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Flourishing Creativity: Education in an Age of Wonder

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Abstract

The 21st century is often described as an age of uncertainty and ambiguity with unprecedented challenges. Those with a creative mindset however might call this millennium an age of wonder. New technologies and digital media are facilitating imagination and inventiveness. How are we innovating education? Are schools and classroom fostering creativity? This chapter will discuss the understanding of the cognitive functions of creativity and relate these to curriculum and pedagogy. It will deal with issues such as tapping on the powers of psychological habits and novelty, contextualizing learning, providing for serendipity, imagination and play.

Keywords: creativity, education, cognitive functions, problem-solving

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Creativity in the 21st Century

For education to flourish creativity, we need to learn from all other fields of work. I once spoke to a businessman whose enterprises were in geographical regions where the political and social scenarios were rapidly changing. I asked: “Is it very stressful to do business in such places?” His reply surprised me. He said, “The more complex the circumstances the more opportunities there will be and such situations favour the creative entrepreneur.” Uncertainty and ambiguity with unprecedented challenges may aptly describe the era of the 21st century. Looking through a different lens this is also an age of opportunities for learners, thinkers and problem solvers. Twenty years ago, there were no social media experts or technology integration experts. Facebook didn’t exist and neither did Google nor Twitter. Today 75% of the Generation Y - millennials aged eighteen to thirty – has presence in social networking sites. According to Davidson (2010), 65% of today’s pre-schoolers will grow up to work in jobs or pursue careers that do not currently exist. In addition, the Institute for Business Value of IBM surveyed 1,500 CEOs in an effort to identify the chief leadership competency (Kern, 2010) needed in their businesses. The CEOs responded, creativity. Not operational effectiveness, influence or even dedication. Societal needs are changing. As the world spins rapidly faster, organizations everywhere say they need people who can think creatively, communicate and work in teams. People who have the ability to think creatively come up with novel solutions to problems, make connections in new and exciting ways, and brainstorm ideas are in high demand. This is the skill of entrepreneurs, inventors, writers, scientists, engineers, and many careers that are on the rise.

Creativity drives economies and cultures and makes people think in different ways (Goodwin & Sommervold, 2012). We need creativity to adapt to changing paradigms and situations. More often than not, breakthroughs in science and technology are the result of

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interests or fascination with problems. While the tablet computer is associated with Steve Jobs, he did not come up with the original idea. The first tablets were launched in the late 1980s, but these were pricey, heavier than the laptops of that time, and were mostly used by the military. In 2010, Jobs graced us with the Apple iPad, which is affordable, light, and has an attractive touchscreen. Since then, it has hatched new tablet competitors and is fast transforming the traditional PC. However, some researchers (Kim, 2011; Russ & Dillon, 2011) who study creativity worry that it is on the decline among students. Even though creativity is innate, it needs to be cultivated and nurtured. As schools place greater emphasis on learning material and taking tests, they are concerned that opportunities for thoughts to flow freely are fewer now than in the past. If we adopt a mindset of learning from challenges, engage in an active search for meaningful information, a proactive immersion in the task a conscious and subconscious investment of time on the task, and a search for meaning and explanation, there will be real improvement and advancement.

Education and Creativity

In many ways, education in the 21st century deals with the science of knowledge and information, along with a new art of observation and learning. History reminds us that the great minds such as Aristotle, Galileo, and da Vinci utilized knowledge from both spectrum of the humanities and the sciences. In this day and age, the complementary relationship of the sciences and the humanities has been embraced by medicine, engineering, sports, and art among others. Few would dispute that the great scientific and technological innovators were creative thinkers. Society needs creative people for continued innovation. In this sense, a future-ready education must accept change for learning and infuse creative ways of observation to construct, derive and create knowledge in students (Tan, Teo, & Chye, 2009).

The thrust of education is to help students construct their own knowledge about the world rather than passively receiving information. Educational programmes with creative

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problem-solving orientations appear to also stimulate other creative processes in students (VanTassel-Baska & Stambaugh, 2006). To face the challenges in this day and age, we need to practice both logical thinking and “ana-logical” thinking. “Ana-logical” thinking means the ability to creatively and laterally transfer a whole set of ideas across to another situation (Tan, Teo, & Chye, 2009). We also need to be flexible in using different modes of thinking, such as seeing the big picture, generating new ideas and perspectives, as well as having a good sense of reality in terms of the constraints of circumstances, resources, the human perception, and so on (Tan, Teo, & Chye, 2009). It is vital to be receptive to new ideas and approaches, and not contain ourselves with popular assumptions and usual ways of sorting things out. Education must foster the creation of a critical mass of individuals with greater creativity and higher levels of thinking skills. Education would fail if institutions continue to teach content to students without paying attention to how quickly such content knowledge becomes obsolete or irrelevant (Brennan et al., 1999). What every person entering the workforce needs is the ability to adapt oneself to the ever-changing demands of our workplace and society and to think on one’s feet especially when presented with a situation that is unfamiliar. Educators therefore need to consider if what we are teaching truly prepares our students for the workplace of today.

