



Structuring Education to Encourage Creativity and Innovation

The Catalysts for Enterprise Development at the Confluence
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Abstract.

This paper analyzes creativity and innovation as methods of promoting entrepreneurship. Modern formal educational systems are not equipped to handle the environment necessary to foster creativity and innovation. A method to cope with this is to use the surrounding community to supply students with unique perspectives and experiential learning. It was found that creativity cannot be taught as it is intrinsic similar to an emotional attribute. Innovation, on the other hand, can be taught, as it is a capability based on ones critical thinking skills.

Keywords: Creativity, education, entrepreneurship, ideas, innovation, service learning.

Binghamton Keywords: Civic engagement, entrepreneurship across the curriculum.

I. INTRODUCTION

Two of the most important aspects of human capital are creativity and innovation. These attributes are necessary for bringing about the success of a single company or an entire economy.

By definition, creativity is the ability to transcend traditional ideas, rules, patterns, relationships, or the like, and to create meaningful new ideas, forms, methods, interpretations, etc. and the definition of innovation is, the act of innovating; introduction of new things or methods. It is the actual act of taking an idea and fashioning something out of it. The major difference between creativity and innovation is creativity is the ability to come up with the actual idea; while innovation is the ability

to implement it. Scientists and researchers have examined what influences creativity and how to measure it.

...Creativity is influenced by multiple factors, such as those associated with personality, cognition, motivation, and environment. The creative cognition approach suggests that creativity is built on one's existing knowledge (Amabile, 1998; Lubart, 2000-2001; Santanen, Briggs, & Vreede, 2000). In other words, something cannot be created from nothing (*Zeng, Proctor, & Salvendy 508*).

Scientists have attempted to measure creativity, the most used method being the Torrance Test for Creative Thinking. This test uses visual based exercises to test five different mental characteristics: fluency, resistance to premature closure, elaboration, abstractness of titles, and originality. Jonathan Plucker of Indiana University analyzed the predictability of the Torrance test and found that "the correlation to lifetime creative accomplishment was more than three times stronger for childhood creativity than childhood IQ" meaning that creativity is three times more likely an indicator for innovation and success than intelligence (Bronson and Merryman). Another faculty member from the same university, took a sample of over 300,000 Torrance test scores and found that since 1990 the amount of creativity has been on a downward sloping trend (Bronson and Merryman).

A important component of creativity is divergent thinking. It is the ability to formulate multiple solutions to a situation or problem. A study done, by George Land and Beth Jarman, that tested divergent thinking found that 98% children of the ages 3-5 scored at genius level. These same children were tested five years later and only 32% of them got genius level. At the ages of 13-15, only 10% still were able to get genius level. The researchers also tested a large group of adults over the age of 25 and only 2% were able to get to genius level of divergent thinking (Roland). This conforms to the downward trend of creativity.

Recently, much focus has been on how, if at all possible, to incorporate creativity and innovation into education. One must first understand the current methods used by the general educational systems and its effectiveness in increasing creativity and innovation.

A. Education

The length of time students spend in formal education has increased over the years. While a high school diploma used to be sufficient qualification to get a job, today, a four year undergraduate degree is often required. Some students are finding it necessary to attend graduate school or even post-graduate. Formal education has also expanded to encompass the other end of the continuum with preschools opening up to very young ages. With this increase in preparation, one would think that today's students would be more prepared than the previous generation. Instead students are lacking necessary skills after graduation. A study done in 2006 by the Conference Board and other organizations found that the number of people entering the working force from high school was 42.4% deficient in areas such as communication, critical thinking, and leadership. In the case of graduates of two and four year college

programs, 10.8% and 8.7% were found deficient, respectively (The Conference Board et al. 2). The study also showed for two- and four-year college graduates, creativity were among the top five applied skills found deficient. Clearly, there is a significant gap in deficiency between adults entering the workforce after high school and after college but it is not too alarming since college, the problem seem to be resolved for the most part. However, a recent study done on skill development in college showed that the first two years of college are not getting utilized. According to a recently researched publication analyzing the success of more than 2,300 undergraduates at twenty-four institutions:

45 percent of these students demonstrate no significant improvement in a range of skills—including critical thinking, complex reasoning, and writing—during their first two years of college. 36 percent of students "did not demonstrate any significant improvement in learning" over four years of college. Those students who do show improvements tend to show only modest improvements. ... A student who entered college in the 50th percentile of students in his or her cohort would move up to the 68th percentile four years later -- but that's the 68th percentile of a new group of freshmen who haven't experienced any college learning (Arum & Roksa).

