

Text of lecture by Professor Arun S. Mujumdar
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A Global Academic Journey - A Personal Perspective
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I am very happy to be here amongst you today and meet the new and fresh faces of tomorrow's future. I am truly grateful to your President for the very kind invitation to address this youthful gathering of very bright and accomplished minds to share some of my experiences and provide a few words of wisdom that may be helpful.

The world today you are growing up in is so different from the world I was growing up in India in 1950's and 60's. Today with the electronic media access and TV and Baidu, Alibaba and Google, the world is at our fingertips. Sitting in our home we know so much about other countries and their people and culture and politics and sports!

When I was growing up it was only through books that we read about the outside world. Still they were exciting times. India had become independent for just about a decade. It was also the Sputnik Age- I recall it was October 4th 1957, when all the high school kids after a game of cricket gazed at the sky at twilight to watch the tiny shining speck moving slowly across the horizon. As you may know, Sputnik was the first satellite launched successfully by the former Soviet Union that circled the globe at 6900 km per hour in a low orbit. The

Sputnik Shock changed the way science and technology was done in the USA. To me, it reinforced my desire to study science and engineering and follow the footsteps of my father as well as my grandfather. Interestingly my daughter also followed the same career path but on her own free will.

I grew up in a small town in India and went to a modest school there. After completing my high school I moved to the big city of Mumbai and graduated with Distinction from University of Bombay in Chemical Engineering. India has a huge population just like China and getting admission in a good university especially in engineering discipline is very competitive even today. I had to work very hard to get into the university I wanted. Since childhood it was my goal to be an engineer and go abroad for higher education. Fortunately my hard work paid off and I got scholarship from McGill University in Montreal, Canada to do the Master's and Ph.D. degrees.

I still remember the day I left India in September 1965, alone, only with \$8 in my pocket (that was the amount allowed to carry with you abroad). It was right during a war time when all airlines except Air India had cancelled flights. It was an unexpected adventure for a young boy of 20 who had no idea of what was waiting for him at the other side of the globe. In hindsight how I wish the internet was invented in the 60's!

McGill University was truly a Global Village with graduate students as well as the staff from numerous countries around the world. It was an extremely fascinating, enlightening and inspiring experience to meet and learn from and about my peers. I learnt a lot about the world just by making friends with fellow students. Teaching methods of faculty at McGill were very different from what I was used to. With extra hard work I could surmount the initial hurdles and difficulties of a "Culture Shock".

I had to get acquainted to new food as well. I was only used to eating spicy Indian food and now I tried food from other countries and slowly learnt to get used to it and finally started enjoying it. In fact I was raised as a vegetarian in India but I had to change to a non-vegetarian diet in a hurry to survive!

Same thing with the weather. I had never seen snow in my life and the first snow was the breath of fresh air to me. I turned into a little kid when I touched snow with my own hands and snowball fights with my friends were so much fun even at the age of 20.

What I learnt from my journey so far is life is really beautiful if you make it so. It is really up to you, to mould your own life. You need to adapt to your surroundings and make the most of it.

As teenagers, I don't know how many of you have specific goals set for your life. There are so many choices open these days. Don't worry if you have not yet decided what you want to be in the future. Keep your mind and eyes open to your surroundings. Curiosity is the mother of invention. Be curious about things. Find out how things work. Many times we walk the same road every day but never notice the surroundings. We must smell the flowers in the spring and breathe in and enjoy the fresh cold air of the winter too. Nature is full of mysteries to be solved. All discoveries and inventions happened took place only because one person got curious about the mystery. Try to solve problems. Don't get discouraged if you are not successful at first try. Thomas Edison said that our greatest weakness lies in giving up. The most certain way to succeed is always try just one more time. Always remember that the secret of getting ahead is getting started. Always do your best. What you plant now will blossom in due time.

I would suggest that when you select courses, select the ones which suit your ability, aptitude and passion. Nelson Mandela insisted on everyone being educated. He said that "Education is the most powerful weapon which you can use to change the world" and it is

true. Education is not preparation for life; education is life itself. Develop a passion for learning. You will never cease to grow.

