

# **A Model for the Enhancement of Creative Thinking Targeting Students Enrolled in Higher Education Programs of Agriculture**

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## **Abstract**

The purpose of this theoretical article is to stimulate discussion in our profession on creativity and how it relates to academic programs in higher education. Due to a dearth of research in an agricultural or natural resources context, it is hypothesized that faculty are unclear on how to design instruction to enhance creativity and encourage creative thinking on the part of our students. After a detailed review of the literature on creative thinking, the authors present a definition of creativity and examine specific variables that influence creativity. A model of the creative thinking process is proposed for the purpose of serving as a cognitive map for faculty as we seek to unleash the creative potential of students. In conclusion, the authors encourage further discussion on the creative potential in higher education, and recommended that agricultural faculty in higher education use this article as a foundation to develop a more creative learning environment.

## Introduction

Higher education is faced with the challenge of making the educational experience relevant to the needs of society as well as maximizing the use of the talents of its stakeholders. According to Boyer (1990):

What we are faced with, today, is the need to clarify campus missions and relate the work of the academy more directly to the realities of contemporary life. We need especially to ask how institutional diversity can be strengthened and how the rich array of faculty talent in our colleges and universities might more effectively be used and continuously renewed. (p.13)

The W. K. Kellogg Foundation (1999) indicated that to reinvent and reenergize the role of universities, there is a need to create and implement a vision in collaboration with the community. In this atmosphere of team building and problem solving, the university can better promote diversity and serve the needs of society, as well as maximize the talent of its stakeholders.

This brings up a series of questions. How are educators to proceed with implementing this visioning process? Are there certain activities that enhance this process? What are the key attributes that need to be utilized? Are there certain steps? If so, how can they be utilized? The need to be creative is central to the visioning process.

In 1993, Torrance asserted that creativity is one of the essential elements that will enable universities to create this vision. He stated:

No educational reform can succeed and endure unless it is supported by appropriate retooling in the form of methods, instructional materials, assessment procedures, and statements of objectives. This is true in educational reform that requires creativity or is based in part on research. (p.158)

This retooling must be achieved in a manner that promotes and enhances creativity, teamwork, and problem solving abilities of the university in collaboration with the community.

One of the challenges that confronts higher education is the need to examine the multiple realities of its clientele. Freire and Macedo (1998) stated: "In part the exclusion of social, cultural, and political dimensions from learning and practices gives rise to an ideology of cultural reproduction that produces teachers who are de-skilled and acritical, without much independent thought" (p. 3). If higher education is to promote creativity it must reflect upon the realities (of its clientele), discuss how these realities can be utilized to enhance creativity, as well as engage in activities that encourage creativity.

## **Purpose/Methods/Procedures**

The purpose of this theoretical paper is to explore creativity as it relates to higher education programs. In an attempt to accomplish this purpose, the researchers will investigate the meaning of creativity and propose a model of the creative thinking process that can serve as a cognitive map to faculty and stakeholders as they plan for the future and seek to improve instruction. The methods and data sources of this scholarly pursuit involve an in-depth literature review of the creative thinking literature.

## **Findings**

Creativity is a complex construct and is most commonly expressed through a broad range of intelligences including linguistic, musical, mathematical, spatial, kinesthetic, interpersonal, and perhaps even intrapersonal (Gardner, 1985). In a classic study of creativity, Taylor (1959) proposed the existence of five typologies for creativity. These were expressive, productive, inventive, innovative, and emergentive.

Expressive creativity is the type of spontaneous creativity often seen in children and is exemplified in drawings and play. Productive creativity is illustrated by scientists and artists. An element of spontaneous production remains, yet is characterized by the need to create rather than being restricted by the need to express. The third classification is inventive creativity that may be described as a problem solving or a creation to improve an existing technology. An example would be an engine invented to make farm tractors more fuel-efficient. Innovative creativity deals with the capacity to improve or reinvent an existing organism or object through the utilization of conceptualization skills. An example is the recent movement to reinvent government, in which the existing governmental structure was redefined through reconceptualization. The final type of creative skill is emergentive. It is a new creation opening an entirely new paradigm. An example is the interventions of chemical fertilizers, insecticides, and hybrid seeds that helped to launch the Green Revolution. Emergentive creativity is a discovery that opens an explosion of ideas in a synergetic fashion (Taylor, 1959).

