

Creative and Critical Thinking: Assessing the Foundations of a Liberal Arts Education

The Five Colleges of Ohio

Introduction

Enhancing one's creative abilities has long been a tacit assumption underlying liberal education, and liberal arts colleges pride themselves on producing creative thinkers, those who can draw on the breadth and depth of their curricular experiences to solve problems and produce innovative solutions. This mission, not unexpectedly, is inextricably linked to economic enterprise. David Kearns, in his introduction to Dennis Doyle's *Reclaiming the Legacy: In Defense of Liberal Education*, reminds us "that the real challenge of today's economy is not in making things but in producing creative ideas. Today, the race goes not just to the swift, but to the inventive, the resourceful, the curious." In other words, in an ever-increasingly competitive (one might even say hostile) environment, liberal arts institutions need to know and understand their strengths in order to remain viable. But little research exists to help educators and students determine exactly what is meant by creative thinking in the undergraduate classroom – let alone methods by which we can promote and evaluate the success of such thinking. Some even hypothesize that, ironically, general and field specific undergraduate education works effectively quashes creativity. That which is so often emphasized in elementary curriculums is systematically wiped out by college prep high school course work and then swiftly eradicated by discipline specific training at the post-secondary levels.

Yet we surmise that most post-secondary instructors recognize the reality of creative thinking in our own research and teaching – and value that same reality for our students.

The field of psychology has only embraced the serious study of creativity since 1950 when J.P. Guilford, president of American Psychological Association, challenged his colleagues to accept that task. Much of the literature prior to that date situated the study of creativity as the provenance of philosophy, mysticism, and spirituality. As a result, creativity research has been beset with the belief that the source of creativity resides in the divine, the “mad,” the specially gifted – that “Ah-Hah” or “Eureka” moment generated from the unknowable, the magical, or the bizarre. Within the last sixty-some years, however, psychologists have focused creativity research on systems theories that identify stages of unilinear development and on readily identifiable criteria or variables of creativity across and within specific fields. While still hampered by problems defining creativity and creative thinking as well as narrow visions of creativity that inappropriately generalize human behavior outside the sociocultural context (Sternberg 1999, 12), this redirection has foregrounded cognitive, affective, and environmental factors that demystify creativity. In other words, all individuals can think creatively and produce creative products, at least in some capacity. Creativity is not the sole province of genius and the gifted.

Psychometrics has not yet provided a reliable standardized test for creativity – and perhaps never will. Nonetheless creativity is no longer the sole property of the Einsteins, Van Goghs, Curies, and Dickinsons of the world. It is a quality inherent in greater or lesser degrees in all human beings, one necessary for a successful life and a

vibrant culture.

Much of this work led some psychologists and educators in the late sixties and early seventies to predict a transformation of higher education. Perhaps most hopeful was psychologist Paul Torrance (1915-2003), the creator of the Torrance Tests for Creative Thinking, who in a 1969 ERIC report acknowledged that “research on creativity has had virtually no impact on higher education except in rare instances,” but he envisioned an imminently brighter future: “the chances are good that this will change in the 1970s.” Using language that sounds eerily like that coming from contemporary business and education leaders, Torrance concluded that “[s]tudents want to acquire creative problem-solving skills, and colleges and universities can no longer afford to ignore the needs of their creative, and, possibly, most productive students,” especially when doing so disadvantages minorities. (unpaginated document resume).

There are a few exceptions, such as Tufts University, which in 2007 piloted an optional creativity essay for applicants. In 2010, they added the option of allowing a student to submit an object made out of paper (“Use an 8.5 x 11 inch sheet of paper to create something,” they instruct the applicant. “You can blueprint your future home, create a new product, draw a cartoon strip, design a costume or a theatrical set, compose a score, or do something entirely different. Let your imagination wander.”) or a YouTube video “that says something about you.” Among other options, students can write a short story using one of the following titles: House of Cards, The Poor Sport, Drama at the Prom, Election Night 2044, or The Getaway (Tufts Supplemental Form for the class entering Fall 2010; <http://admissions.tufts.edu/downloads/TuftsSupplement.pdf>). Some colleges and

