# CAN CREATIVITY AND CRITICAL THINKING BE TAUGHT

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**Abstract-** Throughout human history, creativity has solved problems through science, technology, art, and human communication. Researchers suggest that creativity is on the decline. Educators and professionals consider the question; are we born creative or can environments be designed to cultivate creativity? Studies suggest creativity is born from necessity, and it is cultivated through ideal learning environments. This paper posits that creativity is innate within humans, and learning environments can be developed for students to discover techniques and solutions within their fields of study.

**Keywords**- Creativity, Learning Environments, Problem Solving, Invention

## I. INTRODUCTION

Creativity is a powerful, driving force that has stretched across all disciplines including science, technology, art, communication, mathematics, humanities, sociology, and education. Through creativity, inventions are birthed, problems are solved, industries are saved, art is designed, and ideas are conceived. Creativity may be considered as crafting something new. This could be a design on a canvas or a screen, a speech, a short story, a masterful plan of action to solve a problem, an algorithm, a cure, or a movement to bring about social change. There has never been a greater need for creativity in a world growing in population, globalization, and tribulation. Researchers suggest that, although IQ has increased, American ingenuitybegan to significantly decline in 1990 [1]. To discover if the trend can be changed, one must first consider if creativity is something that can be taught or cultivated. One school of thought is that we are born to be creators, but evil pedagogical practices of standardized testing and poor parenting where a screen is a babysitter is the cause.

In the end the question becomes, can creativity be taught, or is the decline in creativity a biological issue? This article reviews research in nature verses nurture as it relates to creativity in individuals. Is creativity a process that can be learned and thereby taught?

## II. NATURAL CREATIVITY

### 2.1. Creativity in Early Homo Sapiens

Early evidence of artistic creativity in coloring skin, 164,000 BP to cave paintings in 77,000 BP [2]. Although it is impossible to make a clear link of brain evolution to the evolution of art in human populations, the creation of art is evident across historic cultures. "The virtually ubiquitous existence of art today suggests that the neurological potential to create art was established within all of the human populations who remained within and migrated out of Africa,"[2]. Art and tools began emerging together, therefore, creativity developed with survival skills. But are all human beings born creative?It would appear that to survive, humans had to have a level of creativity, but these vary based on the individual. People learn and build upon previously learned information to create new ideas.

### 2.2. The Nature of Creativity

Schlegel et. al. studied the extensive neural activity that takes place when creative processing is occurring [3]. When ideas are created, the brain is more flexible, using more than four areas of the brain, in order to generate novel ideas. Scientists at Cornell University link creativity to genetics. "The Cornell University team found that creative people, such as writers, artists and musicians, tend to have a smaller corpus callosum, which could enhance their creative ability by allowing each half of their brain to develop thoughts and ideas more fully" [4].This study would suggest that people are born with a level of creativity. Another study suggests that people with bipolar disorder tend to be more creative. Kounious et. al. discovered that extremely creative people disseminate their thoughts over a broader array of environmental stimuli than those who were less creative[5]. Researchers agree that creativity requires the whole brain, simultaneously using instinct, insight, logic, and original thought.But is creativity limited to only a few who have a tendency to innovative thinking?

### 2.3. Born to be Creative

Researchers proclaim that we are born creative or we would not have been able to survive [6]. It is also suggested that employers are seeking employees who are able to work creatively and collaboratively in groups. Colleges are obligated to prepare students for the workforce; therefore, colleges need to develop curricula to teach teamwork, collaboration, and inventiveness. These skills need to reach across curricula to benefit humanity. Livingston [6] further suppositions that creativity is innate so a creative curricula does not need to be taught but cultivated. If every human being is born creative, then educators should harvest this valuable skill in order to make the world and economies prosperous for all.

Aristotle posited that new ideas are invented due to need [7]. In *The Rhetoric* Aristotle identified the first step in the rhetorical process as invention. Inventions are creative ideas originating because of a need. Everything that has been invented was conceived out of need. From the floor to the ceiling, from oracle address to a motion graphic, from the sculpture to the canvas, memorable, moving ideas started with a need or reason to exist. Furthermore, the inventor must have some knowledge and talent from which to build. The most powerful speeches, art, movie, commercial, algorithm, architecture etc. was crafted from purpose, passion, interest, knowledge, and talent. Those with passion for speeches who work diligently to master the task will create a more compelling presentation than someone with passion and knowledge in another craft.

All people may have the ability to be creative, but, just as some individuals have higher Intelligence Quotients (IQ), it would be hard to deny that people have various levels of Creativity Quotients (CQ). Select people appear to be born with a talent to draw, paint, traverse mathematical equations, manipulate images on a computer, write stories, design an ad, write a program etc. Imagine children who have difficulty reading but can build an engine with ease. Perhaps it is this need to survive that causes some children to be born with wild talents as anglers, gardeners, educators, scientists, mathematicians, sculptures, mechanics, designers, and persuaders.

