NSB Science and Engineering Indicators: Utilizing a Unique Data Set to Promote Economic and Workforce Development

APLU Annual Meeting
Council on Research

Sunday, 13 November 2016

Parsing the Title: Important Words

- National Science Board
- Science and Engineering Indicators
- Unique Data Set
- Promote Economic Development
- Promote Workforce Development

Cross-Cutting Issues

- This session was organized jointly among 4 APLU organizations
  - Council on Research (CoR)
  - Council on Governmental Affairs (CGA)
  - Commission on Innovation, Competitiveness and Economic Prosperity
  - Commission on Information, Measurement and Analysis (CIMA)

The National Science Board

Founded in 1950 as part of NSF Act

24 Members + NSF Director

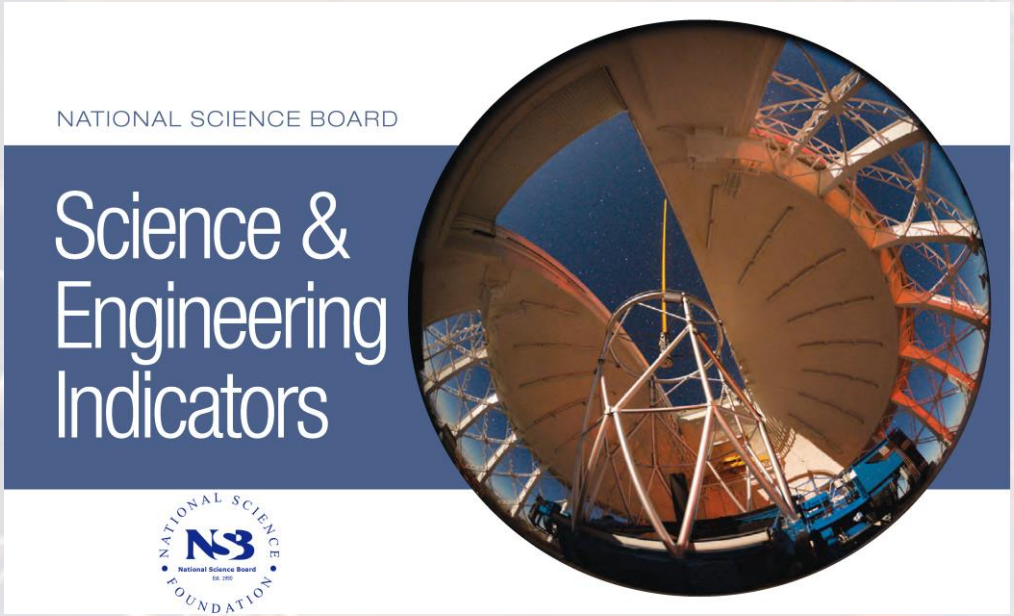
Governing and policy making body for NSF

- Develops a long-term vision for NSF
- Establishes NSF policies
- Approves the budget and extremely large projects
- Identifies and assists with issues that are critical to NSF's mission

Serves as an independent body of advisors to both the President and Congress on broad, national policy issues related to science and engineering research and education

Science and Engineering Indicators

- Biennial report on the state of S&E in the U.S.
- Required by law; delivered to the President and Congress
- Started in 1972 as SI
- Factual and policy neutral
- Drawn from a wide variety of high quality data sources



Science and Engineering Indicators

- How it used to be….
- Hard copy tables and charts
- Detailed explanation of data and statistics
- Separate volume for data tables
- Spreadsheets and other data available online