The researchers' explanation for this lack of improvement in critical thinking, which is a large part of innovation, is the lack of rigor in today's educational systems. One must question what kind of rigor that would actually be beneficial. To simply increase the amount of assignments and homework would be shortsighted. Undoubtedly, if one increases the amount of required homework, such as the number of papers per class, the students will improve only in that skill namely, that of writing large quantities of papers. The content and quality of those papers will most likely not improve at the same rate, if at all. If innovation is the end goal, then the content and relevancy of the assignments are what matters. A business student assigned a forty-page report about worms would vastly improve that student's writing ability but little else than that.

However, if the student was working on a written report for a local agriculture organization and the assignment was about developing a new method of growing and marketing worms, this would be a different story, especially if the student had the time to adequately research and analyze the possibilities. In other words, the students have the opportunity to get their hands dirty. It is one thing to be forced to work hard; it is another to willingly work hard of one's own accord.

According to Bloom's Taxonomy, there are six skills in the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation. Knowledge can be facts, terms, or details—Generally speaking basic concepts. Comprehension is the understanding of facts by interpretation and visible demonstration. Application is making use of the newly acquired knowledge to apply to more general situations. Analysis is the ability to dissect the acquired knowledge and break it apart to understand the cause or objective. Synthesis is the ability to create something new upon previous knowledge and experiences. It is this skill that people most often term with creative ability. Finally evaluation, the highest level of Bloom's Taxonomy, is when people can make independent decisions beyond what others have

expressed or imparted. Unfortunately, most educational systems focus on the basic skills knowledge, comprehension, and sometimes application. It is much easier to provide a test on rote memorization of facts than it is to promote synthesis and evaluation of projects with no clear-cut answers. This is not to be said that all educators focus on the three basic skills. There are those that are attempting to do out-of-the-box methods. Their attempts within a formal educational system are often met with difficult barriers. Classes often have a standard curriculum, unless teachers create a completely new one. The more basic a class is the more it is made to be uniform to all classes alike to it. A Math 101 class will have very little variation over a wide sample of educational institutions. Another barrier is the focus on grades versus learning.

Critical thinking is necessary component for innovation to succeed. People can have the most creative ideas but in reality, they may impossible to implement. However, in the study previously mentioned by Arum and Roska, it is stated that there is no significant improvement in the first two years of higher education. This is the time period where students are taking elective classes and getting general education requirements out of the way. Most of these classes offer no or little hands-on experience since they are meant to give a broad overview of the subject matter. It is also difficult for freshmen and sophomores to take advantage of internships, co-ops, or civic engagement programs as it is assumed that they are thought to be inexperienced. Understandably, companies do not want someone who is fresh out of high school to be interning at their business. Yet it is vital to enable the students, early on in the curriculum, to start building the foundation of creativity that will lead to innovation.

B. Service Learning

Service learning is a program that has been developed to allow students to assist their community while benefiting from an educational experience at the same time.

Service learning was first introduced in the 19th century and has been revitalized over the years during the 1960s, 1980s, and is going through a period of renewal today. "In 1993 President Clinton approved legislation that repositioned Serve America, as well as the AmeriCorps and Senior Corps programs, under one roof with the creation of Learn and Serve America" (ETR Associates). Service Learning was develop to provide students from kindergarten to higher education a way to work on solving real issues in the community or at the university while providing a hands-on educational experience. Examples of service learning projects range from redesigning an admission packet for a university to helping with the cleaning up a neighborhood. These projects are not additional work but a substitution of the homework that teachers typically would use to model real situations.

Research has demonstrated that courses incorporating service learning components generally provide greater learning benefits than those that do not, including a deeper understanding of course material, a better understanding of the complex problems people face, and an ability to apply course material to new situations and real world problems. Service-learning experiences have also been shown to enhance students' creativity, as they often require students to

apply knowledge to novel situations in settings that have few resources (Hurd 1).

Allowing students to become involved with experimental learning related to the subject they are learning is definitely a heartening one. However, there are those who are critical of the actual benefit of service learning. The time spent working on the service projects are argued to be better spent on time studying in the library or researching the subject matter of the class on hand. Students are concerned with the perceived additional work of service learning courses but in reality, since service learning projects typically replace artificial assignments, not additional to them, the workload proves to be similar. Professors are apprehensive about getting sufficient support for the additional effort spent planning and administrating service projects. However, there is universal support offered by the National Service-Learning Clearinghouse from planning and implementing the projects. Additionally, the Corporation for National & Community Service offers grants and assistance to the individual professors or to the whole university. Towering over the hesitancy of the students and the critical eyes of professors is the colleges' and universities' large inertia to change. Implementing service learning within a university can easily take years due to the bureaucratic procedures for approval.