Further research [8] suggests that creativity requires flexibility and adaptation. Creativity is more likely to exist with people who are in environments where they are free to take risks, work independently, have access to resources, do not have critical supervisors, and have knowledge in the area in which they want to create. Rather than teaching creativity, it may be more productive to assist students and employees in stimulating their innovative ideas within their individual passions, interests, and talents.

## III. LEARNED CREATIVITY

### 3.1. Cultivating Creativity in Students

This paper was birthed the old fashion way, with a debate between partners. I am a digital media professor and my spouse is a speech communication professor. In one of our many conversations about this topic, I proposed that one cannot make a person creative. She stubbornly held to the view that it can be taught. We decided to research the topic. We read articles and books about teaching creativity. Although I was the one who was on the -- creativity is innate rather than learned -- I secretly wanted to find the formula to teach creativity. My students create short films, commercials, storyboards, and motion graphics. My partner teaches public speaking, persuasion, conflict management, and communication skills where innovation is also paramount. In the end, we discovered that one cannot make someone creative, innovative, or a critical thinker; however the correct learning environment can helpstudents develop creative thinking skills.

### 3.2. Creative Environments

Although creative ideas can come with large-group brainstorming, students and employees who can work independently in stimulating, distraction free settings with ample resources and positive support tend to be more creative [8]. When working in teams, all members need to be free to express original ideas that may not agree with traditional thinking.

If one is in a position where one feels pressure to conform or anxiety about being judged, the brain is too busy working on the fear or other emotions to be able create or solve a problem. To explore a new idea, the creator must have some knowledge in the area, but Runco (2004) warns of relying too heavily on former knowledge. "Indeed, experts are often inflexible, and thus overlook original options, precisely because they rely so heavily on established knowledge," (p. 665). In the classroom, instructors who are creative/flexible create classrooms where students are more innovative.

These classroom environments encourage divergent thinking, allowing students to consider new, original options rather than a traditional answer [8]. Instructors and students need to broaden perspectives to allow for new possibilities. It is also important to note that creativity is expressed differently within different areas [8]. Cognitive processing is different for the creative scientist, or orator, or musician, or digital artist; however, creativity flows more freely under certain conditions.

Even if cognitive processing is different in different disciplines, researchers do provide practical ways to provide creative learning environments across the curriculum.

In 2013, a report was submitted to The European Commission on Improving the Quality of Teaching and Learning in Europe's Higher Education Institutions [9]. The group created a list of questions that teachers should ask themselves when designing a course that enhances creative thought in students.

- *How can I make sure that my course design encourages and requires the active involvement of students in the learning process, e.g. through innovative forms such as problem-based and research-based learning...*
- *How can I organize my teaching in such a way that it will not simply provide my students with facts and knowledge, but confront them with questions that are bigger than the course itself?*
- *Will my teaching lead students to questioning their preconceived ideas and thus to a deeper understanding of the issue and to 'self-thinking'.*
- *Will it stimulate critical and inquisitive attitudes among my students?*

- *How can I adapt my assessment formats to reflect the new pedagogical approaches, such as problem-based and research-based learning? (pp. 71-72)*

The report highlights a holistic approach to improve education in higher education.

### 3.3. Teaching the Process

Tina Seelig, a professor at Stanford University, teaches courses in creativity and published a book on the subject, *inGenius* [10].

She suggests that creativity is an activity and a skill to learn. The first step is to realize that there are many possibilities in problem solving. To create a new solution, one must consider reframing the problem and consider alternate possibilities. These possibilities can be considered by brainstorming good and bad ways to solve a problem. This encourages the brainstorming participants to ram through obvious solutions. Brainstorming can be used in work groups, but the participants need to be very comfortable sharing all ideas. This works better with dyads or triads than in larger groups.

To invent, one must begin with knowledge in an area and build on that knowledge through observation. "Acute observation is a key skill for gaining valuable knowledge about the world around you. This knowledge is the fuel for your imagination," [10, p. 69]. As we remain curious and observant, we make new discoveries. Furthermore, it is important that our work and classroom environments are aesthetically stimulating and equipped with comfortable spaces for groups and individuals to thrive.

Creativity is also enhanced if the bar is raised. Instructors should give students tasks that require creativity and higher order thinking. They will meet the task. It is also important to give deadlines that are true to the workplace. This pressure to create a new product in a pushed period of time can enhance credibility [10]. Reward those who reach your highest standards to encourage future creativity.

Humans appreciate a challenge. I play video games and have discovered that gamers will spend hours looking for every possible way to solve a problem. Instructors who cultivate creativity teach the skills necessary to create, be it digital design programs, public speaking skills, the scientific method, mathematical algorithms or color theory. Then they construct assignments and assessments that require using that knowledge to spawn a new idea or product.

## CONCLUSIONS

In the end, we are all born with the ability to be creative on some level. It takes a whole brain to generate a new idea. Under the right conditions, creativity can be cultivated. Environments that enhance creativity in the classroom and the workplace are judgment-free zones with ample resources of support and knowledge. Further support is recognized in peer reviewed feedback such as critique in projects which will result in refining the creative process. Instructors who have imaginations running rampant in their classrooms make a cognitive effort to design experiences, curricula, and assessments that require critical thought.

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