

Cultivating Creative Potential during Adolescence: A Developmental and Educational Perspective

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In this article, we argue that adolescence is the most important period of development for nurturing creativity. We propose a developmental definition of creativity that focuses on the development of creative inclinations and capabilities. We then discuss the paradoxical situations facing adolescents that provide both opportunities and challenges for developing creative potential. We describe a research program aiming at nurturing creative potential during adolescence. We finish this paper by making several suggestions for protecting and nurturing adolescents' creativity.

It is a common perception that East Asian students as a group have been doing well in academics. Indeed, they compare favorably with other countries in international studies of math and science achievement such as the Trends in Mathematics and Science Study (TIMSS) (IES, 2007). Questions have been raised, however, as to whether East Asian students can do equally well in areas where knowledge has to be put to use in real world contexts instead of traditional classroom settings and testing conditions. Will our students survive and cope well in "the wild", that is, in a world where problems have no clear disciplinary boundary and prescribed solutions? Will our students be innovative and adventurous enough to tackle the unknown and deal with uncertainties? Will our students become smart life-long learners and lead a productive, self-fulfilling life in the 21st century? In short, are they capable of exercising their creative thinking beyond the classroom walls? Developmentally, what is the most critical window of opportunity in students' life for nurturing creativity? These questions have motivated us to search for intellectual and educational answers, a process that itself involves problem finding and problem solution; that is, creativity!

THE NATURE AND ORIGINS OF CREATIVITY

Although there are numerous definitions and conceptions of what constitutes creativity, a consensus seems to be that there are two main criteria for judging the presence and degree of creativity in one's products or behavioral expressions: (a) it should have novelty, including new combinations, perspectives, conceptions, modifications, applications, etc.; and (b) it should be appropriate and effective for a specific func-

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tional purpose (Sternberg, 1999). Typically a distinction is made between big C and small c (Csikszentmihalyi, 1996), the former being ground-breaking, transformational events in major areas of human endeavor such as sciences and humanities, and the latter referring to everyday creativity, which, unlike big C, is not confined to creative activities of an extremely small minority of individuals. It should be noted that small c and big C are not necessarily of different kinds, since big C may well evolve from small c.

Students of creativity have different emphases and perspectives when it comes to understanding the origins of creativity. Typically the products or expressions of creativity are explained in terms of *person*, *process*, and *context*. In the history of the creativity research, much attention was given to personal characteristics, and how these characteristics determine a person's typical pattern of interaction with environmental challenges and opportunities (e.g., openness to experience; McCrae, Costa, & Yik, 1996). Since cognitive revolution, more attention has been given to underlying cognitive processes, including problem finding and problem solution, interaction of conscious and unconscious thought processes, divergent and convergent processes (see Csikszentmihalyi, 1996). We can roughly characterize *the person approach* to creativity as mainly focused on *creative inclinations*, and *the process approach* as mainly focused on *creative capabilities*. They correspond to Lin's (2000) distinction between creative thinking and creative personality.

The most recent trend is to make a more contextual approach, viewing creativity as emergent from complex interaction of individuals with technical and socio-cultural aspects of the environment (Sawyer, 2003), thus, not residing within the person or merely an issue of cognitive processes. This new perspective emphasizes the dynamic, situated, distributed, and social nature of creativity. While we still hold the person and process approaches as providing valuable insights into the nature and sources of creativity, we argue that creative inclinations and creative capabilities be understood in the social contexts in which they can be either nurtured or thwarted.

