within society and the world. Kim (2019) argues that creativity is not a mysterious power available only to geniuses and prodigies. Gifted children are excellent candidates for creativity education supported by Smutny and Von Fremd's (2009) theory. Smutny and Von Fremd (2009) believe that when gifted learners receive an education that encompasses both creativity *and* educational excellent, they can exceed expectations in their knowledge beyond their wildest dreams.

There is a paucity of adequate pedagogy for children with creative/productive gifted behaviours in the current Canadian education system for a few reasons. Of the few gifted programs available, the focus is on curriculum compacting, with a more academic focus on student's areas of interest and less on teaching the creative process and nurturing creativity. Additionally, since there is no clear definition of a student with creative/productive gifted behaviors, teachers are unsure of how to identify and support these students. Lack of knowledge and resources for this population may lead to teacher and administrator biases (Kim, 2019; Ridgley et al., 2019; Smutny & Von Fremd, 2009). Researchers and educators need to increase their awareness of creative/productive gifted behaviour, dispel the misconceptions and biases around these students to create fulfilling educational services.

This paper will present; a definition, four theories of creativity, and provide identification and assessment tools that educators can use when evaluating potential creative/productive gifted behaviours in children.

A Working Definition of Creative/Productive Gifted Behaviors in Students.

Creative/Productive Gifted Personality Traits, Attitudes and Behaviors

Just as creativity is difficult to define, students who display creative/productive gifted behaviours are as unique and varied as their work; therefore, the definition must be flexible and multidimensional. Davis and Rimm (1977) describe characteristics creative students demonstrate such as high self-confidence, curiosity, willingness to take risks, energetic, spontaneous, eager to try new things, playful, a sense of wonder, good sense of humor, and possibly have artistic or aesthetic interests such a drama, art, music. These characteristics can be seen in famous creative minds such as Pina Bausch, whose risk-taking and playfulness broke barriers in the dance world, or Marie Curie, whose deep curiosity and sense of wonder led to discoveries in science. A study by Martowska and Romanowicz (2020) corroborate Davis and Rimm's descriptions in their study of music student personalities. When testing overexcitability in university students, Martowska and Romanowicz (2020) found that participants enrolled in music programs scored higher in overexcitability than the control group. Behaviours associated with overexcitability (Martowska & Romanowicz, 2020) include impulsive actions, high energy, imagination, and strong empathy, which echo the behaviours mentioned by Davis and Rimm.

Kim (2019) categorizes creative attitudes into four categories, namely--inquisitive visionaries, courageously persistent, complex collaborators, and compassionate rebels. Students demonstrating creative/productive gifted behaviors may present as passionate individuals who persistently tackle unusual problems or ideas, who work hard even when faced with uncertainty or failure. They may be the ones who jump into new projects, push boundaries, ask questions, empathize with others, and may appear to be living in their own world (Davis & Rimm, 1977; Kim, 2019). Some children with creative/productive gifted behaviours may not be easily

identified, and Kim (2019) cautions teachers and parents that these children may "produce strange or unsuccessful work more often than they will produce a beautiful, finished work" (p. 120). It is not uncommon for this group of children to be labeled as button pushers, rebels, or disruptive (Rimm et al., 2017). Historical figures corroborate this theory. For example, Salvador Dali and Marcel Duchamp pushed the boundaries of art but are now widely celebrated artists of the Dadaism and Surreal art movement (Kim, 2019). Innovation is often viewed with fear and disdain as it challenges the status quo of what is considered normal. See Table 1 for some of the characteristics demonstrated by creative/productive gifted students.

Three Ring Concept of Giftedness

Renzulli and Reis's (2018) Three Ring Concept of Giftedness state that giftedness is a behavior that can be nurtured, and educators must consider the students' environments, personality, educational opportunities, support, and life experiences. The Three Ring Conceptualization of Giftedness (Renzulli & Reis, 2018) identifies three human traits, *above-average ability, task commitment, and creativity*, that interact with each other to develop "creative/productive giftedness" (p. 186).

Students with *above-average abilities* have high performance or high potential (roughly the top five percentile range) within general and specific abilities. Examples of general abilities include processing information, numerical reasoning, and spatial awareness. Specific abilities can be defined as skills, performance, or knowledge in any specific area such as math or drama. These areas can be further broken down into more specific areas and skills like algebra or mask work (Renzulli & Reis, 2018). When evaluating creative/productive gifted behaviours in students, educators can consider students' unique talents, within any area of interest. Kim (2019) notes that "creativity is neither subject nor field dependant" (p. 120) and can occur anywhere. So.

it is important to be aware that students do not always have interests and talents within the arts. Students with creative/productive gifted behaviors may have an interest in any area, perhaps science, math, literature, or the natural world. As noted above, creativity changes depending on the student's family life, school environment, gender, culture, and society.

Task Commitment is the student's motivation to focus on a specific problem or performance area (Renzulli & Reis, 2018). Often students with creative/productive gifted behaviours will have what Duckworth et al. (2007) coined as grit. Grit is the perseverance, dedication, and passion with which an individual tackles a task. In one of their six studies, Duckworth et al. (2007) found that children who scored higher on grit performed better than their counterparts in the Scripps National Spelling Bee because they practiced more. In a study of 361 male high school students, Mostafavi et al. (2020) observed a significant relationship between student's academic motivation and creativity. Students demonstrating creative/productive gifted behaviours may also experience cognitive flow (Csikzentmihalyi, 1975, as cited by Doyle, 2017). When students experience flow, they become completely immersed with the task, often losing track of time, experience a balance of ease and challenges, and feel no self-consciousness or distractibility (Doyle, 2017). Nakamure and Csikszentmihalyi (2014) note when experiencing flow, students find the task intrinsically rewarding. Teachers can help students experience flow by encouraging students to choose projects based on their interests and provide unstructured timeslots where the student decides how to engage with the project (Nakamure & Csikszentmihalyi, 2014).

Creativity. Expanding on Renzulli and Reis's (2018) theory, creativity can be nurtured and may lead to students producing influential creative works and innovations. As a concept, creativity has been studied, debated, and has captured the attention of artists, philosophers,

teachers, and researchers for centuries. Creativity has multiple definitions and theories and yet remains ambiguous. When researching definitions of creativity Plucker et al. (2004) mention of the ninety selected articles analyzed "only 34 (38%) provided an explicit definition of the term *creativity*" (p. 88). As we progress into the 21st century, definitions and creativity perspectives are again changing with the evolution of technology and societal norms. Teaching creativity is being slowly introduced into school curriculums. In Hong Kong, creativity "has been highlighted as one of the core generic skills to be promoted in all areas of the curriculum" (Curriculum Development Council 2000 as cited by Chan & Yuen, 2014, p.110). The British Columbia school curriculum has also included creative thinking as one of the sub-competencies to teach throughout a students' school career (BC Education, 2021). These examples of adapting curriculum to include teaching for creative growth have important consequences for both educators and students, and further demonstrates the importance of this subject.

Figure 1

Creative/Productive Gifted Behaviours, Personality Traits and Attitudes

Personality	**Attitude**	**Behaviors**
High self confidence High sense of wonder Good sense of humor Playful Empathetic Imaginative Original Thinkers Disruptive Impulsive	Risk taker – eager to try new things Questions societal norms Persistent Passionate Grit (Duckworth et al., 2007) Cognitively flexible Constantly questioning ideas and the world around them (Rhodes, 1961) Able to navigate conflict and tension (Rhodes, 1961) Opposed to conformity (Rhodes, 1961) Convergent and divergent thinkers (Gilford (1957)	Inquisitive Visionaries Courageously Persistent Complex Collaborators Compassionate Rebels (Kim, 2019) Overexcitability (Martowska and Romanowicz, 2020)
Interests		
Artistic or aesthetic interests such as art, drama, music, dance Affinity for unusual problems or ideas		

Note: Personality, attitudes, behaviors, and possible interest of creative/productive gifted students.

Theories of Creativity

It is important to consider creativity theories when expanding on the definition and educational services required to support creative/productive gifted behavior in students. This review will briefly describe four theories of creativity, namely: divergent thinking (Gilford, 1957), the Four “P” s (Rhodes, 1961), The Four C Theory (Kaufman & Beghetto, 2009), and CATs Model (Kim 2019, Mullen et al., 2019).

Divergent Thinking – Guilford 1957

One of the first contributors to measuring and defining creativity, J.P. Gilford, approached creativity as a function of thought processes. Gilford (1957) outlined creativity as a form of thinking broken into three parts, namely--cognition, production, and evaluation. He hypothesized that creativity is a combination of convergent and divergent thinking. Convergent thinking is “thinking towards one right answer" (Gilford, 1957, p.112), and divergent thinking is the opposite, thinking in multiple, different directions to multiple answers and opinions. Gilford (1957) proposed that divergent thinking comprises of three thinking qualities, specifically, fluency, flexibility, and originality. Fluency is measured by how many ideas or responses a person has to a problem (aka., brainstorming). Flexibility is "the ability of an individual to produce many different categories of responses to a task” (Lubart et al., 2019 p. 545). Originality is an individual's ability to create unique ideas (Lubart et al., 2019).

