

Executive Speech Reprint



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Remarks prepared for delivery to:

Bernard M. Gordon - MIT Engineering Leadership Program

Cambridge, Massachusetts

May 20, 2009

Thank you, Dr. Hockfield ... Bernie ... Dr. Suresh ... Professor Crawley ... and a special welcome to our future engineering leaders.

It's a pleasure to be here with all of you today to celebrate the official launch of the Bernard M. Gordon-MIT Engineering Leadership Program. This is an exciting program, at a critical time, that teaches essential skills. It is named after a true pioneer and leader in engineering and electronics.

As a young engineer, Bernie Gordon learned from smart people who were taking on exciting challenges, including groundbreaking work in digital computing. He went on to demonstrate outstanding leadership in converting analog to digital and transforming our world.

Now, thanks to his determination to give back, the students enrolled in this program have a wonderful opportunity to learn — and become important contributors and leaders in their own right.

I know I speak for everyone here when I say “thank you” to Bernie for all he is doing to support engineering leadership education here at MIT.

As I reflected on what I might say today on the occasion of the official launch of this new program, three points came to mind:

- First, the importance of project-based learning ...
- Second, the challenge of becoming an engineering leader ...
- And third, the obligation the engineering profession has to our customers and society.

First, let me speak to the importance of hands-on, project-based learning. It is an extremely powerful tool.

Those who have graduated from universities that teach “learn by doing” feel right at home in companies that expect them to rely on both hands and head. This approach teaches the importance not only of design, but also of cost and schedule. “Learn by doing” gives one a feel for real-world considerations, such as cost and schedule and the other variables like maintainability, reliability and producibility, to mention a few.

I still remember today how I learned to work a lathe and milling machine along with others in our laboratory at the university during my freshman year. We had to make gears and also shafts to put them on. So you learned how to make a 64-pitch gear with a shaft that has a 32 RMS finish, for example.

Let me just say I learned first hand the meaning of scrap or rework. However, the real lesson was in our junior year when we were required to design a gear train and had to specify the parts. I remembered real quick how hard it was to make those parts.

“Learn By Doing” or “Project-Based Learning” was brought home very quickly — and a lesson I have never forgotten. It reinforces another saying I have. I remember one-third of what I read, one-half of what I hear and 100% of what I feel. I felt the difficulty of requiring those specifications.

It (“learn by doing”) moves the classroom from a traditional, book-learning environment to a real-world “lab” that challenges preconceived notions and “book smarts” with the details and surprises of everyday obstacles and opportunities. “Work-arounds” become the new reality.

“Learn by doing” accepts thoughtful risk and tolerates noble failure because both are essential tools in real-life education. I let our teams know that I have learned more from mistakes than I ever did from successes.

As Thomas Edison said in his exhausting search for the right filament for the incandescent light, “I have not failed 1,000 times. I have successfully discovered 1,000 ways to NOT make a light bulb.” And who would say now that all those failures were not worthwhile?

We believe strongly in this approach, because it fosters experimentation, teaming, strategy and action. And isn’t that part of what we mean by “leadership”?

The benefits of project-based learning extend even further — to the very way engineers think and feel. Just criticize an engineer and you will see how quickly they feel. Project-based learning provides engineers with the courage to make the decisions needed to be solid contributors — and with the wisdom to know when they need to learn more.

It takes confidence to work this way, to seek out diverse thoughts and opinions, to find mentors who won’t just agree with you but who can be relied upon as thoughtful sounding boards — and to commit, really commit, to life-long learning in pursuit of excellence. I am grateful to all of my mentors.

That brings me to my second point: the importance of leadership in engineering. It is an interesting challenge.

Believe it or not, it is one of the primary challenges for all engineers who seek to broaden themselves. It is no coincidence that it is also the skill which this new program specifically seeks to address.

On the one hand, engineers by nature are fact-based decision-makers. We are logical, by nature and by training. We think through risk and second- and third-order effects. This is not only helpful. It is essential. Thankfully, because of the way we are wired, engineers usually master these critical skills early.