In an operationally problem-oriented definition, Torrance (1966) defined creativity as:

A process of becoming sensitive to a problem, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypothesis about these deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results. (p. 6)

Figure 1 presents forces and factors in the creative thinking process model. This model is one cycle that consists of three distinct phases: (1) an initial catalyst; (2) a gestation period; and (3) a problem solution and verification phase. In one's reality, any problem experienced in his/her livelihood system or expressive creative "seed" could serve as an initial catalyst (Wells, 1984). After the initial catalyst, there is a gestation period where

one begins to delineate the problem that he/she wishes to solve. Finally, there is a problem solution and verification process in which the individual comes up with a proposed resolution or creation which he or she then tests (Wells, 1984).

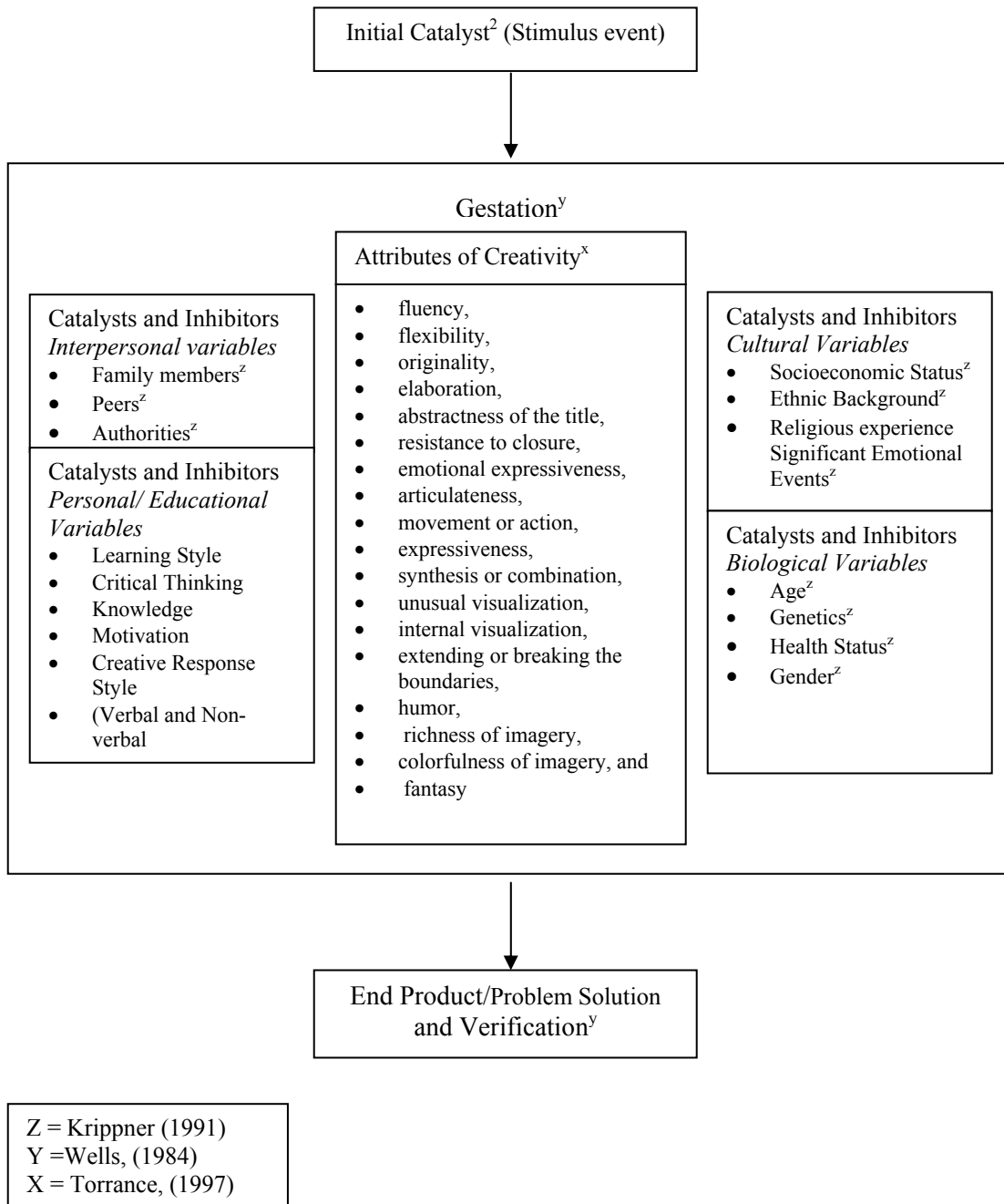


Figure 1. Creative thinking process model

The gestation phase includes four groups of often overlapping catalysts/inhibitors of creativity. These are encountered throughout life and either stimulate and/or limit one's capacity to be creative. The first group of catalysts and inhibitors of creativity consists of interpersonal variables that Krippner (1991) defined as family, peers, and authorities. These relationships help to shape the cognitive, behavioral, and attitudinal components of attitudes and are seen as catalysts and/or inhibitors depending on the manner in which they impact the individual.

Wright (1987) listed the factors that influence a creative home environment as "respect for the child, the stimulation of independence and enriched learning environment" (p. 34). Pratt-Summers (1989) found similar results to the one described above. Jausovoc (1988) and Dorner (1979) discovered that the teacher's teaching style (based on Piagetian cognitive theory: exercise training, tactical training, and strategic training) was related to the development of creativity in students. These results support the notion that interpersonal variables are important catalysts and/or inhibitors of creativity.

The second group of catalysts and inhibitors consists of biological variables such as age, genetics, health status, and gender (Krippner, 1991). The majority of the research has been concentrated on gender and birth order. There is not a consensus on the impact of gender upon creativity. Torrance (1983) wrote, "A substantial body of evidence indicates that males and females perform at similar levels