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Chapter 3

Creative learning and learning creativity: Scrutinising the nature of creativity and developing strategies to foster creativity in education.

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Introduction

Creativity is often viewed as a gift rather than a learned skill. From this perspective, individuals who are creative are seen to have the creative 'spark' in particular abilities, often focusing on the so-called 'creative arts' such as literature, painting or sculpture. Therefore, the role of education and the educator in such a process is limited or even seen as a threat to creativity due to the conventions of education which may stifle individuals from developing their creativity (Craft, 2001).

The overall aims of this chapter are to challenge these common views on the nature of creativity and to make a case for the role of education in enhancing an individual's creative potential. The first section explores some foundational models of creativity such as the four-stage theory (Wallas, 1926) and the primary-secondary thinking process theory (Kris, 1952) in order to shape the basic understanding of the nature of creativity. The second section discusses two underlying factors, defocused attention and emotions, which may have a significant influence on creative thinking. The final section articulates the challenges in fostering creativity and provides several strategies aimed at fostering creativity in educational contexts.

The nature of creativity

There are many definitions of creativity but one of the most widely cited comes from Sternberg and Lubart (1999) who define creativity as'the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)' (Sternberg and Lubart, 1999:3). In line with this definition, Mayer (1999) suggest there are two key characteristics of creativity: 'Originality' and 'Usefulness'. Here, 'Originality*'* refers to the concept of novelty or novel features of creative products, and 'Usefulness*'* to the concept of utility, appropriateness, significance or the degree to which the features of creative products is valued by society. The 'Originality' dimension of creativity tends to be how the general

public would recognise something as creative; however, the 'Usefulness' dimension, is sometimes neglected when creativity is discussed.

Creativity is also often considered as a property of thinking processes. Torrance (1966:6) defined creativity as:

> ...a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results.

In this respect, Torrance (1996) suggests that creative thinking involves multiple cognitive thinking processes primarily distinguished into two states. One state involves the processes of generating ideas; identifying unusual and innovative approaches to problems and ordinary situations. Some would see this state as being similar to divergent thinking, a concept which also describes a process of generating potentially creative thoughts (Runco and Chand, 1995), but as we will see later this view is contested by others. The other state in Torrance's definition involves a critical evaluation of these new and unusual ideas or perspectives, estimations of their acceptability and further considerations for creative outcomes. We will encounter this dual-state definition of creative thinking in the next section where certain models see creativity as alternating between these states in order to produce something both original and useful.

Reflections: What is divergent thinking and what are the similarities and the differences between divergent thinking and creative thinking?

Different researchers have proposed their own models of creative thinking, often with similar viewpoints but using different terminologies for the thinking states which are described as sub-processes of creative thinking. To get a better understanding of the nature of creativity, four such models which are important to education, namely the four-stage theory by Wallas (1926),

the Primary-secondary Process by Kris (1952), the Three-component model of creativity by Amabile (1983, 2013) and, considering the scope of creativity, Gardner's (1993) Little C and Big C Theory, are all explored in this next section.

Four-stage theory of creativity

In his Four-stage theory of creativity, Wallas (1926) attempted to understand creativity from the perspective of creative problem solving. He suggested that creativity could be broken down into four sequential creative thinking processes in search of a solution to a problem, including Preparation, Incubation, Illumination and Verification.

In the Preparation stage, the problem is analysed with attempts to provide possible solutions. It involves a preliminary analysis of the problem, including defining and setting up the problem, and obtaining sufficient raw materials for creative idea generation (Lubart, 2001). In this stage, individuals work to obtain problem-relevant knowledge, consciously develop familiarity with the existing elements, and then analyse them seeking new creative combinations. This means that there is a time requirement for the Preparation stage; sufficient time is needed to learn the necessary domain-related knowledge before an individual can be creative. The greater the diversity of domain-related knowledge an individual accumulates in this time, the greater are the opportunities in terms of broader associations for creative idea generation (Martindale, 1995).

After Preparation is complete if a solution has not presented itself and an impasse is reached then the next stage, Incubation, is triggered (Finke, *et al.*, 1992). In the Incubation stage, the creative individuals usually set the problem aside to work on other tasks, so the problem solving processes occur below the conscious level (Wallas, 1926). Therefore, attention is not focused on the problem. Often, creative individuals take time off from their focused work when impasses are encountered to simply relax, take a break, and engage in an unrelated activity. Unconsciously, however, the mind continues to work on the problem, forming train-of-thought associations which generate further creative solutions or ideas (Lubart, 2001). This indicates that defocused (broadened or diffused) attention benefits further creative performance as it

provides the opportunity for new associations to appear in our thinking processes (Finke, *et al*., 1992; Kounios *et al*., 2008).

