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HON 310: The Creativity Process in Science

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Creativity and Diversity- A Domino Effect

The year is 1891. A Polish woman, unknown to the world, leaves her hometown of Warsaw with her sister to study in Paris. There, she meets, falls in love with, and marries a Frenchman. The two of them worked side-by-side for more than a decade before sharing the 1903 Nobel Prize in Physics for their discovery of radioactivity (Eastwick et al., 2017). It is hard to guess the quality of Marie Curie’s work if she worked without her lover, Pierre Curie. Could the outcome have been influenced by the close intercultural relationship between the two? Was this influence positive or negative, or perhaps both at times? Or, we could take a look at the brilliant mind of Steve Jobs, co-founder of Apple. What is the secret behind his extraordinary success? Sure, it’s because of his creativity. But what is the secret behind his extraordinary success? Of course, there are a lot of factors, but Steve Jobs’s creativity, drive, and prowess owe a considerable amount to the influence of Zen Buddhism. In fact, for many years Steve Jobs would meet almost daily with a Japanese monk named Kobun Otogawa, the man responsible for the integration of Buddhist values such as empathy, simplicity, and kindness into his rigorous work-life (Flatley 2018). These values can be observed in the appearance and functionality of Apple products, which has been crucial to the commercial success of Apple. Finally, we can check out the largest PC vendor in the world, Lenovo. With more than fifty-thousand employees in over 160 countries, Lenovo has one of the most diverse workplaces in the world. Yolanda Conyers, Lenovo’s chief diversity officer, once said that serving customers all over the world requires “more than out-of-the-box thinking, because it’s not just one box. It’s a hundred different boxes. A million different boxes. It takes every dimension of our diversity. All our diverse mindsets, skills, and cultural backgrounds, to deliver such a wide array of technology”. This paper will explain and exemplify the relationship between cultural diversity in America and creativity in STEM fields as well as highlighting ways to achieve greater cultural diversity in the workplace.

First of all, what is creativity? Such an intangible topic is bound to have different definitions for it, but we can all agree on one thing- there is no doubt that creativity is the single most important human resource. Without creativity, humans are no different from dogs or fish; there would be no civilization, no social structure, no inventions, and no innovation. We would forever be repeating the same patterns over and over again. This ability to generate new ideas from pre-existing concepts is pivotal in the success of individuals and their businesses, so much so that in a survey of over 1500 CEOs from 60 nations around the globe, creativity was ranked as a more important leadership quality than global thinking or integrity (IBM, 2010). Creativity is also the “spark” that causes a lot of other important human ideas such as entrepreneurship or innovation. Everyone knows about the video where a tiny domino is pushed over, which in turn pushes over a larger domino, and then a larger one, until a huge ten-meter-tall domino falls over. Think of creativity as the tiny, first domino that falls. That is creativity. It is raw. It is unprovoked. It stems from nothing but the pureness of human ingenuity. Then, we have things like entrepreneurship and innovation. These are the dominoes that come after creativity. After all, you can’t have innovation without creative thinking, and new and novel ideas are the lifeblood of entrepreneurship. After innovation and entrepreneurship, we have bigger concepts that begin to relate to organizations and societies as a whole. This would include economic growth and prosperity, technological advances, and an increase in social wellbeing. When you connect this domino chain, with creativity as the first domino, you can almost call creativity the “engine” of the human endeavor. Does this mean that nothing can influence creativity? No. Just because creativity is fundamental in the domino chain, doesn’t mean that there is nothing that affects it. After all, according to Newton’s first law of inertia, a domino will never topple over unless a force act upon it.

Diversity can be considered as one of the most crucial forces that will topple the domino known as creativity. Diversification can be split into two types when it comes to the workforce- personal and team. Diversification in personal creativity is crucial as it requires every individual to practice it. Let’s say a businessman has a business client who they need to impress with a multimedia presentation. Their mind immediately wanders to what they are familiar with- PowerPoint slides, a pictograph, or a case study. These thoughts are associated with a businessman who comes from a specific background and has experienced unique things. However, if this businessman is smart and wants to get more creative, he will need to broaden his thinking and stimulate his mind into seeking out knowledge that is associated with other concepts. Perhaps a drama or a painting would convey this business presentation better than a slide show. Effective ways to boost diversity in personal creativity is to experience more things that may be out of your comfort zone; walking around a city, visiting museums and art galleries, or even introducing yourself to new people can expose your mind to factors that boost creativity. After all, creativity is the implementation of new ideas; what better way is there to generate new ideas than to experience new things?