universities include creativity in their mission statements. The mission of Yale College, for instance, “is to seek exceptionally promising students of all backgrounds from across the nation and around the world and to educate them, through mental discipline and social experience, to develop their intellectual, moral, civic, and *creative capacities* to the fullest.” Hofstra’s College of Liberal Arts and Sciences “is dedicated to the genesis of knowledge and *creative works* in the Humanities, Natural Sciences, and Social Sciences,” and Texas A&M University is “dedicated to the discovery, development, communication, and application of knowledge in a wide range of academic and professional fields. Its mission of providing the highest quality undergraduate and graduate programs is inseparable from its mission of developing new understandings *through research and creativity*. More recently, the AAC&U’s VALUE project to develop rubrics to assess undergraduate learning skills introduced a rubric to assess creativity (Teagle Project faculty participated in the construction of this rubric.).

Unfortunately, despite the rhetoric, and as the research record in higher education testifies in absentia, little has changed in terms of institutions of higher education embracing and acting on creative thinking as a graduation requirement and as a legitimate pedagogical focus across the liberal arts curriculum. It was because of this vacuum – and genuine faculty interest in integrating creativity into the liberal arts classroom – that the Five Colleges of Ohio (Oberlin College, Kenyon College, The College of Wooster, Denison University, and Ohio Wesleyan University) pursued, with the support of the Teagle Foundation, a three-year project focused on developing tools to assess two fundamental and related outcomes of a liberal arts education: creative thinking and critical thinking. Consequently,

educators now have a powerful body of literature with which to move creativity studies onto the campus and into the classroom – to determine how to amplify an individual’s creativity to position our students for the dynamics of the 21st century. Using primary trait analysis (PTA), this collaboration foregrounds the belief that tools designed to assess student learning in these areas will allow us to measure the distinctive educational gains that a liberal arts education provides. While our study addressed both critical and creative thinking, creative thinking quickly became the more compelling of the two since so little research to date addresses creative thinking in higher education, with the exception of the fine arts.

The Project

*“The challenge is to encourage faculty members to be experimental
in the ways they imagine student work”
– Five Colleges of Ohio faculty member*

The following four research questions guided the project:

- (1) What tools might we develop to assess fundamental and related outcomes of a liberal arts education?
- (2) Can we effectively assess development of critical and creative thinking in the classroom?
- (3) What are faculty and student perceptions of creative thinking and critical thinking?
- (4) How do student perceptions of critical and creative thinking change during their college years?

Sixty faculty members from across the disciplines participated at various stages of the project, studied research on critical and creative thinking, and developed and tested instruments to assess critical and creative thinking. Also, approximately 160 faculty members participated in focus groups and completed surveys for us, in addition to over 700 students, first years through seniors, completed surveys and participated in focus groups as part of the research.

Research Question #1 -- What tools might we develop to assess fundamental and related outcomes of a liberal arts education?

To answer Research Question #1, we developed surveys as well as focus group and individual interview protocols to determine faculty and student perceptions of critical and creative thinking.

During the first two years of the project, we constructed a generic rubric that

we piloted and refined to be used effectively across disciplines to assess a wide range of student learning activities. We spent the first two years developing this rubric. We also conducted longitudinal and cross-sectional studies across the disciplines to measure development in students' critical and creative thinking skills. The generic rubric was used to assess development of these learning goals.

