# Chapter 15
# Supporting Creative Teaching and Learning in the Classroom: Myths, Models, and Measures


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**Abstract** Creativity is enjoying a resurgence of interest in the education systems of many developed countries. The core of this is the recognition that *creativity*, in its broadest sense that encompasses divergent thinking, problem-solving, and related abilities is a core skill in the twenty-first century. While there is a great deal of rigorous, empirical research that underpins creative teaching and learning, there remains much rhetoric, myth, and misconception that militates against efforts to embed creativity in the modern classroom. In this chapter, we first explore some of the general beliefs that frequently interfere with efforts to broaden and systematise the understanding of creativity. We also examine specific evidence from teachers, suggesting that this practitioner cohort is favourably primed and disposed to teach both *for* and *with* creativity. In the literature of creative education, we identify and address a significant gap relating to developmental models of creativity. Finally, we discuss some of the nuances of creativity in school settings, offering specific advice for school teachers who are at the coal-face of creative education.

## 15.1 Introduction

Around the world, national education bodies as well as individual schools are calling for a shift from traditional pedagogy and standardized testing to a more creative education paradigm (Beghetto & Kaufman, 2017; Beghetto, Kaufman, & Baer, 2014). Teachers are being advised, if not compelled, to introduce creativity into their daily classroom practice in countries ranging from Australia (Australian Curriculum Assessment and Reporting Authority (ACARA), 2010), to Iceland (Ministry of Education, Science, and Culture (MESC), 2011), and Hong Kong

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(Hong Kong Examinations and Assessment Authority (HKEAA) & Hong Kong Curriculum Development Council (HKCDC), 2007).

This push for creativity is experiencing a resurgence of interest for many reasons. Cropley (1997), for example, explains that creativity is an integral part of the psychological functioning of children, and therefore a necessary component of a well-rounded, equitable education. Rosenstock and Riordan (2017) emphasise creativity as one of the *dispositions* necessary in the modern innovation economy. Bakhshi, Downing, Osborne, and Schneider (2017) add that *skills* such as creative problem solving, and *abilities* such as originality, are amongst those in greatest demand in future occupations in the United States and the United Kingdom.

ACARA (2010), like its counterparts in Iceland and Hong Kong, recognises that the twenty-first century is characterised by rapidly changing environmental, economic, and social factors. This requires that individuals—creative problem solvers—be equipped with the skills to find new and effective solutions to problems arising in this new paradigm. On top of this, employers continue to call for creativity, and the related capacity for innovation, as desirable abilities of prospective employees. Symes (2014), for example, noted that 45% of human resources decision-makers identified innovation and creativity as two of the most important skills to develop within workforces seeking to drive organisational growth. Adding to this, Frey and Osborne (2017) argue that "occupations requiring a high degree of creative intelligence" (p. 262) are amongst those *least likely* to be automated over the coming decades.

As this push for creativity in the classroom gathers pace, a great deal of knowledge is available—much of it long-standing—to inform the process of developing guidelines, tools and resources for schools and teachers. Examples of such design work include Getzels and Jackson (1962) and Torrance (1963) who set out many of the basic principles of creativity in school education, as well as Cropley and Field (1968) who described creativity not as a level of ability but as a style for *expressing* ability. Other notable examples of guidelines, tools and resources for classroom creativity include Beghetto and Kaufman (2014), Cropley (2001), Davis (1982), Renzulli (2016), Runco (1992), and Sternberg (2003).

Cropley (2018), however, notes that while schools are capable of embedding creativity in the modern curriculum, the actual implementation of this requires two factors. First, the development of creativity necessitates *focus* and *differentiation*: It is not enough simply to attempt to foster creativity in a general and diffuse manner. Second, the development of creativity depends on a *dynamic* approach that accounts for the interaction of key components—the person, the process, and the environment. We explore these requirements later in this chapter.

However, before creativity can be embedded in the twenty-first century curriculum, it must be allowed to fall on fertile ground. This means that before schools and teachers address the question of *how* to teach for and with creativity, it is first necessary to explore what barriers, if any, exist that might derail efforts to transform education in this important area.

## 15.2 General Beliefs About Creativity

One of the enduring frustrations in creativity research is the persistence of myths and misconceptions—that is, unproven or incorrect beliefs, opinions, or attitudes. Plucker (2017), for example, acknowledges that these may act as a shield, blocking individuals from developing a deeper understanding of creativity. While myths and misconceptions are relatively harmless in some contexts, in education these have the potential to frustrate efforts to embed creativity in the twenty-first century curriculum (Patston, Cropley, Marrone, & Kaufman, 2018), to the possible detriment of students and future employers alike.

A driving force behind many of these erroneous beliefs may be a centuries-old positive valence ascribed to creativity (see, e.g., Cropley, 2016; Cropley, Kaufman, White, & Chiera, 2014). This general "benevolence bias" (Cropley & Cropley, in press) makes it difficult for individuals to see creativity as anything other than benign and altruistic, thereby reinforcing mystical and artistic collocations.