To integrate the person, process, and contextual factors, we call for a developmental approach to creativity that highlights creative thinking and expression as fundamentally developmental; that is, one needs to take into account developmental as well as environmental constraints for developing creativity. For this purpose, we propose a working definition of creativity: *Creativity originates from envisioning new possibilities and making persistent efforts to realize these possibilities*. Four specifications follow. First, creativity efforts involve the tension between the known and the unknown; in other words, one would inevitably experience uncertainty when making a creative product, be it writing an essay or designing a research study. This is a subjective experience that can be characterized as being "at the edge of chaos" (see Dai & Renzulli, in press). Second, it involves prospective imagination of what is possible and persistent thinking regarding how it can be realized and what obstacles need to be overcome. Third, it involves judgment and decision regarding likelihood of success and risks. In other words, one needs to know when to take risk and push ahead, and when to take alternative pathways. Fourth, novel products and expressions typically meet with resistance because people are not familiar with them or/and because they are still in the developing stage. Therefore, in the social matrix, one needs to make persistent efforts to move from the marginal, unpopular situation to the center (i.e., gaining social recognition and cultural distinction).

ADOLESCENCE AND CREATIVITY

Based on the above developmentally oriented definition, we argue, along with other creativity researchers (e.g., Rothenberg, 1990), that adolescence, not childhood, constitute the most important period for developing and nurturing creativity. A popular notion (or misconception) is that young children's *pretend play* best demonstrates how human creativity develops (Russ, 1996). Indeed, some researchers argue that adolescence is a period when acceleration of skill acquisition is accompanied by declines in creative thinking. Such an argument implies that children naturally possess creativity and they gradually lose it when they reach adolescence (see Albert, 1996). We argue that children, while possess elements of creativity, cannot be truly creative until they reach adolescence, when they are capable of hypothetical thinking and thoughts about possibilities that are not tangible and concrete but can only be conceptualized when one is capable of counter-factual thinking, and when they can truly distinguish between the hypothetical and the real (Piaget, 1972). For example, a 10 grade Chinese student wrote a narrative about "Empty Castle" in the Chinese classic entitled the *Legend of Three Kingdoms*. As the orthodox account goes, the besieged Sima Yi (司马懿) suspected he will be ambushed when he tried to conquer the empty castle and capture Zhuge Liang (诸葛亮), the arch enemy of Sima. But this student came up with a different explanation: Sima knew it was an empty castle and he could easily capture Zhuge Liang. But the reason he decided not to capture Zhuge was to save his own life, for if Zhuge were to be captured, Sima himself would be useless as a key strategist for the King he served. Moreover, he would become a threat to the King. This hypothetical thinking and causal reasoning was based purely on the logic of personal intents and consequences rather than facts. It is well established that only adolescents are capable of envisioning alternative, sometimes competing, possibilities, retrospectively or prospectively. We therefore argue that conceptualizing creativity as a quality a child possesses and loses in later life is erroneous and misleading.

Based on our developmental definition, we also argue that not only the onset of development of *creative capabilities* is adolescence, roughly starting in the beginning of the second decade of life, not earlier childhood (cf. Keegan, 1996), but *creative inclinations* also emerge mainly during adolescence. Based on our definition, a creative act is fundamentally purposive (i.e., goal-directed) and instrumental, unlike children's play, which is just "for fun." It involves a dialectic interplay of playfulness and seriousness, spontaneity and deliberation (Csikszentmihalyi, 1996). It involves well formed intention, persistent efforts to pursue specific goals, and decision and choice regarding the meaning and worth of the efforts for the self. It involves affect as well as cognition (Csikszentmihalyi, 1992). Gruber (1986) characterized the creative process as organization of knowledge, organization of purpose, and organization of affect. This is why Vygotsky argued that adolescence makes creative thinking possible because during adolescence, thinking and imagination, feeling and reason reaches an optimal combination for truly creative thought. In other words, creative inclinations are now coupled with creative capabilities, enabling adolescents to fashion products and expressions in a way impossible in earlier developmental stages (see Moran & Steiner, 2003).