The final two stages, Illumination and Verification are closely linked. In the Illumination stage, creative individuals usually find the solution to the problem as a sudden insight (Wallas, 1926). Therefore, it is also referred to as a period of 'insight', in which creative ideas jump up to the surface of consciousness from existing elements incubated with a preceding and intuitive feeling that an idea is coming (Sawyer, 2006). After insights emerge into consciousness, the stage of Verification is triggered where the creative individual seeks to make sure that a given solution works (Wallas, 1926). After evaluating the appropriateness of the insights they are then refined and developed into a complete creative product or idea.

The four-stage theory offers two important insights into the nature of creativity. Firstly, it highlights the critical importance of domain relevant knowledge as a foundation for creativity. This shows a clear role for education in promoting creativity through providing that foundation and challenges the validity of the popular image of education as something that stifles creativity. Secondly, by proposing the incubation and illumination stages, the four-stage model suggests a role for subconscious processes in the production of creative ideas and solutions. In that, 'defocused attention' is an important cognitive process which provides opportunities to develop related teaching and learning pedagogies that would facilitate the generation of original ideas. The concept of defocused attention is elaborated in a later section of this chapter.

Primary-secondary process

Wallas's (1929) four-stage model was highly influential on the theories that followed it while adding their own unique spin. One of the better known theories is the Primary-Secondary process model by Kris (1952). In essence, Kris has taken the four stages and divided them into two cyclical stages labelled 'Primary Process' and 'Secondary Process'. Kris defined primary process thinking as free-associative, analogical, uninhibited, abstract and less conscious. This is very much in line with the specification for incubation and illumination stages, new combinations of mental elements or ideas are freely associated in an uninhibited and often less

conscious manner. There is a tendency to fantasize during this process, which is believed to facilitate the discovery of creative ideas (Fromm, 1978). By contrast, the secondary process is defined as thinking which is logical, associated with concrete images and knowledge, reality-oriented thought occurring in fully 'waking consciousness'. This is very much in line with the verification stage in that cognitive elements of ideas are analysed logically and reoriented with goals. This model is also similar to what Torrance (1996) defined as 'dual-state' creative thinking processes that involve creative individuals generating original ideas and critically evaluating their ideas or perspectives for creative outcomes.

An important distinction that the Primary-Secondary process model makes is to present creativity as a more cyclical process overall than the Four-stage model did. The process described in the Four-stage model is more liner, from new ideas being generated to the productions of a creative output at the end. By contrast, Kris (1952) suggested that we alternate back and forth between primary and secondary processes many times before a solution is reached. Creative individuals possess a better ability to alternate more flexibly between primary and secondary process than uncreative individuals.

Following on from Wallas and Kris, research on the concept of creativity continued to explore and expand our understanding of the nature of creativity during the 1960s, 70s and 80s, as psychology entered a period known as the 'Cognitive Revolution' (Gardner, 1985), and the computational model emerged as the dominant paradigm (See chapter 05 for a critical evaluation of the computational model). During this period of time, Rhodes (1961) proposed the '4 P's of creativity', four strands which have influence on creativity , namely Person, Process, Press and Product. The 4 P's model and others are influential in creativity research because they see creativity as one of the cognitive processes such as memory, motivation or attention which are all intertwined and having influences on each other (Torrance, 1966)

Three-component model of creativity

Another example of a creativity model which was influenced by the cognitive research of the time is Amabile's (1983, 2013) Three-component Model of creativity. Amabile proposed three key elements of creativity: *domain-relevant skills, creativity-relevant processes* and *intrinsic*

task motivation. This model suggests that creativity, rather than a single ability, is a collection of skills and knowledge possessed by creative individuals. She characterises domain-relevant skills as knowledge, expertise, technical skills, intelligence, and talent in the particular domain where the problem-solver is working. Creativity-relevant processes refer to interactions between cognitive processes and creative individuals' characteristics. The cognitive processes include the ability to use a wide range of flexible categories for synthesizing information and to break out of perceptual and performance scripts. The characteristics include self-discipline, risk-taking and projecting a tolerance for ambiguity during creative processes. Finally, intrinsic task motivation is characterised as the passion and intrinsic motivation to undertake a task or solve a problem because it is interesting, enjoyable, personally challenging and satisfying, rather than being externally motivated by rewards, surveillance, competition, or evaluation (Amabile, 1983, 2013).