The myths and misconceptions of creativity take many forms and may manifest as implicit beliefs (e.g., unconscious associations of creativity with art) or explicit misconceptions (e.g., claims that creativity cannot be taught). Even in research literature, where it might be expected that clear and consistent concepts would be readily available, it seems that many authors default to the pervasive myth that creativity is somehow incapable of being defined. Notwithstanding their constructive comments on the importance of creative intelligence to the future economy, Frey and Osborne (2017) fall victim to this myth, stating, "The psychological processes underlying human creativity are difficult to specify" (p. 262). Similarly, Mishra and Henriksen (2013) begin a discussion of creativity by restating their belief that creativity is poorly defined, while Ihsen and Brandt (1998), in an editorial on creativity in engineering, celebrate the fact that the 13 papers in their special issue present 13 different definitions of creativity!

Cropley (2018) summarises myths and misconceptions in three ways. First is the myth of *ineffability*—creativity cannot be defined. Second is the myth of *ineluctability*—creativity cannot be controlled. Third is the myth of *inscrutability*—creativity cannot be understood. Cropley (2016) offers a more detailed, historical discussion of the origins of these myths.

Another persistent and damaging fallacy in creativity surrounds the question of whether creativity can be taught. Years ago, Acar (1998), for example, argued that no widespread agreement exists on the question of whether creativity can be taught, while Törnkvist (1998) reiterated earlier claims made by Evans (1991) that it is not possible to teach creativity.

While there is substantial evidence of pervasive myths and misconceptions about creativity in the general population, one should ask if these also influence teachers' beliefs about creativity. If teachers hold faulty beliefs about creativity, then it is likely that these will, at best, slow down efforts to embed creativity in the curriculum, and, at worst, block or corrupt these efforts entirely. Benson (2004) stressed the

importance of identifying and addressing misconceptions to facilitate the development of creativity. Conversely, one must avoid generating a new myth—that is, that teachers do not understand creativity. If teachers do hold largely valid and accurate understandings of creativity, then this offers a springboard for embedding creativity in the classroom. It is important, then, to ask if teachers' beliefs support the substantial evidence of pervasive myths and misconceptions about creativity in the general population.

## 15.3 Teacher Beliefs About Creativity

Some of the general myths and misconceptions about creativity might be expected to exert a specific, albeit damaging, effect on creativity in education. For example, the notion that creativity is a special talent or ability frequently associated with *dysfunctional* behaviour (see Kaufman, 2016; Sternberg, 2015), could account, at least in part, for evidence that teachers appear to *dislike* creative students. Westby and Dawson (1995), for example, found a negative correlation between teacher judgements of their favourite students and creativity. Reinforcing the possible detrimental impact of myths and misconceptions, the Westby and Dawson study also found a disparity between teacher concepts of creativity and traditional concepts. In other words, whether teachers actually dislike creative students or disliked what they erroneously thought were creative students, there are issues needing correction in relation to teacher beliefs about the attributes of creativity.

Another myth or misconception with the potential to block efforts to embed creativity in the twenty-first century classroom is the so-called *arts bias* (e.g., Patston, et al., 2018). Creativity is frequently misrepresented as an exclusively artistic ability (e.g., Glăveanu, 2014; Runco, 2007), with two effects in education readily apparent. First, if teachers subscribe to such a belief, it is possible that they are only associating creativity with exceptional levels of human artistic endeavour, consequently reasoning that creativity can only be found in the Picassos and Rembrandts of the world as represented by creative products. This *Big C* characterization of creativity (Kaufman & Beghetto, 2009)—the notion that creativity is associated with *exceptional* individuals—is likely to discourage most teachers from attempting to embed creativity in their curricula on the grounds that it is inaccessible to most students. Linked to this is the implication that because creativity is found only in the arts, it is irrelevant to most subjects—why teach for or with creativity in mathematics, physics, English, geography, and so forth if creativity is not found in any of these domains?

In a recent study of teacher implicit beliefs of creativity, with a large sample (N = 2485) from seven countries, Patston et al. (2018) explored the particular issue of arts bias. Contrary to the expectations in much of the literature and the researchers' own hypotheses, the findings indicated that teachers across different countries, disciplines, and different teaching levels appear to reject an arts bias in creativity. In other words, they appear to understand that creativity *is not* exclusive to the arts.

While this encouraging result suggests that efforts to embed creativity in the school curriculum are unlikely to be hindered by faulty misconceptions, there remain nuances that inform specific efforts to help classroom teachers more toward a more creativity focused paradigm in their classes.

The picture that we have constructed so far is as follows. Creativity may be subject to a range of unhelpful myths and misconceptions in the general population that block efforts to embed creativity in education. However, within the narrower population of teachers, these myths and misconceptions may be less prevalent than supposed.

Drawing on empirical evidence, Patston et al. (2018) have suggested a more differentiated approach to supporting creative teaching and learning in the classroom. This is in line with Cropley's (2018) call for an approach that is both *differentiated* and *dynamic* and is supported by Soh's (2015) *Creativity Fostering Teacher Behaviour Index*. Soh suggests that teacher attitudes and behaviours can have a significant impact upon the development of creativity in the classroom. One piece of the puzzle, however, remains unresolved: developmental levels of creativity. Even with accurate teacher beliefs, with the support of robust instruments that assess products, teachers' efforts to embed creativity in the curriculum, and in their classroom practice, will remain only partially differentiated unless the developmental levels of creativity are defined. Even the richest, most differentiated and dynamic model of creativity will struggle to find widespread application in schools unless it answers the question: what should this child be capable of at any given age/grade/stage? What, for instance, should teachers expect in terms of *idea generation* in mathematics at age 6, compared to *idea generation* in biology at age 17? What will a *preference for complexity* look like in an 8-year old, compared to a 15-year old?

