

Doctoral Pipeline Issue

Concerns:

Availability of S&E doctorates

- i) NSF studies
- ii) Dick Atkinson report
- iii) Bowen-Salsa report
 - ...demographics
 - ...retirements

Particularly acute in engineering

Over the next two decades, PhD replacement needs will double in all sectors (academic, industry, government)

25% of engineering faculty will retire in next 6 years

On the basis of BS production alone, PhD production will decline by 20% in the decade after the mid-1990s.

Further, in many fields (engineering, mathematics, physical sciences), foreign student now comprise more than 50% of awarded degrees... and while exceptionally talented, this dependence on foreign human capital puts us at some risk...just as does our dependence on foreign financial capital...

The PhD production rate simply cannot respond quickly to market signals.

Note that the PhD recipients of 2000 are already in college.

Must focus on currently enrolled college students to affect PhD shortfall in late 1990s.

Time scales:

i) long-term:

rebuilding the pipeline
K-12 education
minorities, women

ii) intermediate term:

plug the leaks
undergraduate S&E education

iii) near term--1990s

focus on graduate education

NSB EHR Committee

On the 1990s timescale, the most effective way to deal with the problem is through a major increase in the available of graduate fellowships/traineeships

More specifically, it was felt unanimously by EHR ...and supported by the full NSB that a major traineeship program, patterned after the NIH program, designed for U.S. citizens was the most effective way to go.

Note: Here, "traineeship" means that the grants would be made to institutions rather than individuals, thereby taking better advantage of the existing capacity of the academic enterprise. These would be particularly effective for Engineering... ...but also of value in other sciences

NSB Budget Request

- i) \$25 M for traineeship program in FY92, growing to \$125 M over five years
- ii) \$25 K per traineeship...hence 1,000 new starts, building to 5,000 in pipeline at any time
- iii) roughly comparable to NSF fellowship program

Convergence of views

- i) Mettler/Sample proposal
 - Engineering traineeships
 - Essentially same as NSF...
 - Gained support of

Council on Competitiveness
Business Higher Education Forum
other interested business and professional associations

- ii) AAU, NASULGC proposals
- iii) Atkinson proposals
- iv) FCCSET proposals
 - FY92: \$150 for S&E traineeships
 - NSF: \$25* --> \$50 M
 - DOE: \$25 --> \$40 M
 - NASA: \$25 --> \$50 M
 - NIH: \$300 --> \$350 M
 - DOD: \$50 --> \$100 M
- v) Other groups

...a number of leaders of industry and education

Where do we stand?

- i) While OMB has expressed basic support for NSF, they have deferred action at this time, in part, because the NSF Fellowship program is already receiving a \$45 M catchup this year.
- ii) Since NSF is the lead agency in the broader FCCSET program, when it was deferred, so too were the efforts in other agencies
- iii) Hence effort is being redirected toward the Hill, to seek additional funds "outside the envelope" to get the traineeship program added in.
- iv) The NSB EHR Committee will go on record...once again... that it believes that the traineeship program is clearly the most effective way to deal with the coming shortfall on the necessary time schedule

Coretech Effort

Consensus proposal:

- i) major research federal agencies each ought to provide a base level of graduate fellowship/traineeship support to maintain future S&E workforce
- ii) agency "S&T megaprojects" ought to incorporate within their budgets additional support for fellowships/traineeships since these projects are major users of scientific and technical workforce.

Overall goal: An additional 12,000 graduate students...

Ramping up at 3,000 new students per year
Steady-state cost of about \$300 million
(Close to FCCSET proposal)

Will work directly through Congress for FY92

- ...NSF: Add \$25 M for traineeship program
- ...DOD: make special \$50 M increment Congress added to FY91 budget part of annual base, and part of this directed to S&E graduate effort
- ...NASA: looking for \$25 M from refocused NASA (Augustine report)
 - ...and \$25 M from redesigned space station
- ...DOE: Both a base program and something as part of SSC
- ...NIH: Some ramping up of traineeships following Bloom report from IOM

Final Comments

Again, I represent an increasingly common viewpoint that a major expansion in graduate S&E fellowships/traineeships is the most effective way to deal with a urgent problem for the late 1990s... the availability of doctoral level scientists and engineers

An unusual coalition is coming together...from higher education, industry, government...to make the case for this initiative.

We haven't won the war yet...but you can be certain and more and more folks are going to be pushing on this.

The Manufacturing Forum's support would be greatly appreciated.