I enjoyed developing innovative ideas in my theses and research career. It gives me enormous pleasure if any of my ideas turn out to be useful for the problem solving of other colleagues of mine and for industrial problems. I like to disseminate freely the knowledge I have generated in my lifetime. In a way this is my service to the society. For example, recently my group has produced about a dozen free e-books that are downloaded by students and faculty from around the world.

Though I give lectures around the world, I am always a student at heart - forever a learner. Life teaches us at every step. We have to have an open mind to take note of these lessons.

We all want to succeed in life. Never get discouraged by initial failures you may face. The beginning of all achievements is passion to excel. Your desire for success should be greater than your fear of failure. Remember when one door closes, another opens. Always be ready to bounce back if you hit bottom. In order to succeed, we must first believe in our abilities. Make your own path. Love what you choose to do. During your drive towards success always remember to be a person of value. Study with dedication and passion. I always enjoyed what I did and so I was willing to devote whatever effort was necessary to complete the task at hand. Always strive for excellence.

Self learning is the key I used during my life. I had to define and propose my own thesis projects. I had to develop oral and written communication skills in English. English is not my mother tongue. I had to work very hard to be proficient in this foreign language. Where there is a will, there is a way. Luckily I had an excellent mentor in my thesis advisor Prof. Murray Douglas at McGill. As you advance in your academic career you will meet teachers who will be your mentors to guide you.

Reading biographies of accomplished leaders, artists, scientists, industrialists, etc always motivated me. I would advise you all to make this a habit. You can learn so much from their success stories. You can also avoid the pitfalls they may have faced.

University life is always competitive. Living and working ethically has been the motto of my life. I am always motivated by the desire to achieve, not by the desire to overtake others. Do work hard and act ethically in your life. Learn from your peers. Share your knowledge - which is unique in that it grows by dissemination.

It is important to remember that success is not a **zero-sum-game**. This means that your gain does not have to come at the expense of someone else. Do share the fruits of your success. Express gratitude intangibly as well as tangibly to those who helped you directly or indirectly in achieving your success. I am always grateful to all my teachers, students as well as collaborators from around the world and of course my family. Supporting your alma mater after you graduate and are gainfully employed in one way you can tangibly express your gratitude to the institution that helped you succeed.

Achieving your goals is important, but what is more important is what you become after achieving your goals. Be a good human being. Apply your resources to help the needy people of the world. I admire the Bill Gates of this world. After achieving the pinnacle of success Bill Gates has devoted his life now to bettering of the world. Look at the big picture. Try to help the under-privileged in the world regardless of where they are. Ultimately this is what will give you mental peace and happiness. This is also a key aspect of globalization.

Now let me say something about one of my research areas which has been with me for well over four decades. Drying Technology was a field that was nearly non-existent when I started my engineering research career, but I saw that drying is an important aspect of our daily life. On a small scale it is not necessary to know much about it.

However, on industrial scale it is another matter. The drying operation is used extensively in food processing, in textiles, in pharmaceuticals, paper making, agriculture, mineral processing - you name it. It fascinated me. It is a highly energy-intensive operation. It is multidisciplinary. It involves science and art. It was also inefficient for lack of in-depth knowledge. I organized the First International Drying Symposium in 1978 and it generated great interest in industry and universities. It was a major success. It then became a series. As of this year we have held over 50 global scale conferences on this subject. Without getting technical, I am pleased to note that this effort has resulted in massive energy savings in industrial drying around the world. It also has had a positive impact on climate change due to reduced emission of greenhouse gases. Much is still unknown about drying. Advances in other fields will help us gain deeper knowledge into drying of various materials with their unique properties.

I have had the good fortune of visiting China frequently since 1984. I have visited the great cities of Beijing, Shanghai, Xian, Tianjin, Wuxi, Hongzhou, Shenyang, Teiling, Guilin, etc. I am awe-struck by the rapid pace of development in every city and institution. I also admire the wide variety of art and crafts and culture of your country.

It is known that extra-curricular activity stimulates the right side of the brain. In applying science and technology we use the left side - the analytical and logical side - of the brain. It is a proven fact that utilizing both sides of the brain can lead to higher levels of creativity and innovation. It also helps reduce lower the stress level, calm the mind and enhance intellectual performance. I encourage you to give some time to develop any kind of art and take active part in sports. Recently I have taken up water colour painting as a hobby to reduce my stress level and I think it is working. I believe it has improved my thought process and productivity as a result! It is essential for us all to consider both mental and physical health.