In the next section, we explore the question of developmental models of creativity in education, before proposing suggestions and offering guidance for teachers seeking to embed creativity in their classrooms.

## 15.4 Developmental Models of Creativity

Schools run on scope and sequences in subjects and across grade levels. National curricula incorporate advice of a developmental nature as to what stage or age a student should be at in a particular subject, usually based on the knowledge they have or the skills they can apply (ACARA, 2010). Discipline area teachers utilize material that fits their students while stretching them in some way and leading them on to the next unit of work. Experienced teachers understand what students are capable of and what they are not yet able to do at any point in time in their subject or unit. Over the past 100 years broad consensus has developed across countries about what students at certain ages should be capable of doing in the classroom (e.g. Shaheen, 2010) in terms of emotional and cognitive development. Such information, however, is lacking in terms of skills associated with creativity.

With the introduction of creativity into national-level curricula around the world, national education bodies as well as individual school districts and schools are faced with a practical, implementation problem. If teachers are to teach both for and with creativity (Craft, 2000), what are the developmental stages of creativity they can match to their curriculum, and how will these developmental stages guide the design and implementation of a new curriculum?

Despite over six decades of research in the field of creativity, information is sparse in terms of its developmental trajectory in children and adolescents for complex reasons. The field of creativity is maturing and the focus has become increasingly *facet-based* (Barbot, Lubart, & Besançon, 2016), as in examining ways in which creativity manifests across a range of domains (Baer, 2016). What then are current research trends relative to the developmental trajectory of creativity in children and adolescents?

Developmental studies in creativity have in some ways been hamstrung from the beginning. Consider the seminal Torrance paper (i.e., Torrance, 1968), which proposed that creativity is a non-linear process, with "slumps" at various ages. This view is compounded by confusion as to whether creative development should be categorised as purely related to individual psychological development or to social and cultural development (as per the criticisms of Blamires & Petersen, 2014).

Cropley (2001) has reviewed a number of creativity studies touching on the question of developmental trends. Examining Torrance (1968) and related "slump" studies (e.g., Camp, 1994; Krampen, Freilinger, & Wilmes, 1988; Smith & Carlsson, 1990), he suggested that slumps and surges in children's creativity may be as much due to the effect of how much school a child has completed (i.e., the *environment*) as these are to age-related cognitive changes (e.g. a change from preoperational to operational thought, or from egocentric to socio-centric thinking). This Piagetian view of development contrasts with the view espoused by Vygotsky (2004), who proposes that creativity develops in two ways, firstly as the application of imagination to experience and secondly as the combination of ideas from a variety of elements. Creativity develops as experiences become richer, more diverse and more complex.

Taylor's (1975) framework is an example of what may be classified as an attempt to define *developmental* models of creativity. Taylor's model specifies five developmental levels of creativity: *expressive* creativity, *technical* creativity, *inventive* creativity, *innovative* creativity, and *emergent* creativity. It is certainly the case that Taylor's levels correspond to age-related changes, that is, the degree of higher-order thinking implied by inventive or innovative creativity that will generally preclude children from these levels. However, the actual ages corresponding to each level were not explicitly defined.

Rosenblatt and Winner (1988) offered a more child/school-centric developmental model of creativity. They identify three phases of creativity in children's creative lives, beginning with a *preconventional* phase applicable to children from 6 to 8 years of age. This is followed by a *conventional* phase applicable to children between the bands 6–8 and 10–12 years of age. Finally, the model defines a *postconventional* phase describing children from about age 12 extending to adulthood. This

model offers a more functional mapping of age/grade to the expected creative capacity of children. The three levels broadly correspond to primary/elementary, middle, and high school levels, thereby serving to provide the basis for teacher guidance in terms of what might be expected from children at different grades/ages.

Cohen (1989) focused on the idea that children's concepts of creativity must be linked to adult's concepts of creativity, proposing a continuum of levels and stages that could be mapped against time. This proposal is similar to the Four C model (Kaufman & Beghetto, 2009); this suggested that creativity can be considered in four stages. The *mini-c* level is in line with the developmental views of Vygotsky (2004), the beginning of the learning process, when concepts become not only novel, but also meaningful. The *little-c* level is more about the application of knowledge and skills in a specific domain. *Pro C* is the equivalent of professional expertise in a domain or field of endeavour (such as being a classroom teacher), while *Big C* level is about creativity which alters the perception of a domain or field. Most school education is about working with students at the *mini-c* or *little-c* level (Kaufman & Beghetto, 2009).