On the other hand, engineers who wish to be leaders also need to be comfortable — or get comfortable — with a range of skills they may find much more challenging: those dealing with human nature, ambiguity, pressure and what this program calls “making sense of context.”

These challenges do not fit a formula like $E=MC^2$, but they do fit Newton’s Third Law of Motion: “For every action there is an equal and opposite reaction.”

Developing an elegant solution is not everything. Identifying that solution within the right context is also critical to finding the pathway to success.

Metrics alone won’t be much help in addressing human variables. One needs to develop an ability to evaluate not only the nature of the problem, but also the nature of the individual, the team, and the situation — and then put out a vision that the team can understand and buy into. This is the true art of leadership.

That’s why this kind of engineering leadership program is so important. It teaches the skills of leadership, of context, and the importance of engaging others and creating a strong vision, coupled with alignment.

Last but not least, let me address the engineer and society.

Engineering is a serious, noble profession. People count on engineers to do the job right. In my company, engineers carry the responsibility of keeping our men and women in uniform safe.

We want them to have an unfair advantage on the battlefield, and we want them to come home safe to their loved ones. It is a responsibility we embrace with pride, honor and deep humility. This is the real thing.

Sometimes people make jokes about engineers, but you have to take all that with a grain of salt. As a matter of fact, often the people who make the jokes about engineers don’t realize the joke is on them.

That reminds me of a story about a manager whose name will remain anonymous.

This manager, in his spare time, really liked to test the limits. He did the triathlon, he surfed giant waves, and he was an avid balloonist.

One day he was soaring in his balloon when he realized he was lost and late. No GPS. No cell. Nothing. So, he reduced altitude until he spotted a person standing below.

He descended a bit more and shouted down to the person, "Excuse me. Can you help me? I don't know where I am, and I promised a friend I'd meet him an hour ago."

The woman on the ground replied, "You are in a hot air balloon hovering approximately 30 feet above the ground. You are between 40 and 41 degrees north latitude and between 59 and 60 degrees west longitude."

The balloonist paused and then said, "You must be an engineer."

"I am an engineer," the woman replied. "How did you know?"

"Well," said the balloonist, "everything you told me is technically accurate, but I have no idea what to make of your information ... and the fact is, I'm still lost. Frankly, you haven't been much help at all."

The engineer looked up and said, "You must be a manager."

"I am," replied the balloonist, "but how did you know?"

"Well," said the engineer, "you don't know where you are or where you are going. You have risen to where you are due to a large quantity of hot air. You made a promise, which you have no idea how to keep ... and now you expect me to solve your problem. The fact is, you are in exactly the same position you were before we met ... but now, somehow, it's all my fault."

Engineering is a noble profession.

Look at all the technologists today who are at the heart of our culture – transforming the way we process information and communicate with each other, the way we treat and prevent disease, and the way we integrate and network the digital aspects of our world that Bernie helped unleash.

They are engineers — and they are engineering leaders.

Engineering is serious business. And engineers are the ones who are often on the front lines.

It is my view that as engineers, we should have the equivalent of a Hippocratic oath — that "above all" we should "do no harm." We have a higher calling. Ours is a tremendous calling, and a tremendous responsibility. Part of that responsibility is an opportunity to give back.



So while it may seem a simple matter to begin a leadership program for engineering students at one of the top schools in the country, I hope I've shared with you the context of solemn responsibility that such a program entails.

Solemn and exciting!

As an engineer who has strived his entire career to excel in engineering and leadership, I can assure you that the journey can be just as rewarding as the destination. That's why it is a special pleasure to be here today for the launch of a program made possible by the generosity of a responsible leader like Bernie Gordon.

I want to congratulate him on demonstrating tremendous leadership and stewardship. And I wish everyone in this room the very best as this program begins a new phase in its exciting journey.

My journey starts its 38th year next month. I wish you all the excitement I have had on my journey. My hope is that you, too, can find a company like Raytheon in order to grow — but more so, to have the ability to give back!

Thank you, and all the best! ■