Amabile's model provides a detailed analysis on the interconnections of these three essential components of creativity within creative individuals and their interactions with external tasks and environments. The three-component model could be seen as an update of Wallas' (1926) four-stage theory for the cognitive era, incorporating many of the key cognitive concepts and research of the time. It has continued to develop and remained highly influential in educational contexts right up the current day. It is used as the basis for a number of educational practices aimed at fostering creativity among students.

Little C and Big C

The research on the scope of creativity emerging in the 1990's and early 2000's considered the different levels of impact that a creative output had on individuals and society. Gardner (1993) explores this phenomenon in his notion of Little C and Big C theory. Big C refers to the impact of one's creative output being recognised by a wider society as an eminent contribution which has made a fundamentally and historically novel contribution in a particular field. By contrast, Little C refers to creativity at the personal level, regardless of whether many others have produced similar ideas or innovations; something any individual might produce on a regular basis in the process of solving problems and adapting to changes in daily life (Runco, 2004).

Gardner's (1993) Little C and Big C theory provides two insights on creativity in relation to education. Firstly, it shows that the characteristics of creativity: originality and usefulness/appropriateness (Sternberg and Lubart, 1999; Mayer, 1999) are contextual. That is, an output or idea might be original or significant in one area but not the other (e.g. local versus global). In this way, something can be known to others but newly 'discovered' by one individual and still qualify as an example of creativity on his or her own part. Secondly, the Little C concept challenges educators to consider how variable the processes of evaluating originality in students' work and learning progress can be. Each educator may have their own 'thresholds' in mind when it comes to making judgement on the originality of students' work (e.g. I may consider that an idea in an essay is not original if it's also in the textbook, but you may disagree). Educators need to be consciously aware of these thresholds as they could affect how students are evaluated and whether their creativity is encouraged under such practice.

In summary, this section shows that creativity can be seen as the product of processes that produce the features 'originality' and 'appropriateness' which characterize creative thought. It has also been demonstrated that creative thinking is more complex than merely thinking divergently and creating new ideas. In the next section it will be shown that these complex creative thinking processes are interconnected with other factors which influence creativity both positively and negatively.

Underlying factors that influence creativity

Creativity should not only be considered in isolation from other dimensions of human abilities and experiences (Sternberg, 2010). Previous reviews on the nature of creative thinking have identified two significant underlying factors which have direct impact on the creative processes: defocused (broadened) attention and emotions.

Defocused (broadened) attention

Attentional breadth is defined by Kasof as 'the number and range of stimuli attended to at any one time' (Kasof, 1997:303). The links between attentional breadth and creativity have been

explored in a number of studies (e.g., Fredrickson and Branigan, 2005; Friedman *et al*., 2003; Kasof, 1997; Kounios *et al*., 2008). In the context of creativity, attentional breadth determines the number of mental elements or cognitive units to be triggered for idea generation. A defocused (broadened) attentional breadth, which allows more of these mental elements to come to mind, is thought to be beneficial to creative thinking (Kasof, 1997). Mendelsohn stated that 'The greater the attentional capacity, the more likely the combinational leap which is generally described as the hallmark of creativity' (Mendelsohn, 1976:366).

Attentional breadth determines the range of stimuli to be attended to and thereby has an effect on the degree to which extraneous or less relevant stimuli or information will be filtered from awareness (Kasof, 1997). If breadth of attention is consistently narrowed (or focused) on a relatively small range of stimuli or information, individuals tend to filter greater amounts of less relevant information away from their consciousness. In contrast, if breadth of attention is broadened (or defocused) on a large range of stimuli or information, less relevant information has a greater chance of gaining our attention. In other words, a defocused or broadened breadth of attention enlarges the possibility for remotely associated ideas, information or cognitive units to enter into consciousness, resulting in facilitating creative performance (Mendelsohn, 1976; Runco and Sakamoto, 1999). In this line of thought, defocused (broadened) attention would be more of an asset during the incubation stage (Wallas, 1926) or primary process (Kris, 1952), where ideas are generated and a greater attentional capacity is required. Whereas, focused (narrowed) attentional breadth would be of more use in the evaluation stage or secondary process where ideas are to be evaluated and an attention to detail is required.