Urban (1991) proposed a general model of developmental levels that drew on data from studies involving the Test of Creative Thinking–Drawing Production (TCT–DP). Comprising six stages, this model is based on observations of behaviour in children, demonstrating a developmental progression in terms of the production of novelty. The stages begin with *autonomous scribbling/drawing*, and move through *imitation*, *concluding/completing*, *isolated animation/objectivation*, *producing thematic relations*, and ending with *forming a holistic composition*. Cropley (2001), in summarising elements of developmental models of creativity, linked these to Piaget's stages of cognitive development (e.g., Piaget & Inhelder, 1969). In doing so, Cropley makes the salient point that age-related differences in creativity result from a complex combination of internal (i.e., psychological) and external (i.e., social) factors, and that this complexity may explain some of the difficulty in obtaining a highly concretised, age/grade-specific developmental model of creativity. This can also be explained by the idea that these factors may be highly individual and fluid (Vygotsky, 2004) due to individual social contexts and environments (Sawyer, 2003).

In fact, the elements of the developmental stages of creativity that have been described above have a high degree of coherence, as Table 15.1 shows. In addition, from these stages, it is possible to define not only what the stages are, and how they relate to developmental concepts expressed by both Piaget and Vygotsky but also at roughly what age/grade they occur. It is then possible to suggest specific cognitive behaviours that might be expected at each stage (Table 15.1).

The most recent analysis of developmental aspects in the field of creativity was Barbot et al. (2016), in which they refer to "peaks, slumps and bumps" in their summary of the literature. They propose an "optimal fit" model which supports the idea of a highly individual and somewhat fluid developmental trajectory:

> This "optimal-fit" view translates easily in a developmental perspective: performance outcomes in a given creative outlet will depend upon the specific creative-task characteristics

**Table 15.1** Elements of a developmental psychology of children's creativity

| Zone of proximal development (Vygotsky) (age not fixed) | Cognitive stage (Piaget) | Approximate ages | Stage of creativity (Rosenblatt and Winner) | Concrete expression of creativity | | Typical cognitive behaviours |
|---|---|---|---|---|---|---|
| | | | | Urban | Taylor | |
| Dynamic process of personal construction within socio-cultural context, primarily through play | Preoperational thinking | 2–7 | Preconventional creativity | Autonomous scribbling | Expressive spontaneity | Children operate with isolated concrete fragments of information |
| | | | | Imitation | | If they make linkages among bits of information, these are based purely on spatial or temporal proximity |
| Collaboration between thinking and imagination | Concrete operations | 7–12 | Conventional creativity | Completing | Technical creativity | Children begin to form systematic concepts of the world, but these are based on concrete properties of stimuli |
| | | | | Isolated objectivation | Inventive creativity | Concepts become increasingly complex, but are still isolated from each other |
| | | | | | | Concepts do not go beyond what already exists |
| Collaboration between thinking and imagination develops as skills and knowledge increase | Formal operations | 12+ | Postconventional creativity | Producing thematic relations | Innovative creativity | Fragments of information are linked to form *thematic* structures reflecting children's subjective understandings, not just the concrete physical properties of experience |
| | | | | | | Children add additional material of their own to flesh out fragments |
| | | | | | | Concepts are linked together to form more complex and *abstract* structures |
| | | | | | | Concepts may go beyond what already exists (creativity) |

> and the asynchronous development of person-level characteristics … leading to outcomes of variable creativity over time. (p. 40)

This model could be of interest to teachers because it is in alignment with current educational theories and practice which emphasise differentiated teaching and learning (Landrum & McDuffie, 2010). It acknowledges that creativity is task specific, meaning that creativity can be applied within specific subject contexts, it requires a developing level of both attitudes and skills, and it changes over time. In other words, creativity develops along a highly individualised pathway. The model also implies that teachers can influence student's creativity attitudes and skills, which can be taught.

In a recent iteration of the Australian National Curriculum (ACARA, 2010), the *Critical and Creative Thinking Capabilities* are articulated in a scope-and-sequence learning continuum. This consists of four elements: ***inquiring*** by identifying, exploring, and organising information and ideas; ***generating*** ideas, possibilities and actions; ***reflecting*** on thinking and processes; ***analysing***, synthesising and evaluating reasoning and procedures. Unfortunately, the origins of and evidence for this sequence do not appear in the national curriculum.

It is rather obvious that clearer guidelines and better measures for accurately assessing the developmental trajectory of creativity must be found. These guidelines and measures must take into consideration the teaching and learning environment, students' individual characteristics in terms of attitudes and behaviours, and the acquisition of explicit skills in creativity (e.g., such as problem solving, critical thinking, and divergent thinking, as applied in individual subject contexts). Such guidelines and measures should also acknowledge that the assessment of progress is not only about achievement in standardised international test scores (Amrein & Berliner, 2005), but also about developing skills for life (Shaheen, 2010). The following sections offer a new framework of creative education currently being implemented in an Australian school and examples of how creativity can be successfully implemented into the classroom at all levels of schooling.