C. *Entrepreneurship*

Another major program that is also being used to stimulate creativity but more so innovation is the entrepreneurial discipline. Today there are more than 1500 higher educational facilities that offer a form of entrepreneurial education. More than 100 of them reside within the U.S. (Alberta and Libecap 1). A lot of educational institutions are hesitant to take on this academic program. Educators argue that companies aren't going to hire students who are trained to work for themselves rather than an organization. However research done at the Eller College of Business and Public Administration at the University of Arizona found, "on average, emerging companies that were owned by or employed entrepreneurial graduates had greater than *five times* the sales and employment growth than those that employed non-entrepreneurial graduates (3)." Eller College also gathered that "it received nearly \$12 million in funds due to its entrepreneurial program" (3) and of course the students themselves befitted, "Entrepreneurial graduates received an average annual income that was 27 percent higher than the average annual income of non-entrepreneurial graduates" (3). The entrepreneurial program is not an easy one though. In order to have successful entrepreneurial programs, one must offer a wider range of activities than what is possible within a classroom. This requires far more substantial resources to be available in comparable to most other programs (Rasmussen & Sørheim). Clearly, teaching entrepreneurial skills has a great impact on students as far as business smarts but this could be argued to be the result of very rigorous education. There have been numerous studies on what individual attributes entrepreneurs have that set them apart from their peers in business. The studies measured five different personality traits: extraversion, neuroticism, agreeableness, openness to experience, and conscientiousness. The aggregate results of 23 studies found significant differences on

four of the five traits. Entrepreneurs were characterized as more creative, more innovative, and more likely to embrace new ideas (Griest). Embarking in a career of entrepreneurship requires an environment that fosters motivation to create and innovate and is consequently, the drive behind any successful entrepreneurs.

II. MOTIVATION: Fostering Creativity and Innovation

Previously defined, creativity is the ability to find new patterns and connect different sources together to make new ideas; innovation is the application of those ideas. It is disputed on the actual definition depending on the field of study.

Cognitive psychologists prefer to define creativity in terms of a mental process (Smith, Ward, & Finke, 1995); psychologists in experimental aesthetics define creativity as a product (Martindale, 1990; Simonton, 1989). Personality psychologists prefer to treat creativity as a trait (F. X. Barron, 1969; Eysenck, 1993). However, there has been a growing consensus among creativity researchers regarding the appropriateness of defining creativity in terms of an outcome (Amabile, 1983).

Essentially, creativity involves too many factors to be defined in only one way. It can be learned but not via the traditional methods used by educational facilities today. In order for someone to develop the capabilities of being creative, they first need to be exposed to diverse stimuli. A person kept in an enclosed space with nothing to see or interact with from the moment that they are born, will never be able to achieve the same level of creative capacity as someone who immersed themselves in an abundant and stimulating environment. This is common knowledge but the point is that the more diverse experiences a person has, the more easily they can draw upon these resources for innovation. The skill for people use their knowledge to be creative let alone innovative is not due to merely lacking adequate resources when developing as an adolescent. Intrinsic and extrinsic factors both play a role in influencing the internal incentive for a new concept. Prabhu et al. found that in a study observing the relationships between creativity, openness to experience, self-efficacy, and perseverance that “Intrinsic motivation partially mediated the relationship between creativity and openness to experience and completely mediated the relationship between creativity and self-efficacy” (61). However, as far as perseverance, “it is interesting to note that at low and mean levels of extrinsic motivation, perseverance was not related to creativity, but at high levels of extrinsic motivation, perseverance had a negative association with creativity” (61). Both people’s openness to new situations and the amount of self-efficacy they felt influenced how creative they were. While openness carried a moderate influence, self-efficacy affected creativity strongly. The most fascinating thing is that the greater the external reward offered for creativity the less creative people became (61).

III. Best Practices: Looking at Innovative programs

Two good examples of universities that have gone beyond the traditional methods of teaching are Keuka College and Babson College.

A. Keuka College

Keuka College offers a very unique program. They are the national leader in experimental learning. By the time their students graduate they already have 560 hours of field experience under their belt. This is done by “Field Periods” program, which is designed to give students the necessary knowledge of what they want to do as well as how. Field Periods are student driven; the student defines the kind of work they will be doing. They are assisted by the faculty members with setting up the parameters and end goals of their experience. Classes at Keuka often involve real world experiences so students are constantly getting relevant, current, and beneficial knowledge.