Friedman and Förster (2005, 2010) further developed the concept of attentional breadth by distinguishing between perceptual and conceptual attention and attributing a ‘breadth of attention’ to both facets. Breadth of perceptual attention refers to 'the degree to which attention is trained on central as opposed to peripheral perceptual cues', while breadth of conceptual attention refers to 'the degree to which attention is trained on internal cognitive representations as opposed to external percepts' (Friedman and Förster, 2005:263). Friedman and Forster believed that the two kinds of attentional breadth were positively associated with each other. Narrowed or broadened breadth of perceptual attention may correspondingly expand or constrict breadth of conceptual attention which in turn may influence creative generation

(Friedman et al., 2003). It is interesting to note that according to the study of Friedman and his colleagues (2003), physically directing visual attention to a wider or a narrower visual area could broaden or narrow breadth of perceptual attention (For more details, see Discussion to wider research 1). This shift in visual attentional breadth could subsequently engender a corresponding shift in internal breadth of conceptual attention, increasing or undermining creative generation correspondingly. This phenomenon could have implications for developing creative teaching strategies which are discussed in the final part of this chapter.

In summation, the above discussion suggests that creative individuals utilize a form of defocused or broadened attentional breadth at certain stages of the creative process to achieve a wider cognitive remote association for creative ideas generation. In addition, they suggest that achieving defocused attention in one area (visual attention) may be linked to achieving defocused attention in other areas (conceptual attention). Interestingly, in the next section emotion is shown to be another factor which influences this defocused (broadened) attention-creativity link.

Research focus: Can breadth of perception affect breadth of conceptual attention?

In order to explore the relationship between breadth of perceptual attention and breadth of conceptual attention, Friedman *et al*. (2003) first examined whether manipulating an individual's breadth of perceptual attention would have an influence on the breadth of their conceptual attention. Participants' breadth of perceptual attention was manipulated by a visual searching task which had participants search for a specific digit (e.g. '3') in either a broader or narrower size of digital display. A second method of altering perceptual attention was also used involving facial muscles. To broaden the breadth of perceptual attention, participants were asked to contract their frontalis facial muscle by raising their eyebrows associatively. To narrow attentional breadth, they were asked to contract their corrugators muscle by furrowing their eyebrows. Measuring creativity involved participants generating alternative uses or titles for several objects, with the originality of their suggestions being rated by several independent scorers. Results of these experiments yielded consistent

evidence that a broadened or narrowed breadth of perceptual attention was positively related with a broad or a narrow breadth of conceptual attention respectively, suggesting a corresponding enhancement or impairment of creativity.

Emotions

Emotions are thought by some to serve as a gate which unconsciously widens or narrows attentional breadth and thereby affects which stimuli or information are brought to mind during the creative process. This means that emotional stimuli such as targets, rewards, competition, a relaxing environment or anything else which might trigger an individual's emotions would influence subsequent creative cognition (Howard-Jones, 2002). The means by which external emotional stimuli may influence creative thinking can be explained via the breadth of attention theories previously mentioned. For example, more relaxed emotional states are associated with broader attentional breadth benefiting idea generation. By contrast, reduced relaxation (i.e. stress) induced by extrinsic goals or competitive environmental settings may lead individuals to fixate upon a limited set of ideas, hindering idea generation (Howard-Jones, 2002). It has been emphasised that even mild fluctuations in emotions from daily lives events and activities can have very significant influences on cognitive abilities (Mitchell and Phillips, 2007). For example, different extent of arousal might affect creativity differently (Martindale, 1999).

A large body of research on the cognitive effects of positive emotions has suggested that both artificially induced and naturally occurring positive emotional states will generally lead to greater cognitive flexibility and facilitate performances on creative problem-solving activities. (For reviews, see Ashby, Isen, and Turken, 1999; Ashby, Valentin, and Turken, 2002; Isen, Daubman, and Nowicki, 1987). These studies have provided evidence to support the notion that positive emotions broaden our access to alternative cognitive perspectives and facilitate creative problem-solving skills across a broad range of situations, from young children at play to adults in organisational settings. In many of these studies, the remote associates test (RAT) (Mednick, 1962) has been used to provide evidence that positive emotions improve cognitive

flexibility (Ashby *et al*., 1999; Isen *et al.,* 1987). In this test, participants are presented with three cue words and a blank line and were asked to respond with a fourth word that is related to each of the three cue words. An example of one set of cue words is GOWN, CLUB, and MARE and the correct response was NIGHT (i.e. nightgown, nightclub, and nightmare). Research using this test has shown that individuals in the positive emotions condition responded with a broader range of more unusual word associations than those in the neutral emotions condition (Isen, Johnson, Mertz, and Robinson, 1985).