> Guildford’s studies indicate that people who stand out [from their fellows] as creative thinkers are characterized by sensitivity to problems, fluency of ideas, mental flexibility, divergent thinking, and ability to redefine familiar objects and concepts (Rhodes, 1961, p.307)

This approach to creativity is beneficial because Gilford's research began the separation of IQ measurements and creativity, stating that both convergent and divergent thinking contributes to creativity (Gilford 1957). Contention exists between the research when linking high IQ with creative/productive gifted behaviours (Kim 2019; Renzulli & Reis, 2018). While some research indicates a correlation between IQ and creativity (Gilford 1957), MacKinnon, (1978; as cited by Rimm et al., 2017), found no correlation between measured intelligence and creativity after an IQ score of over 120. This is important to note as often only students with an IQ score of 130 or higher are considered for gifted programming (Rimm et al., 2017). In a qualitative research study of eighteen students identified with creative/productive behaviours, Delcourt (1993) recorded IQ scores ranging from 104 - 154. If IQ score was the only form of assessment within this study, Delcourt (1993) notes at least six students would have been excluded from the gifted and talented programming. Solely using IQ as a gifted and talented indicator runs the risk of missing students with creative/productive behaviours such as cognitive flexibility and originality, who may make greater contributions to society. This opportunity is reflected in the addition of “Art” within science, technology, engineering, and mathematics learning (STEM). With the correct implementation and making art a core focus in STEAM education, Lui et al., (2021) highlight how incorporating the sociocultural context within a design challenge can lead to more profound and socially sensitive creations. Lui et al., (2021) found when children enrolled in a STEAM program focused more on the artistic side of the program, they created more socially aware inventions. The children developed “multifunctional somatosensory clothes [for seniors in care] that included various functions (heartbeat sensor, GPS positioning, and built-in somatosensory adjustment” (Liu et al., 2021, p.2). This not only provided heightened care for elderly patients but reduced the stressors placed on caretakers. Since children with creative/productive gifted

behavior may be empathetic, cognitively flexible, and original thinkers, they may make greater contributions to society. When exploring the relationship between empathy and creative group problem solving Yoon et al., (2020) found empathy predicted the groups problem solving ability. With this knowledge, educators and policy makers can become aware that it is necessary to move beyond sole IQ and consider alternative assessment considerations.

The Four P's – Rhodes 1961

Inspired by Guilford's writing and the new concept of creativity, Mel Rhodes collected and analyzed the many definitions of creativity. Rhodes (1961) noticed how the definitions of creativity overlapped and were related to each other, explicitly identifying four central ideas, which he coined as the Four Ps of creativity: (a) person, (b) process, (c) *press* aka environment & (d) products. Rhodes' work presented a broader view of creativity. It influenced the creation of new assessment tools which measured new concepts such as creative behaviors, quality of products, the impact of environments, and personality traits (Ambrose & Machek, 2015).

Persons

Rhodes (1961) first considers the many facets contributing to the definition of a creative personality. These facets include personality, intellect, temperament, physique, traits, habits, attitudes, self-concept, value systems, defense mechanisms, and behavior (Rhodes, 1961). Like Davis and Rhimm (1977), Rhodes (1961) notes that a person with creative/productive gifted behaviours may present ideas or thoughts that are out of the box, be opposed to conformity, and possess "the ability to accept conflict and tension" (Fromm, 1959; as cited by Rhodes, 1961, p.307). Additionally, Rhodes (1961) considers the benefits of developing the habit of constantly observing and questioning the world's mysteries. Since defining creative/productive gifted behaviours is complicated, teachers and administrators should consider the factors described by

Rhodes (1961) to prevent children demonstrating these behaviours from being overlooked. Rimm et al. (2017) present a list of some of the great creators of our time, which includes Einstein, whom teachers and society dismissed. This highlights the fault of focusing solely on one aspect of a student's personality.

Process

Rhodes (1961) believed that the creative process could be taught, which has been expanded on by many throughout history (Greenwald, 2000; Isaksen & Treffinger, 2004; Osborn, 1952 as cited by Isaksen & Treffinger, 2004; Renzulli 1976). Process components in the Four P's are motivation, perception, learning, thinking, and communicating (Rhodes, 1961). Research around the creative process has given rise to programs utilizing Alex Osborn's Creative Problem-Solving process and Paul Torrance's Future Problem Solving Program (1978).

Creative Problem Solving.

Noticing the need for "an explicit or defined creative process" (Isaksen & Treffinger, 2004, p.77), Osborn outlined seven steps to encourage creative thinking and problem solving, these steps have since developed and evolved as perceptions of creativity grew. There are currently six versions of Creative Problem Solving. The original seven steps, which focused on developing Guildford's (1957) convergent and divergent thinking were orientation, preparation, analysis, hypothesis, incubation, synthesis, and verification (Isaksen & Treffinger, 2004). These seven steps have since transformed throughout the past fifty years, and inspired programming such as Destination Imagination. The benefits of Creative Problem-Solving programs are they teach students to find a problem or area of concern using both divergent and convergent thinking skills. Once students have decided on their problem, they then generate ideas utilizing thinking skills such as fluency, flexibility, and originality. As mentioned above, these thinking skills are deeply connected to creativity (Guilford,1957). Once students have found the heart of their

problem (Treffinger et al., 2003) they then prepare a plan of actions (solutions path) by developing solutions and building acceptance to finally planning an approach to solving the problem (Isaksen & Treffinger, 2004). When implementing a creative English writing class based on the Creative Problem-Solving Model, Wang (2019) found Taiwanese high school students reported the model contributed to their abilities in creating and using skills in English. Students also reported they enjoyed sharing and hearing other students' ideas. Using the Torrance Tests of Creative Thinking, Wang (2019) found students improved scores on their originality but did not show significant changes in their fluency or relative flexibility. Wang (2019) notes this finding may be caused by two factors, the challenge of using a second language (English) and that students did not receive enough group discussion time.

Future Problem-Solving Program

Paul E. Torrance, described by (Runco et al., 2010) as pioneer in the study of creativity and creator of the Torrance Test of Creative Thinking, describes creativity as

> The process of sensing problems or gaps in information, forming ideas or hypotheses, testing, and modifying these hypotheses, and communicating the results. This process may lead to any one of many kinds of products – verbal and nonverbal, concrete, and abstract. (Torrance, 1977, p.7).

The Future-Problem solving Program, is a disciplinary program where students work together to examine and solve future problems (Torrance, 1978). This program mirrors Creative Problem-Solving quite closely in the generation of ideas, studying of data and solving of the specified problem. One difference is the specified focus on problems that students will face in the future. In a pre-program evaluation of a Future Problem-Solving Program, Torrance (1978) collected responses from 1,729 gifted students who indicated most participants enjoyed thinking about the future. In the same pre-program evaluation, Torrance noticed only 73% of elementary school children believed they could change their future. This finding lead Torrance (1978) to

recommend younger students may need more explicit guidance to recognize steps they can take to change their future. Torrance collected data from a gifted student summer camp known as the Governors' Honors Program (GHP), which utilized the Future Problem-Solving Program format. Study results indicated positive effects including increased peer connection, peer tutoring, and the freedom and joy to express their ideas about the future. One student from a rural area expressed the impact of this program as such

> Let me take this opportunity to assure you of this thing: GHP changed my life. I am not the same person as when I left my small town in which I live. I was never quite sure that there was anyone who shared my ideas and intellect in all the world. I had this dismal outlook that for the entirety of my life I would be "gearing down". But GHP was my redemption. Not once was I referred to as "the girl with the brains… Not once were my fears laughed at, rather they were brought into the open and often worked out. (Torrance, 1978, p.85).

More recently, the effects of the Future Problem-Solving Program are still showcasing evidence of its vast benefits. In a study of 131 Portuguese high school students enrolled in an extra-curricular Future Problem-Solving Program International program, Azevedo et al. (2017) found significant differences between the control and experimental group. Using the Torrance Test of Creative Thinking, Azevedo et al. (2017) found students in the experimental group scored higher in creative index than students in the control group. The students in the experimental group displayed enhanced ability in fluency, originality, elaboration, and creative strengths. (Azevedo et al., 2017). Additionally, Azevedo et al. (2017) reported students felt the program encouraged positive feelings in time management, creativity, finishing tasks and motivation. As both studies show, Creative Problem-Solving and Future Problem-Solving programs, have a significant effect on the development of core creative thinking skills and positive perceptions towards creativity. The creative process is one aspect that educators can teach in their classrooms, and Renzulli (1976) encourages educators to consider what strategies can enrich students' experiences.