At the end of our first two years, we had amassed a substantial collection of data and learned a considerable amount about our topic and ourselves. What became clear early on, creating some frustration along the way, was how widely definitions of creativity vary. Like all conscientious scholars, we knew we had to start with a working definition, but the length of the initial lists that we generated took us aback some. Consider this sampling from our work during year one:

1. Creative thinking is a cognitive activity that may result in a creative production that groups or individuals perceive as useful and new. The products may be pieces of writing such as books, essays, poems, or short stories; physical creations such as new robots, works of art, buildings, or miniature representations; new systems, theories, or conceptualizations such as quality circles, managements by objective, the wave theory of light, the self-concept theory in psychology, or the periodic theory of elements in chemistry; performances in drama, music, dance, or speech; or inventions such as automobiles, the airplane, or the automatic can opener. We call the products creative if they represent a transformation or a reconceptualization, have aesthetic coherence and appeal, represent a new configuration or connection of ideas, or serve some functional or explanatory purpose. Problem solutions have all these critical elements, plus relevance or resolution to the original

- problem. (Isaksen et al, 1993, p. 31-32)
2. Creative intelligence is involved when skills are used to create, invent, discover, imagine, suppose, or hypothesize. Creativity is one of three sets of abilities (the other are practical and analytical) that are integrated “to attain success in life, however an individual defines it, within his or her sociocultural context” (Sternberg and Grigorenko 2000).
 3. Creating involves the realization of an analogy between previously unassociated mental elements (Martindale in Sternberg 1999).
 4. “Creativity is among the most complex of human behaviors. It seems to be influenced by a wide array of developmental, social, and educational experiences, and it manifests itself in different ways in a variety of domains. The highest achievements in the arts are characterized by their creativity, as are those in the sciences. Creativity is also quite common in a wide range of everyday activities. . . Theories of creativity have attempted to recognize the inherent complexity by defining creativity as a syndrome . . . or even a complex. . . “ (Runco and Sakamoto in Sternberg 1999).
 5. Creativity is “the confluence of intrinsic motivation, domain-relevant knowledge and abilities, and creativity-relevant skills”; the latter includes coping with complexities, knowledge of problem-solving heuristics, concentration, ability to set aside problems, and high energy (Amabile 1983; Sternberg 1999).
 6. Creativity is the result of “an anomaly with a system . . . or moderate asynchronies between the individual, domain, and field . . .” (Gardner 1993).
 7. Creativity is produced by “a confluence of six distinct but interrelated

- resources: intellectual abilities, knowledge, styles of thinking, personality, motivation, and environment” (Sternberg and Lubart in Sternberg 1999).
9. Creativity is “a creative product produced by a creative person engaged in a creative process within a creative environment” (Kleinman 2005).
 10. Creativity is the exploration and transformation of conceptual spaces.
 11. Creativity is about applying the imagination to find a solution (Stella Cottrell, 2003).
 12. Creativity is “the power of the imagination to break away from perceptual set so as to restructure or structure anew ideas, thoughts, and feelings into novel and associative bonds” (Khatena & Torrance, 1973).

Over time, we learned that creativity experts have identified over 100 different definitions in the extant literature (NRC/GT vii). The number of definitions is a problem, but so too is the way in which the definitions are linguistically structured. For instance, the above list illustrates that some researchers position creativity as an activity (e.g., exploration, transformation), others as a product or thing (e.g., life skill, human behavior, result). Some define it through the interactions of its constituent parts (e.g., “creativity arises out of the tension...”; “creativity involves...”; “creativity is about. . .”; “creativity is produced by. . .”), thus speaking to creativity as a process but eliding the thing altogether. There is even apparently fundamental disagreement about the term or name itself: should we say “creativity” or “creative thinking”? The literature presents no universally accepted answer to this question.

For classroom instructors, these issues prove rather problematic, if not downright frustrating. How are we to assess creativity, or creative thinking, if we have such difficulties finding reliable (i.e., definitions accurately and consistently applicable to the classroom)? However, for creativity researchers, these apparent disparities are legitimately explained as the reflection of the different emphases upon which creativity research has evolved: researcher may use the same word, but they don't always mean the same thing.

As we came to learn, different definitions are appropriate for different contexts and different purposes. Therefore, an instructor needs to think carefully about what one wants to assess and find the most appropriate definition upon which to build his or her assessment tools. We decided to define creativity as the construction of a novel and useful product, a definition that allowed us to focus on creativity as both a human process and the culmination (product) of that process. However, we encouraged faculty participating to use whatever definitions they thought most suitable for their creation and testing of class-specific rubrics.

