

Address by Joseph Napolitano, Professor of Physics
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These are scripted remarks, and I am not used to working this way. To me, teaching and professional speaking are performance art, best done from loose outlines embellished with extemporaneous remarks. However, I want to say some specific things today, and I am also feeling humbled by the Darrin Award. So, I have prepared written comments from which I expect to stray only slightly.

First, I want to thank the members of Phalanx for honoring me with this award. I consider my profession as dedicated to making a positive difference in the lives of young people, so this recognition means very much to me. I will always count the Darrin Award as one of the highest points of my career, and I hope I am able to continue to live up to the principles it embodies. Secondly, congratulations to the new members of Phalanx and White Key. This is quite an honor for all of you, carrying with it important responsibilities. Rensselaer is fortunate to have you among our student body.

Now, I've decided to briefly give you my perspective on four aspects of higher education. These are the evolution of the university, the importance of studying the arts and sciences, the concept of leadership in academic environments, and what I believe is the key to building a great university.

The University of Yesterday, Today, and Tomorrow

In her novels *Oryx and Crake* and *The Year of the Flood*, the author Margaret Atwood offers pre- and post-apocalyptic visions of a future that has been shaped by science, technology, and human frailty. Universities are a focal point of the story, having become feeding grounds for the young talent that populate global corporations. These fictional accounts make for enjoyable reading, but they left this educator with an uneasy feeling about the directions being taken by many universities today.

I remember when I entered RPI as a freshman in the Fall of 1977. It was a heady time for a naive, nerdy kid from Long Island. All of my four years here, we were taking lots of courses from great faculty - many of whom are now my colleagues - and joined their research groups in one way or another. I proudly joined the faculty here in 1992, and saw many of the ideals of my undergraduate days intact, despite a number of changes. In the past two decades, there have been more changes, in my opinion some good and some not so great. But the faculty and student ethic by and large remains the same, and I continue to be proud to be part of that tradition. Nevertheless, there are pressures of the sort to which Atwood alludes, and I must admit, these have made me uncomfortable.

Teaching and learning work best as a partnership between professor and student. As a faculty member, my job is *not* to fill your heads with arcane knowledge or to train you for a job, although these do tend to be byproducts. Instead, my job is to teach you *how to think*. A

realization came to me some years ago, that the way I *teach* physics is far different than the way I *practice* physics. That is, teaching someone how to think, is more art than it is science. It is only through my work at this university, where I am in touch with colleagues in the arts, architecture, business, history, and politics (etc), as well as science and engineering, that I have learned to make this connection with my students.

So, I believe we must resist what Geoffrey Clark of Arizona State University calls "academic corporatism." [See *How academic corporatism can lead to dictatorship*, by G.A. Clark in *Nature* 452 (March 13, 2008) 151.] If we are not careful, we will see "job training" replacing "education" as the academic mission, and "funding" replacing "scholarship" as the measure of a faculty member's worth. Such actions would not be in the best interests of our students, or our university.

Expanding the Bubble: The Importance of Research in the Arts and Sciences

When I describe my research (in so-called high energy elementary particle physics) I am frequently asked "So, what is it good for?" Such is the lot in life for those of us in the "pure sciences" and, I suspect, to many in the Arts and Humanities. Urban legends provide humorous retorts. Benjamin Franklin purportedly responded "What use is a newborn baby?", while Michael Faraday supposedly answered his Prime Minister "I cannot say what use they may be, but I can confidently predict that one day you will be able to tax them." Let me take a moment to try and come up with a more serious answer.

To me, mankind lives in a bubble. We cannot see outside the bubble, but we know there is more out there. Inside this bubble, there exists joy and also problems that need to be solved. Also inside the bubble are all of the tools we have at our disposal for solving these problems. Learning how to use these tools and to modify them is the work of the engineer and applied scientist. However, more tools lie outside the bubble. (Likely there are more problems, too, but let's not worry about them for now.) Those of us in the "pure" arts and sciences, we push on the bubble, expanding it so that we gather more tools. Nobody knows for sure which direction is the right one, to find the tools for any one particular problem, so we push on the bubble in all directions that we can. Steadily, we learn new things, build new tools, and help mankind solve more of its problems.

Our universities are the "bubble expanding factories", especially places like RPI. We teach students how to think outside the bubble, how to gather new facts and look in new places. Establishing the balance between "pure" and "applied" research is much easier at universities than it is at private profit-oriented companies and corporations. Indeed, our privilege to be at a place such as Rensselaer comes with significant responsibilities for the eventual betterment of our planet.

Academic Leadership

Phalanx is committed "to recognize those Rensselaer students who have distinguished themselves among their peers in the areas of leadership, service, and devotion to" RPI. The concept of "leadership" in an academic environment is peculiar, perhaps even something of an oxymoron. We teach students to be independent thinkers, to be open to new opportunities, information, and ways of looking at things. If the whole point of a university is to attract creative

people and to feed and cultivate their independent approaches, how is such a group "led" anywhere?

The answer is both delicate and powerful. Aristotle wrote it down in *Metaphysics*, namely that "the whole is greater than the sum of its parts." (Lesser philosophers have referred to this as "synergy.") That is, the successful academic leader is able to take this group of independent thinkers and instill in them a vision that encompasses their individual interests and abilities. The trick is to have them find consistency between the overall vision and individual passions, so that *all* members of the academic community have a sense of ownership of where they are all going, and what they are trying to achieve.

Please forgive me for slipping into idealism. It's an old habit that I find hard to break. Of course, it is not possible to please all the people all the time, but that is what makes strong academic leadership difficult. The student leaders assembled here are our best prospect for achieving this goal. I am confident that I speak for my colleagues on the faculty, to say that I salute your ambition and I am grateful for your service.

Building and Maintaining a Great Institution of Higher Education

A university is not its buildings and facilities. More than any other kind of institution, a university is defined by its people.

Enlightened administrators and dedicated staff will always be important to any university, but the key to making a great university are its faculty and its students. We are the battery, the power generator that enables the university to become inspiration for thought, the "bubble expanding factory" that it needs to be. I include the alumni that our students will become. If the faculty does its job right, our students will be lifelong learners. They will not only continue to add to our knowledge base, they will feed back into RPI, keeping contact with our students, promoting everyone's interest in moving Rensselaer further and more strongly into the future.

No university is great, or becomes great, without its faculty and students partnering in a vision and ethic that defines their particular academic environment. The role of leaders is to foster ownership in that vision, and take to heart the input and perspective of the collective campus community. This is hard to do, but it is a necessary ingredient for a great institution of higher education.

Students, alumni, and faculty, this is *your* university. Members of Phalanx and White Key, you are critical for mustering collective recognition of, and support for, the ideals that make for a greater Rensselaer, both as leaders of the current student body and in various roles as the alumni you will become. Work to keep our academic community a "whole greater than the sum of its parts", and to maintain a vision to which we can all contribute.

Finally, let me say that it is tremendously reassuring to this faculty member and alumnus that we have, in you, such a strong group of articulate and motivated leaders. Thank you for your dedication.

Once again, congratulations to all of you, and thanks for your attention.