B. Babson College

Babson College was founded in 1919 in Massachusetts. It was the first educational establishment on earth to facilitate an entrepreneurship course. It was ranked number one for Entrepreneurship by *U.S. News & World Report's* 2011 “Best Colleges in America” for the 14th consecutive time (Babson University). Babson provides both undergraduate and graduate tracks for entrepreneurship. The undergraduate degree works on building layers of skills starting from subjects such as: teamwork, communication skills, study skills, and community living. The following year there is more focus on the business knowledge necessary for any organization such as accounting, economics, finance, marketing, organizational behavior, and operations. Entrepreneur classes are open to all academic majors that wish to take them. The curriculum uses the integration of disciplines to apply a diverse approach to education. The students gain real world experience by observing, visiting, and presenting to local companies as well as working on their own projects that may become successful businesses.

VI. Recommendations

In Binghamton there is great potential for growth. It can be arguably said that promoting entrepreneurship is one of the better ways to improve a local economy. Binghamton already has the human capital needed; the local higher education institutions provide it. There is a wealth of great support for the would-be entrepreneurs from different organizations and programs such as the Greater Business Innovation Center or the NYS Small Business Development Center. When it comes down to it, Binghamton has everything but the actual entrepreneurs, similar to an empty house with welcoming neighbors, waiting for people to move in. Unfortunately, the students graduating are not thinking of entrepreneurship nor are they equipped with the tools

necessary to start. There needs to be a strong platform of creativity and innovation to allow students to build experience and knowledge into a tower of success.

In order for Binghamton revitalization to occur by way of entrepreneurship, there needs to be a change in the interaction among the educational institutions, the community, and the students. As observed earlier from empirical data, in order to motivate creativity, openness to experience and self-efficacy are key elements. For the first step in encouraging creativity, a higher exposure to diverse experiences is necessary; a service-learning program would be a good tool to initiate the first step in this process. Service Learning allows students that are just entering higher education to gain hands-on experience and assist the community. The projects in service learning are designed to enable students to learn the tools necessary within the course of the semester. Companies and organizations are able to benefit from this system, as it is basically serves as a large free think tank. The students might not be as skilled in critical analysis as that comes with experience but the pure numbers of people scrutinizing and developing a solution will make up for that gap. Sax and Astin found that students participating in service learning were found to be more likely to spend significantly more time "(20 hours plus per week) studying and doing homework than the non participants, who reported spending less than three hours a week studying" (Shane, Brewer, and Thomas 21). The students also stated that after taking service learning courses they felt more connected to the community and more likely to become more active within it (25).

Binghamton University has recently established a new office for the Center for Civic Engagement (CCE) on the main campus. The CCE has already done initiatives to incorporate students learning to benefit the community. CCE also has initiated a Faculty Community Scholars Program to incentivize teachers to incorporate service learning within their courses. With expansion, the center will be an excellent resource for connecting the community and the university for a highly beneficial collaboration.

The next step is to progressively increase the students' involvement with more intense hands-on projects that include students from different academic disciplines. To encourage creativity, it is necessary to form groups of people from different backgrounds and/or training; hence the need to become interdisciplinary in nature. A project team comprised of a manager, accountant, economist, and financial analyst would not be differentiating as they all are under the division of business administration. An example of a diverse team for a project is an artist, psychologist, engineer, political scientist and an accountant. Collaborating with different disciplines will allow for students to receive continual exposure to different perspectives providing a more rounded evaluation. Accomplishing these tasks will open up students to new experiences thereby increasing their self-efficacy and the end result of creativity. Keuka College is nationally known because of their accomplishments in this area. Their field periods strongly promote self-efficacy since they are student-led.

As far as encouraging innovation, we must plan how to help students critically analyze ideas and develop a strategic plan for execution. Babson College is a prime example of teaching their students the methods of critical analysis. Babson's courses build upon each other with the level of critical analysis needed. More importantly, Babson's entrepreneurial program focuses on the critical thinking skills for their

students to apply to their own ideas. They are by far not the only ones that do this but they are successful because of their realistic approach to innovating ideas.

There are statewide programs that are beneficial in helping the increase of self-efficacy and innovation. One such program is SUNY StartUP, which allows for successful local entrepreneurs to become mentors for academic institutions. Cradle to Career, another program, involves networking students with their desired industry. SUNY Works, a third program, integrates academic knowledge into professional work environments. All three of these programs are part of Chancellor Zimpher's "The Power of SUNY" plan.

According to research done by Dane Stangler, "In every single year from 1996 to 2007, Americans between the ages of 55 and 64 had a higher rate of entrepreneurial activity than those aged 20-34, averaging a rate of entrepreneurial activity roughly one-third larger than their youngest counterparts." With a strong push for creativity and innovation starting early in peoples' education and careers, we will have the ability to increase the number of young minds exploring entrepreneurship.

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