Complicating matters was our effort to isolate characteristics of creative thinking, taking into consideration cognitive characteristics, personality traits, and biographical/contextual factors, all of which contribute in some fashion to an individual's creative capacities and production. As Treffinger et al. note, "the relationships among these areas is complex. . . .Characteristics vary within and among people and across disciplines. No one person possesses all the characteristics nor does anyone display them all the time" (11). They also state, and this is especially relevant to our project, that many of these traits and characteristics can be taught (11).

We also encountered the recurring reality of butting up against critical thinking as we sought to identify characteristics of creativity for assessment. What we naively thought were two mutually exclusive, if not antagonistic, realities – critical thinking and creative thinking – quickly collapsed. Good creative thinking, we determined, involved critical thinking attributes; conversely, good critical thinking was in many respects good creative thinking. Certain characteristics, however, seemed to dominate one field more so than the other, while some shared common ground. For instance, synthesis and integration align smartly with both, while imagination and openness to novelty fit more smoothly with creative thinking, as evaluation and explication do with critical thinking. Ultimately, Teagle Project faculty found that multiple components of creative and critical thinking are at work throughout our students' learning processes, some emerging more predominantly at certain points than at others, depending on context and individual.

During this process, we came to identify a number of characteristics associated with creative people and products. The list below focuses on cognitive and affective skills or abilities that creativity researchers have associated with creative individuals, although there is clearly no consensus opinion that all of these must be present in a creative person or process. Some of these traits also characterize successful critical thinking, and some are distinct yet not mutually exclusive. Most of the research that speaks to these characteristics has focused on industrialized western nations and cultures. One should also take into consideration the fact that certain individuals and components may have thresholds above and below which creativity can or cannot take place; strengths in one area may balance weaknesses in others; and high levels of interactions between components can enhance creativity beyond a simple

summing equation (Sternberg 1999).

1. Idea generation – coming up with new ideas, new alternatives to solving problems, and new variations on a theme (flexibility, fluency, originality, divergent thinking).
2. Curiosity – wanting to know more about something; a desire to dig deeper into a subject; an unwillingness to settle for conventional explanations.
3. Imagination – the faculty or action of producing ideas, especially mental images of what is not present or had not been experienced; the ability to consider alternative points of views; ways of life; and beliefs both across time and across social and physical space. Imagination is also the ability to pose counterfactuals (“what ifs”), to suppose, and to reason through the implications of such alternative scenarios.
4. Reasoning by metaphor and analogy – finding homologies; recognizing common traits across otherwise dissimilar phenomena; interpreting or communicating something that is unfamiliar or ambiguous by means of comparing it to something more familiar and recognizable.
5. Elaboration – related to curiosity is the desire and ability to extend an insight, story or discovery -- to consider repercussions, to push an argument to its extremes, to “unpack” statements and observations.
6. Complexity – ability to identify and recognize non-obvious problems; question assumptions; see multiple paths of causation; consider multiple variables; formulate numerous hypotheses; recognize missing elements; tolerate ambiguity.
7. Synthesis and combination– ability to bring together disparate bits of information and facts in order to tell a coherent story or provide a logical argument; “connecting the dots;” applying knowledge and techniques from one discipline to solve or consider problems in another discipline (x-disciplinary thinking); utilizing knowledge in a different or new context.
8. Abstraction and simplification – the ability to formulate general concepts by abstracting common properties of specific instances; the ability to pose overarching “theories,” and the capacity to see the “big picture” – identify fundamentals, first principles, general structures.
9. Tolerance for ambiguity – the ability to perceive value in the highly

complex or asymmetrical.