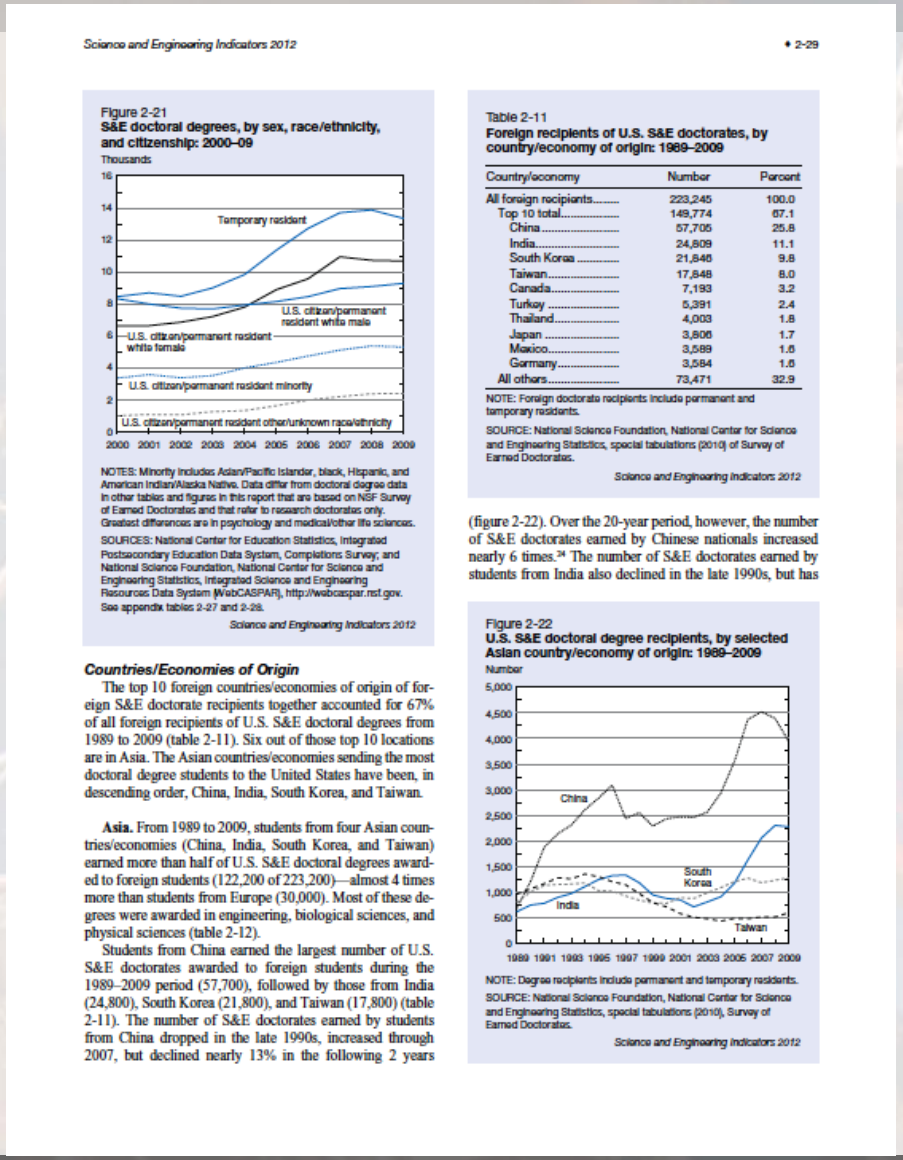


Figure 2-21
S&E doctoral degrees, by sex, race/ethnicity, and citizenship: 2000–09

Thousands

NOTES: Minority includes Asian/Pacific Islander, black, Hispanic, and American Indian/Alaska Native. Data differ from doctoral degree data in other tables and figures in this report that are based on NSF Survey of Earned Doctorates and that refer to research doctorates only. Greatest differences are in psychology and medical/other life sciences.

SOURCES: National Center for Education Statistics, Integrated Postsecondary Education Data System, Completions Survey; and National Science Foundation, National Center for Science and Engineering Statistics, Integrated Science and Engineering Resources Data System (WebCASPAR), http://webcaspar.nsf.gov.

See appendix tables 2-27 and 2-28.

Science and Engineering Indicators 2012

Table 2-11
Foreign recipients of U.S. S&E doctorates, by country/economy of origin: 1989–2009

Country/economy	Number	Percent
All foreign recipients	223,245	100.0
Top 10 total	149,774	67.1
China	57,705	25.8
India	24,809	11.1
South Korea	21,846	9.8
Taiwan	17,848	8.0
Canada	7,193	3.2
Turkey	5,391	2.4
Thailand	4,003	1.8
Japan	3,806	1.7
Mexico	3,589	1.6
Germany	3,584	1.6
All others	73,471	32.9

NOTE: Foreign doctorate recipients include permanent and temporary residents.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2010) of Survey of Earned Doctorates.

Science and Engineering Indicators 2012

Countries/Economies of Origin

The top 10 foreign countries/economies of origin of foreign S&E doctorate recipients together accounted for 67% of all foreign recipients of U.S. S&E doctoral degrees from 1989 to 2009 (table 2-11). Six out of those top 10 locations are in Asia. The Asian countries/economies sending the most doctoral degree students to the United States have been, in descending order, China, India, South Korea, and Taiwan.

