ASEE's EDC K-12 Engineering Education Committee

Darryll J. Pines
Dean and Farvardin Professor,
University of Maryland
Chair of ASEE's Engineering Deans Council
K-12 Engineering Education Committee

Outline

- Membership of EDC K-12 Engineering Education Committee
- LinkEngineering.org
- K-12 Pre-College Division: Strategic Planning for P20
  - Day of Impact at June 2016 Conference
- AP in Engineering?
- Committee Meeting at ASEE Annual Meeting

Committee Membership

- Emily Allen (Cal State, Los Angeles)
- Nada Anid (New York Institute of Technology)
- Nicholas Altiero (Tulane University)
- Jim Aylor (University of Virginia)
- Eric Baumgartner (Ohio Northern University)
- Richard Benson (Virginia Tech)
- Peter Crouch (University of Hawaii at Manoa)
- Diane Dorland (Rowan University)
- Jackie EL-Sayed (Marygrove College)
- Hesham EL-Rewini (University of North Dakota)
- Doug Goering (University of Alaska)
- Jeffrey Goldberg (University of Arizona)
- David Hayhurst (San Diego State University)
- Tom Katsouleas (Duke University)
- Gary Kuleck (University of Detroit-Mercy)
- Bob Kolvoora (James Madison University)
- Shankar Mahalingam (Univ. of Alabama-Huntsville)
- Louis Martin-Vega (North Carolina State University)
- David Munson (University of Michigan)
- Darryll Pines (University of Maryland, College Park), chair
- Paul Plotkowski (Grand Valley State University)
- Michael Quinn (Seattle University)
- Julia Ross, (University of Maryland, Baltimore County)
- Jonathan Russell (US Coast Guard Academy)
- Steve Schreiner (College of New Jersey)
- Richard Stamper (Rose-Hulman)
- Will Sutton (University of Tennessee - Chattanooga)
- Cherrice Traver (Steinmetz Hall Union College)
- Greg Washington (UC Irvine)
- Ronald Welch (Citadel)

LinkEngineering.org

- The *National Academy of Engineering* has launched **LinkEngineering**, a new website to support implementation of preK–12 engineering education in the United States. ***LinkEngineering*** aims to provide high-quality resources and build a professional community for three groups: educators working in preK–12 classrooms and out of school settings; those engaged in preservice teacher education and professional development; and school, district, and state administrators. The website responds to recent efforts, including the ***Next Generation Science Standards***, to introduce preK–12 students to engineering concepts and practices. The LinkEngineering project was made possible by the generous support of Chevron.

- website. **http://linkengineering.org**

NAE Committee for Project

- **Chair**

  Cary Sneider, Portland State Univ
- **Members**

  Ashok Agrawal, ASEE HQ
  Steven Barbato, ITEEA
  Laura Bottomley, NC State
  Christine Cunningham, EIE
  Bonnie Dunbar, Univ. of Houston
  Maurice Frazier, ODU
  Gayle Gibson, Dupont
  Jacqueline Gish, NGC
  Kris D. Gutiérrez, UCLA
  Eric Jolly, Minnesota Philanthropy
  Linda Kekelis, Techbridge
  Peter McLaren, Achieve Inc.
  Steve O'Brien, College of NJ
  Doug Paulson, Minnesota DOE
  Darryll Pines, Univ. of Maryland
  Stephen Pruitt, Kentucky DOE
  Rick Sandlin, Texas Ind. School
  Jacqueline Smalls, Discovery Ed
  Johannes Strobel, Texas A&M
  Ted Willard, NSTA

website. **http://linkengineering.org**

Bold are ASEE members and some are Pre-College K-12 Division Members

LinkEngineering.org at ASEE Annual Conference in June 2016

- On Saturday, June 13, at 1:30 p.m. we will hold a 75-minute session for K-12 teachers as part of ASEE's pre-conference K-12 engineering education workshop.
- On Wednesday, June 17, at 8:45 a.m., A paper detailing the front-end research done for the project.