Indeed the challenge for educators is to design new learning milieus and curricula that really encourage motivation and independence so as to equip students with learning, thinking and problem-solving skills. In the last few decades the challenge of teaching and learning has progressively changed, from making content knowledge visible to learners, by enhancing clarity of explanations and elucidating difficult terrains of knowledge, to making teachers’ thinking visible through pedagogy that supports and models process skills, problem-solving skills, and thinking skills, and then to making students’ thinking visible through designing

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learning environments and processes that enable students' ways of thinking and knowing to be manifested via active, collaborative, and self-regulated learning.

Teachers need to believe that innovation in education is necessary and can work. Educators themselves – principals and teachers – must be designers of learning and facilitators and mediators of learning. It is not how much content we disseminate in our classrooms but how we engage students' motivation and independent learning that is important. Learning to learn and lifelong learning are important goals. There will be increasing demands in the future for workers to be able to read more prolifically and to write and communicate confidently.

The Creative Process

Creativity is a complex and vast construct that has been vital to the progress of human civilization and very likely the development of human reasoning processes. Across various definitions and interpretations of creativity, researchers generally agree that creativity involves three core components (Hayes, 1989). First, a creative act must be original or novel. Second, no matter how original an act is, it must also be appropriate or valuable to be considered creative. Third, an act will not be judged as creative unless it reflects the intelligence of the creator, i.e. the act is not purely by chance. Definitions of creativity are dependent on researchers' perceptions or conceptions of what creativity is. Some definitions focus on personality of the creative individuals (e.g., Eysenck, 1997; Feist, 1999). Other definitions are related to thinking processes behind the creative acts (e.g. Guilford, 1950, Perkins, 2001). Some other definitions consider the cultural and environmental factors that support or hinder the creative acts (e.g. Amabile, 1996). Creativity is also seen as a multifaceted process involving different ordinary abilities and some specialized skills and techniques; it can be fostered by many different ways of thinking, and it draws on critical judgement as well as imagination intuition and often gut feelings (Robinson, 2011).

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Sternberg (1996) defines creativity as a process that requires the balance and application of three essential aspects of intelligence – creative, analytical, and practical. Creative intelligence refers to the ability to go beyond the given to general novel and interesting ideas. Analytical intelligence is required to analyse and evaluate the new ideas so as to sieve the better ideas from the weak ideas. Practical intelligence is required for the translation of theory into practice and abstract ideas into practice accomplishments. Isaksen, et al., (2011) propose that the creative process is concerned with the mental or cognitive processing or thinking that occurs as people use their minds or intellect in novel ways. In this definition, creativity is viewed as a kind of thinking, reasoning, association-making or problem solving ability which results in many new and original ideas.

Cognitively, creative people have been described as: (a) being able to think metaphorically and flexibly, (b) independent in judgement, (c) skilled in decision-making, (d) able to cope well with novelty and ambiguity, (e) willing to take risks, (f) able to visualise and play with ideas internally, (g) able to break away from set ways of thinking, (h) question norms and assumptions, and (i) are alert to novelty and gaps in knowledge (Tan, 2009). The creative ability may be understood as a form of cognitive fluidity underpinning the capacity to operate on familiar symbolic representations that allows novel ones to be generated (Gregory, 2004). Treffinger describes the process of creativity as a sequence of stages through which a problem is solved systematically (Treffinger et al, 1994).

Furthermore, social psychologist Graham Wallas wrote in 1926 *The Art of Thought* where he described the four stages of the creative process: preparation, incubation, illumination, and verification. In the preparation stage, the problem is investigated in all angles. You might brainstorm, read relevant material, collaborate with others, and gather your own past experiences, or anything that can help you understand the implications and other innuendoes. Incubation stage is the period of unconscious processing” (Popova, 2013)

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unconscious processing, when the person turns his/her attention to anything else. The incubation stage is when the person discovers that flash of insight or the “Aha!” moment. This may come only after many hours of hard work or not at all. The final stage is the verification where one challenges the idea that came in the illumination stage. It is the deliberate effort to validate the feasibility, workability and acceptability of the data. Jung (2014), who has written a number of articles about the neuroscience of creativity, notes that the stage between incubation and illumination involves a pretty big cognitive handoff. Moreover, Davis and Rimm (2004) argue these stages do not necessarily happen in sequence; some maybe skipped or the person may backtrack to an early stage.