## 15.5 Models of Creativity in the Classroom: Tailored Pedagogy

Teachers should be experts in their subjects and in pedagogy, not experts in everything. When a field such as creativity is introduced into the world of education, it is essential that teachers see both the need for and the relevance of any changes to their practice. Importantly, they should be given resource materials and the necessary professional development to help them implement this alternative education paradigm (Longshaw, 2009). Sternberg (2015), however, has observed that "There are hundreds of books and thousands of articles on how to teach children to think creatively. If one walks into a classroom, however, one is not likely to see a lot of teaching for creative thinking" (p. 115). In order for creativity to be successfully implemented, relevant and strategic professional development of teachers is needed.

Given the high level of misconception about creativity and dysfunctional implicit beliefs about creativity, in addition to the sparseness of research into developmental aspects, such questions arise as what kind of information and professional development would be best for teachers and where might they start.

Wallas' (1926) model of problem solving is an example of a cognitive framework of creativity, as is the Creative Problem Solving (CPS) model developed by Osborn (1952). Both models have four stages that involve applying cognitive skills for solving a problem. The first commonly cited model of product based creativity is the Four Ps, initially developed by Rhodes (1961). This model focuses on the components leading to a creative product; while acknowledging that the environment (known as "Press" in this model) has an influence upon creativity, the primary aim is the production of a product. In teaching, the equivalent would be that learning is only useful if it can be formally assessed with a standardised test and given a score.

Creative education should be, like creativity itself, context specific. Various frameworks and models have been proposed in a variety of domains, such as the Four C model (Kaufman & Beghetto, 2009). However, most lack "ecological validity" in that their results can be difficult to apply in real-life settings, such as a classroom (Gruszka & Tang, 2017).

Frameworks in education are rarer still. The idea of creativity being a separate "subject" (Likar, Cankar, & Zupan, 2015) fails to take into account the domain-specific nature of creativity (Baer, 2016). Similarly, using language that is received as jargon to teachers (Lin, 2011; Tsai, 2015) is unlikely to result in pedagogic change. Teachers essentially want to know three things in order to make changes to, or developments in, their practice, such as creativity: Where does it (creativity) fit into the curriculum? Does it affect my personal pedagogic style? How can it be assessed? (Craft, 2003; Shaheen, 2010).

To address these key questions, the *Results, Investigation, Student, and Environment* (RISE) Approach to Creative Education (Patston, 2017) was developed. The RISE Approach is based on well-established research and theory, both newly applied to the school environment and to Australian standards and practices. The RISE Framework is currently being trialled in a K-12 school in Australia and is undergoing a validation study conducted in collaboration with the University of Connecticut, University of South Australia and University of Melbourne.

As its name implies, the RISE framework has four interconnected elements: results, investigation, student, and environment. The model's components are such that teachers are supported to teach for and with creativity (Jeffrey & Craft, 2004), applying each element of the model to their specific subject context. To elaborate on the RISE elements (Fig. 15.1), a sub-section devoted to each one follows.

### *15.5.1 Results*

Results are the eventual products or outcomes that are desired. In terms of the classroom, results can take the shape of student learning and activities, teacher lesson plans and work, and other types of classroom experiences. Important

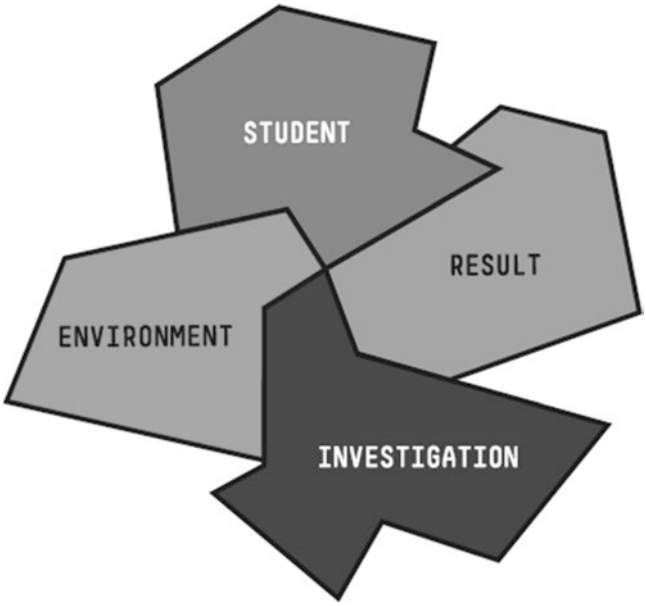


**Fig. 15.1** The RISE framework of creative education (Patston, 2017)

concepts include how creative work is evaluated, how creativity is included in rubrics or larger assessments, how peer-to-peer interaction is used to improve results, and how teachers are utilized to judge student creativity, as those most qualified to do so. This aligns with current theories of formative assessment (Andersson & Palm, 2017).

### *15.5.2 Investigation*

Investigation is the way that people create. People may investigate in many different ways, with individual preferences, styles, or strengths. Creative thinking skills (such as idea generation, evaluation, and iteration) are a vital part of the investigation process (Kaufman, 2016). This can happen alone but there are many benefits to creating with peers in small groups (Allsopp, 1997). Teachers play a strong role in nurturing the creative process of students. Important concepts include different stages of the investigation process, the importance of teachers in nurturing student investigation, and the construction of student groups with the best mix of diversity.