ASEE P12 BOD Strategic Planning Committee

- Members:
- Liz Parry, chair
- Stacy Klein-Gardner (Precollege Division)
- Pamela Lottero-Perdue (Precollege Division)
- Bruce Wellman (Precollege Division, P12 teacher)-due to rotate off or be Renominated by division for one more 3 year term in June, 2016
- Darryll Pines, (EDC representative)
- Elizabeth Holloway (WIED)
- Kathy Harper (First Year Programs)
- Rick McMaster ((ret), CMC)-due to rotate off or be Renominated by CDC for one more 3 year term in June, 2016
- MIND-this position is currently open due to Karl Reid's resignation; will be filled by June 2016

ASEE P12 Strategic Planning Change in Mission and Vision

- Change the ASEE mission and vision to include the following italicized statements including P12 engineering education:
  - Mission: “The American Society for Engineering Education is committed to furthering education in engineering and engineering technology *from preschool through college (P20)*.”
  - Vision: “ASEE will serve as the premier multidisciplinary society for individuals and organizations committed to advancing excellence in all aspects of engineering and engineering technology *from preschool through college (P20)*.”

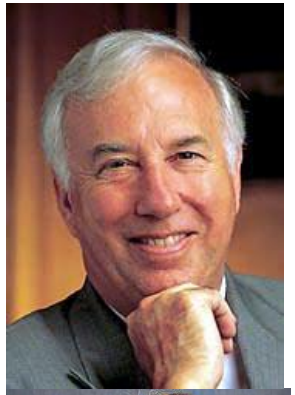
ASEE P12 Strategic Plan Recommendations

- **ASEE Strategic Plan on P12 Engineering (Proposed)-September 2015**
- **Goal: Extend ASEE as a leader, both externally and internally, within the Pre-school through grade 12 (P12) engineering education space, and increase awareness of and best practices within and beyond ASEE.**
- To do so, we recommend the following initiatives:
- 1. Change the ASEE mission and vision statements to add explicit inclusion of P12 engineering education.
- 2. Establish ASEE as a center of expertise in P12 engineering education research and best practices.
- 3. Emphasize high quality P12 engineering education within ASEE conferences and attracting P12 teachers to ASEE conferences.
- 4. Promote inclusive P12 engineering standards, guidelines, and best practices that reach a diverse audience.
- 5. Provide workshops to support P12 teachers, administrators, counselors, and parents.

ASEE P12 Strategic Plan Recommendations-cont.

- 6. Enhance and improve internal communication about P12 engineering education throughout ASEE.
- 7. Enhance and improve external communication, collaboration and partnerships between ASEE and outside organizations.
- 8. Affect change at the policy level, positioning ASEE as a resource for engineering content and pedagogical expertise.
- 9. Seek external funding and support for ASEE P12 engineering education efforts.
- 10. Create an information stream about P12 engineering education.
- 11. Enter into a meaningful discussion among Engineering Deans, College Presidents, and ASEE leadership about the equivalent value of engineering education research and engagement as part of the process for promotion and tenure.

What do National STEM/Policy Leaders think about an AP in Engineering?



- **“**It is clearly a good idea if for no other reason than to give engineering a place among other serious academic subjects at the secondary school level that is not at the technician standard. The optics of this positioning in the eyes of the public is critical to engineering. It positions engineering to be fundamental to all highly educated people.**”, Dan Mote, President of National Academy, October 2013.**
- "The problem solving, systems thinking, and teamwork aspects of engineering can benefit all students, whether or not they ever pursue an engineering career," said **Linda Katehi, Chancellor of UC Davis,** "A K-12 education that does not include at least some exposure to engineering is **a lost opportunity** for students and for the nation.“
- “It is important to brand Engineering at the K-12 level to build pipeline for future engineering graduates,” **Thomas Kalil, Office of Science, Technology and Policy-OSTP**
- “This is a great idea. Let me know how I can help,” **Pramod Kharonegar, Director of Engineering, NSF**