Another way of looking at the creative process is through Davis’ (1998) two-stage model. The first stage is the “big idea” stage, when the person is actively looking for a new idea or solution to a problem. This idea is usually found by using creative thinking like brainstorming or analogies. The second stage is “elaboration”, when a person develops the idea, explores the idea, and finally implements the idea. For example, the artist will make a sketch of preliminary drawings before putting the final touches of an intended picture. Creativity is not only needed to get the big idea, but it is essential in carrying out the plans to make the big idea work.

The Cognitive Functions of Creativity

Feuerstein’s theory of structural cognitive modifiability (Feuerstein et.al., 1980) is premised on the idea that we need to take care of different domains of thinking beyond just traditional analytical thinking. This means that “big picture” thinking or getting an overall perspective, is different from breaking things into smaller parts or logical sequences. Generating something new or putting together two apparently unconnected ideas is again different from inferential logic. The educational system tends to emphasize analytical thinking and our pedagogies are not so good at teaching “big picture” thinking and generative

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thinking. We also need to recognise that fostering creativity involves tapping on both the “habit” networks and the “novelty” networks of the brain. On the one hand the mind learns by patterning and networks of routines through memory, imitation and modelling. On the other hand the mind is stimulated by something new. The quest for novelty however is often tied to motivation and emotional factors.

The cognitive approach focuses on thinking abilities and knowledge as the basis of creative work. The cognitive approach emphasizes various facets of mental abilities that are linked to creativity. These include divergent-thinking, perceptual processes, problem-definition and problem-solving skills, insight skills, induction skills, and abilities to form associations and analogies. More recently, cognitive approaches have also included biological bases of creativity such as the hemispheric roles of the brain. Drawing on ideas from Guilford's (1950, 1988) factors of divergent production, the following could perhaps be considered as cognitive functions related to divergent thinking: (i) flexibility (i.e. ease of changing mental set), (ii) fluency (i.e. number of ideas in a given time), (iii) novelty or originality (i.e. coming up with new perspectives and ideas), (iv) degree of complexity, (v) synthesizing ability, (vi) analysing ability, (vii) reorganisation of existing ideas, and (iv) evaluation. The Torrance Tests of Creative Thinking have often been used to assess abilities pertaining to divergent and creative thinking. It appears such tests could perhaps be used from the dynamic assessment perspective to develop cognitive functions that may lead to more divergent and creative thinking. The number of cognitive functions can be identified from Torrance's tests. These include: (i) fluency, (ii) originality, (iii) abstractness, (iv) elaboration, (v) resistance to premature closure, (vi) emotional expressiveness, (vii) storytelling articulateness, (viii) movement, (ix) synthesis, (x) unusual visualization, (xi) internal visualization, (xii) humour, and (xiii) richness of imagery. Finke et al. (1992) proposed that creative thinking involves two distinct processing stages, namely, the

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generative stage and the exploratory stage. They propounded the Geneplore model which provided useful examples of cognitive processes, structures and properties. Isaak and Just (1995) pointed to the importance of “releasing unwarranted constraints” as part of the cognitive process of creativity and cited many interesting problems and cognitive exercises that may help highlight this cognitive function (e.g. the nine-dot exercise).

In whatever way a person understand the creative process or the production of creative outputs, one would invariably look for attributes of fluency, flexibility, originality, and elaboration, as described by Torrance (1966, 1995) and Guilford (1967). And as teachers, we are all too aware of the positive effects of teaching for creativity in the classroom and cultivating creative traits in students. So how do we go about nurturing creativity in schools?

Cognitive Creativity, Curriculum and Pedagogy

In all instances of learning, students need to be involved in active thinking, both creative and critical. Similar in the context of a problem, Elder and Paul (2007) emphasised that thinking cannot occur in a vacuum but must take place within a system. When thinking something through for the first time, one generates new ideas, new assumptions, and new concepts by asking new questions, making new inferences, and allowing views to form in new directions (Tan, Teo & Chye, 2009). This is basically a creative act.

