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Literary and Artistic Creativity to Augment Technical Innovations

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Abstract

Science and Technology, and Art and Literature are not two distinct polar opposites, but that which complements each other. As disciplines science and technology, like arts and literature need imagination and creativity. This fact is quite relevant when we look at the polymaths of the renaissance age. They never approached these disciplines on varying temperaments. Leonardo da Vinci was an undisputed expert who managed to blend the three disciplines, science, engineering and arts. He had an artistic eye of everything, along with the scientist's spirit to look at the minutest with keen precision.

Creative perusal of talents helps technologists and scientists to have a wider perspective of things and in considering everything in a global perspective. It will boost the imagination and also help the scientists/ engineers in multitasking things. Oliver Sacks who is known as the Poet Laureate of medicine is a man who excelled in medical field and also a famous writer, neurologist and a bestselling author.

This study shows how literature and artistic commitments help in increasing the technical efficiency and in eradicating lethargy and boredom. Even when they are saddled with jobs that expect a different work ethics and meticulous time management, there are good numbers of people employed in various technical and technological innovation centers and,

engaged in research and development, who make use of their innovative creativity and love for literature to improve their performance at their career level.

This paper looks at how artistic and literary creativity help a scientific community to be more innovative and how they promote a sustainable and holistic development.

Key words- Scientific spirit, creativity, literature, arts, technical efficiency

"The greatest scientists are artists as well."

Albert Einstein (Calaprice 245)

Quite often it is the imaginative visions of the future rooted firmly in a reasonable social cause that compel most of the scientists and technologists to come up with innovations. These visions and hopes regarding the future get reflected in several media in different manifestations. In the global world where the information technology and communication have developed to such a great extent, these visions are always reflected in the social media, network groups, print and digital media, thereby become more fluid and are always at war with the boundaries and fixities of the world.

Studies have shown that when people are given enough time to exercise their creative and artistic outputs, it will help in the development of their personality and thereby it will boost their technical innovations. It is an aid which compels them to increase their output and productivity in their careers also. A lot of significant research work has been going on in this area for the past few years. Quite often critics consider Raymond B. Cattell's 1987 book *Intelligence: Its Structure, Growth and Action* published by Elsevier Science Publishing Inc, as one of the key text that explains the link between intellect and achievement based creativity. Duke University Press has published a book in 1976 written by Albert Rothenberg and Carl R. Hausman, *The Creativity Question*. Rothenberg and Bette Greenberg had already published *The Index of Scientific Writings on Creativity: Creative Men and Women* in 1974. In these works and the studies that followed later, creative people are often considered as more intelligent than less creative people. *Annual Review of Psychology* has published an article, "Creativity, Intelligence, and Personality" by Frank Barron and David M. Harrington, where they have thoroughly established an authentic definition of creativity as "(i) as socially recognized

achievement in which there are novel products to which one can point as evidence, such as inventions, theories, buildings, published writings, paintings and sculptures and films; laws; institutions; medical and surgical treatments, and so on; and (ii) creativity as an ability manifested by performance in critical trials, such as tests, contests, etc, in which one individual can be compared with another on a precisely defined scale.”(5)

American psychologist and psychometrician who is currently the Professor of Human Development at Cornell University, Robert J. Sternberg has analyzed three interacting aspects that help in the successful application of intelligence within a society. They are (i) “analytical skills that helps individuals to evaluate, judge, or critique information, (ii) practical abilities that create an optimal match between individual skills and their external environments, (iii), creative intelligence that involves maximizing experience in order to generate new products, solve relatively novel problems, and quickly automatize procedures” (68).

The research and studies conducted by all these eminent psychologists strongly emphasize the fact that creative people manifest unusual combinations of creativity, intelligence and personality. As personalities who beautifully linked artistic creativity and scientific aptitude, a single variety of creativity is a myth. They effectively handled the multitasking, taking care of their respective professions, and their artistic pursuits and literary creativity which helped in being sharper and keener in their profession. A lot of studies are going on to analyze the creativity of scientists and their outcome, but very few studies were conducted to understand the relationship between artistic and literary pursuits and their relationship with the success or productivity of a scientist. Juha T. Hakala’s book *The Art of Scientific Discovery- Creativity, Giftedness and the Nobel Laureates* (2013) analyses the link between a scientist’s talents and giftedness and his scientific pursuits.