10. Divergent Thinking – the ability to go against the grain of the usual or expected.
11. Fluency – the ability to extend an idea.
12. Flexibility – the ability to cross conceptual boundaries.
13. Concentration– the ability to disregard peripheral material and concepts in order to focus on the task or problem at hand.
14. Persistence – the ability to pursue a solution to a problem, etc., even when faced with difficulties, roadblocks, negative feedback, and other forms of resistance.
15. Entrepreneurship – the ability to go outside the approved or recognized conceptual boundaries of a situation or context in order to solve a problem or pursue an idea.
16. Intrinsic motivation – the desire to do something based on the enjoyment of the behavior itself rather than relying on or requiring external reinforcement.
17. Risk taking – the willingness to undertake a venture that may result in a loss or damage to oneself.
18. Projection/empathy – the identification with and understanding of another’s feelings, situation, or motivations.
19. Originality – creating something new and useful to a discipline, domain, or community.
20. Story telling – using spoken or written language in narrative form to make sense of something, to theorize about something, and/or communicate something to others.
21. Flow -- the automatic, effortless, yet highly focused state of consciousness when engaged in activities, often painful, risky or difficult, which stretch a person’s capacity while involving an element of novelty or discovery. Such activity can be based on the following nine elements: clear goals, immediate feedback, balance between challenges and skills, merging of action and awareness, elimination of distractions, lack of fear of failure, lack of self-consciousness, distortion of sense of time, autotelic activity (enjoyment for its own sake) (Csikszentmihalyi 1996).

As we worked with these traits over two years, we came to understand that creating a generic rubric is difficult but do-able work. The testing process was at times frustrating, but it engaged us in stimulating conversations with each other, and we were eventually able to agree upon a set of characteristics with which to construct our generic rubric (see the Appendix).

Research Question #2 – Can we effectively assess development of critical and creative thinking in the classroom?

Yes, creative and critical thinking can be assessed in students, and we found improvement of performance on many creative and critical thinking traits among the students we studied.

In the third year of the study, faculty were given the option of constructing a cross-sectional study (introductory v. advanced students) or longitudinal (pre-post within a single class). We ended up with 31 courses representing all four divisions and 444 students. Assignments varied from standard analytic papers, to fiction writing, software construction, and oral presentations. The majority were papers.

Faculty could choose to assess students on a variety of traits presented in the generic rubric because we wanted to make this part of the experiment flexible enough to represent real world application. The traits assessed most frequently across all disciplines were *original thinking* and *completeness* measured in 89 and 87% of students, respectively, followed by *disciplinary knowledge* measured in 85% of students. The traits least likely to be measured included *abstract thinking*, *logic*, and *germinal thinking*.

There were some differences across disciplines in the traits that faculty emphasized. For instance, faculty teaching in interdisciplinary courses were more likely to examine *complexity*, and they shared with fine arts faculty a greater concern for *engagement* and *risk taking*. Faculty teaching in the humanities tended to assess *explain, analyze, flexibility, and originality*. Faculty teaching in the natural sciences most frequently assessed *explain, analyze, and complete*. Finally, social science faculty tended to examine *complex, complete, original thinking, and risk taking*.

The longitudinal data that measured change in student performance across a semester revealed the following:

1. The traits that improved the most were *complete, elegance, knowledge, and engagement*;
2. *Transformational, divergent thinking, and risk-taking* were the lowest (in the 2s)
3. The students who improved their creative and critical thinking skills the most were in interdisciplinary courses.

These results were determined using correlated group t-tests. The mean scores for these were in the 3s and 4s, which means, **not to a high degree**.

We also noted change by discipline:

1. Fine Arts – the greatest change was found for *risk taking* and *flexibility*
2. Humanities – *engagement, divergent thinking, and germinal thinking*
3. Social Sciences – *completeness*
4. Natural Sciences – *integration, divergent thinking, engagement, and risk taking*

In the cross-sectional research that compared less expert students to more expert students (introductory to advanced courses), the most reliable differences

indicate that the more expert students were better at *analysis, logical thinking*, using *disciplinary knowledge, explaining*, and *synthesizing*. There was no significant difference between the groups' performance for the traits of *abstract thinking, fluency, flexibility, elegance, divergent thinking, germinal thinking*, and *risk-taking*. Again, *transformational, divergent*, and *risk-taking* scored the lowest (2s).