Renzulli (1976) suggests using flexibility and choices when guiding students on developing their creative process. Involving students in decisions making around their education and skill development will lead to motivated and happier students (Renzulli, 1976). Delcourt (1993) notes when interviewed, students with creative/productive gifted behaviors preferred choosing, engaging with, and competing in projects on their area of interest. Playfulness can also be a contributor to the creative process (Chylińska & Gut, 2020). In a longitudinal study of 127 children, Mullineaux and Dilalla (2009) found preschoolers with high early pretend play skills scored higher on creativity measures as adolescents. Chylińska and Gut (2020) note that teaching students to embrace playfulness encourages imagination, develops divergent thinking, and helps students express and experience emotions, leading to higher creative performance.

Expanding on Rhodes's (1961) concept of *Process*, Project-Based learning (PBL) builds upon learning, thinking, and communication. Project-Based Learning encourages students to take charge of their learning and responsibility for their education (Greenwald, 2000). Greenwald (2000) outlines ten steps which include encountering an ill-defined problem, asking questions, and analyzing the problem, brainstorming solutions to the problem, organizing, and mapping their possible solutions, investigating the problem and solution plan, analyzing results, generating solutions, communicating the results, and reflecting through self-assessment. Project Based Learning is different from Creative Problem Solving in the way students present their finished products. Part of Project-Based learning requires the student to communicate the results of their project and reflect through self-assessment. Effective self-reflection is a lifelong reflective practice which helps students articulate and document their experiences and thoughts. Effective self-reflection is "essential for the growth and personal development of an artist, and indispensable in helping students plan their artistic trajectory. It enables them [students] to map

their development within an ever-shifting landscape" (Guillaumier, 2016, p.354). Teaching students with creative/productive gifted behaviours how to use reflection positively and constructively will help students move away from what Petsilas at al. (2019) refer to as ruminating. Rumination in this context is defined as a student repeatedly thinking about their performance or work from a *good* or *bad* perspective (Petsilas at al., 2019). This way of thinking may impact a person's self-esteem, self-efficacy, and performance (Petsilas et al., 2019). The reflection process can develop student's skills in articulation and documentation of projects they work on. Educators can guide students when documenting projects by posing reflective questions about how the student felt, their goals and how they worked through problems. Students can document through journaling, drawing, using technology and discussion with peers and their teacher. During this time educators can provide feedback around rumination and redirect students to focus on the process instead of the final product (Guillaumier, 2016; Petsilas et al., 2019. Creating short- and long-term goals as part of this reflective practice may assist concerns around evaluations. If students and teachers work together to create a project criterion, both students and teachers can reflect and discuss work habits, problem solving, student development, the process and final product. Once familiar with articulation and documentation students can begin to develop making deeper connections to research and artistic theory, depending on their chosen project. Asking questions and looking into research can develop students practice and critical thinking (Guillaumier, 2016). Students can begin to share these reflections with others and learn how to give and take constructive feedback. Guillaumier (2016) notes "refection is a specific skill that has to be learned in order for students to heighten their awareness of self, practice and context" (p. 355). Developing a refection practice in which students discuss with themselves, peers, teachers, or mentors can help students look at their project process, discuss

problems, incorporate feedback, and discuss future steps or iterations of the project. Utilizing Creative Problem Solving, Project Based Learning, playfulness, flexibility, and providing students choices (Chylińska & Gut, 2020; Greenwald, 2000; Renzulli 1976) expands on Rhodes's (1961) process concept.

Press

Rhodes (1961) presents *press* as the relationship between human beings and their environment, sensations, perceptions, and imagination. Examining a creative/productive gifted student's environment provides more context on who they are. Life experiences, internal and external influences, and the society in which a creative/productive gifted student exists will influence who they are and how they perceive and interact with the world (Rhodes, 1961). Lubart et al. (2019) state that environmental characteristics can support or hinder creativity. In a study of 603 Chinese elementary school students, Gao et al. (2020) found the school environment, (teacher support, student support and opportunities for autonomy) directly affected student's trait creativity. Geo et al. (2020) also found "proactive personality mediates the relationship between school climate and trait creativity" (p. 333). Individuals with proactive personalities are described as innovators who strive to actively solve problems, change the status quo, and create new environments (Akgunduz et al., 2018 as cited by Gao et al., 2020). Individuals with creative/productive gifted behaviours are influenced by changing environments and societal shifts (Lemons, 2011). In an opened-ended drawing activity, Kukkonen et al. (2019) noted the "open-ended nature of the activity and materials, the natural free play environment, and the children's existing relationships with each other" (p.909) influenced preschool aged children as they engaged in creative collaboration. Within this exploratory qualitative study, preschool educators and researchers set up long sheets of paper to encourage group drawing. The children

were free to move in and out of the drawing activity and no adult direction was emphasized (Kukkonen et al., 2019). The scaffolding provided (placement of paper and art supplies, open-ended setting) contributed to the children observing, discussing, and influencing each other's drawing creations (Kukkonen et al., 2019). Lemons (2011) noted that we overlook the importance of a supportive environment, available resources, and support systems. Additionally, Kim (2019) explains how different cultures and societies influence students' creative talents. Differences in environments are particularly salient when considering creative/productive gifted students of color, those who identify as female, and students with disabilities (Kim, 2019). When considering a student's environment, one must look at the climates within the child's ecosystem (Kim, 2019). For example, the effects of a summer program showcased how learning outside of the classroom was beneficial for students with creative/productive gifted behaviors. During a five-day summer camp program, 29 gifted elementary school students participated in a waste management camp. Ceylan (2020) found this program influenced gifted student's creative thinking skills, critical thinking, and environmental attitudes. The camp programming included interdisciplinary, differentiated, and enriched activities run by teachers experienced in gifted education. This study exemplifies how out-of-school learning broadens students' horizons and experiences. These experiences can be field trips, guest speakers, interest centers, demonstrations and access to audio visual material and various technology. With the rise in technology these activities can reach across the world with online museum tours, TED Talks and connection with artists and communities through zoom or other online communication platforms. Educators can directly influence a student's environment, both in class and by providing out of school experiences.

Rhodes does not mention the importance of like-minded peers, which educators can facilitate through ability-grouping. Smutny and Von Fremd (2009) mention that connecting with like-minded peers can provide students with creative/productive gifted behaviours acceptance and increase self-worth and confidence as shown in studies mentioned above (Azevedo et al., 2017; Torrance, 1978). Kim (2019) recommends that creative students initially work alone and then collaborate with others. Collaboration can be beneficial as it allows students to develop communication, share ideas, combine, and discuss others' thoughts and opinions (Kim, 2019). There are various collaboration programs and activities such as debate clubs, dramatic play, Imagination Destination, Future Problem-Solving Programs, and Creative Problem-Solving Programs (Isaksen & Treffinger, 2005) where gifted students learn and practice creative problem solving and group collaboration. These teach students the skills needed to work together to solve and develop solutions to problems presented to them.

Guillaumier, (2016) outlines the benefits of interdisciplinary work as it

> Provides students with the opportunity to question one another's approaches and assumptions; it requires them to present their ideas persuasively and articulately to an audience of peers who may not share those same beliefs. By cultivating and developing these methods, students are actively thinking about how they need to approach these challenges and reflect on the best strategies for their practice (p.359).

Debate clubs provide students with creative/productive gifted behaviours an active learning environment where they learn critical thinking skills, active listening abilities, and develop public speaking skills (Kennedy, 2007; Oros, 2007). In a study of 87 university students who participated in five debates, between 35% – 54% of participants indicated an increase in knowledge of the five debate topics and participants reported an increase of empathy towards opposite point of views (Kennedy, 2009). By creating and working with students with other interests and passions, students can begin to recognize their creativity is not rooted to one

medium (Guillaumier, 2016) and develop new ways of thinking and working. The study conducted by Kukkonen et al. (2019) highlights benefit of collaboration with younger students. As they recorded preschoolers sharing knowledge that influenced how and what they drew. The young students "adopted similar drawing strategies and/or expanded [on their drawings] and worked together to create a collective artwork using various verbal and non-verbal forms of metacommunication and communication" (Kukkonen et al., 2019, p.907). However, Oztop and Gummerum (2020) note when implementing creative collaborative activities, educators must consider age differences, and the child's ability to manage social "social perspective coordination skills" (p. 11). In a group story telling activity Oztop and Gummerum (2020) found adolescents with a mean age of 14 years, collaboratively wrote more creative stories than elementary school participants (mean age ten years). Additionally, Oztop and Gummerum (2020) found that social perspective coordination, was a positive predictor of group creativity. This research highlights the importance of considering students' age, and how explicitly teaching cognitive flexibility and perspective taking is necessary for creative collaboration.

