RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

(Established through Act No.18 of 2008)
ANDHRA PRADESH, INDIA
(Catering to the Educational Needs of Gifted Rural Youth of Andhra Pradesh)

CONVOCATION ADDRESS

BY

DR. N. R. NARAYANA MURTHY
FOUNDER CHAIRMAN, INFOSYS, BENGALURU

5ᵀᴴ CONVOCATION

FEBRUARY 26, 2022

RK VALLEY CAMPUS

Convocation Address

Sri N R Narayana Murthy
Founder - Infosys

You can make a difference. Please make it

Prof. Raj Reddy, Prof. Balakrishnan, Chancellor, Honourable Minister for Education of Andhra Pradesh-Dr. Audimulapu Suresh, Vice-Chancellor, members of the Governing Council and Academic Council, directors, deans, faculty, staff, students, graduating students, families and friends of the graduating students, and guests, I am honored and privileged to be with you virtually on this happy day. Thank you for this opportunity to share your joy and pride. Thank you for your kindness in awarding me this honorary doctorate.

Thank you for giving me the opportunity to share the screen withProf. Raj Reddy. He is my hero. He is a unique person. He is the only Indian and the first Asian to win the Turing award, the highest honor for a computer scientist. He has competed with the best in the field and has shone. Among the people who have accomplished as much as he has,I have not seen another person who is as humble as Prof Raj Reddy. Even if you subtract all his

scholastic achievements from him, he will remain as great a human being and as worthy of our veneration. My hope is that the countrywould honor him with Bharata Ratna since several generations of Indians have been, are and will be inspired by him.

After much thought, I decided that I would use ideas and content from a speech I gave on a similar occasion in the last decade. The reasonsare simple. The occasion is similar. Audience is similar. The message is the same. Finally, as an engineer, I believe in reusability.

Graduating students, this is your day.I salute your aspiration, smartness, determination, hard work and discipline. I salute your family for their sacrifice and support. I salute your teachers for giving you the strength, support, and encouragement to complete this laudable marathon.

Some of you will go on to do your graduate studies and most of you will start your career as practising engineers. I wish you the best.

I want you to ponder about an important problem on this important day, and decide how you can be part of the solution

to this problem. The problem is that every gadget we use and every invention that we see around us have been invented abroad. Why is to so? Let me answer that question based on my experience of interacting with literally hundreds of thousands of engineering graduates who joined Infosys as trainees during the period 1983 to 2011. I believe it is because we do not use much of what is taught in the college. For us, education ends with passing the last examination in the college. Our students put enormous focus on rote learning and passing the examination. Most of the trainees that I met at Infosys told me they hardly remember even fundamentals learnt from their college education just three months after the examination. They do not see college education as an instrument to solve societal problems around them.

Therefore, today, I would like to speak to you on how you can use the outcome of these four years of your undergraduate study which forms the foundation for your future accomplishments in pursuit of a higher degree or for your success as a professional.

How do we use our education to make the society around us a better place? We do it by learning the fundamental concepts taught in the college, and ensuring that these fundamental

concepts become part of our DNA in our work.We should constantly update our understanding of these fundamental concepts by becomingaware ofthe advances in academia and industry.We should seek opportunities to use these fundamental concepts to produce better products for our customers and to make our work more productive and comfortable.We will, in the process, invent new ideas. Every day, just ask how you can use your professional knowledge to make what you do cheaper, faster and better.

Education is about enhancing learnability. Learnability is the ease with which you can learn new things. It is also the ability to extract generic inferences from specific instances and to use them in solving new unstructured problems. Such a learning paradigm requires that you have a clear grasp of a set of fundamental concepts. For example, I learnt the concept and the mathematics of negative feedback, and the power of modelling and simulation from the Control Theory class in my undergraduate years fifty eight years ago. I make it a point to use these ideas in my work even today. You will be surprised to know that I have used these ideas very successfully for over 20 years when I was the CEO of a multibillion dollar company.

I completed my graduate degree in computer science about 52 years ago. I still use fundamental concepts from my CS courses. I want you to use similar ideas in your own branch of engineering. If you studied Operations Research, then you should internalize at least the power of simplex algorithm, Integer programming, and dynamic programming. Having done a course in statistics, you should use the ideas of probabilities, Bayes Theorem, or those of uniform, normal, binomial and Poissondistributions in your work. If you studied a course on algorithms, you should at least use in your workthe basic attributes and applications of sequential, parallel, distributed, concurrent, event-driven, randomized, approximate and genetic algorithms. If you took a course on databases, you should be able to use at least the concepts of B* trees, transaction processing, normal forms, logging and recovery, distributed databases and multi-phase COMMITs. I have installed Mathematica on my laptop for simulations using mathematical equations.