### *15.5.3 Student*

Students are those who benefit from a learning environment; and teachers are learners too! Each student has particular strengths that can be used to enhance the learning experience. Key concepts include personality (such as openness to experience and conscientiousness), intellectual strengths (such as problem solving, memory, and knowledge retention), motivation, risk taking, resilience, and past experience (Sternberg & Lubart, 1993).

### *15.5.4 Environment*

Environments (e.g., school, family, social, and classroom) represent different systems that may influence creativity. Each environment can be influenced by many different variables, from school administration to available resources and technology and the classroom atmosphere teachers and students generate and simple ideas such as seating plans. Important concepts include creating and maintaining a supportive environment, nurturing creativity within prevailing constraints, and ensuring to the extent possible that all students feel safe enough to be creative (Beghetto & Kaufman, 2014).

## 15.6 Applications of Creative Education Across Subjects

Patston's (2017) RISE Framework of Creative Education is currently in use in a four-campus school in Australia, from Kindergarten to Year 12 classes. All teachers (n = 215) participated in a blended learning program (Means, Toyama, Murphy, & Baki, 2013), combining online instruction and small group meetings to introduce them to the theory and practice of creative education and concepts and evidence behind the RISE model. Then they developed lessons or units of work that included elements of RISE, and were invited to initially make relatively small changes to their pedagogy while adhering to the Australian Curriculum guidelines (ACARA, 2010). The following five examples across subjects and grades are currently in use at the school.

### *15.6.1 Example 1: Environment: Grade 5*

At the start of the school year, all furniture and removable fittings were taken out of the room. In the empty space, students were asked to design their ideal learning environment. They discussed ideas and presented them in a format of their choosing, working as a team. The final layout is what they designed. When speaking to their teachers, students expressed interesting observations, such as surprise over

how much they knew about the kind of learning environment and spaces in which they could best learn. The discussions were rich, students collaborated in a selfless manner, and opinions were respected. They came up with many creative and useful ideas not thought of by the teachers. It became clear that these learners understood the role of different learning spaces (e.g., individual, small group, different seating plans) being utilised throughout the day, and the need to change their behaviour accordingly and seamlessly.

### *15.6.2 Example 2: Student: Year 10 Maths*

A study conducted at the University of Melbourne (Young, 2016) found that students can struggle to find value in mathematics as a subject, beyond doing homework and exams. One of the reasons for this difficulty is that math can be seen to be prescriptive, rather than creative. At the end of a lesson Year 10 students were offered a problem they did not know how to solve. Their homework was to try to do as much as they could and bring their work efforts to class the next day. In the following lesson, students were randomly assigned to a group of four or five to compare notes and see if they could develop the process toward a solution. Each group presented their work and then the class came to a consensus on the process and the solution if they could.

Teachers observed the following: Even the least able student was able to make some progress with the homework. Randomly assigning groups was more effective than choosing groups based upon ability. Also, the small group peer-to-peer teaching worked well, supporting evidence from the literature (Allsopp, 1997). Initially, the teacher struggled with not directing the lesson, but was pleasantly surprised at how well the students did without their direct instruction. They also witnessed their students' motivation increasing when solving problems together.

### *15.6.3 Example 3: Investigation: Year 8 Science*

There has been a movement toward STEM education in the twenty-first century. Part of the value of STEM, and project-based learning, is that students learn the value of iteration, which is a component of creativity focusing on repetition in the face of failure. While many STEM projects rely on the use of digital technology, it is possible to obtain the same understanding of processes and concepts using analogue tools, as in a Rube Goldberg machine. Rube Goldberg was an American cartoonist, best known for his series of comics depicting complicated, deliberately over-engineered contraptions that perform a very simple task (Kim & Park, 2012). One step triggers the next in a chain reaction until the final task is complete. In this project the students had to use a variety of machines, such as levers, pulleys, and inclines in order to achieve a task—the ringing of a bell. The students were not

given any digital or electronic devices, just everyday items such as string, toilet rolls, and disposable plastic coffee cups.

The teachers' observations were as follows. Their students embraced the patience and problem solving skills required to develop their solutions to the problem. Those students with little patience for doing book exercises were more than happy to have 10, 20, or even 50 failures before coming to their final solution. Teachers made similar positive observations to those reported in example 1, including higher levels of student engagement and motivation. Students came up with many creative and useful ideas and so forth, and they could perceive the value of understanding the theories of physics and mathematics underpinning their projects.

### *15.6.4 Example 4: Results: Year 10 Texts and Traditions (Religious Studies)*

With subjects that are perceived as hard or boring by students, it can be tempting to infantilise one's teaching using animations, simple videos, and more rather than challenging the development of their critical thinking skills. The same can be said of assessment, that hard subjects require hard assessments. The model of assessment used in this subject combines the creative with the traditional. In Texts and Traditions the students were given their end of semester exam to look at in the 1st week of classes. They were asked to discuss the types of questions asked and the knowledge they would need to build over the semester. Then they discussed what type of note-taking they might like to use; they played with some different forms ranging from handwriting to using a computer, photos, or recordings. As with the previous examples, students were given agency extending to choices over a part of their learning process. Student agency is a form of self-determination, which is a key to developing creative skills (Ryan & Deci, 2000). Regarding assignments, they were invited to choose a format, understanding that the key was to demonstrate understanding. They also self-assessed and peer assessed their work in class before final marks were decided.