Products

Rhodes (1961) proposed developing a scale for rating the newness of creative products. He believed "products are artifacts of thoughts" (Rhodes, 1961, p.309) and that the idea of an invention may be more creative than an extension of an existing product. The assumption that creativity must include only original ideas or creations has gained criticism (Corazza, 2016; Kim, 2019). It limits creative potential and focuses solely on a finished product and not the creative process. Kim (2019) states that creative thinking requires *existing* knowledge and skills. When looking at the creative process, there is no guarantee of success, and often an individual with creative/productive gifted behaviours will spend multiple hours working on a project that may

not be successful (Corazza, 2016). Corazza (2016) proposed that while novelty and original ideas are valid, Corazza also suggest considering the creative process and the subjectivity of judgment.

The Four C model – Kaufman & Beghetto 2009

Kaufman and Beghetto (2009) divide creativity into The Four C model; Big-C creativity, Pro-C creativity, little-c creativity, and mini-c creativity. This model is advantageous as it provides distinctions between everyday creativity versus seminal works, which in turn may help teachers notice student's potential. Big - C creativity (Kaufman & Beghetto, 2009, 2013) focuses on ground-breaking discoveries and creative genius. While geniuses and child prodigies will appear throughout history, Kaufman and Beghetto (2009) note it is hard to identify when an individual has reached the Big-C level. Often, individuals placed into the Big-C level arrive there posthumously as their contributions need to stand the test of time and have a lasting effect on society (Kaufman & Beghetto, 2009). One such artist is Pablo Picasso who only sold one painting while alive but has since become a Big -C creative (Rimm et al., 2017). An important consideration is the error of focusing solely on significant, ground-breaking discoveries or creative geniuses while ignoring the benefits of everyday creativity (Kaufman & Beghetto, 2009).

Kaufman and Beghetto (2009) acknowledged this issue by coining the idea of little-c creativity. Little-c creativity (Kaufman & Beghetto, 2009) celebrates regular people's everyday creative actions and contributions. This level of creativity is the level at which students with creative/productive gifted behaviors may be identified within their specific domain or based on how they approach problems and ideas both inside and outside the classroom. For example, a student talented in creative writing may win a poetry competition with a piece of written work, or a student may present and win a provincial science fair with a creative and innovative project.

Another demonstration of little-c creativity is described in Liu et al's. (2021) study of a Science, Technology, Engineering, Art, Math programs (STEAM) and creativity. Taiwanese students enrolled in a STEAM program tackled the issue of stray dogs in their community by designing a smart doghouse. The students' efforts resulted in a smart doghouse equipped with features like automatic doors, feeders, and temperature regulators. Students also painted the outside of the doghouse to represent native Taiwanese tribes (Liu et al., 2021). This doghouse was not only highly innovative, but it also solved a problem within the student's community. Kaufman and Beghetto (2013) note that creativity consists of originality and task-appropriateness. The authors remind educators that while working with students with creative/productive gifted behaviors, to not overlook the importance of teaching the fundamentals within their area of interest. It is essential to understand the importance of parameters before breaking them. For example, learning the parameters behind a math equation is necessary before brainstorming creative ways to find a solution. Knowledge of Little-c creativity helps teachers nurture creativity and create a curriculum that combines both academic and student creativity (Kaufman & Beghetto, 2013).

Kaufman and Beghetto (2009) found the two levels of creativity (Big-C and Little-C) limiting when considering the scope of creativity. The authors introduced two additional levels of creativity: Mini-c creativity and Pro-C creativity. Mini-c creativity encompasses "the creativity inherent in the learning process" (Kaufman & Beghetto, 2009, p.3). This level focuses on the creative potential and nurtures young minds to gain knowledge or experiences to fully express their ideas (Kaufman & Beghetto, 2009). Mini-c creativity includes students making interpersonal connections between concepts. For example, a student making unique and personal connections to the philosophy of the book Charlotte's Web, based on past experiences or events, is considered mini-c creativity. Kaufman and Beghetto (2009) note that acknowledging Mini-c

creativity is essential when assessing students in school. Educators should be cognisant that creativity requires time and nurturing. Students with creative/productive gifted behaviours may be easily discouraged or overlooked if too hard a judgment is used or when they are compared to other students with more experience and knowledge (Kaufman & Beghetto 2009).

Pro-C creativity is on the opposite side of mini-c creativity, where one is a professional within their domain but has yet to achieve Big-C status. This level can include professionals within a chosen domain and individuals who have spent a significant amount of time honing their creative skills. The Pro-C category acknowledges professional creative contributions (Kaufman & Beghetto 2009). An example of Pro-C creativity could be a local chef working towards achieving a Michelin Star rating or an Opera singer performing and supporting themselves within in their community. Kaufman and Beghetto (2009) note that the Four C Model can be a developmental trajectory for a creative individual. Creative/productive gifted behaviours in students may emerge as either mini-c or little-c creatives who may eventually become professionals within the Pro-C level. Moving through each level will involve time, hard work, and dedication, but Kaufman and Beghetto (2009) note that these particular individuals at any level often have an intrinsic motivation to move forward.

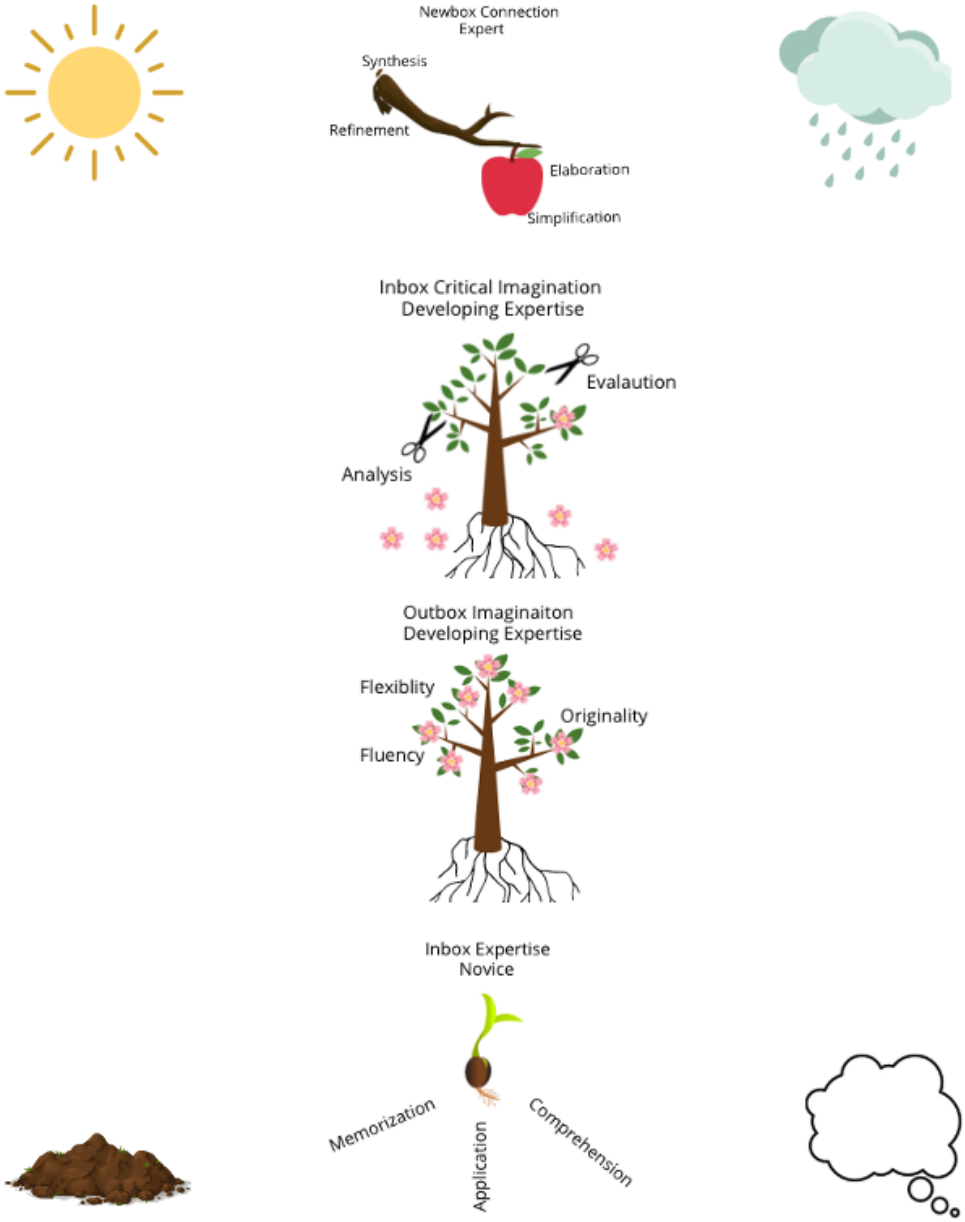
The Four C model (Kaufman & Beghetto, 2009) is a potential framework for educators to introduce creativity into school curriculums. The Four C Model offers more options when considering if a student is potentially creativity gifted. Knowledge of this model may encourage educators to consider differences in creativity levels and appropriately provide students with tailored options that encompass their abilities and interests (Kaufman & Beghetto, 2009).