OPPORTUNITIES AND CHALLENGES DURING ADOLESCENCE

Being capable of creative thinking does not mean that adolescents can automatically develop optimal levels of creative competence. Endogenously, there are developmental challenges adolescents have to deal with. These include a series of paradoxical conditions that make adolescence necessarily an "awkward age." Adolescents have the dual role of finding out their own individuality and identity but in the meantime conforming to social norms and established conventions, including those set up by school; hence the tension between autonomy and heteronomy, between rebellion and conformity. Adolescents have to negotiate what is possible with their newly developed capability for imagination, and what is realistic with their increased analytic ability. In other words, Their analytic ability and introspection can put checks and balances on their ambitions and aspirations (for example, "personal fables" they create for themselves). Adolescents are idealistic, having "transformational imperative" (Feldman, 1988, p. 288). However, their knowledge preparation and limited experiences constrain what they can actually accomplish. Adolescents often talk like adults but act like children, a mixture of maturity and immaturity. In short, adolescents' marginal situations (between childhood and adulthood, being idealistic and realistic, rebellious and conforming at the same time) predispose them to develop creative inclinations and capabilities. However, these developing capabilities and inclinations can be vulnerable, due to both endogenous and exogenous factors.

Specifically, we identify four developmental conditions, similar to those developmental conflicts or crises identified by Erik Erikson, that can facilitate versus hinder the development of adolescents' creative capabilities and inclinations:

- The formation of personality (e.g., being inquisitive and adventurous) conducive to creative thinking versus losing creative inclinations;
- The formation of motivations (e.g., developing intellectual interests and being persistent in problem solving) leading to creative efforts versus losing motivation to quest for the unknown and envision alternative possibilities;
- The formation of habits of mind and cognitive skills (developing new ideas and follow through with well-reasoned argument and evaluation) necessary for carrying out the creative tasks in hand versus falling into conventional ways of thinking and mental set;
- Personalization of knowledge through self-directed learning, thinking, and knowing versus other-directed, mechanical accumulation of knowledge.

RESEARCH EFFORTS AND EMPIRICAL SUPPORT

Scientific studies of creativity have been abundant and diverse (see Sternberg, 1999). It is our belief that a developmental approach has some unique features. First, it is *age-specific*, focusing on specific ages considered sensitive periods for development of creative capabilities and inclinations. Second, it is *context-sensitive*, with a focus on social and educational conditions that potentially change the developmental trajectories and pathways related to the development of creative potential. Third, it is *process-oriented*, focused on dynamic changes rather than static traits. And fourth, it is

practically-driven, aiming at changing those relevant internal and external conditions for optimal development with respect to creative productivity. Because of the nature of such a developmental approach, our method is necessarily situated in real life context, particularly in educational contexts. We believe that such molar-level, applied research is complementary to more molecular-level approaches, such as looking at brain mechanisms for specific creative cognitions.

Our efforts along this line of inquiry started with developing a conceptual system and related instruments for measuring creative capabilities and inclinations as well as environmental variations such as teachers' beliefs and teaching practices regarding the nature and nurture of creativity. To measure creative capabilities, we decided to focus on scientific creativity, with a focus on *creative processes* (imagination and creative thinking), *creative representations and products* (scientific questions, scientific knowledge, and technical products), and *creative qualities* (fluency, flexibility, and originality) (Shen, Hu, & Lin, 2002). Besides, we identified five aspects of creative inclination, self-confidence, curiosity, inquisitiveness, seeking challenges, and volition (Shen, Wang, & Shi, 2005). In more recent efforts, we conceptualize three variables under each of the three dimensions of creative inclination, motivational (e.g., curiosity), attitudinal (e.g., self-confidence), and dispositional (e.g., adventurous).