In another set of studies, the people in the positive emotions condition produced a wider range of possible solutions and perspectives in an innovative problem solving task - Duncker`s candle task (Isen *et al*., 1987). Participants viewed comedy film clips before being presented with an innovative problem-solving task (the candle task) to complete. Their performance on the task was compared to two other groups, those who had watched a neutral film condition and a 'separated-cue' condition. The candle task was presented to them as three objects: a box of tacks, a candle and a pack of matches placed on a table next to a cardboard wall. The question in this task was: how to attach the candle to the cardboard wall in a way so that the candle can burn properly without dripping wax on the table or the floor beneath. In the separated-cue condition the display of the objects in the task was changed by separating the tacks from their box as a cue for alternative uses for each item (i.e. the box can be a separate tool rather than just being a container for the tacks). The solution to this task was usually to empty the box, then tack it to the wall and use it as a platform or a holder for the candle. The results from this study showed that participants in both the positive emotions condition and the 'separated-cue' condition showed higher levels of creativity in their solutions compared to those the neutral film condition It's worth noting, however, that although, most kinds of positive emotions are likely to enhance creative generation, there may be some kinds of positive emotions that do not.

Research Focus: Will positive emotions always lead to broader attention?

Gable and Harmon-Jones (2010) challenged the view of positive emotions broadening attention when they proposed the Motivational Dimensional Model of affect, which explored the way that both positive and negative emotions vary in motivational intensity (i.e., high or low). They argued that a combination of the valence (positive or negative) of an emotion as well as its motivational intensity is what determines the effect that emotion would have on breadth of attention and creative cognition. This is in contrast to previous studies which only considered the valence of an emotion and in doing so implied that all positive emotions would broaden attention. Instead, Gable and Harmon-Jones (2010) suggested that only positive emotions that are low in motivational intensity (e.g. relaxation) will lead to a broadening of attention; whereas, positive emotions which are high in motivational intensity (e.g. desire) actually narrow attention. In the same way, negative emotions high in motivational intensity (e.g. anger) will narrow attention, yet negative emotions low in motivational intensity (e.g. sadness) which actually broaden attention. What all this shows us is that the relationship between emotions and creativity may be more complex than we originally thought.

To summarise, from the above discussions on the underlying factors that influence creativity generation it can be understood that defocused (broadened) attention may facilitate remote associations leading to creative ideas being generated. Furthermore, by defocusing or broadening perceptual attention, creative idea generation may also be enhanced and encouraged. In addition, emotions play a significant role in determining breadth of attention and that is likely to thereby influence levels of creative thinking too. As we will see later, the above concepts lend themselves to application through educational techniques aimed at enhancing creativity. Before we can review those techniques, in this next section the challenges and strategies to foster creativity in education are first discussed.

Encouraging creativity in education

While on the one hand education has often been criticised for spoon-feeding and killing creativity (Kaila, 2005; Robinson, 2009), ironically, it is also in demand to provide educated

and creative graduates to respond to global changes in politics and economics as well as the sociocultural and environmental landscapes (Shaheen, 2010). When unforeseen and unpredictable challenges and problems emerge, creativity is seen as the solution (Gaspar and Mabic, 2015). Thus, educational institutions are increasingly expected to encourage creativity in a wide range of students from early years to higher education (Shaheen, 2010; Walberg, 1988). In the light of reviewing in this chapter the nature of creativity and the factors that influence it, it can be argued that creativity can be developed as part of an individual's life-long development (Craft, 2001) and that everyone can be creative (Lin, 2011). Creativity exists not only within the extraordinary but, most importantly, also within the ordinary (Craft, 2003; NACCCE, 1999). To investigate how creativity can be fostered in education, firstly this section discusses common challenges in promoting creativity in education today. Secondly, several educational strategies to encourage creativity in the twenty-first century are articulated.

Challenges in fostering creativity

There have been many discussions in the literature regarding the challenges in fostering creativity in a wide variety of educational contexts (e.g. Craft, 2005; Jeffrey, 2006; Lin, 2011). From these reviews, this section identifies four common challenges in fostering creativity; 1) Misconceptions regarding the nature of creativity and creative pedagogy, 2) Limitations of a pre-designed curriculum, 3) The lack of teachers' training in fostering creativity and 4) Over-valuing the grading and assignment systems.

Misconceptions regarding the nature of creativity and creative pedagogy

A common misconception regarding the nature of creativity found in both teachers and students is the belief that to be 'creative' is merely to form new ideas and think divergently (Rinkevich, 2011). This misconception leaves teachers and students with incomplete educational practices which do not lead to enhancing creative outcomes. The notion that creativity has two characteristics, originality and usefulness/appropriateness (Mayer, 1999) would change those practices dramatically. It reinforces the idea that both teachers and students should see the development of creativity as learning not only to create new ideas but also to scrutinise these ideas and form them into useful outcomes which have value either at a personal level or on a

wider scale.

