

Skill Set for “Success”

Technical competence is a given and we (engineers) do it well.

We could do better preparing ourselves and our graduates in:

- 1) critical and independent thinking
- 2) communication
- 3) collaboration and teamwork
- 4) vision transcending narrow disciplines

Skill Set Most Desired by Employers

Based on interviews with executives from 305 employers with at least 25% of 25 or more employees having at least a bachelor's degree.

Teamwork Skills	44%
Critical Thinking/Reasoning	33%
Oral/Written Communication	30%
Ability to Assemble/Organize Information	21%
Creative Thinking	20%
Ability to Work with Numbers/Statistics	9%
Foreign Language Proficiency	3%

How Should Colleges Prepare Students to Succeed in Today's Global Economy?
The Association of American Colleges and Universities,
Peter D. Hart Research Associates, Inc., 2006

Skill Set Most Desired by the NIH

Recognizing the important contributions of engineering to public health, in 2001, the National Institutes of Health initiated its first non-disease based institute, the National Institute for Biomedical Imaging and Bioengineering (NIBIB).

According to the founding director, Dr. Joan Harmon (Aug. 6, 2001), the institute seeks to promote the following characteristics in trainees:

- technical competence in field
- capability as an independent thinker
- communication of ideas
- ability to work in teams
- vision transcending narrow disciplines

A Model of Engineering Reasoning

Standards → Elements → Traits or Virtues

- | | | |
|---|--|--|
| <ul style="list-style-type: none">• Clarity• Accuracy• Relevance• Logicalness• Breadth• Precision• Significance• Completeness• Fairness• Depth | <ul style="list-style-type: none">• Purposes• Questions• Points of View• Information• Inferences• Concepts• Implications• Assumptions | <ul style="list-style-type: none">• Humility• Courage• Empathy• Integrity• Perseverance• Confidence in Reason• Autonomy• Fairmindedness |
|---|--|--|

R. Paul, *et al.*, A Thinker's Guide to Engineering Reasoning,
The Foundation for Critical Thinking, 2006.

Multidisciplinary

involves more than one discipline by necessity...

Science

- Biology
- Chemistry
- Materials
- Math
- Physics
- etc.

Engineering

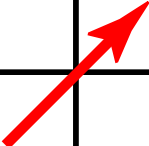
- Aerospace
- Biomedical
- Chemical
- Civil
- Computer
- Electrical
- Environmental
- Materials
- Mechanical
- etc.

Medicine

- Cardiology
- Gastroenterology
- Neurology
- Ob/Gyn
- Oncology
- Orthopaedics
- Otolaryngology
- Radiology
- Urology
- etc.

Types of Research

		<i>Consideration of application?</i>	
		No	Yes
<i>Quest for basic understanding?</i>	Yes	pure basic research (Bohr)	application-driven basic research (Pasteur)
	No	?! taxonomy? pre-S&E?	pure applied research (Edison)



Adapted from D. Stokes, *Pasteur's Quadrant*, 1997.