Good thinking involves a range of cognitive processes and mental activities. In real-world creative problem solving, “the mind has to go through cycles and iterations of systematic, systemic, generative, analytical and divergent thinking” (Tan, 2003, p.20). The late Professor Reuven Feuerstein repeatedly emphasized the macro aspects of a thinking curriculum and the micro aspects of dealing with specific cognitive functions as the approach to flourishing adaptive capacity. Adaptability is the key to creative development and creative problem solving. The ambiguity and complexity of problems in the 21st century requires flexibility and agility in the way people think and apply knowledge. In a contest of a

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shrinking world, and extending literacies and media, what are the implications for creativity, curriculum and pedagogy?

It is now an international trend to integrate creativity into curriculum frameworks (Le Metais, 2003). Hargreaves (2001) argued that we must enhance the capacity of contemporary learners to engage in creativity otherwise our capacity for inventiveness and entrepreneurship will remain unexploited and detrimental to individual and societal futures. From a pedagogical point of view, creativity is best understood and approached holistically as a fully physical, emotional and cognitive, as well as iterative and generative, human capability of a high order. As such, creativity is readily available and potentially shared between all teachers and learners working within overlapping communities of practice that value inquisitiveness, ingenuity and inventiveness as legitimate and productive ways of dealing with both simple and complex challenges (Tudor, 2008).

Facilitating creativity in learners can most readily be achieved when teachers are creatively self-aware and learners are knowingly engaged in a proactive manner with investigating 'potentialities' via the production of future-oriented modes of learning (Tudor, 2008). The approach to creativity in education has unique concerns. The curriculum must contain elements of traditional knowledge-based material as well as an increasingly significant cross-cultural element of skills or dispositions designed to enable children and young people to cooperate with others, to be creative, critical and responsible global citizens and to cope in and contribute to a world where change is perhaps the only constant. The extension of literacies and media in education in ways which take account of digital dimensions to learning and life, and which are therefore multi-modal (Jewitt, 2006), naturally has implications for the curriculum. What becomes possible in terms of knowledge is now vast, global, multi-lingual and multi-contextual. Furthermore, pedagogy in an information-rich environment offers opportunities for teachers to encourage personal and collaborative

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enquiry, building on and extending the skills and interests of learners. Promoting creativity in schools involves the development of characteristics such as self-motivation, confidence, curiosity and flexibility. However, this cannot work without structure which can be used as a scaffold (Vygotsky, 1978) either to go beyond enhance learning, or to work within a framework, flexible enough to accommodate individual styles. Such pedagogy is intricately related to the curriculum.

Conclusion

Traditionally, an indicator of good teaching included making content knowledge “visible” to students, which involved providing clear explanations to students in disseminating knowledge and solving problems. Today, good teaching is about making teachers’ thinking visible. In other words, effective teaching is characterised by modelling the process of learning so that students could observe and learn process skills, problem-solving skills, and thinking skills while acquiring content knowledge. When teachers attempt to move away from the traditional didactics and become more facilitative in the classroom, we have more group work and active learning. However, when we listen to the quality of student interactions in more active classrooms we find that something is still missing in the life of their minds. Pedagogy in the twenty-first century must go beyond making content and teachers’ thinking visible. In order to inject life into the minds, we need to make students’ minds and thinking visible to the teacher and the learners themselves (Tan, 2004). Education must be about learning to learn with abilities to think adaptively. According to Feuerstein, et al. (1980, p. 385) “cognitive factors can be considered key elements to the individual’s successful adaptation, particularly in a technological and rapidly changing society.” In other words, sufficient attention must be given not only to one’s ability to think but also what is going on in the mind of the learner in terms of his or her cognitive processes.

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In the 21st century landscape, education must focus on nurturing the whole child – morally, intellectually, physically, socially and aesthetically (National Institute of Education, 2009, p. 2). Students need to acquire new knowledge, skills and dispositions to ensure their survival and success as individuals, as members of the community, and as citizens of our nation. To achieve this, we must develop teachers who are able to undertake greater responsibilities as they are at the forefront of educating our youth. In terms of curriculum we need to provide lots of space and time for curiosity, discovery and pure imagination and serendipity. It is possible to think creatively and solve problems involving rigorous, challenging content. When teachers apply creativity in approaching educational challenges, innovative resources and practices are possible to attain. It seems that everyone today, regardless of age, is immersed in technology. The use of computers, iPhones, tablets or other smart devices are widespread in our society and globally available for young and old. As a result, technology is a powerful force that acts on learning and teaching today. This creates a new set of creative opportunities and challenges for educators, parents, leaders of community groups, and students. Adults face the challenge of change and the need to adapt to new technology (and the new ways of thinking and relating that accompany it) in their personal life as well as in their interactions in school and community. Moreover, today's technology provides new ways for students to express and apply their creative and critical thinking skills.

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