PreK-12 Education Projects and Related Activities of the NAE

EDC Public Policy Colloquium
February 7, 2017
Washington, D.C.

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National Academy of Engineering
Public understanding of engineering remains relatively low

Unlike science, math, and ELA, engineering is still not a regular part of the “core” of the K-12 education system

There is no well-defined professional pathway for “teachers of engineering” (e.g., very few university pre-service teacher education programs provide coursework in engineering)

Current K-12 teachers express very low confidence in their ability to teach engineering

Research suggests engineering-based instruction can boost student interest/achievement in S,T, M, but such “integrated” teaching and learning requires time and new pedagogy
Emerging Consensus on the “Big Ideas” in PreK-12 Eng

Design Process

- Constraints and specifications
- Modeling
- Analysis
- Optimization and trade-offs
- System(s)

Connections to S,T, and M

Habits of Mind

- systems thinking, creativity, optimism, collaboration, communication, attention to ethical considerations
Positive Trends/Forces of Note

Broadening interest in more “integrated” forms of STEAM in both K-12 and in UG (e.g., +CS, +humanities) education

Move toward more and earlier experiential learning in UG engineering

Adoption/adaption of NGSS by ~2/3 of states

Possible AP Engineering course
Educator Capacity Building in PreK-12 Engineering Education

**Project Goal:** Understand current and anticipated future needs for engineering-literate PreK-12 educators in the United States and how these needs might be addressed.

**Work Plan:** Literature review, landscape scan, workshops, consensus report

**Current Status:** Committee met late November; next meeting in mid-April.
Funded by Chevron
Three primary audiences:
- PreK-12 educators
- PD providers/pre-service educators
- School, district, state administrators

Research-based, iterative development process

Five partner organizations
22-member steering committee (Dean Pines!)

Collaboration with TeachEngineering
Goal: Bring national attention to the value of involving classroom teachers in policy making related to the implementation of K-12 engineering education.

Convocation: Sept. 30-Oct. 1 at the NAS Building; ~100 attendees, majority classroom teachers

Products: Summary report and 3-4 targeted, companion “briefs”
Engineering Technology Education in the United States

Goal: Review status and history of the production and employment of engineering technologists and technicians in the United States

Recommendations

- Nature of ET education
- Supply and demand
- Educational and employment pathways
- Data collection and analysis

Report release: Feb. 15
**Diversity in Engineering Technology Education**

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Understanding the Engineering Education-Workforce Continuum

Goal: Provide a systems view of the career pathways and related decision making of those currently working as engineers and those holding engineering degrees in the United States.

Potential Implications For: Broadening the value proposition for engineering
The Engineering Workforce

Employed Degreed Engineers in the Workforce
3,607,001

Those Working In Engineering Occupations
1,554,357

Degreed Engineers working in engineering occupations
1,266,950 (35% of all degreed engineers)

Degreed Engineers working in occupations not considered engineering
2,340,051 (65% of all degreed engineers)

Those working in engineering occupations without an engineering degree
287,407 (18% of those working in engineering occupations)
Professional Societies Engagement in UG Engineering Education

Goal: Understand the scope and nature of societies’ UG educational activities and encourage collaboration. (Dean G. Washington on the planning cmte.)

- Workshop held Jan 26-27 (Dean Pines keynote)
- Five regional meetings in the spring
- Proceedings to be published in summer 2017

Tip o’ the hat to EDC!
And Finally . . .

What should be the role, if any, of colleges of engineering in preparing PreK-12 engineering educators?

How can engineering colleges engage effectively with the NAE site, LinkEngineering?

Should traditional engineering programs work more closely with and learn from programs in engineering technology?

Is the fact that many engineering grads do not “do engineering” a positive or a negative for the engineering education community? For the country?
Thank You!

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