A first task of developmental research is to determine developmental trends with respect to creative inclinations and capabilities. We suggest that these trends must have universal and unique characteristics. They are universal in a sense that the biological maturation and developmental sequence should have some invariance across cultures. They are unique in a sense that certain culture may encourage or suppress specific expressions of creative potential. For example, East Asian cultures are typically seen as allocating less attention to new ideas. Therefore, we developed two frames of reference: one is age-related changes, and the other is cross-cultural comparison. Although patterns of developmental changes across cultures are necessarily complex, determined by various developmental and environmental factors, there are discernable age differences that provide clues as to when critical changes in creative inclinations and capabilities might occur. For example, Shen et al. (2005) found that creative inclinations of Chinese students showed an inverted U-shape, peaking at middle school and declining afterwards. Using students' "problem posing" (e.g., questioning) as a measure of creative problem finding, Yang and Shen (2005) found interesting patterns of age by gender interaction. Female students on the average raised more high-level questions regarding two Russian fable stories, but the numbers of high-level questions peaked at 10th grade and showed a remarkable decline at 11th grade. Hu Adey, Shen, and Lin (2004) found similar developmental differences across Chinese and English adolescent populations, though in their study, performance on the measures of scientific creativity peaked at 14 years of age and then decrease. Although we cannot exclude the possibility that the observed age-related differences based on cross-sectional data may be methodological artifacts, these results are consistent with the developmental literature (e.g., Runco, 1996).

Explaining the possible developmental changes during adolescence involves several considerations given the paradoxical situations in which adolescents find themselves. One possibility is the increased socialization pressure: Adolescents become inclined to follow the conventional ways as they become socio-emotionally more maturity. Another possibility is the effects of schooling. We hypothesize that adolescents might develop cognitive rigidity when the education they receive overempha-

sizes getting the “correct answer” as if there is only one “correct” answer for every question, one “correct solution” for every problem. We also suspect that a general perception of the teacher as an authority who has “the right stuff,” typical in the Confucian cultural tradition, might also inhibit creative inclinations. Therefore, we developed instruments to assess teachers’ beliefs regarding creativity and whether they intend to promote creative thinking. The preliminary findings are that while teachers can identify those personal characteristics as conducive to creative thinking, they nevertheless prefer smart but obedient students who do well in school but never challenge teachers’ authority (Wang, 2006). This finding is consistent across cultures, even in cultures where creative inclinations are presumably encouraged (e.g., Scott, 1999). We also wondered whether the way teachers encourage autonomy vs. dictate what students should know also have an effect on students’ creative inclinations and thinking. We investigated classroom climate in Chinese schools in terms of openness and support. Openness is defined as the degree to which students are allowed opportunity to pursue their interests and participate in debates. Support is defined as the degree to which students’ feel psychologically safe to express different opinions and make non-conventional arguments. Openness and support are presumably expressed through (a) the teacher-student relationship, (b) instructional strategies, (c) evaluation and rewarding practices, (d) organization of extracurricular activities. Classroom climate so defined and perceived by adolescents was found to be related to students’ creative inclinations, intrinsic motivation, and openness to experience, but not creative capabilities as measured by traditional divergent thinking tests (Zou, 2007). Although causality and the direction of causality cannot be determined, the results are suggestive of possible school interventions for promoting creative inclinations. We concur with other researchers that there is a host of schooling factors that can affect the development of creative inclinations and capabilities, and these factors should be understood in the larger cultural context in which schools are embedded and serving as a socialization institution (Niu & Sternberg, 2003; Sternberg & Williams 1996). Particularly important in the context of East Asian countries is the cultural tradition that accentuates the power differential and distance between the teacher and the students (Scott, 1999), emphasizes learning as a way of personal perfection rather than seeking truth (Li & Fischer, 2004), and perceives the socialization process as other-directed attempts to fit in and conformed to collective norms, rather than self-directed attempts to develop intellectual independence, personal knowledge, and an authentic life (Ng & Smith, 2004). Ultimately, developmental changes in creative inclinations and capabilities need to be understood as developmentally engendered (i.e., made possible) but modulated by culture through its value system (Rudowicz & Yue, 2002).