Most of the inventions made by man resulted from his curiosity and his excellent extrapolation of imagination. This fact is being proved by many of the science fiction movies and stories. Modern science can be considered as an extension of man’s earnest urge to know about the universe. This urge is reflected in literature. There are people who are passionate about artistic performance also. If enough opportunities are given to our scientific and technical community to explore the world of art and literature it will definitely enkindle their scientific

spirit too. This is quite evident when we look at the innovative achievements of people like, Steve Jobs, Jay Silver, etc.

It is the love for the unknown, the curiosity and earnest urge to explore the unexplored that compel the scientists to pursue their subject of interest. It is this very subject that inspires the poets and writers too. Through their work and passionate journey they give a structure and a pattern to their thought process and what they explored. This is beautifully elucidated by the Nobel Prize winning poet Czeslaw Milosz, "the incessant striving of the mind to embrace the world in the infinite variety of its forms with the help of science or art is, like the pursuit of any object of desire, erotic. Eros moves both physicists and poets" (Lee Gutkind 16). Both the evolutionary biologist and the poet participate in the inherent tendency of nature to give rise to pattern and form.

Jonathan Holden, Poet Laureate of Kansas, was a Maths teacher before becoming the Professor of English at the Kansas State University. For him, of all the written languages, Mathematics is "the most visual, the least oral and the language closest to silence" and Science, "in its true essence is the concentrated truth, applicable to many situations," closely related to our lives (771). He also says that when these two disciplines, science and literature, blend together, the suggestive techniques of literature and the language and legends of scientists act upon the human mind so that they will get a liberated sense of truth and reality.

Miroslav Holub one of the most internationally well-known Czech poets, was an immunologist and his works were heavily influenced by his experiences. He wrote many poems applying his scientific knowledge to poetic effect. His scientific knowledge, following the very same tradition of literature, makes use of words to measure a definite and concrete data. He says in an interview how practising as an immunologist helped in exuding the writer in him. For him "Science presents a firm ground for all personal feelings, a sort of safe existential ground. A scientific worker writing poetry does not see (perceive, feel, sense) the abyss. He is not happy, but he is less desolate and, in many instances, also less neurotic" (Interview with Czech Poet Miroslav Holub).

William Carlos Williams, another English poet was a medical practitioner before he took poetry as his vocation. He published his first collection of poems, *Poems (1909)*, after he took his medical degree in the year 1906. He produced the most captivating collection of poems while he was a doctor in Rutherford. He explains how his vocation as a poet compliments his work as a physician. He says, “One occupation complements the other, they are two parts of a whole, it is not two jobs at all, one rests the man when the other fatigues him” (122).

To many of these writers, writing poetry is an impulse similar to a scientific pursuit where the grandeur and excellence of a scientific theory or hypothesis is equally get represented through the apt selection and coalition of words and thoughts. The scientists and artists or writers are always impelled by this sense of wonder and awe regarding the universe, and they always contemplate on how to recreate the world and all that is included in it. The profession of neither the scientists nor the poets can fully reveal the secrets of universe, but they can definitely lay bare the beauties and wonders of nature before us to appreciate and nurture.

In *Cross-Pollinations: The Marriage of Science and Poetry (2004)*, the ethno biologist and poet Gary Paul Nabhan examines the space where poetry and science meets and begins his book with this quote by photographer Paul Strand: “The true artist, like the true scientist, is a researcher using materials and techniques to dig into the truth and meaning of the world in which he himself lives, and what he creates, or better perhaps, what he brings back are the objective results of his explorations” (3). He believes that exchange of ideas between science and poetry nurture the discovery of new meanings and identities. He says; “I felt free to move between the practices of field science and the literary arts without being hampered by disciplinary boundaries” (9).

As it is rightly contented by poet and cognitive scientist Pireeni Sundaralingam who explores the nature of interactions between the two disciplines, poetry and science, though our current culture tends to treat the disciplines science and poetry as if they were “mortal enemies,” we have to consider them “in terms of the variety of relationships that have evolved

between species in the organic world” (*Science and Poetry: Predation or Symbiosis?*). It is these relationships that originated as a result of the close association between science and art that help any scientist or artist to chisel out new meanings and new vistas in the respective research field.