In addition, misconceptions in relation to the concepts and terminology surrounding creative pedagogy may sometimes cause ‘slippage of the language’ used to describe creativity in educational practices and thereby hinder the development of creative teaching and learning (Craft, 2003). In England, a report by the National Advisory Committee on Creative and Cultural Education (NACCCE, 1999) sought to distinguish between teaching creatively and teaching for creativity. Teaching creatively is referred to as 'using imaginative approaches to make learning more interesting and effective' (NACCCE, 1999: 89), whereas teaching for creativity is defined as the 'forms of teaching that are intended to develop young people’s own creative thinking or behaviours' (Jeffrey and Craft, 2004:81). The former focuses on developing the teacher’s practices, while the latter focuses on developing the student’s creativity (Craft, 2005). Craft (2003) and Lin (2011) further argued that creative teaching and teaching for creativity are also distinct from the concept of creative learning. These concepts of creative teaching, teaching for creativity and creative learning are all explored in Lin’s (2011) model, which is elaborated in a later section in this chapter. It’s important that educators understand these differences: that an initiative which promotes one kind of creativity (e.g. creative teaching) is not guaranteed to promote the other (e.g. student creativity).

Limitations of a pre-designed curriculum

Many courses in the education system are based on a pre-designed curriculum, a curriculum which is designed by a central authority and not by the teacher who delivers the course itself. The curriculum plays an important role in fostering creativity on a course because teaching and learning practices are often based directly on the design and content of the curriculum. Although a pre-designed curriculum provides a starting-point for educators and students to then maximise their best practices according to learning goals and expected outcomes, it can also cause limitations that hinder creativity development. One limitation of a pre-designed curriculum is the tendency of many pre-designed curricula to place restrictions on teachers’ practice, forcing them to follow all the instructions provided and so losing sight of the goal of fostering creativity. Creativity is not usually listed among the prescribed goals on most courses and so many teachers see it as not within their discretion in terms of which teaching

pedagogies/strategies they adopt (Rinkevich, 2011; Craft, 2003). Another issue is time constraints arising from the time allocated in the curriculum to a given class or topic. Also, the way in which the curriculum is presented and organised to meet a certain assessment criterion can cause limitation on teachers' practice in fostering creativity (Craft, 2003). Ultimately, these time and regulation constraints that teachers face may lead them to see creativity as something 'extra' and so optional rather than necessary.

The lack of teachers' training in fostering creativity

Teachers' behaviours can be a significant factor in encouraging or discouraging creativity through their acceptance or rejection of the unusual and imaginative. Although educators generally claim to recognise the importance of encouraging creativity in their classroom practice, they often hold negative views about certain characteristics of students that are associated with creativity (e.g. nonconformity, autonomy) (Westby and Dawson, 1995). Many teachers tend to view novel (unexpected) responses as disruptive, so they prefer 'relevance' over 'uniqueness' in students' responses during classroom discussions (Beghetto, 2007).

Teachers may find it difficult to value creative and non-conforming behaviours due to the lack of training in fostering creativity and dealing with these behaviours (Rinkevich, 2011). Without the training to enable them to manage it, teachers may simply wish to avoid the stress and potentially unpleasant emotional feelings of being seemingly disrespected by creative students' 'disruptive behaviours' (Chang and Davis, 2009). They need help to develop the level of trust in their relationships with students necessary to foster a creative learning environment (Rinkevich, 2011).

Over-valuing the grading and assignment systems

Exams and grading systems, peer competitions, and external rewards are commonplace techniques for achieving motivation in education. However, extrinsic rewards such as these may hinder intrinsic motivation if not managed appropriately (Hennessey and Amabile, 1987).

Reflections: How does focusing on the goals set in assessments help students to learn? In what ways may that help be a hindrance for creativity development?

Assessments can and should be used to facilitate students' intrinsic as well as extrinsic motivation. Unfortunately, when the high performance in assessments is presented as the goal or target for a students' learning, both teacher and student tend to miss the potential for assessments to facilitate and support a student's learning. Achievement in assessments is then overly emphasized and learning or creativity are relegated to little more than the means-to-an-end, seen only as methods for increasing the level of that achievement. By contrast, an individual's own enjoyment of or involvement in the course, their satisfaction in their work, ungraded learning, and mastery of their subject are all instrumental in the emergence of intrinsic motivation. Both intrinsic and extrinsic motivations are important to the development of creativity. However, with performance in assessments increasingly valued by both students and teachers (who are themselves evaluated on the performance of their students), a focus on assessment performance comes to dominate teaching and learning interactions. Thus, intrinsic motivations are side-lined, creating a missed opportunity for creativity development.