of tests designed to measure creative potential" (p. 134). He found that girls did not perceive themselves to be inventors and were largely influenced by their environment. Harriss (1989) found that women were discouraged from becoming artists. Torrance and Allioti (1969) discovered that 13-year-old girls had higher verbal creative ability compared to boys of the same age. Gupta (1979) did not find that there was a significant difference between boys and girls in verbal creative ability, but found that there were distinct elements of non-verbal ability in which each scored significantly higher. The research on the impact of birth order has detected that first-born males and females scored significantly higher on creativity tests than the second born (Comeau, 1980; Jaraial, 1985). The unique contribution of age, genetics, and health status to creativity is unclear.

The third catalysts/inhibitors group is cultural variables. Krippner (1991) defined these as socio-economic status, ethnic background, religious experience, and significant emotional events. There is a wealth of research to support the connection between socioeconomic status and creativity (Forman, 1979; Cicirelli, 1966; Singh, 1970; Kaltounis, 1974; and Torrance, 1963). The exception to this was discovered by Warden and Pratt (1971), who found no division in creativity between any ethnic or social class.

Cultural background was found to have an impact upon creativity of individuals from Japan (Torrance & Sato, 1979), India (Sharma & Naruka, 1983; Torrance, 1981), the United States, Western Australia, Western Samoa, Germany, (Torrance, 1981) and the Dominican Republic (Baker, Rudd, & Pomeroy, 2000). Sharma and Naruka (1983) found a creative difference between the Hindu, Muslim, and Christian religious groups in India.

Torrance (1986) suggested the way that significant emotional events may affect creative expression when he wrote: "apparently, an intense emotional experience sets up a need for creative expression and actually facilitates the creative expression" (p. 130). Significant emotional events such as divorce, death of a loved one, or personal illness often force the individual into a state of deep reflection of the core inhibitors/catalysts which influence creative attributes. Significant emotional events at the societal level such as war, famine, or political instability can also influence individuals. Torrance (1986) reviewed events such as the Challenger accident and then discussed the outpouring of drawings, poems, etc. Similar events have been recently witnessed in regard to the tragic death of John F. Kennedy, Jr.