On a reflective note, we have searched for a more integrative view of creativity by conceptualizing creative inclinations and capabilities as mutually strengthening in the development. This is, however, not what we have found. In general, there was little evidence of correlation between creative inclinations and creative capabilities as measured by traditional divergent thinking tests. We figure that the contents of divergent thinking tend to be remotely associated with real life situations. Therefore, creative inclinations can hardly be expressed when test takers cannot make personal connections with the content in question. Indeed, when creative tasks are set up in a more personal way (e.g., asking subjects to generate problems to be solved based on their own observations and real life experiences), their creative performance was associated with creative inclinations (Liu, 2006). Therefore, we suggest that assess-

ment of creativity be made more authentic, tapping into everyday contexts and more immediate educational environments (e.g., emergent problems in specific academic subjects or in students’ surroundings). We hope that by building a more intimate connection between creative inclinations and creative capabilities, we will be able to develop insights into the developmental changes leading to creative ideation and production, and the respective role of cognition, emotion, and motivation (Dai & Sternberg, 2004).

EDUCATION: NURTURING ADOLESCENTS’ CREATIVITY

In an information age, it is impossible to conceptualize cognitive and intellectual development without discussing the role of information and knowledge. However, there are different philosophies as to what kind of knowledge and skills we would like our younger generations to acquire, and what kind of role formal education should play. Historically, there has been a tension between *cultural conservatism* (or traditionalism), which stresses imparting knowledge to younger generations to preserve cultural heritage and civilization, and *progressivism*, which assigns education a major role of facilitating social reform and progressive changes (Dewey, 1916). While this tension is still alive and well, there is emergent pressure for providing a workforce that is knowledgeable and creatively, capable of working effectively and productively in the 21st century, an ever-changing information and technology age. We argue that a solid knowledge base is necessary for creative transformation and use; it is misleading to equate creative thinking with free-wheeling thought. However, we do not believe that such knowledge base can be constructed without active engagement of the learner and without being put to use by the learner. Therefore, while we disagree with the simplistic view that creative thinking is unconstrained by knowledge, we also disagree with a view that expertise has to be achieved before one can make creative attempts, because such a view implies that self-directed personalization of knowledge unnecessary for creativity. Whitehead’s (1903) theory of learning, which delineates a process of going through the cycle of romance, technical precision, and generalization, provides a good balance between freedom and discipline, imagination and analytical thinking. Thus, we suggest that creative thinking and critical thinking are different ways of looking at productive thinking, rather than two separate categories of thinking, as creative thinking involves critical thinking, and sometimes critical thinking (e.g., finding discrepancies and gaps) is essential for creating new understandings and solutions.

Some Principles for Protecting and Nurturing Creative Inclinations and Creative Capabilities

Based on our understanding of the development of creative inclinations and capabilities, we suggest the following pedagogical principles:

- Encourage the spirit of exploration and inquiry. We need to encourage different perspectives and approaches while holding students accountable for defending their perspectives and approaches
- Provide experience of *knowing* rather than merely transmit knowledge as a product. This focus highlights knowledge as created to solve practical problems and explain puzzling phenomena. This is a way to combat what Whitehead called “inert knowledge.”

- Treat theories as hypothetical models and use hypothetical situations to stimulate thinking and reasoning. This approach not only helps develop thinking skills but also conveys to students an epistemic stance that knowledge can be modified and students themselves are active agents of knowledge production and change rather than merely the consumer of knowledge created by others.
- Promote critical thinking. In other words, teachers need to inculcate an attitude that one should never easily accept a position or argument without carefully examining their basis and assumptions. Likewise, one should always defend an upheld position based on evidence and sound logic, rather than impressions and gut feelings.
- Encourage reasonable risk taking and recognize failures as essential for new learning. It is important to protect students' self-confidence and willingness to try new approaches and taking a minority position.
- See individuality as source of creativity rather than a nuisance. Each student bring some idiosyncrasies and uniqueness to classroom life. What teachers should do to bring this wealth of individuality to productive use so that each student will find their own strengths and what they cultivate in themselves.

CONCLUSION

Adolescence is important developmental period for developing creative inclinations and creative capabilities. In a negative sense, education should be careful not to thwart adolescents' creative potential. In a positive sense, education should create a learning climate in which explorative and innovative spirit is promoted. The function of education is not just imparting what has been known about the world but, more importantly, helping students envision new possibilities and pursue these possibilities with zeal and persistence, for the well-being of the society they live in as well as for themselves.

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