Throughout the semester the exam paper was shown every 4 weeks and the students were asked to consider how their understandings were developing. If they had misunderstood a concept, then this misunderstanding was identified well before the final exam. The teacher observed that after the initial shock of being given an exam well in advance (6 months) and being shown the questions on it, students expressed gratitude that they could determine their learning strategies over time. They valued having the freedom to take notes in a format of their choice and to experiment with note-taking techniques. The small group peer-to-peer teaching and sharing of note taking, memorisation, and study techniques had worked well. Students were able to conduct both self and peer assessment, and reported that this had given them a deeper sense of immersion in the subject. In addition teachers reported that the students had developed a deeper understanding as to why certain concepts were important and how themes could be connected in the final exam.

These examples show that teachers can teach with creativity and for creativity in their classes, while still meeting curriculum requirements. Teachers were reporting that they felt more engaged with their teaching as they had more choices in their classes through designing new activities through the lens of creativity, but still linked to their curriculum, once again supporting the idea of self-determination and creativity (Ryan & Deci, 2000), and that students felt more motivated and engaged in their learning, attributed to having been given more freedom and choice.

### *15.6.5 Example 5 Student: Year 9 English*

A key element in the RISE framework is the Creative Student. Students' attitudes and beliefs matter, in that those who believe that they are not creative are less likely to be creative (Tierney & Farmer, 2011). The goal of this trial was to find a way for the more reticent and introverted students in English classes to participate in discussion and engage more actively with the content in small group work, thus enhancing their creative self-belief.

In considering this, the assumption that students who speak the most write the best (essays) had been challenged. In this setting, the teacher faced the following predicament: Some students needed to talk aloud their ideas in order to process information before they wrote. Other students listened to their peers talk and did not contribute their own ideas yet still wrote well. Another type of learner was those who found it easy to contribute ideas but challenging to put the ideas down on paper.

The teacher focused on three learners, demonstrating that the RISE framework can be highly context specific. These were two boys (J and K) who rarely spoke and whose essays were of a poor quality; one boy (L) who spoke frequently and added much value to the classroom conversations but whose essay was of a very poor quality, and a girl (M) who never spoke and whose essay was of a good quality.

In sum, for all students in this trial the effect of building a closer personal relationship led to a significant improvement of writing skill—specifically the ability to construct clear arguments and articulate reasons soundly. In the case of J & K, this ability to construct arguments more effectively led to increased participation in class discussions, and relative to C he more confidently put forward his thoughts and significantly improved his writing. M (the girl) was an interesting case. She did not increase her participation but based on her grades prior to the trial her engagement with the subject increased significantly. In terms of the RISE Framework, impacting the Creative Student had an impact upon the Creative Result.

## 15.7 Measuring Teacher Behaviours

A challenge which teachers face in their efforts to foster creativity in the classroom is the impact their behaviours may have on student learning. Even in an environment in which implicit beliefs (e.g., unconscious biases) have been addressed, there

remains the question of how teachers' explicit classroom behaviours impact on the development of their students' creativity. It has been known for decades (Milgram & Feldman, 1979) that some teachers are more effective in developing students' creativity than others. Cropley (1982) noted that those creativity-fostering (and inspiring) teachers act in particular ways. They provide a model of creative behaviour, reinforce creative behaviours, protect creative students from unwarranted criticism, and establish a supportive classroom atmosphere.

To help teachers understand the impact of their behaviour on the development of creativity in classrooms, Soh (2000) used a set of nine key creativity-promoting behaviours of teachers that Cropley (1997) had developed to define a practical, self-assessment scale. The *Creativity Fostering Teacher Behaviour Index* (CFTIndex) is a set of 45 items, organised around the nine principles defined by Cropley, and addresses actual *behaviour* in teacher-student transactions. In this way, the index gives teachers specific insights into how they may be fostering or inhibiting the creativity of their students. The index also serves as a diagnostic tool in support of teacher training and development for creativity, with Soh (2015) also reporting the use of the CFTIndex as an observational instrument.

Soh's (2015, 2018) more recent research documents the psychometric properties of the CFTIndex across a number of different studies. The results generally support the proposed factor structure and scale reliabilities reached satisfactory levels. Table 15.2 shows the original CFTIndex items (Soh, 2000) with suggestions for modified text relative to two questions aimed at improving reliability.

## 15.8 Conclusion

The current push for greater creativity in schools, evident across developed countries, is a necessary response to the challenges of rapid environmental, economic, and social change. The problems that arise from change require a future workforce equipped with the skills and abilities—broadly speaking, a capacity for creativity and innovation—that will enable individuals as well as societies to prosper. However, this reorientation of school education towards greater creativity in classroom must be informed by an understanding of current beliefs and biases that have the potential to impede, if not block, efforts to embed creativity as a core component of twenty-first century curriculum. Teaching for and with creativity must not be hindered by faulty definitions of creativity, or by an assumption that creativity is found only in the arts.

