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“How You Change the World”

University of New England
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President Ripich, distinguished faculty, trustees, staff, family and friends,
and **especially** members of the University of New England Class of 2009.

It is an honor to be here on this special occasion, at the Commencement
for this special institution providing a superb education.

Let me first extend my congratulations to the graduates and their families.

This is a proud moment in all of your lives.

I make a promise. This will not be the longest commencement speech ever
given. That was a six-hour address given in the 19th Century at Harvard;
the first half was in Latin, the final three hours in Greek. Then, the
graduates were given a test. In contrast, I will abide by the best advice
given to all speakers – be sincere, be brief, and be seated.

In many ways, this is a commencement for me, just as for you. About 40 years ago, I began my academic career at Georgetown University as a young Assistant Professor, joining the faculty of a newly established graduate program in Biology at Georgetown. Construction of the Science Building on the Georgetown Campus had just been completed and the Department had a new chairman, recruited from Cornell University, who as graduate student, was the first to slice a bacterium into very thin sections so that its inner cell structure, including the DNA, could be visualized using an electron microscope. That was a major breakthrough in September 1963. It was an exciting time -- new faculty and staff, a brand new building, shiny new equipment, and a fledgling program in the biological sciences. The country was in an exuberant mood, with a dashing, vibrant young President, John F. Kennedy.

The students, then, like you, were bright, energetic and hardworking. In many ways, it was a euphoric time in the life of our country.

Georgetown University undergraduates were all male and the students were required to wear jackets and ties to class – the rules did not mention socks....so the rebellious did not wear socks....how the times have changed. Professors are grateful today if their students wear clothes!

But, the calm and, yes, the complacency was shattered....by an assassin's bullet. Millions of Americans will always remember where we were standing and what we were doing at the moment we heard the tragic news of the assassination. The crowds watched silently, standing along Pennsylvania Avenue, in Washington, DC, as the horse-drawn hearse that bore our fallen leader passed by.

Soon after, an eloquent speech was given by Martin Luther King at the Lincoln Memorial. And he, too, fell victim to an assassin's bullet. The riots that followed Martin Luther King's death were quelled by National Guardsmen who were encamped on the Georgetown University Campus. When I looked out of the windows of my office on the third floor of the Science Building, National Guardsmen, their armored vehicles and guns were clearly visible on the greensward.

Vietnam unrest subsequently left its mark on universities throughout America. Students marched in Washington, led protests on campuses, and actively lobbied Congress in delegations to Washington, DC to end the war.

The University of New England, has its special place in history. As students, you have spent your years on this beautiful Campus being educated in the finest tradition of this college.

It does bring to mind, however, Winston Churchill, who in a commencement address said, “My education began when I was very young – not long after I left college.” Perhaps not what parents who have paid for your college tuition want to hear.

During your years at the University of New England, you, too, have found your lives bracketed by tragedy. The war in Iraq and, again, in Afghanistan have occurred during the years you have spent at the University of New England. You have been educated to be leaders...challenged to “think out of the box.” Whatever your views on the Iraqi war, don’t make the mistakes that were made in Vietnam, where we condemned the warriors, as well as the war. The Iraq war may well be a hugely tragic mistake, as Vietnam, but, we must honor those brave young men and women – most from working-class families – who are serving their country in uniform. And, so many who return home with their lives shattered.

You are young people ready to encounter choices and make decisions. Another commencement speaker, Woody Allen offered sage counsel to a graduating class like you, but at an earlier time....and I quote, “More than any time in history, mankind faces a crossroads. One path leads to despair and utter hopelessness, the other to total extinction. Let us pray that we have the wisdom to choose correctly.”

Actually, your choices are much better. In our science and technology powered world of ever-increasing complexity, there is a growing need for your knowledge and know-how, as we try to understand each other, in order to live in harmony, and as we continue to build toward a sustainable future.

I challenge you to “Change the World.” I know that sounds like a lofty and unrealistically ambitious goal. Likely few of us would think of announcing such power or prescience. But we all have our passion. Some of us want to write novels, some want to heal others, some want to train horses, and some of us want to uncover new knowledge, win a Nobel Prize. Let us, however, not forget service to others. Find time to tutor an underprivileged child, take meals on wheels to an infirm elderly citizen, transport people with disabilities, or play ball or watch a movie with an at-risk teenager. These are experiences that enrich your lives and build your character too.

Our passions are uniquely ours, because we bring our own vision, our own values, and our own versatility to them. Our passions are what start us on quests to change the world.

No matter your chosen field, you can always be an explorer and a pioneer. Never be daunted by the knowledge of others. Learn what others know, but be curious and courageous about what is not known....and, always, be compassionate. Be tolerant.