The zoologist turned novelist Vladimir Nabokov once posed a question, “Does there not exist a high ridge where the mountainside of ‘scientific’ knowledge joins the opposite slope of ‘artistic’ imagination?” (Nabokov 330). He comes with an answer in his book *Speak, Memory*, where he says, “there is . . . in the dimensional scale of the world a kind of delicate meeting place between imagination and knowledge” (Nabokov 166). For him reality is a very subjective affair, and it is a kind of gradual accumulation of “information and specialization” (Alexandrov 33). He, as a poet arrived at this truth during the course of his life as a zoologist who observed and studied butterflies and later inspired by the very same observation to look at nature and write poems.

Tomas Tranströmer, the 2011 Nobel Prize Winner and the great writer who passed away recently was a psychologist for more than fifty years. He balanced his occupation and passion to such an extent that he was considered as the most celebrated poet of Sweden and also as an excellent psychologist. His job as a psychologist at the Institution for Psychometrics and at Røxtuna, a youth correctional facility was exemplary.

Stanislaw Lem, one of the prominent science fiction writers of all time from the Soviet bloc, started his career as a redactor of contemporary western articles on science for a journal. There he was reading and editing number of science articles and the expertise in that particular field later compelled him to come up with novels like *Solaris* (1961), *The Investigation* (1959) of great depth and intensity.

These are writers who were doing other jobs to support them, or as their professions. There are people who made of their technical expertise to produce great master pieces of all

time. Their knowledge and learning in the concerned disciplines helped them to come up with great master pieces. They complement each other in producing great literature of all time. To list a few in this area; Robert Heinlein, renowned science fiction writer, Isaac Asimov, the one who introduced the three principles of Robotics, Oliver Sacks, the internationally renowned neurologist.

Robert Heinlein who is considered as the dean of science fiction writers was a naval engineering graduate from the U. S Naval Academy, Maryland. His experiences along with this passion for science and an irreconcilable imagination compelled him to write stories of great craftsmanship.

Isaac Asimov, who is known as one among the big three's of Science fiction was a Professor of Biochemistry at the Boston University School of Medicine. Though he was approached by the US Defense Advanced Research Projects Agency (DARPA) for the development of new technologies for the military he declined it, but later submitted a paper "On Creativity", explaining how government can encourage people to come up with ideas which can be developed by government funded agencies. This experiences and information he gathered from all these sources, and his expertise as a professor of Biochemistry helped him a lot in producing great works of literature.

Oliver Sacks who passed away recently on August 30, 2015 at the age of 82 was an eminent neurosurgeon, a great physician, and a prolific writer. He always gained the greatest impetus of writing from his patients, their illness and their experiences. His cure was his writings. It is his experiences and life with the survivors of 1920s sleepy sickness, encephalitis lethargica, which formed the basis of his book *Awakenings* (1973). Some of his other works that were inspired by his patients include; *The Man who Mistook His Wife for a Cat* (1985), *An Anthropologist on Mars* (1995), *Seeing Voice* (1989), *The Island of the Colorblind* (1997), etc.

As a writer and a scientist, the greatest maestro of all time, Carl Sagan whose sense of inquisitiveness and wonder at nature and all it encompasses made him an astronomer, and a great writer. He was a full time Professor at Cornell University, was an advisor to NASA, and also

associated with the US Space programme since its beginning. His most noted works include; *Cosmos*, *Pale Blue Dot* (1994), *Broca's Brain* (1979), *The Dragon's of Eden* (1977), etc.

One cannot make a study on scientist and artists without considering Einstein. "If I were not a physicist," he once said, "I would probably be a musician. I often think in music. I live my daydreams in music. I see my life in terms of music.... I get most joy in life out of music" (Calaprice 155). This is what Einstein says about his preoccupation with music which was always for him an abode of peace and contentment. Einstein always recognized an unimaginable connection between music and science, as something that give harmony and order to something really chaotic. Regarding the role of creativity in science and technology, one always think about Einstein's notion regarding imagination. He says, "Imagination is more important than knowledge" (Calaprice 10).

Arthur I. Miller while analyzing the life and works of Einstein and Picasso in his book, *Einstein, Picasso: Space, Time and the Beauty That Causes Havoc* (2001) says that for both of them art and science prided a channel to explore the world beyond their sensory perception and appearance. They proved during the culmination of creative process; the boundary between art and science eludes and they merge together producing the paramount beauty.