CATs Model – Kim 2019

Kim (2019) presents the CATs model, which is cultivating *climates,* nurturing *attitudes,* and developing *thinking skills.* This strength-based model as shown in figure 2 suggests that creative potential becomes innovation through a nurturing creative climate. In turn this climate helps facilitate creative attitudes which lead to mastering creative thinking skills (Kim 2019). Using the image of an apple tree Kim (2019) describes thinking skills as the roots, tree trunk, branches, and apples. This apple tree or creative thinking/potential is supported by sun, storm, soil, and space attitudes and climates. Kim's (2019) CATs model share similarities with Guildford's (1957) convergent and divergent thought processes and two parts of Rhode's (1961) Four P's - specifically persons and press. Corazza (2016) highlights the importance of creative potential, recognizing that students with creative/productive behaviors need time to develop their specific talents and experience with the creative process. While describing her planning process for a science fair project a highly gifted student reported spending months planning her project while only spending one month executing her project (Birlean et al., 2021). Birlean et al. (2021) note gifted learner's will spend more time planning than executing their ideas when compared to typical learners. Creatively gifted students may spend time exploring and enjoying creative endeavors regardless of the final product, so it is important to nurture those exploratory and curious behaviors (Birlean et al., 2021; Renzulli & Reis, 2018).

Figure 2

CATs Model and Climates



Note: An adapted CATs Model with the four climates as described by Kim, 2019.

Creative Thinking Skills: ION Thinking

The CAT's model focuses on nurturing and developing creative thinking skills. These creative thinking skills are broken into four sections: (a) inbox expertise, (b) outbox imagination, (c) inbox critical thinking, and (d) new box connections (Kim, 2019). Inbox expertise is the foundation for students to develop and eventually become experts in their field of interest. Memorization, comprehension, and application are the thinking skills required to gain inbox expertise (Kim, 2019). Inbox expertise is when students begin as novice explorers, acquire skills, and become experts after many hours of practice (Kim, 2019). However, it is crucial to note that practicing a skill is not the only predictor of expertise (Ruthsatz et al., 2008). When testing general intelligence, practice skills, and domain-specific music skills, Ruthsatz et al. (2019) found "general intelligence domain-specific skills are major factors responsible for musical achievement with a self-selected population of high school musicians" (p.335). While this study only targets high performing musicians, there are similarities between development of expertise and gifted individuals particularly within cognitive development (Birlean & Shore, 2018). In an extra-curricular science enrichment program, Wang et al. (2019) recorded ten gifted preschoolers' (age five to six) dialogues and artworks. Throughout the yearlong program, the authors found these gifted students demonstrated "superior verbal expressive, logical reasoning, elaborate creative and flexible problem-solving skills" (Wang et al., 2019, p.2677). Robinson (1993 as cited by Wang et al., 2019) note that gifted students "usually perform at age levels that are ¼ - ½ beyond their actual age" (p. 2677).

Outbox imagination describes how students expand and explore their skills and knowledge while on their path to developing expertise. This stage requires imagination and thinking skills like divergent thinking, fluency, flexibility, and originality. Kim (2019) utilizes

Guilford's (1957) divergent thinking and describes fluent imagination as having many different ideas, like an apple tree with many blossoms during springtime. Flexible imagination requires "imagining many different kinds of categories of ideas" (Kim, 2019, p. 123). Original imagination, like Guilford's (1957) concept of novelty, encourages students to dream big and create unique ideas based on current information (Kim, 2019). Original imagination is slightly different from Guildford's (1957) novelty as Kim (2019) links student's creative attitudes and expertise within their specific domain to "reframe their imagination, identify a need or gap in the subject, and find the hidden or underlying problems" (p. 122). According to Kim (2019) the more experience a student has within their domain the more "*fluent, flexible* and *original* their outbox imagination will be *if* they have developed creative attitudes" (p.122). Inbox Critical Thinking requires students to analyze and evaluate all their big outbox imaginings. Inbox critical thinking teaches students to edit and refine their ideas through checking, analyzing, and evaluation (Kim 2019; Mullen et al., 2019). By learning the differences between unsuccessful and successful ideas, students can create their own learning goals and evaluations. Once students have decided and selected their ideas from the critical thinking stage, Kim (2019) introduces the final stage; Newbox Connection. New box thinking is the highest level of thinking and combines inbox critical thinking and outbox imagination to create a new idea or concept (Mullen et al., 2019). Kim (2019) suggests using synthesis to find similarities and essential elements between promising new ideas. Once combined, students refine their ideas, creating interpretations and improvements with the skills of elaboration and simplification.

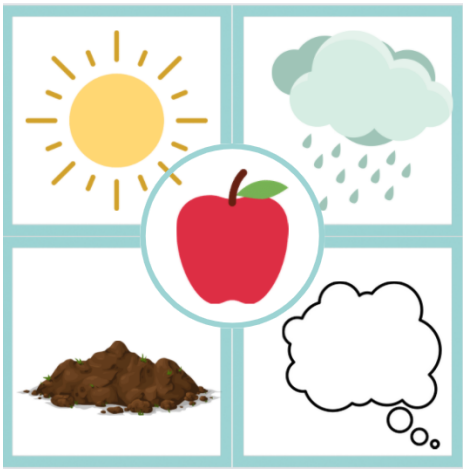
Climates

Deepening Rhodes's (1961) environment lens, Kim (2019) and Mullen et al. (2019) believe a student's climate is the most essential influence on creative products. Climate includes

a child's culture, schools, family home, and societal environments (Kim, 2019). Educators can directly influence the school climate; this is especially important for students facing poverty, discrimination, or who only have access to creative environments in school (Mullen et al., 2019). As illustrated in figure 3, Kim (2019) uses an apple as a metaphor for creative innovators. Mullen et al. (2019) suggest that students "require (a) inspirational and encouraging *sun* climate; (b) high-expectation-holding and challenging *storm* climate; (c) resources, experiences, and viewpoints diverse *soil* climate; and (d) deep and free-thinking *space* climate (Kim, 2016 as cited by Mullen et al., 2019, p.224).

Figure 3

The Four Climates



Note: The four climates influencing an apple (creative innovators) adapted from Kim, 2019

Sun Climate

The sun climate inspires and encourages young minds through self-expression, optimism, and dreaming big (Kim, 2019; Mullen et al., 2019). Torrance (1970) describes a situation in which through a playful and imaginative drama activity, a young student was able to overcome her extreme anxiety when encouraged to pretend to be a bear with three other confident students. Torrance (1970) used colorful nylon fabric to create "magic nets" (p. 3). With Dr. Torrance's

playful encouragement and the magic nets, the student began to actively participate and contribute creative ideas in the class (Torrance, 1970). Mullen et al. (2019) recommend that educators approach new concepts and lessons with playfulness using real-life examples, like innovators and inventors. Educators can utilize the power of reading to introduce young minds to innovators' early life experiences and new exciting ideas (Mullen et al., 2019). Torrance (1970) suggests a creative reader uses information from their readings to add to their knowledge and perception of life. Using both critical and creative thinking skills, a creative reader can use the text (both fiction and non-fiction) as an opportunity to recognize biases within themselves, the writing and perspectives of the character or witnesses. Educators can guide students to consider multiple viewpoints of the truth and generate new possibilities to the problems presented (Torrance, 1970). Teaching students with creative/productive gifted behaviours the power of creative reading may generate infinite opportunities to create and imagine new possibilities in all aspects of their life.

Storm Climate

As students dream up big, exciting ideas, the storm climate concept brings challenges facilitating opportunities for students to develop their resilience and persistence. Within the storm climate students can receive feedback, face learning challenges, and meet high expectations set out by educators (Mullen et al., 2019). Educators have an opportunity to help students with creative/productive gifted behaviors navigate challenges, take more educational risks, and learn from mistakes. Educators can help students with creative/productive gifted behaviours deal with mistakes and failure by teaching practical self-reflection skills. This climate may help students learn the important skills of learning how to respond to constructive criticism, developing healthy thinking practices, (including documenting their process), asking leading

questions for further development, moving away from perfectionism, and collaborating with others (Guillaumier, 2016; Petsilas et al., 2019).