Let me urge you to consider a career in public service. We live in a time of change....New scientific theories, new forms of music and literature, new technologies, cures for disease, new psychologies, and new visions come from those who dare to take risks and challenge conventional wisdom. Each of you has a unique contribution to make and your contribution can help make our world safer, kinder, and more compassionate.

It was the distinguished educator and writer, John Gardner, who said, "Democracy is measured not by its leaders doing extraordinary things, but by its citizens doing ordinary things extraordinarily well."

Over the last two centuries, America has been the nation that has most fundamentally shaped the world, primarily by citizens doing ordinary things with passion, commitment, and ingenuity.

The pioneers built sturdy wagons and trekked hundreds of miles with their families to settle a vast unknown territory.

America has also been shaped by its scientists, engineers, inventors, and entrepreneurs. They have ingrained in our culture the importance of asking questions, finding answers, and challenging the status quo.

Now, you are launching your careers -- in a world that few could have imagined 100 years ago, at the dawn of the twentieth century. Social and career choices were more limited then. Few women worked. Those who did were usually limited to teaching or nursing.

As individuals and as a nation, we must decide **what we value** and **how to achieve it**.

Over the last 50 years, we have moved steadily toward a society defined by science and engineering. That transforming force of science has brought miraculous change with things that seem ordinary to all of us. But, I remember a time **before** the polio vaccine was widely available, **before** Sputnik, and **before the ubiquitous “post it note.”**

Let me share one story of how this works. In my career, I have had the privilege and satisfaction to help understand where in the aquatic environment the bacterium causing the infectious disease, cholera, makes its home. I have studied the bacterium, *Vibrio cholera*, for more than 20 years.

I'll just share a few highlights. The research has taken me from my high school days in Beverly, Massachusetts, to graduate school at the University of Washington, Seattle. A circuitous route that led to Bangladesh where I was brought into contact with countless others who combat this scourge.

In our years of research, we posed scientific questions and performed experiments that defied the conventional wisdom of the time. Many scoffed at our ideas and continued to pursue the old path. That only spurred us on with greater commitment.

Eventually, we were able to prove that cholera was a bacterium that occurs naturally in rivers, estuaries, and coastal waters. And, the bacterium has a dormant stage that fooled researchers. It literally hides between epidemics.

We found that the cholera bacterium is associated with plankton found in virtually all rivers and streams. But purifying the water is an elusive goal. In poverty-stricken countries like Bangladesh boiling water to obtain safe drinking water is not an option. There simply isn't enough firewood to burn.

A less expensive option is filtering out the plankton to lessen, and possibly curb the disease. We found that sari cloth of finely woven cotton would make an excellent and affordable filter.

The sari is the native dress for women in Bangladesh. More than five years ago, our team of researchers taught women in remote villages how to filter their water. And, we have learned in a follow-up study just now underway that they continue to filter and the cholera rate is significantly lower.

Our work is a small step toward reducing the number of people, especially children, who die each year from cholera. We were ordinary people committed to our passion and able to make a difference. There are few things more gratifying in life than helping others help themselves.

There is still much work to be done. The toll that infectious diseases inflict on the world is enormous. Worldwide, over 17 million people die from malaria, hepatitis, cholera, AIDS, and other virulent scourges each year.

There is an African proverb that says, “the lack of knowledge is darker than night.” There is still a lot of darkness remaining in the world. There are still many things to change for the better. And, simple solutions can be powerful. You will not want for challenges.

Scientific knowledge has brought light to the darkness of not knowing. In the last 50 years science has catapulted us to places far beyond our imaginations.

In my day, Bob Dylan wrote “The Times They Are A-Changing.” Today, we are moving into the times **that are amazing**.

This brings me to my conclusion. Living in a society rooted in science and engineering brings many benefits, and it also brings important responsibilities. It is not just up to scientists and engineers to decide how we apply these new capabilities. All of us must be engaged in the discussion.

And, it is no longer enough for scientists and engineers alone to generate the new knowledge. All of us must be active in the debate about the use of that knowledge. Science is a strong and valuable force for finding solutions to problems and for changing the world in positive ways. But our task as a society is to understand the issues that science raises, so we can be informed partners in the debate about how knowledge is used.

Your degree carries with it the fine reputation this institution has earned over more than a century of excellence. This commencement is just the beginning of a life-long journey in learning and in changing the world to become a better place.

The torch of leadership must always be passed to the next generation. You stand on that threshold today. Be curious, be compassionate, and be committed. There is much to do here and elsewhere. You will not lack for challenges, for excitement, or for gratification, and I know that you will change the world.

Congratulations and great good luck!