Research Question #3—What are faculty and student perceptions of creative thinking and critical thinking?

To address this question, we administered surveys to faculty in year two and to first-year students, sophomores, and seniors in years two and three. We had 147 faculty and 1,383 students participating. Of the students, 65.8% were women; 53.9% were first-year students; 79.8% identified as Caucasian. We included open-ended questions; we also assessed attitude and campus climate qualities with scaled responses. The campus climate traits came from research conducted by the Swedish psychologist G. Ekvall. As we reviewed the data, we found a number of items of interest. First, Students most frequently associated creative thinking with a hobby: “Engaging in a hobby” = 4.26 on a 5-point scale (creative; 5 = towards extremely creative), while “Writing papers for class” = 3.88 (moderately/creative). Note the difference with Critical Thinking: “Completing projects” = 4.35, with “Writing papers for class” = 4.62.

We also found that critical thinking was closely associated with the classroom. Seventy-two percent of our respondents said that is where it generally takes place and “writing papers for class” scored 4.62, compared to 3.72 for creative thinking. However, students rated “class projects,” such as performances, role-playing,

creating films and class publications, etc., as important in facilitating both creative and critical thinking.

Interestingly, although perhaps not surprisingly, female students reported more experience with both creative and critical thinking and more positive attitudes about creativity compared to male students.

To distinguish growth in creative thinking, faculty identified *novelty*, *risk*, and *curiosity*. *Synthesis* and *complexity of thought* characterized growth in both critical and creative thinking.

With respect to characteristics associated with a creative environment, students and faculty perceived a fairly high degree of *challenge* (the emotional involvement of the members of the institution in its operations and goals) and *freedom* (independent behavior), although not “extensively” present, which was the highest ranking possible. Both groups rated slightly lower the traits of *conflict* (presence of personal and emotional tensions in the institution) and *risk taking* (acting swiftly, taking advantage of opportunities, preferring experimentation to analysis), finding them to be “moderately extensive” on our campuses. Generally, faculty rated most of these characteristics that promote creative thinking as less prevalent than did the students. No trait received a score of 6 or 7 or of 1, 2, or 3. So basically, the data say that these traits are “moderately” to “much extensive.”

Regarding barriers to creative thinking, 34% of the students found no barriers, while 38% found pedagogy to be the barrier (at Wooster, it was 41%, the highest of the four schools). Faculty most often wrote about lack of time as a barrier, but this was only 18%. Almost 75% of our students think that diversity promotes creativity and 54% think that technology promotes it (but not surfing the internet or using

Facebook).

However, all groups showed positive attitudes towards creative and critical thinking. When the groups differed in responses it was generally the faculty, and sometimes the senior students, whose responses were more tempered or negative. Faculty most often considered their own research to be the site of their most creative experiences – 61%, while 32% identified teaching as their most creative. Faculty were also the group least likely to believe that the college provides time and space for creativity, that there is a “creative vibe” on campus, and that the higher education system facilitates creative thinking.

Students had fairly stereotypical views of the disciplines in that they rated critical thinking to be most involved in the natural sciences, followed by social sciences, humanities, and fine arts; and creative thinking to be most prevalent in fine arts, followed by humanities, social sciences, and natural sciences. However, faculty in these disciplines rated creative thinking as very important to their disciplines.

Research Question #4—How do student perceptions of critical and creative thinking change during their college years?

Our survey responses revealed that first-year students tended to see more possibilities for creative thinking campus-wide (everywhere) than did sophomores – 22% compared to 15%. Students generally did not perceive reading assignments for class to involve creative thinking, with seniors rating this lower than did sophomore and first-year students. Seniors, in contrast to sophomores and first-year students, were more likely to report (1) writing papers that required integration and (2) putting together ideas across courses. Seniors also rated characteristics of a creative campus environment somewhat lower than did sophomores and first-year students. The

ratings for “freedom” were lowest for the seniors. However, it was heartening to find that as students progress through the curriculum, their belief that creativity can be taught increases.