Research focus: Culture and creativity in education

It is possible that in some cultural contexts where levels of choices and personal autonomy are culturally defined, education may face constraints which hamper creativity. For example, Chinese educational traditions are heavily influenced by Confucianism (Wu, Wu, Chen, and Chen, 2014) where ' Maxims of modesty' are seen as a social norm for teachers' and students' interactions. The general rule of being modest in a Chinese social context is the expectation that children do not to show off or ask questions, irrespective of how much they know or are curious, but instead they keep quiet and listen to the adult's instructions (Hui and Yuen, 2010). The social hierarchy is also another dominant culture at all levels of Chinese society. For the young to respect the elder and the novice to respect the experienced are common practices, particularly in educational contexts. The young and the novice are expected not to argue with the elder and the experienced in order to sustain a social harmony

in society. Thus, under such cultural constraints, in educational contexts, creativity is implicitly discouraged and instead students conform compliantly to externally prescribed standards such as learning outcomes and grades. This cultural element presents an additional challenge for both teachers and students who wish to introduce and adapt creative practices in educational contexts involving those Chinese learners who are influenced by the Confucian educational culture.

Strategies for fostering creativity

This section provides four strategies for fostering creativity in learners. These are based on a combination of the models of creativity, the factors that influence creative thinking and an awareness of the challenges of creativity which are reviewed in the previous section.

Integrating creativity into the curriculum

In both the four-stage model (Wallas, 1926) and the three-component model (Amabile 1983) of creativity, the development of domain-relevant knowledge is seen as an important first step. Thus, in order to build creativity into the curriculum, schools should provide an environment where each student can learn the fundamental knowledge, technical skills and intellectual abilities related to a few domains based on their personal interests. Educators should create a curriculum which provides opportunities for students to enhance their cognitive complexity which is paramount to creative idea generation (Runco and Chand, 1995).

'Cognitive complexity' refers to a cognitive space which allows for a great diversity of relevant domain knowledge or information to create interrelationships with each other, facilitating remotely associated ideas to merge into generative thinking processes. A greater level of cognitive complexity influences the production of both the quality and quantity of these ideas. This can be done in education by designing activities that exercise and expand the capacity of thinking. For example, an up-to-date curriculum should integrate the use of technology into teaching practices to create a virtual learning environment which helps to expand thinking capacity. Many students today have long been 'habitués' of a multidisciplinary world, informational omnivores owing to the empowerment of living in a digital environment which

stimulates their creativity (Livingston, 2010). An example of this can be found in research by Yeh (2015) which looked at the cognitive effects of out-of-school videogame play on creativity, and found evidence that games which demand a broader attentional breadth and expending cognitive complexity in visual forms appear to facilitate creativity..

Another way to enhance cognitive complexity is to create interdisciplinary subject knowledge integrated from several different subject domains, an approach that is infrequently supported in most educational systems (Kandiko, 2012). Today's students face challenges that require multi-disciplinary knowledge and problems that cannot be fully addressed by discipline-specific approaches, all of which show the need for providing interdisciplinary course elements in the curriculum. Curriculum design could stimulate creativity through the use of interdisciplinary teaching approaches such as introducing elements of arts and music into other more traditionally academic subjects (Treffinger, Renzulli, and Feldhusen, 1971), including what are now so-called STEAM (science, technology, engineering, arts and mathematics) subjects (e.g. see Barrett *et al*., 2015).

Encouraging creative pedagogy

Lin (2011) developed a framework of creative pedagogy to illustrate the relationships and interplay between 'teaching creatively', 'teaching for creativity' and 'learning creatively'. He emphasized that the best creative pedagogy requires teachers to practise all these three aspects of teaching and learning. To foster creativity, teachers should 'teach creatively' by providing imaginative, dynamic, and innovative approaches to inspire (Jeffrey and Craft, 2004). The teachers can 'teach for creativity' by identifying learners' creative potential as well as encouraging and providing opportunities for the development of those capacities, for example, promoting strategies of learning how to learn, arousing curiosity and learners' motivation (Lin, 2011). The interplay between creative teaching and teaching for creativity is fluid and teachers are encouraged to seek collaborative co-construction of knowledge and classroom practices with students.

