Gazing Into the Crystal Ball

Arthur T. Johnson

Appeared in the 25 April 2008, v 2008(1), issue of the AIMBE Newsletter

The world around us is undergoing major change, and all of us are going to have to change with it. Hill (2007) posits that the U.S. has entered a post-scientific age, in which the basis for our continued economic and societal advancement will primarily come, not from technological advancement, but from new organizational structuring. There will still be need for engineering and scientific innovation, just as there is continuing need for some manufacturing, mining, and agricultural production, but there will be an increasing dependence on commercial and functional innovation, such as the new commercial and interpersonal paradigms offered by Ebay, Google, and YouTube. It will be the new means of presentation and organization that drive our future society forward.

With world-wide communication becoming so facile, the cost of new information falls to nearly nothing. The only ones who will pay substantially for the new information will be those who develop it, and, due to globalization, information development is becoming more and more diffuse. The U.S. used to have a huge technological lead over much of the rest of the world. Now, the lower costs of doing research in China and India are moving those countries closer to technological leadership.

Engineering education administrators have largely applauded the National Academies' report Rising Above the Gathering Storm, largely because they have seen the report as justification for new financial allocations. As an engineering educator myself, I took a look at recommendations in the report and said, "I'm already doing that." It's not

that I wouldn't be happy to have more resources, but it just seemed as if actions taken in accordance with the report recommendations would just be bulking us up against inevitable change. What good would it do to train more engineers in science and math, if, when they were finished, there wouldn't be a place for them in the post-scientific society?

A few years ago, when I served briefly as Executive Director of AIMBE, I helped to organize a session at the Annual Event that had as its theme the effect of globalization on medical and biological engineering (MBE) in the U.S. We publicized the session to congressional offices and successfully had some congressional staff members in the audience when presentations were made.

What happened next had me shaking my head in dismay. Each of the speakers ended up by saying that globalization would have no untoward effect and that everything would be fine for MBE in the U.S. I still think that globalization is having and will have a profound effect on U.S. MBE. What an opportunity was missed when those staffers went back to their bosses, our representatives in Congress, and said that everything was fine and there was no reason to do anything about problems that didn't exist.

If you follow Hill's argument, we need creative skill more than math and science skills to meet the challenges of tomorrow. I am not saying that we don't need math and science at all--we do need them, but math and science are largely left-brain skills. We presently do well teaching those skills to our students. In order to meet the challenges of the future, we need to start exercising the right brain a lot more. We haven't always done such a good job at that.

When you look objectively at the effects of economic and, consequently, technical globalization, you see that a lot of the skilled engineering and science development jobs will migrate to the least expensive, yet reliable, source. If computer programming, engineering design, and applied research move offshore, innovation (the strength of U.S. technology) will move with them. It seems inevitable.

Those engineers who remain and who service in the new climate will have to be versatile, general, and local. They will have to be the ones who can manage projects detailed offshore, or they will have to be the ones who can apply global products to local customers, or they will have to be able to change focus of their careers maybe one or maybe many times.

MBE is in a particularly good position to meet the challenge. Although bio-based engineers may receive some specialized education, they are more likely to be generalists than some other engineers. The MBE field draws its strength from physics, math, chemistry, and biology, thus being inherently broader than electrical or mechanical engineering. There is, I suspect, a broader range of personality types (Myers-Briggs) in MBE than in most other engineering and scientific disciplines. This, it seems to me, augers well for the future of MBE. This is also one reason why we need to embrace the biological part of MBE as well as the medical part.

The post-scientific society will come, and we will be ready for it. We will, that is, if we emphasize generality, versatility, and creativity in our educational systems as well as in our professional activities. To paraphrase Walt Kelly, creator of Pogo, "We have met the future, and it is us."

References:

Hill, C. T., 2007, The Post-Scientific Society, *Issues in Science and Technology*, 24(1):78-84 (Fall).

NAS, 2007, *Rising Above the Gathering Storm: Energizing and Employing Americans for a Brighter Economic Future*, National Academic Press, Washington, D.C.