

FIE 2018: Building on the Past, Creating the Future Where are the New Frontiers?

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Abstract — At FIE 2002, 13 engineering educators assembled to address a variety of topics and predict the “Future of Engineering Education.” Last year at FIE 2017, a follow-up panel assessed our progress in several key areas: the role of active and cooperative learning, the state of the University and forces driving change, promotion and tenure (the faculty reward system), strategies and methods for delivering engineering education, enhancing student performance, the impact of research in engineering education, diversity and inclusion, and the role of schools of engineering education.

This year, we will continue the discussion of several of these issues, and ask “Where are the New Frontiers for Engineering Education?” Our goal is to stimulate discussion among faculty at the forefront of new approaches to instruction and outreach. We will also discuss the changing nature of the institutions where engineering education occurs, and speculate on the future of the university.

Keywords— *Engineering education, changing nature of the faculty, tenure and the faculty workforce, assessing impact, technology enhanced instruction, personalized learning, lifelong learning, diversity, and inclusion.*

I. INTRODUCTION

At previous FIE conferences in 2002, 2014, and 2017, panels of faculty with long-term involvement with the FIE conference reflected on its past, present and future. Last year’s discussion focused on the 2002 paper “The Future of Engineering Education.” This panel included five of the original thirteen authors and several new contributors. We examined the predictions made in 2002, and asked how things have changed since then. Many of the issues previously discussed are still hot topics 15 years later. The issues addressed included why lecture is still the main mode of teaching undergraduates, curriculum design for the middle years, diversity and inclusion, personalized technology for learning, re-envisioning promotion and tenure based in impact, the value of Departments of Engineering Education, lifelong learning, and looking

back/looking forward. These topics will be covered in an article for *Advances in Engineering Education*.

The 2017 panel was well-attended and the audience participated actively and enthusiastically. They raised additional concerns and challenged us to hold a follow-up panel at FIE 2018. There were many topics we could not cover in the time available. There was sufficient interest and controversy about some topics to warrant further discussion: the basis for tenure decisions, the absence of creative use of information technology in higher education, and the prevalence of traditional teaching styles and curriculum content.

Where are the new Frontiers? What are the issues and innovations will define engineering education over the next 20 years? What are the problems and impediments to realizing best practices in engineering education? Which current trends are likely to change the university and the engineering curriculum?

II. POTENTIAL TOPICS

New Directions

- The Maker Movement: active learning in action
- Additive manufacturing: what is its role on teaching and learning?
- Mechatronics = the core of the new engineering
- Cases, games and simulations: making learning relevant and fun!

Redesigning the University

- Lifelong education – will traditional schools lead the way?
- Nontraditional students – how can we accommodate them?
- MOOCs - the hype is gone; what did they accomplish? What value did they add to education?
- The Khan Academy – a model for modern education

Changing Nature of the Faculty

- Who's teaching our kids?
- Contingent faculty – implications of the growing use of non-tenure track faculty: expectation of continued employment (EOC), adjuncts, and professors of practice. ASEE now has a task force on this issue
- Career paths for general faculty; medical school model
- Is tenure necessary, desirable? What is the role of post-tenure review?
- The proliferation of faculty titles
- Growing use of non-faculty administrators, including professional advisors
- Unions in higher education – faculty, staff, and graduate students: will unions be necessary to preserve the educational mission of the university?
- Are we producing too many PhDs?
- The perpetual associate professor – a liability or asset?
- The disappearance of the “fully functioning faculty member”

Beyond ABET: Metrics that matter

- How to measure student success
- How to measure success in the classroom
- How to measure program success? Selection vs value added; reaching the second tier
- How to measure faculty success: Impact, not just citations
- How do we measure faculty effectiveness: local service vs global reputation
- Post tenure review: keeping the pressure on!

Structure of the panel

Clearly we have much to discuss and too little time to cover it all. The list of topics will be presented to the audience and the areas of greatest interest assessed. Based on preliminary discussions with faculty at ASEE 2018, we have identified several potential participants with unique perspectives on particular issues, and will enlist them to stimulate discussion. As happened last year, we know that the audience and panelists will shape the discussion, define its direction, and raise additional issues and problems.

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