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Letter to Editor
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The Advantages of Being Multi-Disciplinary

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Letter to Editor

When I started my path in college toward a career, I chose physics as my field of study. After 4 ½ years, I received my B.S. degree in physics. After graduating, I knew I wanted to work on a graduate degree but I didn't want to start graduate school in debt. I therefore wanted to find a job but soon realized that a B.S. in physics was not much in demand. I ended up teaching math and Science in Jr. High and High School. Finally after earning enough to pay off my debt, I began to think about returning to college to begin working toward a graduate degree. I however realized that if I wanted to increase my chances of finding a job when I finished, I needed to consider other fields. Because of discussions I had with a professor in chemistry who was a physical chemist, I realized that I could pursue a PhD in chemistry and at the same time maintain my connection with physics. After starting graduate school majoring in chemistry, I began to realize the advantages I had with being muti-disciplinary. I learned that my background in math and in the physical principles of the sciences, which a physics degree afforded me, was able to see various chemical problems from a perspective that my fellow students with B.S. degrees in chemistry did not have.

As an example, in studying physics, I acquired a very good background in quantum mechanics. I also learned to apply a very powerful software program (Gaussian–76) to many different atomic and molecular systems. I was however often told that this program could not produce meaningful results for many of the molecules I was interested in studying. But because of my multi-disciplinary background and the nature of this background, I was not predigests against trying. I was also fortunate to become friends with a post-doc in the chemistry department, Dr. Bijan Rao, who was by training a solid state physics and who also was very interdisciplinary by self-training. We decided to collaborate on a project in which we wanted to apply the quantum mechanical program, Gaussian–76 to a polymer system. At the time, we were told that these programs were not design to handle large molecules and that no meaningful predictions could be obtained. However we were able to use results of calculations from the Gaussian-76 program to predict several statistical properties of the polymer, polyethylene, such as the mean-square-radius-of-gyration, the temperature coefficient, and several others. These results were published in the very prestigious American Chemical Journal, Macromolecules [1].

I have now expanded my interdisciplinary capabilities into many other disciplines. All of these new areas have as its fundamental root my original chosen field of physics. Because of the strong math background I was afforded, it was not hard to "master" fields such as artificial intelligence or bioinformatics. This led me into areas of study such as biochemistry, medicinal chemistry, drug design and other areas of biomedical sciences dealing with proteins. Our group has studied and published papers dealing with Parkinson's disease, Alzheimer's disease, drug resistant tuberculosis, and others in the medical fields. We have also studied new catalytic materials for use in fuel cells and new materials for use in the storage of hydrogen gas, as an alternative fuel to fossil fuels. My latest student is interested in thyroid cancer so we are now delving into this cancer and perhaps other cancers.

In summary, I have only been enriched by branching out from my original line of study. I can only say that it has enriched my research experiences far beyond where I thought I was originally headed. I strongly encourage anyone in any field to explore possibilities beyond one's original field of study. You never know where such exploration will lead.

References

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