Secondly, teams can use diversification in teams to brainstorm and be more creative. If diversification in personal creativity is ideas bouncing around in your brain by experiencing new things, then diversification in teams is ideas bouncing around in a diverse workplace through many unique people. Diversity in teams doesn’t even have to necessarily be demographically related, such as age, gender, or race. It can also translate to “deep-level diversity”, which is diversity within a person that is not immediately apparent to an outside eye. Examples of deep-level diversity include personal abilities, talents, strengths, and weaknesses. A team of people that is rich in cultural AND deep-level diversity provides a broader base of expertise from which to derive data and expand on creative thinking. That is why companies must hire people from different countries and cultures who come from a variety of backgrounds, qualifications, experience, and knowledge. Furthermore, people from different cultures will also be connected to other people of the same culture whose knowledge they can tap to think creatively and complete tasks.

A research study by the American Psychological Association found that intercultural relationships enhanced individuals’ “cognitive flexibility” and “complexity” more than intracultural relationships (Eastwick et al 2017). When pairs of romantic individuals were experimented on, researchers found that the romantic couples who derived from different cultural backgrounds drew disparate concepts and ideas from each other’s cultures, while the couples who shared similar backgrounds were constrained by their cultural routines and conventions. When people from different backgrounds work with each other, think of their creative ideas as “magnifiers” for each other; they allow others to shine even more brightly. However, when people from similar backgrounds work together, their creative ideas collide, and, while it may increase creativity within a certain aspect, will not expand outwards to other fields. In conclusion, diversity within a team causes creative ideas to multiply, while homogeneousness causes creative ideas to increase linearly. This can be shown in the previous example of how Steve Jobs applied the teachings of Zen Buddhism into Apple’s design mantra: “Simplicity is the ultimate sophistication” (Isaacson 2011).

Scientists previously believed that diversity and creativity are linearly related; however, after numerous studies on the subject, they have found that an excessive and unnecessary amount of diversity can hinder or even reduce creative potential within a team or organization. A study by the United Arab Emirates University in 2017 found that as demographic diversity extends beyond a specific threshold, creativity will start to decrease, turning the diversity-creativity relationship graph into a concave parabola. The reasoning behind this, the study says, is that “people tend to pay more attention to other people who have the same demographic characteristics and want to spend time with them”. The study also argues that too much diversity leads to uncomfortable situations, deficient teamwork and harmony, and conscious or unconscious bias (Mumin et al 2017). In management science, there is a paradigm called “too much of a good thing”, meaning that all things are good in moderation except for moderation itself. This also applies to diversity within a workplace. Furthermore, while diversity has its advantages in creating ideas, the same can’t be said when it comes to implementing ideas. A research study done by Sarah Harvey of University College London found that in more than 10,000 teams, benefits of diversity in teams are diminished by pre-existing cultural biases, convergent thinking, and decision-making deficits that diverse teams produce (Harvey 2013). Therefore, it would make sense for organizations to utilize diverse teams to creatively generate ideas, and use more homogenous teams to curate and turn these ideas into reality. An abundance of creative ideas but a lack of teams to implement them is not efficient for companies, and vise versa, which is why it is crucial for companies to hire both diverse and homogenous teams to get their ideas out into the world.

Now that the magnitude of diversity is understood, how can we increase diversity to topple the creative domino more easily? America is a land built from scratch by immigrants in the early 17th century. The ever-changing ethnic demographic in the United States continue to alter the true “American identity” as well as racial composition in the workforce. For the past century, the government and citizens alike have made efforts to make the workplace “more inclusive”. Unfortunately, negative socioeconomic factors continue to be an obstacle in the equal proportion of ethnic minorities, including African Americans, Native Americans, Asian Americans, Hispanics, and Pacific Islanders. For example, in 2010, these ethnic minorities accounted for approximately 29.4% of the United States population yet only accounting for 13.3% of employment in STEM fields such as science and technology. From 2010 to 2020, the rising number of ethnic minorities in STEM fields closely mirrored the rising number of STEM students overall, but the representation gap never wavers. It’s estimated that by 2045, the share of the white population will decline to 44% (Stacy-Ann et al. 2014). However, at the current rate, the minority will still be the majority when it comes to representation in STEM fields.