Soil Climate

Kim (2019) describes the soil climate as "interactive and diverse-viewpoint-holding" (p.124). The central aspect of this climate is interaction and collaboration with diverse people and ideas (Mullen et al., 2019). Kim (2019) describes the collaboration as *cross-pollination,* which requires students to work individually creating an idea and then merging their ideas with others. Interdisciplinary collaboration with diverse people is a valuable tool as it encourages students to question assumptions and approaches, learn effective communication skills and present persuasive arguments (Kim 2019; Guillaumier, 2016). Mullen et al. (2019) recommend that or encourage educators to focus on students' strengths and highlight uniqueness using books, mentors, different cultural perspectives, and interaction with different communities. Renzulli (2002) shares an experience of a young student named Melanie, who with the help of an enrichment teacher, set out to help another student. Melanie noticed a younger student, Tony, struggling because of his near sightedness. Tony was miserable as he could not read any of the books in the library and was being bullied by a group of classmates. Melanie recognized a need within her community and set out to find creative solutions to this problem. She enlisted the help of older students to spend time with Tony during lunch and on the school bus. This delt with the bullies and Tony began to develop friendships with other students. Melanie then tackled Tony's lack of large print books in the library. Melanie first discovered Tony's interest in sports and adventure stories and then enlisted the help of her fellow creative peers. Melanie became the editor of a collection of written and illustrated large print books created by students especially for Tony! Renzulli (2002) remarked that Tony not only had access to books, but his whole attitude also changed; Tony was happy to be at school. Melanie had the support of a teacher

knowledgeable of supporting students with creative/productive gifted behaviours and the space to creatively solve a problem. This simple program not only enriched Melanie's life, but it also made a huge impact for little Tony and created a collective of creative individuals committed to creating imaginative stories. It also demonstrates that if we equip teachers with knowledge on how to recognize and support these individuals, teachers can become empowered advocates for their students. This may lead to happier and more fulfilled teachers which in turn may lead to happier and supported students.

Space Climate

The final climate encourages students to take time to daydream, think deeply and freely and challenge the status quo through questioning and learning (Kim 2019; Mullen et al., 2019). Like a plant in a tiny pot, if a student's thinking and experiences at school are restrictive and controlled, they will never branch out and grow. Mullen et al. (2019) encourage educators to allow students time to play, teach effective thinking strategies, and nurture compassion. They also encourage using debate tools to encourage student's critical thinking, nonconformity, and confidence by asking challenging questions (Mullen et al., 2019).

The current public-school environment does not always provide space for creative expression because of inflexible schedules, lack of creative problem-solving instruction, and variation in teacher and school administrators' beliefs about creativity (Chan & Yuen, 2014; Renzulli, 2014). A study by Ridgley et al. (2019) involving 236 high school students and 13 teachers found that students perceive their creativity differently in school from other environments. In addition, the study results suggests that students don't feel that the school environment supports their creative potential. Both the school and classroom environments are excellent spaces for potential opportunities to nurture creative individuals. Scrutiny of these learning spaces is vital because of the amount of time children spend in these environments. Renzulli (2014) describes a

Schoolwide Enrichment Model (SEM) where both academic and creative-productive giftedness is utilized to "make learning more interesting, exciting and enjoyable, to promote the development of higher-level thinking skills" (p. 541). The idea behind this model promotes student creativity by suggesting labeling specialized programs rather than labelling students. The Schoolwide Enrichment Model framework allows students to move in and out of programs depending on their needs and creative goals (Renzulli, 2014).

Attitudes

As shown in Table 4, Kim (2019) identifies 27 attitudes cultivated in the four climates which are sorted into types: Sun, Storm, Soil, and Space. Kim (2019) suggests these attitudes when nurtured, help develop creative thinking skills.

Table 4

Attitudes cultivated in the four climates

Storm Attitudes Courageously persistent	Sun Attitudes Inquisitive visionaries	Soil Attitudes Complex cross-pollinators	Space Attitudes Compassionate rebels
Independent	Optimistic	Open-minded	Emotional
Self-disciplined	Big-picture thinking	Bicultural	Compassionate
Diligent	Curious	Mentored	Self-reflective
Self-efficacious	Spontaneous	Complexity-seeking	Autonomous
Resilient	Playful	Resourceful	Daydreaming
Risk-Taking	Energetic		Nonconforming
Persistent			Gender bias-free
Uncertainty-accepting			Defiant

(This table paraphrases the four climates and attitudes cultivated within Kim's CATs model, 2019, p.124).

Assessment of a Student with Creative/Productive Gifted Behaviours

Since creativity has many dynamic perspectives and definitions, a multi-method approach to assessing gifted behaviours using qualitative and quantitative methods is recommended (Ambrose & Machek, 2015; Kaufman et al., 2012; Renzulli & Reis, 2018). When deciding on assessment tools to use, an important consideration is clarity around what is being measured. This will determine the choice of tools selected. Renzulli and Renzulli (2010) propose that using only one form of assessment, or creativity definition, while preventing having restrictive cut-off limits, such as selecting only the top 2 -3%, into gifted programs, which increases the risk of excluding potentially creatively gifted children (Renzulli & Renzulli, 2010). Erroneously assuming that all gifted students have a very high IQ is one major contributing factor to students with creative /productive gifted behaviours being overlooked (Ambrose & Machek, 2015; Kaufman et al., 2012; Kim, 2019; Renzulli & Renzulli, 2010). Rather, Renzulli and Renzulli (2010) recommend creating a talent pool consisting of the top 10 – 15 percentiles of high-ability students. These students can be identified using multiple measures, including peer, self, parent, and teacher nominations, behavior rating scales, assessments for creativity, and potential for creativity (Renzulli and Renzulli, 2010). Additionally, Ambrose & Machek (2015) recommend alternative assessments that include performance-based, portfolio, and dynamic assessments (Pfeiffer and Blei, 2008 as cited by Ambrose & Machek, 2015). This paper discusses some reliable assessment tools including The Torrance Test of Creative Thinking (TTCT), The Scales for Rating Behavioral Characteristics of Superior Students (SRBCSS), and The Creative Products Semantic Scale (CPSS). While this list is not comprehensive it offers educators a

starting point for reliable assessment options for assessing student with creative/productive gifted behaviours.

Divergent Thinking - Formal Assessment

Measuring divergent thinking has been the primary assessment tool for measuring creativity for decades (Kaufman et al., 2012). The Torrance Test of Creative Thinking (TTCT) is an influential, widely studied test (Rimm et al., 2019). Building on the work of Gilford but only focusing on divergent thinking, J.P. Torrance created the Torrance Test of Creative Thinking (Ambrose & Machek, 2015; Kaufman et al., 2012; Rimm et al., 2019). The TTCT became a recognized and reliable test using verbal and non-verbal tasks, measuring the same three qualities: fluency, flexibility, and originality (Ambrose & Machek, 2015; Kaufman et al., 2012; Rimm et al., 2019). This test is "the longest-running, continually published assessment of divergent thinking, most carefully studied, and most widely used in educational settings of all tests of creativity" (Kaufman et al., 2008 as cited by Kaufman et al., 2012, p.62). An important consideration is that the TTCT can only be conducted by a psychologist or specially trained individuals. This test is not practical for teachers as they cannot administer the test themselves unless they receive and pay for specific training. The benefit of using standardized divergent thinking scores is that it provides educators with a straightforward, reliable scoring system (Kaufman et al., 2012).

The limitation of measuring only divergent thinking and the TTCT is that it suggests creativity is only a product of the individual's thinking process. Using the TTCT to assess creativity assumes that divergent thinking is the only operationalization of creativity (Ambrose & Machek, 2015). The TTCT does not consider the environment, temperament, or motivation (external and internal). Educators should be cautioned against the pitfalls of standardized testing,

as formal assessments have limitations. These limitations include - excluding minority students and students with disabilities otherwise known as twice exceptional. In addition, only considering divergent thinking may not capture the true nature of a creative mind (Kaufman et al., 2012).

Individual Identification

A more effective way of recognizing and reaching more students during assessment would be including teachers, parents, peers, or students' nomination. Nominating individuals who demonstrate creative/productive gifted behaviours may reach more students and cast a wider net during an assessment. Identification can be formal, using creativity checklist and or behavior rating scales or informal such as students signing up or being casually nominated to participate in gifted programs (Kaufman et al., 2012; Renzulli & Reis 2018; Rimm et al., 2017). The Scales for Rating Behavioral Characteristics of Superior Students (SRBCSS) by Renzulli et al. (2013) is one useful tool for educators or parents. Not specifically created for creativity identification, the SRBCSS rates students' behaviors on fourteen scales and helps assessors identify students' abilities in multiple areas such as leadership, motivation, learning, and creativity. Assessors and teachers can use the creativity scale separately from the other thirteen scales to identify potential students with creative/productive gifted behaviors. Before assessing students, the assessor should be familiar with the checklist and interact with the child in multiple contexts (Kaufman et al., 2012). Rimm et al. (2017) caution against using only teacher nominations with the SRBCSS because of biases previously mentioned in this paper. Parental nominations can be particularly useful for children in elementary schools, as parents observe behaviors that their child may not showcase in the school environment (Rimm et al., 2017). Rimm et al. (2017) recommend using peer nomination in a game format whereby students nominate students other than those in their

exclusive friend group. At the high-school level, self-nomination allows highly motivated students the opportunity to join specialized programs and while identifying which programs or services they need (Kaufman et al., 2012; Rimm et al., 2017).

Individual identification is more flexible than divergent thinking assessments and is beneficial as it uses a broader definition of creativity and creative/productive gifted behaviors. Using a combination of teacher, peer, parent, and self-assessment and a multidimensional description of creativity provides multiple chances for identification of students with creative/productive gifted behaviours. Ambrose and Machek (2015) recommend nominating potential students followed by an assessment and selection phase. Creating a selection committee composed of teachers, professionals, and community members may lead to fair, unbiased selection (Renzulli & Reis, 2018).

