NMAB Study on Materials Education and the Future Workforce

Report to UMC

Lyle H. Schwartz

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Topics

- Issues
- NMAB White Paper
- Proposed Study
- Funding Status
- Plan B

Issues - MSE Departments

- Fewer, larger undergraduate MSE departments
- Ever more subjects to cover leading to increased breadth, decreased depth
- Faculty expertise in many areas reduced or lost as replacements are made in new “hot” areas
- More science, less engineering is a continuing trend for many departments
- Off-shoring of manufacturing and R&D reduces opportunities, effects funding decisions by agencies and hiring decisions by universities- who will teach metallurgy?

Issues – Engineering Schools

- At some schools materials is taught by MSE, at others, by each engineering department
- Many universities and colleges have no materials department
- Materials Research is done by faculty in departments not titled “Materials” –Who is really doing the Engineering in MSE?

Issues-Other

- Engineer in 2020 defines challenges for engineering education – what is implied for materials education?
- Technology opens up distance learning – Are there missed opportunities here?
- Is an Academy study of these educational issues realistic? Useful?

NMAB Whitepaper

- NMAB subcommittee discussed education issues in K-graduate – focused down on undergraduate issues
- Whitepaper developed and approved by NMAB for use in seeking funding

Proposed Study

The NMAB will constitute a broadly based panel of experts to:

- Assess **the subject matter and teaching methodologies** used in presenting materials education to undergraduate engineering students;
- Identify shortfalls and opportunities for improvement over the next decade; and
- Make recommendations to responsible bodies including funding agencies, professional societies and educators.

Proposed Study (cont.)

- Membership on the assessment panel should reflect the diversity of the subject, including educators with a variety of materials expertise from both large and small departments, engineering disciplines other than materials, employer constituencies including large and small industry, and education methodology and evaluation.
- In carrying out the assessment, the panel should be guided by concerns of materials undergraduates as well as those in other engineering departments, career path options, evolving workforce needs and strategies for post-graduate continuing education.
- Anticipating the complexity of developing detailed curricular options, the panel should strive to identify specifics where possible, but clarify needs and opportunities for other bodies where appropriate.

Funding Status

- DOD/DDRE: Lew Sloter is interested in such a study but will not lead or fund it all
- NSF/DMR: Zakya Kafafi expressed interest, but will not lead or fund it all
- NSF/Engineering Directorate/Education: preliminary contact made with Dr. Allen Soyster
- DOE/Science/Metallurgy: preliminary contact made with Linda Horton

UMC Role

- UMC went on record last year in favor of such an Academy study
- UMC might assist as a group in raising funding directly and as individuals in reaching and convincing funding agencies to act as sponsors

Plan B

- **No Funding…No Study**
- **Two Alternatives**
  - **We all take our marbles and go home…**
  - **Or we address the issues ourselves**
- **Create some kind of interactive web site**
- **Begin with some draft documents and position papers**
- **Evolve positions on critical issues in some wiki-fashion**
- **Leadership???? Professional societies and UMC!!!**