As you know we live in a knowledge economy. Technological knowledge is advancing at a fast pace. Many of you will be working in jobs that do not even exist today. It is therefore very important that you keep yourself abreast of technological developments around the world. Improve your depth of knowledge in areas of your study but do not neglect to also broaden the scope of your knowledge.

Man is a social animal and we are communicating constantly. Professionally we also need to use oral and communication media to get our points across to the world. I urge my mentees to pay special attention to enhancing these skills. In my case I have been able to write and publish extensively after developing the necessary communication skills. This is how knowledge is disseminated globally and it has impact in areas that you may never know about. These skills will be need regardless of the job you will eventually do.

I have always worked internationally in my research because it was necessary to do so. Now, one needs to be able to work in multi-national, multi-cultural and multi-lingual teams to accomplish major projects in any area. I developed most of my research ideas independently. Implementing them successfully required building of international multicultural teams. I have had collaborative research with teams in several countries such as China, India, Brazil, Hong Kong, Singapore, Iran, Thailand, etc. My first China connection was in 1984 with Tianjin University of Science and Technology (it was then called Tianjin Institute of Light Industry and in fact belonged to the same Ministry that JU belonged to). This collaboration continues even today after three decades. I am currently an honorary professor at TUST.

My collaboration with Professor Zhang Min of Jiangnan University has been particularly extensive and highly productive as recognized by the National Award for Science and Technology cooperation (2013) and the China Friendship Award (2014). Professor Zhang Min

and I have jointly advised many postgraduate students and published extensively. This has been possible only because of the high calibre research students and staff of Jiangnan University and the leadership of Professor Zhang Min.

Now let me give you a brief outline of my professional career! After graduating with the doctoral degree from McGill University in Canada, I worked in industry in Canada and the USA for 5 years and then joined academic life as a faculty member in Chemical Engineering at my Alma Mater. After 25 years as a professor at McGill, I moved to Mech. Eng Dept of the National University of Singapore in 2000. My research has always been inter-disciplinary and based on science and its applications. Switch from chemical to mechanical engineering did not pose any difficulty.

While at NUS in Singapore, I established and managed a Technology Centre to help industry in mining, metallurgical and materials processing areas. I had the good fortune of mentoring over 150 masters, PhD, postdoctoral researchers as well as junior faculty members from many countries.

I believe over my professional life, I learnt more from my students and collaborators than what I many have taught them. This is the nature of academic life in my opinion. I enjoy being on the learning curve all the time. I have worked and made some contribution to knowledge in many engineering disciplines although I started off as a chemical engineer. Working in a multicultural team can promote innovation and so-called out-of-the-box thinking as well.

Having good mentors and peers has been a major asset in my professional development. Being associated with highly ranked global universities has provided me with many advantages that I am grateful for. However, success is only 10% inspiration; 90% of it is derived from perspiration viz. hard work on your part. There is no substitute to persistent effort even if you fail many times. You learn more from

failures than from successes. Never give up. Take manageable risks. As the old adage goes: No pain, no gain! I have encountered many failures in my career and many hurdles that I had to surmount. Only successes are publicized so we often think the path to success is "smooth sailing". Remember that roses bear thorns too!

Note that a harbour is a safe place for ships but that is not what ships are built for. One needs to sail in turbulent waters now and then to reach one's destination. The journey is as important as the destination. Sometimes one needs to change the path or even the destination as one goes along. This is not unusual but to set course one needs to have a destination in mind. Do not set the bar for your achievements too low so it is not a challenge; nor so high that it seems unattainable from get-go.

In closing I wish you success in building up of your educational foundation. Embarking on university education, I wish you success in all your endeavours so you can make a valuable contribution to China as well as the Globe and help make it a better place to live. Now that China is a major power in the Globe and is taking on responsibilities to assist the developing and underdeveloped world, I am sure you will be a part of this global effort and will be on your own global journey as well. Spread your wings and soar high! Be happy!

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