Timeline of ASEE Engagement w/ CB

- ✓ **2010** Update to College Board on Engineering Design Project Portfolio Scoring Rubric EDPPSR Progress
- ✓ **2011** NSF PRIME Program Award on EDPPSR (UMD/UVA/PLTW)
- ✓ **2013** Meeting at College Board to discuss status of AP in Engineering (2/14)
- ✓ **2013** Session: "NGSS and Engineering" a EDI at Grand Hyatt in NYC (4/14-4/16)
  7 Questions asked with Clicker Responses-Auditi Chakravarty/Maureen Reyes
  - ✓ • What additional support would students need to get them to engineering?
  - ✓ • What would attract women and other underrepresented groups to engineering?
  - ✓ • What additional support would schools need to get them to engineering
  - ✓ • Percentage of schools with capacity for engineering (teachers, resources, etc.)
- ✓ **2013** Interest by White House OSTP on an AP in Engineering
- ✓ **2013** Survey of Engineering Deans, AP Teachers, Students-(10/16)
- ✓ **2014** Approval by Engineering Deans Council to Develop Curriculum (4/12)
- ✓ **2014** Commitment by College Board to fund Curriculum Development-6/14
- ✓ **2015** Appointment of Ms. LaTanya Sharpe to lead AP in Engineering under Mr. J. Williamson
- ✓ **2016** EDI Vote to move forward with Curriculum Development Phase
- ✓ **2016** Three Committees formed by CB to engage stakeholders.
- ✓ **2016** Curriculum Framework Development under review
- ✓ **2016** Delayed Go/No Go decision September 2017 to move forward with full development of AP Engineering

What do Engineering Deans think?
ASEE/College Board Survey Committee

University of Maryland, College Park, Darryll Pines, pines@umd.edu, co-chair
University of Virginia, James Aylor, jha@eservices.virginia.edu, co-chair

Bucknell University, Keith Buffinton,
College of New Jersey, Steven Schreiner
Cornell University, Lance Collins,
Duke Unversity, Thomas Katsouleas,
Florida State University/Florida A&M, Yaw Yeboah,
Georgia Institute of Technology, Gary May,
Grand Valley State University, Paul Plotkowski,
MIT, Ian Waitz
North Carolina State University, Louis Martin-Vega
Purdue University, Leah Jameson
Rose Hulman Institute of Technology, Richard Stamper
Stanford University, James Plummer,
Syracuse University, Laura Steinberg,
Tulane University, Nicholas Altiero
University of Alaska, Douglas Goering
University of Arizona, Jeff Goldberg
University of California, Irvine, Greg Washington
University of Hawaii, Peter Crouch
University of Michigan, David Munson
University of North Dakota, Hesham El-Rewini
University of Southern California, Yannis Yortos
Virginia Tech, Richard Benson

What do Engineering Deans think?
Survey Methodology

- This was an online survey research project conducted among HE engineering faculty.
- The questionnaire was designed by the College Board in close consultation with the ASEE.
- In total, 96 HE engineering faculty took part in the study. The response rate to the survey was 30%, and the questionnaire averaged 21.2 minutes.
    - 34 Private Institutions
    - 58 Public Institutions
    - 4 Missing Institution Type
- ASEE distributed the survey using their sample list of engineering deans (n=~330). The study data was balanced to actual numbers of HE engineering programs.
- The study was completed from October 17th to 31st in 2013.
- The sample was classified into four categories based on enrollment size: 0-999, 1,000-2,499, 2,500-5,499, 5,500-10,000