This chapter has explored general myths and misconceptions of creativity, asking to what extent these are evident among teachers. We present a mixed picture, suggesting that there are some pre-existing beliefs that should be corrected in order to smooth the way for greater creativity in schools. Addressing and correcting myths and misconceptions makes it possible to develop a more differentiated and dynamic approach to teacher training and development in creativity. For example, if there are differences in how mathematics teachers and music teachers understand creativity,

**Table 15.2** Creativity Fostering Teacher Behaviour Index (Soh, 2000)

| Subscale | Item | Item content |
|---|---|---|
| 1. Independence | 1 | I encourage students to show me what they have learned on their own |
| | 10 | I teacher my students the basics and leave them to find out more for themselves |
| | 19 | I leave questions for my students to find out for themselves |
| | 28 | I teach students the basics and leave room for individual learning |
| | 37 | I leave open-ended questions for my students to find the answers for themselves |
| 2. Integration | 2 | In my class, students have opportunities to share ideas and views |
| | 11 | Students in my class have opportunities to do group work regularly |
| | 20 | Students in my class are encouraged to contribute to the lesson with their ideas and suggestions |
| | 29 | I encourage students to ask questions and make suggestions in my class |
| | 38 | Students in my class are expected to work in group cooperatively |
| 3. Motivation | 3 | Learning the basic knowledge/skills well is emphasized in my class |
| | 12 | I emphasize the importance of mastering the essential knowledge and skills |
| | 21 | My students know that I expect them to learn the basic knowledge and skills well |
| | 30 | Moving from one topic to the next quickly is *not* my main concern in class |
| | 39 | Covering the syllabus is *not* more important to me than making sure the students learn the basics well |
| 4. Judgement | 4 | When my students have some ideas, I get them to explore further before I take a stand |
| | 13 | When my students suggest something, I follow it up with questions to make them think further |
| | 22 | I do not give my view immediately on students' ideas, whether I agree or disagree with them |
| | 31 | I comment on student's ideas only after they have been more thoroughly explored |
| | 40 | I encourage students to do things differently although doing this takes up more time |
| 5. Flexibility | 5 | In my class, I probe students' idea to encourage thinking |
| | 14 | I encourage my students to ask questions freely even if they appear irrelevant |
| | 23 | I encourage my students to think in different directions even if some of the ideas may not work |
| | 32 | I like my students to take time to think in different ways |
| | 41 | I allow my students to deviate from what they are told to do |
| 6. Evaluation | 6 | I expect my students to check their own work instead of waiting for me to correct them |
| | 15 | I provide opportunities for my students to share their strong and weak points with the class, |

(continued)

**Table 15.2** (continued)

| Subscale | Item | Item content |
|---|---|---|
| | | I provide opportunities for my students to assess their own strong and weak points and act accordingly before submitting their work[a] |
| | 24 | My students know that I expect them to check their own work before I do |
| | 33 | In my class, students have opportunities to judge for themselves whether they are right or wrong |
| | 42 | I allow my students to show one another their own work before submission, |
| | | I encourage my students to define for themselves what they are trying to achieve in assignments[a] |
| 7. Question | 7 | I follow up on my students' suggestions so that they know I take them seriously |
| | 16 | When my students have questions to ask, I listen to them carefully |
| | 25 | My students know I do not dismiss their suggestions lightly |
| | 34 | I listen to my students' suggestions even if they are not practical or useful |
| | 43 | I listen patiently when my students ask questions that may sound silly |
| 8. Opportunities | 8 | I encourage my students to try out what they have learned from me in different situations |
| | 17 | When my students put what they have learned into different uses, I appreciate them |
| | 26 | My students are encouraged to do different things with what they have learned in class |
| | 35 | I don't mind my students trying out their own ideas and deviating from what I have shown them |
| | 44 | Students are allowed to go beyond what I teach them within my subject |
| 9. Frustration | 9 | My students who are frustrated can come to me for emotional support |
| | 18 | I help students who experience failure to cope with it so that they regain their confidence |
| | 27 | I help my students to draw lessons from their failure |
| | 36 | I encourage students who have frustration to take it as part of the learning process |
| | 45 | I encourage students who experience failure to find other possible solutions |

[a]Suggested replacement text aimed at improving scale reliability

then differentiated training and development will acknowledge these differences, and train these groups accordingly. Similarly, a dynamic approach to creativity will ensure that the impact of elements such as individual motivation, cognitive processes, and the environment inform and guide teacher creativity training and development.

With this *differentiated and dynamic* philosophy in mind, we discussed an underdeveloped aspect of creativity research that forms an important basis for teachers seeking to teach for and with creativity. Developmental models of creativity are necessary to help teachers move from a vague and unfocused approach to the differentiated and dynamic model of creativity in the classroom that we advocate.

Drawing on developmental concepts of creativity in children, we have offered more concrete suggestions for the implementation of classroom creativity extending to teacher training and development in this area.

Finally, we have discussed tools that support the implementation of creativity in the classroom. In particular, we looked at the RISE Framework of Creative Education, designed to assist teachers teach both with and for creativity, and the *Creativity Fostering Teacher Behaviour Index* (CFTIndex) as a self-evaluation tool that targets actual behaviour in teacher-student interactions with respect to creativity.

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