Asia. From 1989 to 2009, students from four Asian countries/economies (China, India, South Korea, and Taiwan) earned more than half of U.S. S&E doctoral degrees awarded to foreign students (122,200 of 223,200)—almost 4 times more than students from Europe (30,000). Most of these degrees were awarded in engineering, biological sciences, and physical sciences (table 2-12).

Students from China earned the largest number of U.S. S&E doctorates awarded to foreign students during the 1989–2009 period (57,700), followed by those from India (24,800), South Korea (21,800), and Taiwan (17,800) (table 2-11). The number of S&E doctorates earned by students from China dropped in the late 1990s, increased through 2007, but declined nearly 13% in the following 2 years (figure 2-22). Over the 20-year period, however, the number of S&E doctorates earned by Chinese nationals increased nearly 6 times.[24] The number of S&E doctorates earned by students from India also declined in the late 1990s, but has

Figure 2-22
U.S. S&E doctoral degree recipients, by selected Asian country/economy of origin: 1989–2009

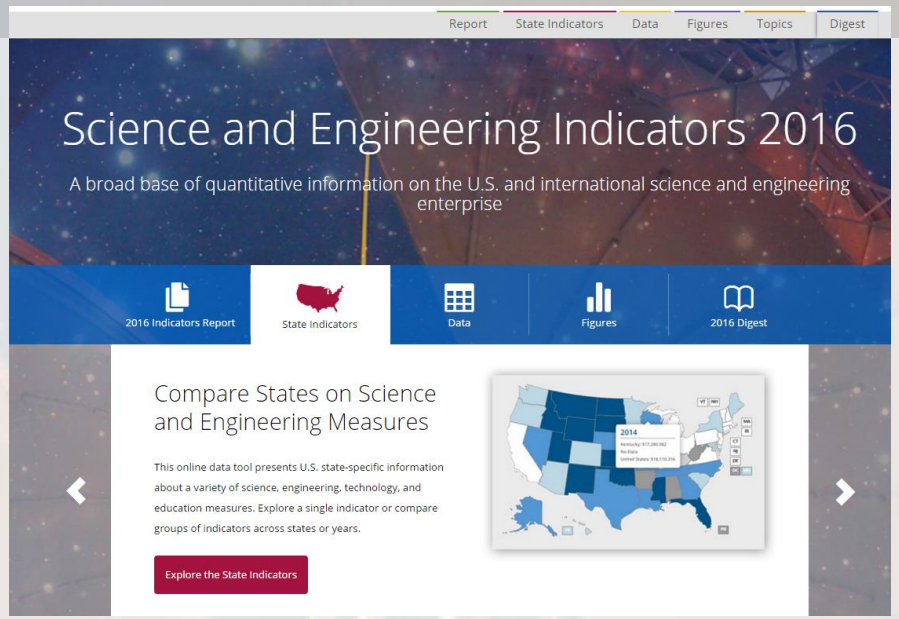
Number

NOTE: Degree recipients include permanent and temporary residents.

SOURCE: National Science Foundation, National Center for Science and Engineering Statistics, special tabulations (2010), Survey of Earned Doctorates.