Jay Silver, founder director of JoyLabz and Maker Research Scientist at Intel Labs is the co-inventor of MaKey MaKey and Drawdio. For making his invention kit he was inspired by the British sculptor, photographer and environmentalist, Andy Goldsworthy. Jay Silver considers him as "an artist who, like ghost in to the woods and organizes natural elements in to beautiful art work that you didn't even know was there he just makes it a reality so all those thing kind come together at the same time and there are hacking like a museum exhibit or something how do you how do we get a button to push a computer without a being a keyboard we have to take a part keyboard solder on to this leads into a" (Insights into a Brilliant World).

David Eagleman, American writer and neuroscientist admits the fact that "good science and good art are the same" (*To innovate, scientists and engineers find inspiration in the arts*). He acknowledges the creative process that is involved in both science and art and says "A good creative person, scientist or artist, generates lots of ideas and has the capacity to throw a lot of them out." This is the reason why programmes like PopTech associate with various

internationally known reputed universities and agencies so that they can provide a common forum to artists, writers, businesspeople, scientists, and social innovators which will make possible all sorts of productive collaborations.

Ed Belbruno is a passionate painter and a great mathematician. He was assigned to find trajectories for the Galileo mission to Jupiter. While finding the trajectories to Jupiter, and to compile the data of those trajectories to a spread sheet he realized that it was not an easy task. He started doing paintings to express him and suddenly envisioned an element of reality that he hadn't seen earlier. Applying the Van-Gogh style for the earth moon system in the brush strokes he saw a route to the moon and that paved the way for the first ballistic capture orbit to the moon with a painting. This story is a central part of the new documentary, *Painting the Way to the Moon*, and it explicitly depicts how one can intertwine art and science.

A list of internationally known personalities who are scientists and artist/writers is below:

	Helen Beatrix Potter	English Author and Natural Scientist
	Alexander Borodin	Russian Composer and Chemist
	Greg Graffin	Singer and Professor
	Brian Cox	Key board Player and Particle Physicist
	Dr Palash Sen	Indian singer, songwriter, musician, composer, actor and a medical doctor
	Mira Aroyo	vocalist and geneticist
	John A. Wood	scientist and painter
	Punathil Kunjabdulla	writer and doctor

	Ed Belbruno	mathematician and painter
	Diane Nalini de Kerckhove	Physicist and Jazz Singer
	Tom Scholz	Engineer and Guitarist
	Dan Snaith	Mathematician and Musician
	Milo Aukerman	Singer and Biochemist
	Brian May	Astrophysicist and Musician
	Carlos Prieto	Engineer and Musician
	Vilayannur Ramachandran	Neuroscientist and writer (articles on neuroscience)
	William James Hung	Technical crime analyst and singer
	Karim Elmahmoudi	Aerospace Engineer and Composer

For these people who decouple their passion and their profession, one complements the other. At times the work pressure instigate them to concentrate more on their passionate rooming, and sometimes it is the demand of time and work that forces them to spend more time to look at these works of art in a new sense. As scientists and as artists they are enthusiastically committed to discover new things. For them each of the discoveries and findings give them a sense of exhilaration where as their artistic or creative ruminations give them a sense of liberation. Science and art always present before us a sense of boundless scope

for searching and finding new truths and revelations about the universe and its infinity. They are always in a symbiotic relationship.

Currently there is a strong insurgence of collaboration of multiple disciplines in Universities, and R&D agencies. This merging of technology and science with art and literature could lead to the pop up of original ideas, more feasible products and services that can satisfy the people on artistic and practical levels. This will make the people more broadminded and happy. Scientists or artists or writers will break away the shell within which they are engaged themselves with their research, ponderings and observations to come out and look around themselves and it will definitely make them more approachable, more humane, and more responsible. This could be the reason for the new insurrection in the national movements in the US for incorporating an A-for Arts into the STEM plan of education, science, technology, engineering, and math. Congresswoman Suzanne Bonamici, on February 6, 2013, asked “witnesses about the importance of STEAM (science, technology, engineering, arts, and math) education before a hearing of the U.S. house committee on science, space and technology” (Turning STEM into STEAM). Ultimately this coalition of disparate disciplines will equip us to face the world in a more invigorated spirit and confidence. This intellectual spirit will make the world around us more beautiful and more perfect.