The final group of catalysts and inhibitors consists of personal attributes/educational factors. These include learning style, critical thinking, knowledge, motivation, creative response style, and educational setting. Isaacs (1987) examined the importance of learning style and its impact on creativity when she stated:

In some ways creativity is as delicate as the very breath of life. It can be nurtured and expended, or starved and diminished. Thus understanding and applying findings from learning style study is as important for sustaining creativity as for stimulating academic achievement. (p.257)

Understanding the manner in which the individual learns facilitates academic achievement and can lead to an environment that enhances creativity.

In discussing the impact of knowledge on creativity, Sternberg and Luppatt (1991) made the distinction between knowledge and usable knowledge. They stated: "knowledge can be learned in a way that makes it inert" (p. 610). These researchers felt that students have often been taught information without understanding its application. They stressed the importance of usable knowledge when they stated: "if we want students to be creative, we have to model creativity for them, and we won't be able to do that if we seek to turn students' minds into safe-deposit boxes in which to store our assorted and often indigestible bits of knowledge" (p. 611). Learner construction of knowledge is an important element for the development of creativity.

Sternberg and Luppatt (1991), when discussing the importance of motivation, identified two key types: intrinsic motivation and the motivation to excel. Intrinsic motivation was seen as an important element because students are much more likely to be creative if they enjoy what they are doing. Motivation to excel has been emphasized because these individuals are willing to work for creative excellence.

Gelade (1995) and Haley (1983) proposed the idea of creative response styles. Haley (1983) defined three types of creative styles - verbal, kinetic, and integrative - in response to an open-ended problem. The verbal style used words and sounds in its expression. An example of this style would be a child that writes a poem. Haley (1983) stated that: "demonstrating problem solution defines a kinetic mode" (p. 25). The use of both verbal and kinetic styles demonstrates an integrative creative response style. Haley (1983)

reported that kinetic style was associated with socio-economic status. Middle- and upper-class learners used more kinetic responses, while lower-class learners used more verbal responses.

In the book *The Nature of Creativity* (1997) Torrance reviewed experiments that examined the effects of educational setting upon creativity. The majority of the research (Boersman & O'Bryan, 1968; Moham, 1970; Hooper & Powell, 1971; Nash, 1971; Ward, 1969; Norton, 1971; Khatena, 1971; Kogan & Morgan, 1969) found that there was a difference in creativity when the school environment (testing conditions, cue rich and cue poor, etc.) was manipulated. These findings were in contrast to studies by Allioti (1969) and Towell (1972), who did not find any differences in creativity based upon changes in educational environments.

The core of the gestation phase of the creative process model are the creative attributes referred to by Torrance, Orlow, and Safter (1990) as creative thinking abilities. These creative attributes were fluency, flexibility, originality, elaboration, abstractness of the title, resistance to closure, emotional expressiveness, articulateness, movement or action, expressiveness, synthesis or combination, unusual visualization, internal visualization, extending or breaking the boundaries, humor, richness of imagery, colorfulness of imagery, and fantasy. The Torrance Test of Creative Thinking (TTCT) is an instrument that can be used to operationalize these creative attributes. According to Torrance et al. (1990):

The term "creative thinking abilities" as used in the TTCT, refers to that constellation of generalized mental abilities that is commonly presumed to be brought into play in creative achievements. . . The author has maintained that high degrees of the abilities measured by tests such as the TTCT increase the chances that the possessor will behave creatively. Certainly, the author of these tests would never argue that possession of these abilities guarantees that an individual will behave creatively, any more than a high degree of intelligence guarantees intelligent behavior. . . Creative motivations and skills, as well as abilities, are necessary for adult creative achievement. (p. 1)

This process may or may not be linear. Each iteration is different in time and shape, depending on its interaction with the other catalysts and inhibitors described in the model. It is even possible that a full iteration may not be completed because of factors such as motivation.