ASEE PRISM March/2014 issue

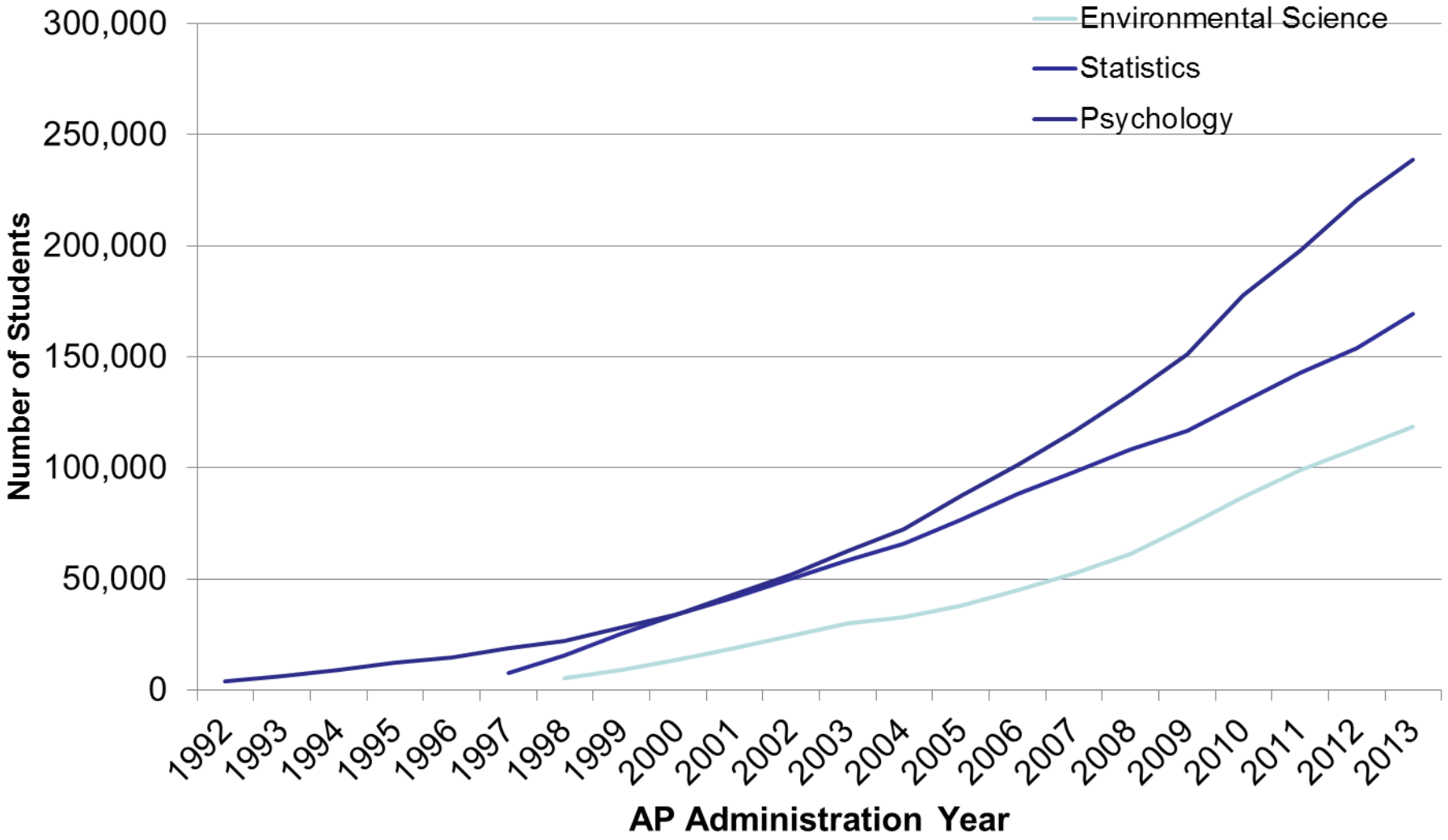
- Article following the Survey Results

Key Next Steps for ASEE/CB

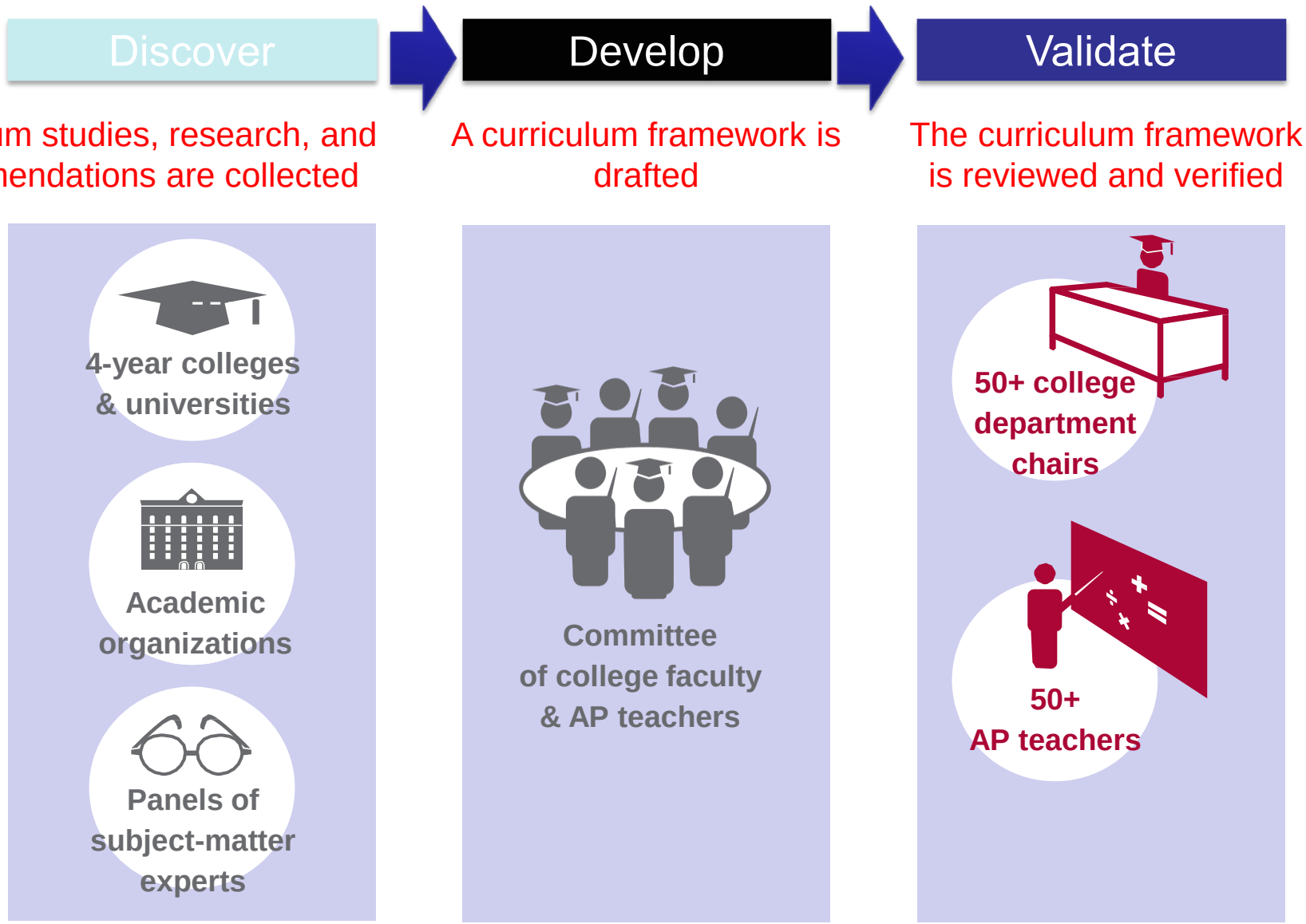
- Step 1 (Approved at EDI in 2015): Seek approval from EDC Executive Committee to move forward with the Development of a joint ASEE/College Board Curriculum Committee
  - Committee will develop and validate curriculum for either a course on
    - Introduction to Engineering, or
    - Introduction to Engineering Principles
- Step 2: Seek approval from EDC-Executive Committee and General Body that if course and curriculum acceptable that colleges can grant both placement and credit in their engineering programs (Requires attestation of a majority of Engineering Deans).
  - Place out of a course in Core engineering curriculum, or
  - Use as elective on General Education/Core Requirement credit

AP Exam Growth from Launch Year

courtesy of College Board



Curriculum Framework Development



Courtesy of College Board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ENGINEERING EDUCATION