Performance-based and portfolio assessments

Ambrose and Macheck (2015), and Rimm et al. (2017) recommend highlighting and recognizing exemplary student's performance and work within the school, the community and the student's area of interest. Assessment is based on evaluators reviewing the processes, quality, depth, and innovation reflected in the student's work (Ambrose & Machek, 2015; Rimm et al., 2017). The Creative Products Semantic Scale (CPSS) (Besemer, 1998) is a model which considers "creativity manifested in many different kinds of products" across multiple fields (p.334). A selection committee composed of teachers and experienced judges, can use CPSS to evaluate a student's performance or work. The CPSS assesses products in three categories--novelty, resolution and elaboration, and synthesis (Ambrose & Machek, 2015; Besemer, 1998). Using a Likert-style rating scale, evaluators examine a student's work's originality, innovation, and newness. When evaluating resolution of a students work, evaluators consider the usefulness,

practical needs of a problem and whether the project makes sense are also considered. When assessing the elaboration feature, evaluators rate the style and craftsmanship of the students' work (Besemer, 1998). Ambrose and Machek (2015) noted that the CPSS is easy for teachers to use and is a valuable teaching tool which students and evaluators can examine the quality of their work.

Consider a society where individuals with creative/productive gifted behaviours are supported, valued, and consulted throughout their young lives. How would our world be different? Contemplate the incredible advance these highly talented children have to offer as we face an unstable future. While this may feel like a huge undertaking, the benefits of identifying and supporting creative/productive gifted behaviors in students vastly outweigh the hard work. When Malala Yousafzai's father recognized her love of learning and creative spirit, he supported her and other young girls in Pakistan by opening a school for girls. Armed with her father's support, Malala showed immense resilience and courage when challenging the Taliban's extremist views barring girls from receiving education. Despite being targeted and gravely injured she has not stopped fighting for all girls to receive an education and in 2014 became the youngest Nobel laureate (Yousafzai et al., 2015). Ending with the words of Torrance (1970) "all children and young people possess unrecognized and awakened potentialities that will amount to little unless someone first recognizes and acknowledges them and then encourages their awakening" (viii). It is time to dedicate the time and resources these incredibly unique students deserve. Helping children with creative/productive gifted behaviors reach their potential now will benefit the world as they create and solve the problems we face in the future.

References

Ambrose, L., & Machek, G. R. (2014). Identifying creatively gifted students: Necessity of a multi-method approach. *Contemporary School Psychology*, *19*(3), 121–127. https://doi.org/10.1007/s40688-014-0020-z

Azevedo, I., Fátima Morais, M., & Martins, F. (2017). The Future Problem-Solving Program International: An intervention to promote creative skills in Portuguese adolescents. *The Journal of Creative Behavior*, *53*(3), 263–273. https://doi.org/10.1002/jocb.175

Besemer, S. P. (1998). Creative product analysis matrix: Testing the model structure and a comparison among products--three novel chairs. *Creativity Research Journal*, *11*(4), 333–346. https://doi.org/10.1207/s15326934crj1104_7

Ceylan, Ö. (2020). The effect of the waste management themed Summer Program on Gifted Students' environmental attitude, Creative Thinking Skills and critical thinking dispositions. *Journal of Adventure Education and Outdoor Learning*, 1–13. https://doi.org/10.1080/14729679.2020.1859393

Chan, S., & Yuen, M. (2014). Creativity beliefs, creative personality and creativity-fostering practices of gifted education teachers and regular class teachers in Hong Kong. *Thinking Skills and Creativity*, *14*, 109–118. https://doi.org/10.1016/j.tsc.2014.10.003

Chylińska, M., & Gut, A. (2020). Pretend play as a creative action: On the exploratory and evaluative features of children's pretense. *Theory & Psychology*, *30*(4), 548–566. https://doi.org/10.1177/0959354320931594

Coleman, L. J., & Cross, T. L. (2000). Social-emotional development and the personal experience of giftedness. In K. A. Heller, F. J. Mönks, R. J. Sternberg, & R. F. Subotnik

(Eds.), *International handbook of giftedness and talent* (2nd ed., pp. 203–212). New York, NY: Elsevier.

Corazza, G. E. (2016). Potential originality and effectiveness: The dynamic definition of creativity. *Creativity Research Journal*, *28*(3), 258–267. https://doi.org/10.1080/10400419.2016.1195627

Csikszentmihalyi, M., Nakamura, J., & Csikszentmihalyi, M. (2014). The Concept of Flow. In *Flow and the foundations of positive psychology: The collected works of Mihaly Csikszentmihalyi* (pp. 239–263). essay, Springer.

Davis, G. A., & Rimm, S. (1977). Characteristics of creatively gifted children. *Gifted Child Quarterly*, *21*(4), 546–551. https://doi.org/10.1177/001698627702100413

Delcourt, M. A. (1993). Creative productivity among secondary school students: Combining Energy, interest, and imagination. *Gifted Child Quarterly*, *37*(1), 23–31. https://doi.org/10.1177/001698629303700104

Doyle, C. L. (2017). Creative flow as a unique cognitive process. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01348

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1087–1101. https://doi.org/10.1037/0022-3514.92.6.1087

Gao, Q., Chen, P., Zhou, Z., & Jiang, J. (2019). The impact of school climate on Trait creativity in primary school students: The mediating role of Achievement Motivation and proactive personality. *Asia Pacific Journal of Education*, *40*(3), 330–343. https://doi.org/10.1080/02188791.2019.1707644

Government of British Columbia. (2021). *Creative thinking*. Building Student Success - B.C. Curriculum. Retrieved December 20, 2021, from https://curriculum.gov.bc.ca/competencies/thinking/creative-thinking

Greenwald, N. L. (2000). Learning from problems. The Science Teacher, 67 (4), 28-32.

Guilford, J. P. (1957). Creative abilities in the Arts. *Psychological Review*, *64*(2), 110–118. https://doi.org/10.1037/h0048280

Guillaumier, C. (2016). Reflection as a creative process: Perspectives, challenges, and practice. *Arts and Humanities in Higher Education, 15*(3-4), 353–363. https://doi.org/10.1177/1474022216647381

Isaksen, S. G., & Treffinger, D. J. (2004). Celebrating 50 years of reflective practice: Versions of Creative Problem Solving. *The Journal of Creative Behavior*, *38*(2), 75–101. https://doi.org/10.1002/j.2162-6057.2004.tb01234.x

Kaufman, J. C., & Beghetto, R. A. (2009). Beyond big and little: The Four C model of creativity. *Review of General Psychology*, *13*(1), 1–12. https://doi.org/10.1037/a0013688

Kaufman, J. C., & Beghetto, R. A. (2013). Fundamentals of Creativity. *Educational Leadership: Journal of the Department of Supervision and Curriculum Development*, *70*(5), 10–15.

Kaufman, J. C., Plucker, J. A., & Russell, C. M. (2012). Identifying and assessing creativity as a component of giftedness. *Journal of Psychoeducational Assessment*, *30*(1), 60–73. https://doi.org/10.1177/0734282911428196

Kennedy, R. R. (2009). The power of in-class debates. *Active Learning in Higher Education*, *10*(3), 225–236.

Kim, K. H. (2019). Demystifying creativity: What creativity isn't and is? *Roeper Review*, *41*(2), 119–128. https://doi.org/10.1080/02783193.2019.1585397

Kukkonen, T., Chang, Kredl, S., & Bolden, B. (2019). Creative collaboration in young children's Playful Group drawing. *The Journal of Creative Behavior*, *54*(4), 897–911. https://doi.org/10.1002/jocb.418

Lemons, G. (2011). Diverse Perspectives of Creativity Testing. *Journal for the Education of the Gifted*, *34*(5), 742–772. https://doi.org/10.1177/0162353211417221

Liu, C.Y., Wu, C.J., Chien, Y.H., Tzeng, S.Y., & Kuo, H.-C. (2021). Examining the quality of art in steam learning activities. *Psychology of Aesthetics, Creativity, and the Arts*. https://doi.org/10.1037/aca0000404

Lubart, T., Barbot, B., & Besançon, M. (2019). Creative potential: Assessment issues and the EPOC Battery / Potencial Creativo: Temas de evaluación y batería EPOC. *Estudios De Psicología*, *40*(3), 540–562. https://doi.org/10.1080/02109395.2019.1656462

Martowska, K., & Romanowicz, M. (2020). Overexcitability profile among university students at music-focused institutions. *Roeper Review*, *42*(4), 271–280. https://doi.org/10.1080/02783193.2020.1815265

Miller, E. M., Dixson, D. D., Matthews, M. S., Birlean, C., Birlean, E. M., & Shore, B. M. (2021). Problem-Solving Characteristics in Gifted and Advanced Learners. In *Development of the high ability child* (pp. 100–113). essay, Routledge.