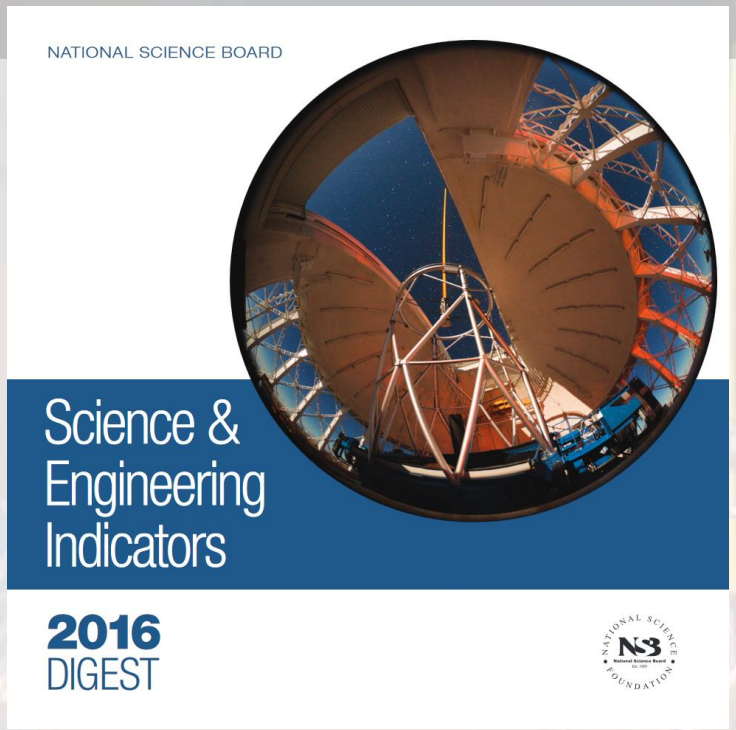
Science and Engineering Indicators 2012

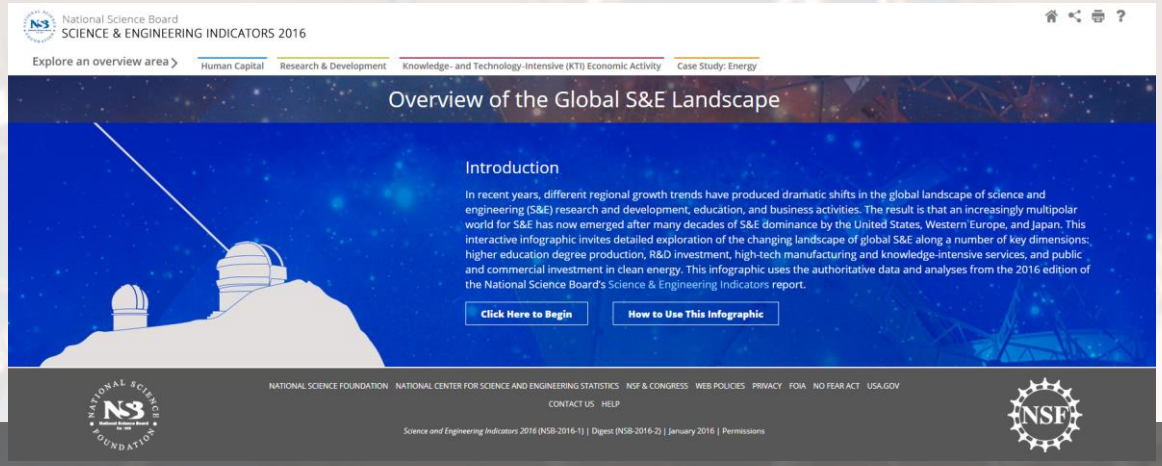
Science and Engineering Indicators



- Now entirely “born digital” with numerous online tools
- Companion Pieces
- Interactive Infographics
- SEI Digest
- Companion Briefs
- STEM Education Resource
- Spring, 2016 stakeholder workshop

Science and Engineering Indicators





SEI Chapters

- 1. Elementary & Secondary Math and Science Education
- 2. Higher Education in Science and Engineering
- 3. Science and Engineering Labor Force
- 4. Research and Development: National Trends and International Comparisons
- 5. Academic Research and Development
- 6. Industry, Technology and the Global Marketplace
- 7. Science and Technology: Public Attitudes and Understanding
- State Indicators (Formerly Chapter 8)