Why I am saying these things? It is because, as a successful engineer, you have to embed these basic concepts in your mindset and use them often to make your work more productive and to produce new innovations. It will help you to keep yourself up-to-date on advancements in these ideas. It will

help you to bring in transformational progress to our country by leveraging the power of these ideas.

How does one internalize these ideas. Make sure you visit these ideas as often as you can by mulling about them often.Seek opportunities to use them in your work as often as you can. One effective way of being in touch with them is torevisitthese fundamental ideas in classical textbooks as often as you can during your spare time. It will also help you assimilate advances taking place in those ideas.

I have created a library of some of the classics in Computer Science. I try to read them as often as I can. These days, I have become very slow in understanding technical stuff but I still try. Reading them puts me in an uncomfortable zone. But, when I start reading them, I get inspired by the smartness of these ideas and of their creators.They make me humble. That humility motivates me to work harder in whatever else I do. Let me name just seven of the one hundred and odd classical computer science books in my library. The Art of Computer programming (4 volumes) by Donald Knuth; Computer Architecture – A Quantitative Approach by Hennessy and Patterson; Modern Operating Systems by Andrew Tanenbaum and Bos; Computer Networks – A Systems Approach by

Peterson and Davie; Automata, Computability and Complexity – Theory and Applications by Elaine Rich; Algorithms Illuminated (4 Volumes) by Tim Roughgarden; Operations Research – Applications and Algorithms by Winston; Database Systems – The Complete Book by Garcia-Molina, Ullman and Widom; and Transaction Processing: Techniques and Concepts by Jim Gray and Andreas Reuter. I have not mentioned books on AI, ML and big data since I have not used them in my work. Contemporary scholars may opine that some of these books are dated. But, they are sufficient for a techno-manager like me to keep my interest alive, to update my knowledge, and to use them in my work. Please choose your own set of classical text books in your specialization for your library and read them as often as you can. These days, it is easy to buy Kindle versions of the books.

Some of you will perhaps not appreciate why you should read these books if your job is to be just a factory engineer. Reading these books and solving problems from them help you to understand what is happening in the field at the leading edge.That will make you a smarter engineer.

Let me give you two examples of engineering skills bringing tremendous value to our customers at Infosys. A couple of decades ago, an important customer of Infosys in Japan wanted

us to review an existing system for performance improvement. The end-of-day batch programs were taking a huge amount of time and were running into the on-line day. Our engineers reviewed the design of the programs and the database, made improvements based on their knowledge of B* trees, and reduced the end-of-day procedure from 8 hours to about 45 minutes! In 1981, when we were designing a large on-line application package, we found that programmer-productivity was hindered by the lack of screen management software on the machine. Mr. Shibulal, my colleague, and I designed our own screen management package using the then ideas in man-machine interaction. We improved the productivity of about 80 programmers by as much as 25% each.

Please join the weekly colloquia in your company or university right from day one. If such a facility does not exist, please start one. Invite well-known experts from the academia and the industry to give lectures on advances in areas of your work. Use internet to get the latest ideas in your area of work.

Become a member of a professional society like ACM and IEEE with subscription to at least one Special Interest Group (SIG) relevant to your responsibility in your company. These professional bodies bring immense value to your work. They are the source of unlimited knowledge to improve your

productivity and innovative capabilities. They open doors to learn from global experts. Take examinations conducted by professional societies like IEEE. Such examinations help you to be up-to-date in your knowledge. They help you to benchmark yourself with professionals globally. They raise your confidence to tackle advanced problems in your workplace. They help you to innovate at the leading edge.

Take part in contests held by professional bodies, the industry and your own company. Such contests will help you sharpen your analytical and skills capabilities.

Any success as a professional requires that you develop a mindset of curiosity and respect for intelligence and knowledge. That means you should hold your teachers in the highest esteem, meet them as often as you can, and learn from them. Please listen carefully and learn from people smarter than you are at workplace and elsewhere. Seek truth. Disagree with people on issues if it requires you to uphold truth, butplease do not bedisagreeable.Develop the habit of spending at least an hour a day in enhancing your professional knowledge. Attend refresher courses conducted by your company, your alma mater or elsewhere.

Of course, none of these will help you if you do not developto be a good citizen of this nation. Please practise team work, discipline, good work ethic, honesty, courtesy, commitment and hard work. Please strengthen your knowledge of English since no other language in today's world has even a small fraction of value for you to update your knowledge as a professional. In every action of yours, please demonstrate your commitment to unite this nation rather than divide it on the basis of religion, region, caste and class.

My congratulations again and best wishes for a great future.

Thank you.

DR. N. R. NARAYANA MURTHY
FOUNDER CHAIRMAN, INFOSYS, BENGALURU

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