One teaching strategy which can be classified as 'teaching for creativity' is to promote collaborative thinking and interaction through group work. Both class discussions and group

assignments help to develop the skills of teamwork and group acceptance (Fasko, 2001; Livingston, 2010). Evidence also showed that, when working in a group, students were more active, constructive and improvisational (Sawyer, 2004) and revealed a greater willingness to take risks (Rinkevish, 2011). However, it's important that these group activities do not merely become another way to focus on goals such as good grades and assessments, as that can undermine their usefulness in the development of creative potential. Lin (2011) suggests that fostering creativity can be achieved by linking learning to ungraded activities such as questioning, searching, experimenting, and aimless play.

Developing creativity through character development.

Schooling and education are often seen as contexts which encourage students to develop the skills and abilities related to creativity such as learning to work collaboratively, broadening the scope of their attention or learning new approaches on problem solving. However, education should also provide a place to develop personal characteristics which are key to creativity such as self-motivation, self-discipline, tolerance of ambiguity (Kieran, 2014), openness, curiosity, risk-taking, resilience, playfulness, humour, dedication and so on. (For reviews, see Zhou and Oldham, 2001). In particular, the four categories of classroom practices created by Treffinger and his colleagues (2002:7) can be used to nurture creativity characteristics. This includes encouraging individuals or groups to 'generate many ideas', to be 'able to dig deeper into those ideas', to be 'willing and able to listen to their own inner voice', and to 'have the motivation, openness, and courage to explore new and unusual ideas'. Ultimately, through practices such as these educators should aim to develop individuals whose creative outcomes and behaviours consider the social justice and promote the common good (Livingston, 2010).

Providing a positive learning environment

Given that breadth of attention affects creative performance and positive emotions appear to facilitate breadth of attention (Ashby *et al*., 1999), creating a positively charged learning environment may be helpful in fostering creativity. Teaching and learning in a relaxing learning environment often means that there are positive emotional experiences for both teachers and students during educational practices. There are a number of ways in which this can be achieved. For example, a relaxing learning environment can be encouraged by offering short

breaks, or changing contexts which could also broaden attentional breadth and facilitate new idea generation, or by offering a safe environment where students are free to make mistakes without suffering negative consequences. Fasco (2001) argued the most effective teaching and learning techniques for creativity are those which stimulate both cognitive and emotional factors as well as providing active learning opportunities. Bringing the classroom outdoors is another way which stimulates positive emotions during learning and broadens perceptual and cognitive attentional breadth, benefiting creative idea generation.

Conclusion

By reviewing relevant models of creativity and examining the underlying factors which influence creative thinking processes, this chapter provides a number of insights into both the nature of creativity and its relevance to education. Far from being the exclusive remit of certain subjects or 'gifted' individuals, creativity can be seen as any output which contains the two key elements, originality and appropriateness, and can be produced in almost any subject or situation by any ordinary individual. Creativity could be seen an outcome of a complex combination of remotely associated information and knowledge, as well as the analysis and evaluation of ideas in a circular process. This conceptualization of creativity as a cognitive process has allowed researchers to explore its relationship with other cognitive processes like attention and emotions. Thus, it also enables educators to develop strategies for fostering creativity in education. With all this in mind, although there are challenges in fostering creativity in educational contexts, it has been shown in that education can be a safe place for creativity development when the appropriate strategies are put in place.

Ultimately, this chapter shows that creativity both can and should be fostered by education. It is important to foster creativity particularly in the fast-changing world of today where there are many unforeseen challenges, such as tackling ambiguous problems in an uncertain future or achieving economic stability in a competitive global market (Shaheen, 2010). With enhanced creative thinking skills, students today will be better equipped with the fundamental life skills which are vital, not only to survive but to thrive in the twenty-first century.

Key points

- Creativity represents the ability to produce work that is both original and useful. While originality is widely recognised characteristic of creativity, usefulness is often overlooked.
- Creative thinking involves either alternating between or progressing through the processes of generating new ideas and a critical evaluation of these new ideas.
- The scope of creativity can range from a historical impact on issues faced by a wider society to a personal impact on problems and changes faced in daily life.
- A defocused (broadened) attentional breadth, which allows more mental elements to come to mind, is thought to be beneficial to creative thinking.
- Emotions serve as a gate which unconsciously widens or narrows attentional breadth, thereby affecting which information is brought to mind during the creative process.
- There are various ways in which creativity can be fostered in education; by introducing cognitive complexity, encouraging group work, promoting the development of personal characteristics such as self-discipline or tolerance for ambiguity and creating a relaxing, low-stress learning environment.

Recommended readings

1. Friedman, R. S., Fishbach, A., Forster, J., and Werth, L. (2003) Attentional priming effects on creativity. *Creativity Research Journal*, **15** (2and3), pp.277–286.
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