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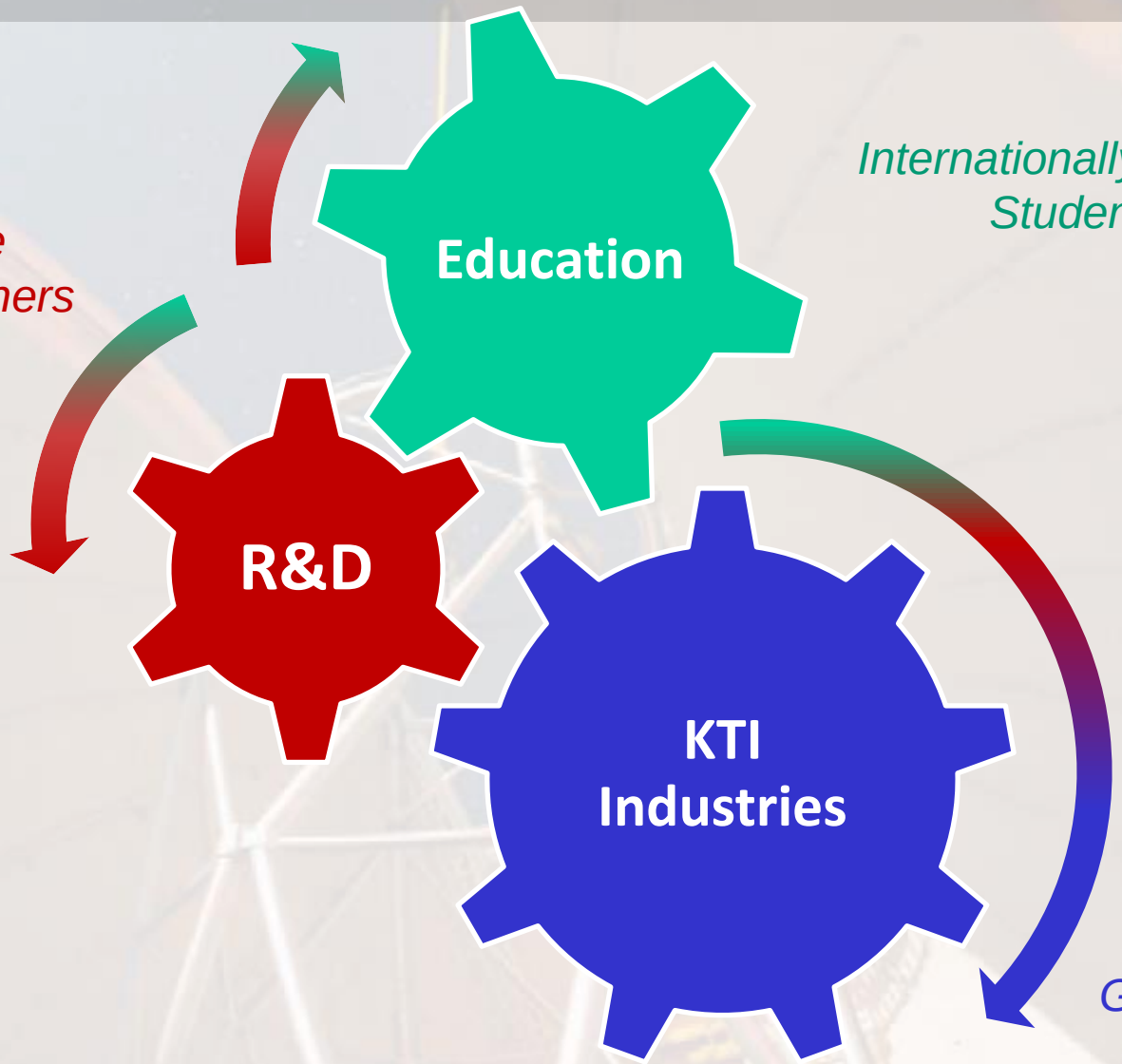
Global Context, Local Application



Our Panelists

Our Panelists

- Khan!!!

Our Panelists

- Beethika Khan, Director of NSF's SEI Program within the National Center for S&E Statistics

Our Panelists

- Rena Cotsones, Associate VP for Engagement and Innovation Partnerships at Northern Illinois University & Adjunct Professor in Department of Public Administration

Our Panelists

- Angela P. Diaz, Executive Director of Government Research Relations, UC San Diego

Some Questions

- Does SEI capture sufficient information about local, regional and national factors to **inform economic development strategies** (e.g., workforce availability, tax and other incentives, related industry output, quality of education)?
- How can university executive leadership, and local and state officials, use SEI as a mechanism to **work more effectively together?**
- NSF and other agencies are focused on **BIG DATA**. How can SEI be better aligned to decision maker needs?
- How can academia utilize SEI to inform, advocate for, and make its case to the **new Administration**?

Some Questions

- How can universities prepare their graduates for a **wide range of employment opportunities?** For example, doctoral students are prepared primarily for academic jobs and R&D activity. How can **graduate programs prepare them** for a wider range of jobs and sectors such as those in the business sector and employment abroad?
- SEI has undergone substantial transformation recently. Given the rapid evolution (and revolution) of the S&E enterprise, **how can SEI best be aligned with 21st Century policy needs?**

Some Questions

- How do we encourage students to make **informed decisions** about degree field and level and career pathways? These decisions made during secondary and postsecondary education, including undergraduate and graduate studies, have implications for **subsequent employment opportunities** and **economic outcomes.**
- Are universities contributing to **economic inequality**? To what extent do **student populations mirror society** and the overall workforce, and how has that changed over time? Some important and related questions include: what factors are important for **access to a university education** and **successful completion** of a degree program? Does **student debt play a role?**