References

1. Alexandrov, Vladimir E. (1991). *Nabokov's Otherworld*. Princeton, N. J.: Princeton University Press.
2. Asimov, Isaac. *Isaac Asimov Asks, "How Do People Get New Ideas?"* July 2015. Available at <http://www.technologyreview.com/view/531911/isaac-asimov-asks-how-do-people-get-new-ideas/>
3. Barron, Frank and Harrington, David M. “Creativity, Intelligence, and Personality” Available at http://www.sagepub.in/upm-data/33595_Anderson.pdf
4. Boyd Brian. (1999) *Nabokov's "Pale Fire": The Magic of Artistic Discovery*. Princeton, N. J.: Princeton University Press.

5. Brown, Kurt. (2001). *The Measured Word: On Poetry and Science*. Georgia: University of Georgia Press.
6. Calaprice, Alice. (Ed.). (2000). *The Expanded Quotable Einstein*. Princeton, N. J. : Princeton University Press. pp. 10-245.
7. Catell, Raymond B (1987). *Intelligence: Its Structure, Growth and Action*. North Holland: Elsevier Science Publishers.
8. de Vries, Gerard and Donald Barton Johnson.(Ed). (2006)*Vladimir Nabokov and the Art of Painting*. Amsterdam: Amsterdam University Press.
9. Gutkind, Lee. (Ed). (1998) *A View from the Divide: Creative Nonfiction on Health and Science*. Pittsburgh: University of Pittsburgh Press, pp. 14-35.
10. Hakala, Juha T. (2013).*The Art of Scientific Discovery. Creativity, Giftedness and the Nobel Laureates*. Ideo Oy: Klaava Media.
11. Holden, Jonathan. "Poetry and Mathematics" *The Georgia Review*, Vol. 39, No. 4 (Winter 1985), pp. 770-783.
12. Honeycutt, Irene Blair. "Interview with Czech Poet Miroslav Holub" *VQR. A National Journal of Literature and Discussion*. August 2015. Available at <http://www.vqronline.org/interview/interview-czech-poet-miroslav-holub>
13. Jana, Reena. "To innovate, scientists and engineers find inspiration in the arts" August 2015 Available at <http://www.zdnet.com/article/to-innovate-scientists-and-engineers-find-inspiration-in-the-arts/>
14. Lingam, Pireeni Sundara. "*Science and Poetry: Predation or Symbiosis*". *World Literature Today*. August 2015 Available at <http://www.worldliteraturetoday.org/2011/january/science-and-poetry-predation-or-symbiosis-pireeni-sundaralingam>
15. Miller I. Arthur.(2001). *Einstein, Picasso: Space, Time and the Beauty That Causes Havoc*. New York: Basic Books.
16. Nabhan, Gary Paul. (2004). *Cross Pollinations: The Marriage of Science and Poetry*. Canada: Milkweed Editions, pp. 3-15.
17. Nabokov, Vladimir. (1979). *Speak Memory: An Autobiography Revisited*. London: Weidenfield and Nicolson. pp. 150-330.

18. O'Herron, Patrick, "Turning STEM into STEAM". August 2015. Available at <<http://www.partnershipmovement.org/news/p/turning-stem-into-steam>>
19. Robinson, Ken. (2001). *Out of Our Minds: Learning to be Creative*. New Delhi: Wiley India Private Limited.
20. Rothenberg, Albert and Bette Greenberg.(1974). *The Index of Scientific Writings on Creativity: Creative Men and Women. General 1566-1974*. Volume II. Hamden, CT: Archon Books.
21. Rothenberg, Albert and Carl R. Hausman. (1976). *The Creativity Question*. United States of America: Duke University Press.
22. Silver, Jay. "Insights into a Brilliant Mind". August 2015 Available at <http://www.://blog.invenzone.com/insights-into-a-brilliant-mind/jay-silver/>
23. Sternberg, Robert J. and Scott Barry Kaufman (2011). *The Cambridge Handbook of Intelligence*, New York: CUP.
24. Taylor, C. W., Barron, F. eds. (1963) *Scientific Creativity*. New York: Wiley.
25. Williams, William Carlos. (1962) *The Doctor Stories by William Carlos Williams*. Canada: Penguin Books, pp.119-134.