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# Why Science Students Need to Learn Liberal Arts?

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***Abstract:*** *The current review focuses on the need of studying Liberal Arts in tandem with Science. To resolve the forthcoming challenges of the 21st century, a greater demand would arise for empathetic scientists in the field of Science and Technology, who could only be trained with liberal arts in order to be so. The liberal arts knowledge would provide the vision to the scientists to conduct their discovery and innovation. It is pertinent to blend Liberal Arts in the syllabus to teach the scientists of tomorrow, the value of liberal arts in order to derive the perspective to see the society for whom they will work.*

***Key Words:*** *Science, Liberal arts, Empathy, Interdisciplinary study.*

## 1. INTRODUCTION:

Knowledge of the historic and philosophical background gives that kind of independence from prejudices of his generation from which most scientists are suffering. This independence created by philosophical insight is—in my opinion—the mark of distinction between a mere artisan or specialist and a real seeker after truth.

-Albert Einstein (1).

In order to exist as living beings we need to have two approaches: Knowing and Practising. Knowing to understand the world around us and practising, to apply the knowledge for perpetual existence. Science allows for the Knowing part while practising it to sustain is provided by the faculties of art. This tandem working is necessary for survival in the world.

However, in our country we are brought up in an educational environment where we fail to link these two faculties of Liberal Arts and Sciences. The streams like arts, science, management, commerce etc are divided and set up in a hierarchy, replicating our Indian society where we have also been divided in caste, class, religion and gender. And the similarity doesn't end there, like we have been made archenemies of each other, belonging from different backgrounds, the faculties too have been made archenemies of each other, which is very evident in various inter-collegiate or inter-university competitions. The faculties which are ought to be ancillary to each other are either seen as rivals or are simply looked down upon.

In the Indian societal hierarchy, science has been placed at the top while Liberal Arts are at the lowest rung. The entire system has been conditioned to be so by the collective conscience of Teachers, Parents, and Relatives where they compel, coerce, force, push, and even threaten seemingly intelligent pupils to opt for science, whereas their supposedly less intelligent peers are herded in a similar fashion to go for arts. Market-driven education system is one of the major factors for the development of this collective conscience of the society's elders. As a developing economy, India had to rely heavily on its Industries but that was only limited to a few sectors and hence the current state of affairs.

However, the roots of this division between Science and Arts date back to the 16th century, when Descartes introduced a speciously logical separation of knowledge into that of matter and spirit, the first becoming the proper field for the scientist, the latter preserved for the theologian and humanist. This face saving distinction was to plague science and philosophy from then on (2).

According to Aristotle, Science is a deductive and inductive reasoning process (3). He propounded that knowledge is based on observation (empirical). He divided theoretical sciences into Physics (science of nature), Mathematics (the science of quantitative aspects of things) and Theology (the "first philosophy," or the science of being). Logic or Analytics, as he called it, was essential to understand all the aforementioned subjects. He devised the idea of a premise

and a conclusion, making the conclusion based on proof and winning debates based on reason. This philosophy of science further guided researchers to develop research methodology.

The roots of Liberal Arts are in the Greek & Roman civilizations. The word "Liberal" originates from the Latin word 'Liberalis', which means appropriate for free men. According to the Greeks and the Romans, Liberal Arts education is a must for human beings to be free, while vocational/technical studies was thought to be suitable for non-free members or slaves. A liberal education is a cohesive collection of experiences, each providing its own unique contribution to the enlightenment of its practitioners. The Liberal Arts offer knowledge, and the cultivation of habits of mind that allow graduates to mature into successful, productive members of society who can appreciate others, experience, and embrace the notion of empathy, and seek lifelong learning (4).

Due to the vast difference in the motive and content of the syllabus of science and liberal arts, it is widely accepted that students from both the faculty have completely contrasting personalities. The science curriculum focuses on understanding the nature and its exploration, whereas the liberal arts expose the student about the societal aspects of human civilization. As a student, teacher, and an observer, we have always felt that these two diverse looking faculties are not independent; Science explore nature for human welfare and Humanities (liberal arts) need science to resolve the societal problem. But unfortunately most of our science students fail to connect and apply their learned knowledge to societal issues.

The science syllabus comprises of derivation, methodology, experiment, experimental observation, analysis and application. The science students do learn scientific attitude, logic, and reasoning; to be concise and analytical. But learning only technical aspect of the subject leads to develop a student with poor communication skills and they lack on the most important human emotion i.e. empathy. It has also been observed that science students are poor in expressing their own thoughts, fail to elaborate, they are rigid in their thoughts and they are less social (exceptions are always there and it is also affected by family background and parenting). In 2015, Takeuchi H et al., had conducted study on science and humanities students' brain and they found that there is structural difference in science and humanities student's brain. Science students tend to have more gray matter in the medial prefrontal cortex whereas humanities students displayed more white matter around the right hippocampus. The research team have put forth that increased amount of gray matter among science-minded students may indicate a lower ability to empathize (5). The poor empathetic science students lack the vision to cognize the societal problem. The surveys have also found that science students are dearth of soft and communication skills which makes them unemployable.

Nadine Dolby concluded his article, "The Decline of Empathy and the Future of Liberal Education" by mentioning that by prioritizing the nurturing of empathy through a liberal education, we can do much to effect positive change (6). We can help our students understand their connections to other humans, animals, and the planet—and perhaps, eventually, find their way back to themselves. Richard Sigurdson, former Acting Dean of Arts, The University College of the Cariboo cited that liberal arts education is not intended to train student for a specific job, though it does prepare the student for the world of work by providing him/her with an invaluable set of employability skills, including the ability to think for themselves, the skills to communicate effectively, and the capacity for lifelong learning (7). He also claims that Liberal arts would teach students to be critical reader and evaluator.

On one hand, the science students face paucity of life skills such as critical thinking, empathy, soft and communication skills and on the other hand liberal arts offer the basket of such life skills. Realising this scenario, it is recommended to have an interdisciplinary approach to prepare and develop the science students for forthcoming challenges. Taking cognizance of this need and the importance of blended teaching-learning of diverse subjects, few renowned universities such as the Stanford University, the University of New South Wales, the University of Sydney, and the Australian National University have initiated trans-disciplinary courses.

## 2. CONCLUSION

The current curriculum of science has been very well designed to understand the specialised subject. However, the need of the hour is to not just gain subject knowledge, but to have an approach of inclusiveness of different subjects, where student can learn diverse subjects and expand their perspectives. Teaching liberal arts to science students will not only make them employable but also prepare them to tackle with the 21$^{st}$ century sustainability problem. The complex, messy nature of sustainability problems which cannot easily be tackled from a single disciplinary perspective makes a transdisciplinary approach valuable (8 & 9). We need the future scientists who can intertwine their specialised subject with liberal arts, understand and resolve our societal problem and make our country a better place to live in.

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