Inter-institutional Comparisons

With respect to Creative Thinking Attitudes, The College of Wooster students rated highest the following claims:

1. The senior project, thesis, or independent study at this college allows students to think creatively or to be creative in ways they would otherwise not be able (6.27 = agree moderately; 6.31 for critical thinking).
2. The college values my efforts to be creative (5.75 = agree slightly/moderately).

They also found their campus to have more freedom than did students on the other campuses.

Kenyon College students, however, rated highest for these claims:

1. Courses on our campus encourage creativity (5.24 = agree slightly)
2. Extracurriculars encourage creativity (5.52 = agree slightly)
3. I value creativity (6.54)
4. There is a creative vibe on campus (5.76)
5. A liberal arts education is conducive to the development of creativity (6.14)
6. “I let go” and have fun intellectually (4.35 = often)

Across all four campuses students said that they often did the following: Wanted to read more, Used brainstorming in class and in an assignment and outside of class, Worked on a paper that required integration (this was close to Very Often), Let go intellectually and had fun, Engaged in abstract thinking, Combined ideas from

different courses, Used a story or metaphor or visual in a class assignment, and Incorporated diverse viewpoints.

Faculty Findings Regarding Pedagogy

We also spent a large part of our third year exploring faculty perspectives on pedagogies that foster creative thinking. Long interviews with third-year faculty participants revealed the following thoughts on the types of pedagogy that best promote creative thinking:

1. “Active learning” techniques that facilitate student engagement with course material, particularly through application of theory;
2. Connecting material inside the classroom with the “real world” outside of the classroom;
3. Engaging students in interdisciplinary work – forging disciplinary knowledge, connections and synthesis. This can be through an engaging question, such as “What does it smell like in 14th-century Florence?”; and
4. Discussing with students a more complex understanding of what creative thinking processes and products look like within a discipline.

Post Year-Three

At the end of the initial three-year grant period, project leaders suggested that faculty would find useful a collection of essays written by Teagle project participants and focused on the integration of theory and practice. To pursue the book project, we petitioned the Teagle Foundation for an extension to April 2010 to compile and publish such a collection. We were granted the extension. We then succeeded in

soliciting seven faculty members to submit essays, but unfortunately only four submitted essays that we deemed worthy of publication. We were left with no time to find additional project participants, since the writing of the kinds of essays that we sought would take at least an additional year. Consequently, we informed the Teagle Foundation that that part of the project would not come to fruition.

During the extension period, we also spent a small amount of funding to present our research findings at an AAC&U conference and an addition small amount to support an assessment event for College Wooster faculty interested in discussing the integration of creativity assessment into the college's educational program.

Conclusion

1. Divergent Thinking, Risk-taking, and Imagination are frequently cited in the literature as key characteristics of creative thinking, but faculty did not assess for these very often. We should, especially if we're serious about teaching and nurturing creative thinking in our classroom.
2. We need to know more about male and minority student perceptions of creative and critical thinking.
3. We need to know a lot more about how technology and diversity can and do promote creative thinking, if they actually do.
3. The disparity between our students' perceptions of the classroom as a relatively noncreative zone compared to other spaces disturbs us. Can this gap be narrowed by more explicit teaching about what constitutes creative thinking? Can we do more to connect the classrooms to other creative spaces on campus?
4. All of our institutions must seriously consider a turn to interdisciplinarity, since our findings reveal that it can be a powerful pedagogical approach. But how can we do it effectively on campuses such as ours? True interdisciplinary pedagogy remains resource intensive.
5. Faculty should be encouraged to pursue scholarly projects, such as the post-third-year book project, to disseminate their experiences with creative pedagogy and assessment. There remains a real need for a scholarly text that lucidly informs higher education faculty across disciplines about how to promote creative thinking.

APPENDIX

Generic Critical and Creative Thinking Rubric

The product exhibits evidence of the following traits, some of which characterize the quality of the finished product, some the process by which the product was created, and some the person who created the product.

You do not have to assess your students' work for all of these traits. Simply choose the ones that best fit your assignment.