The analogy of a leaky pipeline represents the lossy transition of STEM students that begins in early education and extends into an adult career in STEM. This metaphor is based on the idea that a large number of students start with an intention in a STEM field, but slowly “leak” from the pipeline at every stepping stone, ultimately resulting in an extremely small number of STEM graduates compared to the students that start. In 2001, just over four million ninth graders were starting high school in the United States. In 2005, only 2.8 million of those four million has graduated. The remaining 1.2 million students represent the “leak” from the pipeline; they are the high school dropouts that may pursue a career that does not require a high school diploma, travel overseas to attend school elsewhere, or take a gap year. In the fall of 2005, 1.9 million of the 2.8 million high school graduates would make college plans, with the rest of the eight hundred thousand likely taking gap years or going straight into the workforce. Of the 1.9 million college-planned high school graduates, only 1.3 million would be college-ready. Of this 1.3 million, only 278,000 would major in STEM, and ultimately, in 2009, only 167,000 will graduate as a STEM major (Stacy-Ann 2014). When you look at the big picture, only 4% of ninth graders in 2001 ended up graduating college as a STEM major, and a much smaller percent represent the ethnic minorities of the United States. In 2012, the White House reported that approximately 80% of minorities and women who begin their undergraduate education in a STEM field switch to a non-STEM field or drop out of college (Waldrop 2015).

We know that diversity fosters creativity, but racial and ethnic diversity is lacking when you look at the numbers. One of the best ways to boost diversity in the workplace is to strive to hire individuals from different countries and cultural backgrounds with the necessary qualifications, without too much thought into profits. A diverse team will naturally bring in more profit when more creative ideas are implemented. A study by the Boston Consulting Group found that companies with more diverse management teams make 19% higher revenue, are 1.7 times more likely to be innovation leaders in their respective markets, and outperform industry norms by 35% (Martic 2019). Furthermore, about the leaky pipeline analogy, educational systems should make minimizing the leak of underrepresented demographic groups a priority. If there are more programs or opportunities for minorities during their career as a student, there would be more incentive for them to continue their aspirations in STEM. This is why programs such as Women in Computer Science (WiCS) and Minority Engineering Program (MEP) at NC State are so important and encouraged. However, a diverse workplace does not directly relate to higher creativity, because diversity does not necessarily equate to inclusivity. Diversity is the first step in toppling the domino of creativity, but creating an environment where these people of different backgrounds feel included is the key to maintain diversity and boost creativity. There are a few ways to make sure that teams are as inclusive as they are diverse. The first way is to use the Inclusive Workplace Model by making the environment a comfortable place to reveal innate parts of individuals. When members of a diverse team conceal or mask part of their identity because they feel unsafe, uncomfortable, or excluded, their contribution to team creativity and motivation will naturally decrease. The second way is to increase diversity on all levels of a corporate rank hierarchy, not just beginner-level rookie employees. The composition of executive and management teams has a huge impact on the inclusiveness of the rest of the workforce, not to mention clients, shareholders, or partners. A diverse executive team speaks volumes for the rest of the company and can make employees of different backgrounds feel more included in the work environment. Thirdly, companies can boost inclusivity by openly addressing these cultural and societal differences between employees and welcoming a multicultural and multilingual workforce. By making sure all employees are aware of the variety of cultural and demographic backgrounds, companies will find that their employees will feel a sense of connectedness to the company and their coworkers. A big step in inclusivity is for employees to feel that there are no barriers in them speaking their minds based on their unique perspectives.

The domino effect refers to a linked sequence of events where one occasion leads to another, potentially bigger occasion. Creativity can be observed as the first domino in this chain of events, which will boost the cognitive process of individuals working together, which will, in turn, boost the creative output of the team and organization. However, this first domino of creativity will never topple without a force that acts upon it. Diversity in the creative mind and teams plays a big role in the toppling of the first domino. Whether it be exposing an individual’s mind to new ideas and opportunities, or letting people of different cultural or demographic backgrounds mingle and bounce ideas off of each other, diversity in a workplace has been scientifically proven to foster creativity. However, it is important to note that creativity will diminish if diversity reaches a certain threshold, because of the implicit and explicit bias we have towards cultures that are different, as well as the fact that more homogenous teams may be more suited towards implementing the ideas that diverse teams generate. In the world we live in today, STEM fields are seeing a lack of diversity within the education system and workforce, primarily because of the lack of opportunities and the “leaky pipeline” of modern-day education. Thankfully, there are ways to address this problem, such as going out of the way to hire employees from different cultural backgrounds, offering more opportunities and resources for underrepresented minorities in their student careers, and having companies revise the work environment in order to make all employees, regardless of their demographics, culture, disability, and religion, feel appreciated and cherished in the workplace. There is no doubt that creativity is one of the most important human traits that make us different from animals. Only with diversity, however, can creativity begin the toppling of the domino chain.

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