Mostafavi, H., Yoosefee, S., Seyyedi, S. A., Rahimi, M., & Heidari, M. (2020). The impact of educational motivation and self-acceptance on creativity among high school students. *Creativity Research Journal*, *32*(4), 378–382. https://doi.org/10.1080/10400419.2020.1821561

Mullen, C. A., Kim, K. H., & Chae, N. (2019). Chapter 12 Recapturing American Innovation Through Education: The Creativity Challenge for Schools. In *Creativity under duress in*

education? Resistive theories, practices, and actions (pp. 215–233). essay, Springer International Publishing.

Mullineaux, P. Y., & Dilalla, L. F. (2009). Preschool pretend play behaviors and early adolescent creativity. *The Journal of Creative Behavior*, *43*(1), 41–57. https://doi.org/10.1002/j.2162-6057.2009.tb01305.x

National Association for Gifted Children. (n.d). *Gifted education in the U.S.* Gifted Education in the U.S. | National Association for Gifted Children. Retrieved December 2, 2021, from https://www.nagc.org/resources-publications/resources/gifted-education-us.

Nyberg, J., Manzone, J., Renzulli, J. S., & Reis, S. M. (2022). The Schoolwide Enrichment Model: A Talent Development Approach Resulting in Opportunities, Resources, and Encouragement for All Students. In *Creating Equitable Services for the gifted: Protocols for identification, implementation, and evaluation* (pp. 39–57). essay, Information Science Reference, IGI Global.

Ong, K.J., Chou, Y.C., Yang, D.Y., & Lin, C.C. (2020). Creative drama in science education: The effects on situational interest, career interest, and science-related attitudes of science majors and Non-Science Majors. *EURASIA Journal of Mathematics, Science and Technology Education*, *16*(4). https://doi.org/10.29333/ejmste/115296

Oros, A. L. (2007). Let's debate: Active learning encourages student participation and critical thinking. *Journal of Political Science Education*, *3*(3), 293–311. https://doi.org/10.1080/15512160701558273

Özbek, G. (2014). Drama in education: key conceptual features. *Journal of Contemporary Educational Studies / Sodobna Pedagogika*, *65*(1), 46–61.

Oztop, P., & Gummerum, M. (2020). Group creativity in children and adolescents. *Cognitive Development*, *56*, 100923. https://doi.org/10.1016/j.cogdev.2020.100923

Petsilas, P., Leigh, J., Brown, N., & Blackburn, C. (2019). Creative and embodied methods to teach reflections and support students' learning. *Research in Dance Education, 20*(1), 19–35. https://doi.org/10.1080/14647893.2019.1572733

Plucker, J. A., Beghetto, R. A., & Dow, G. T. (2004). Why isn't creativity more important to educational psychologists? potentials, pitfalls, and Future Directions in creativity research. *Educational Psychologist*, *39*(2), 83–96. https://doi.org/10.1207/s15326985ep3902_1

Renzulli, J. S., & Park, S. (2002). *Giftedness and high school dropouts: Personal, family, and school-related factors* (RM02168). Storrs, CT: National Research Center on the Gifted and Talented.

Renzulli, J. S., & Reis, S. M. (2018). The three-ring conception of giftedness: A developmental approach for promoting creative productivity in young people. *APA Handbook of Giftedness and Talent.*, 185–199. https://doi.org/10.1037/0000038-012

Renzulli, J. S., & Reis, S. M. (1991). The reform movement and the quiet crisis in Gifted Education. *Gifted Child Quarterly*, *35*(1), 26–35. https://doi.org/10.1177/001698629103500104

Renzulli, J. S., & Renzulli, S. R. (2010). The Schoolwide Enrichment Model: A Focus on Student Strengths and Interests. *Gifted Education International*, *26*(2-3), 140–157. https://doi.org/10.1177/026142941002600303

Renzulli, J. (2014). The schoolwide Enrichment model: A comprehensive plan for the development of talents and giftedness. *Revista Educação Especial*, *27*(50), 539–562. https://doi.org/10.5902/1984686x14285

Renzulli, J. S. (1976). The Enrichment Triad Model: A Guide for Developing Defensible Programs for the Gifted and Talented. *Gifted Child Quarterly*, *20*(3), 303–326. https://doi.org/10.1177/001698627702100021 6

Renzulli, J. S. (1996). Schools for talent development: A practical plan for total school improvement. The School Administrator, 53(1), 20-22.

Renzulli, J. S., Smith, L. H., White, A. J., Callahan, C. M., Hartman, R. K., Westberg, K. L., Gavin, K., Reis, S. M., Siegle, D., & Sytsma, R. E. (2013). *Scales for Rating the Behavioural Characteristics of Superior Students (Renzulli Scales)*. Gifted.education.uconn.edu. Retrieved December 20, 2021, from https://gifted.education.uconn.edu/wp-content/uploads/sites/612/2014/08/Scales-for-Rating-the-Behvioral-Characteristics-of-Superior-Students.pdf

Renzulli, J. S. (2002). Expanding the conception of giftedness to include co-cognitive traits and to promote social capital. *Phi Delta Kappan*, *84*(1), 33–58. https://doi.org/10.1177/003172170208400109

Ridgley, L. M., DaVia Rubenstein, L., & Finch, W. H. (2019). Issues and opportunities when using rating scales to identify creatively gifted students: Applying an IRT approach. *Gifted and Talented International*, *34*(1-2), 6–18. https://doi.org/10.1080/15332276.2020.1722041

Rimm, S. B., Siegle, D., & Davis, G. A. (2017). Chapter 8 Creativity. The Creative Person, Creative Process, and Creative Dramatics. In *Education of the gifted and talented* (pp. 161–174). essay, Pearson.

Rhodes, M. (1961). An analysis of creativity. *The Phi Delta Kappan*, *42*(7), 305–310.

Roberts, J. L., Inman, T. F., Robins, J. H., Birlean, C., & Shore, B. M. (2022). Cognitive Development of Giftedness and Talents. In *Introduction to gifted education* (pp. 95–118). essay, Routledge.

Runco, M. A., Millar, G., Acar, S., & Cramond, B. (2010). Torrance tests of creative thinking as predictors of personal and public achievement: A Fifty-year follow-up. *Creativity Research Journal*, *22*(4), 361–368. https://doi.org/10.1080/10400419.2010.523393

Ruthsatz, J., Detterman, D., Griscom, W. S., & Cirullo, B. A. (2008). Becoming an expert in the musical domain: It takes more than just practice. *Intelligence*, *36*(4), 330–338. https://doi.org/10.1016/j.intell.2007.08.003

Smutny, J. F., & Von Fremd, S. E., (2009). Chapter 1. Creativity. A gift for the Gifted. In *Igniting creativity in gifted learners, K-6: Strategies for every teacher* (pp. 5–17). essay, Corwin Press.

Special Education Services & BC Ministry of Education, Special education services: A Manual of policies, procedures and Guidelines1–146 (2016). Victoria, B.C.; Ministry of Education.

Torrance, E. P. (1978). Giftedness in solving future problems. *The Journal of Creative Behavior*, *12*(2), 75–86. https://doi.org/10.1002/j.2162-6057.1978.tb00162.x

Torrance, E. P. (1970). *Encouraging Creativity in the classroom*. National Education Association.

Isaksen, S. G., & Treffinger, D. J. (2004). Celebrating 50 years of reflective practice: Versions of Creative Problem Solving. *The Journal of Creative Behavior*, *38*(2), 75–101. https://doi.org/10.1002/j.2162-6057.2004.tb01234.x

Treffinger, D. J., & Isaksen, S. G. (2005). Creative problem solving: The history, development, and implications for gifted education and talent development. *Gifted Child Quarterly*, *49*(4), 342–353. https://doi.org/10.1177/001698620504900407

Treffinger, D. J., Isaksen, S. G., & Dorval, B. K. (2003). *Creative problem solving (CPS version 6.1™) A Contemporary Framework for Managing Change*. Creative Learning. Retrieved February 15, 2022, from https://www.researchgate.net/publication/237616636_Creative_Problem_Solving_CPS_Version_61_A_Contemporary_Framework_for_Managing_Change

Wang, Y.C., Kuo, C.C., & Wu, S.-M. (2019). Creative and problem-solving thinking of gifted and talented young children observed through classroom dialogues. *Universal Journal of Educational Research*, *7*(12), 2677–2692. https://doi.org/10.13189/ujer.2019.071215

Yoon, J., Jo, T.J., & Kang, S.J. (2020). A study on the possibility of the relationship among group creativity, empathy, and scientific inquiry ability of elementary school students. *International Journal of Science Education*, *42*(13), 2113–2125. https://doi.org/10.1080/09500693.2020.1813347

Yousafzai, M., Lamb, C., & Sudevī Thâc. (2015). *I am Malala*. Mindbooks.