The final phase of this model results in an end product and verification of creativity that is expressive in problem solution and verification for the typologies (of creativity) proposed by Taylor (1958). However, it is important to point out that there is a very important time dimension to creativity. The time dimension is influenced by the perceived importance of the problem, as well as the motivation, support, and resources available for problem resolution. Wells (1984) suggested that the creative process involved four steps (initial catalyst, gestation, problem solution, and verification) and would take place over a period of time. The authors propose that creativity is directly

correlated to the availability of time, motivation, support, and resources. The steps are repeated in iterations as the individual attempts to solve the problem and/or utilize the stimuli. This process may or may not be linear. Each iteration is different in time and shape, depending on its interaction with the other catalysts and inhibitors described in the model. Often a full iteration may not be completed because of factors such as low motivation.

### **Conclusions/Recommendations**

It is the desire of the authors to stimulate further discussion, thought, and scholarship on the creative potential in higher education. The W. K. Kellogg Foundation (1999) warned that "higher education is no longer the leader in society that most higher education personnel think it is" (p.1). The authors suggest that agricultural faculty in higher education programs utilize the contents of this article as a foundation for the encouragement of a "creative" dialogue with stakeholders. Clearly, the exciting changes and opportunities that we face in agricultural education deserve our most creative thought in the strategic planning process.

In terms of instructional delivery, Freire and Macedo (1998) indicated that effective instruction is based upon the teacher's ability to think creatively. Anderson (1990) further explored the importance of creativity in higher education when he wrote:

The college experience should include an opportunity to discover one's potential and achieve higher levels of creative expression. The extent to which this happens depends on curriculum and the commitment of the faculty members to nurture this development both inside and outside of the classroom. The learning environment as reflected by the classroom and campus setting, supportive extra-curricular and the advisor/ student relationship all impact the total educational mission of developing creativity. (p. 55)

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# **A Model for the Enhancement of Creative Thinking Targeting Students Enrolled in Higher Education Programs of Agriculture**

## **A Critique**

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Contribution and Significance of Research: The purpose of this theoretical paper was to explore creativity as it relates to higher education programs. Be creative. A simple instruction that many agricultural educators may find intimidating if asked of them, but often times those same educators have no qualms about asking their students to “be creative” when assigning projects, reports or papers. What exactly does “be creative” mean for our students, if we have trouble understanding it ourselves? Finally, we have an exposé on the subject that may help increase the collective creativity component of the agricultural education profession. Creativity is one of the topics that is rarely discussed in-depth and has been glossed over in many agricultural education subjects. From this research, it would appear that the inclusion of creativity, as a practical application of the teaching and learning process, is something all educators should be doing in their classrooms. I am hopeful that all colleagues will read this particular paper and allow themselves to employ the creative thinking process in their classrooms. Thinking creatively is a difficult task for students; it is much more difficult than asking them to memorize a deluge of facts and figures, which they “might” need to know in the future. Asking students to think creatively, is asking them to become active participants in the problem solving process.

Procedural Matters: The authors should be commended for compiling an exhaustive search of the literature, deducing common themes from various philosophical tenets, and proposing a model that has the potential to change the teaching and learning processes in agricultural education.

Questions for Consideration: Time is on my mind. How can the professoriate find meaningful ways to incorporate the creative thinking process into their curricula? Often times, faculty members find themselves working under the constraints of teaching duties in several classes, conducting research studies, writing grants, advising students, and serving on yet another well-intentioned committee. Despite noble efforts, the creative thinking process may lose its importance in the teaching process when faculty members are facing a myriad of other pressing matters. The creative thinking process is not an easy task and requires time for deep, reflective, uninterrupted thought. As shown in this study, many types of creative thought are possible, but may not be achievable if too much interference is experienced by the person wishing for the creative process. Even faculty members need time to think creatively. I believe it is unfair to ask students to think creatively, if we cannot consistently exhibit the same type of thinking patterns. It’s akin to asking students to write essay answers at the higher order of knowledge, when the questions are written at the lower levels of comprehension. These incongruent practices lead to undesirable outcomes for both students and professor. What is the best approach

for including the creative thinking process in agricultural education courses? What assistance is available to those wanting to incorporate this process, but have become accustomed to subject matter-oriented approaches to teaching?