1. Elements of Argumentation:

Explanation – stating the results of one's reasoning; justifying that reasoning in terms of the evidential, conceptual, methodological, criteriological and contextual considerations upon which the results were based.

Analysis – identifying the intended and actual relationships among statements, questions, concepts, descriptions or other forms of representation. Can include defining, cause and effect, as well as comparing and contrasting.

Evaluation — assessing the credibility and logical strength of statements or other representations that are accounts or descriptions of a person's perception, experience, situation, judgment, belief, or opinion.

Interpretation — comprehending and expressing the meaning or significance of something, such as experiences, situations, data, events, judgments, conventions, beliefs, rules, procedures or criteria.

Logic – following the accepted and understood rules for the discipline.

2. Domain and Disciplinary Knowledge — drawing upon relevant literature, methods, insights to construct the product.

3. Synthesis and Connections — combining unlike or distinctly different elements in order to tell a coherent story, provide a logical argument or insightful vision, or create a useful object.

4. Abstract Thinking — formulating general concepts by identifying common properties of specific instances; posing overarching “theories” and seeing the “big picture” – identifying fundamentals, first principles, general structures.

5. Complexity of Thought — using many elements at one or more levels, such as questioning assumptions, revealing multiple paths of causation,

considering multiple variables, recognizing missing elements, and being tolerant of ambiguity.

6. Ideas Generated — producing alternatives to solving problems, variations on a theme.

- a. Fluency — the ability to extend an idea (number of)
- b. Flexibility — the ability to cross conceptual boundaries

7. Completeness/Coherence — being logically or aesthetically consistent with all separate parts fitting together to form a harmonious or credible whole.

8. Elegance — presenting the product in a refined, understated way.

9. Divergent Thinking — going against the grain of the usual or expected in a useful way, not perversely or solipsistically.

10. Novelty or Uniqueness (of Idea, Claim, Question, Form) — newness in terms of new processes, techniques, materials, concepts used; effects on future creative products.

- a. Germinal — likely to suggest additional future creative products, etc.
- b. Original — unusual or infrequently seen in a universe of products made by people with similar experience and training.
- c. Transformational — an existing idea has been transformed via application in a new way or in a new context

11. Engagement — degree of attraction to, curiosity about, devotion to, or ownership of the task at hand.

12. Risk Taking — the willingness to undertake a venture that may result in a loss or damage to oneself.

Rating Scale Description

Each of the above is scored with a six-point scale as follows:

- 6 = Trait is evident to an exceptionally high degree
- 5 = Trait is evident to a high degree
- 4 = Trait is evident to an intermediate degree
- 3 = Trait is somewhat evident
- 2 = Trait is barely evident

1 = Trait is not evident

Creative Climate Characteristics

Rate to what extent the following characteristics exist on your campus.

1. Challenge (the emotional involvement of members in the organization and its operations and goals)
2. Freedom (the independence in behavior exerted by the people in the organization)
3. Idea Support (the way new ideas are treated)
4. Trust/Openness (emotional safety in relationships)
5. Dynamism/Liveliness (the eventfulness in the life of an organization)
6. Playfulness/Humor (the spontaneity and ease that is displayed)
7. Debate (the occurrence of encounters and clashes between viewpoints, ideas and differing experiences and knowledge)
8. Risk Taking (the tolerance of uncertainty exposed in the organization)
9. Idea Time (the amount of time people can and do use for elaborating new ideas)
10. Conflict (the presence of personal and emotional tensions, in contrast to the idea tensions in the debate dimension)
11. Supportive Environment (the socio-cultural context that provides opportunities for creativity and encourages as well as rewards such activities)
12. Working in groups
13. Active models of creative thinking and acting
14. Assignments that encourage independent problem-solving and risk-taking

Note: All of these, except nos. 12-13, come from Buffalo State University's Creative Environment Checklist

Rating Scale:

1 = not at all

2 = very little

3 = little

4 = moderately extensive

5 = much
6 = very much
7 = extensively

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