

AC 2008-1226: PERSPECTIVES ON FIRST YEAR ENGINEERING EDUCATION

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Ms. Ladewski graduated in 2007 from the University of Notre Dame with degrees in philosophy and chemical engineering. She is currently a chemical engineering graduate student at MIT, where she is interested in research relating to energy or the environment.

Some Perspectives on First Year Engineering Education

Abstract

In the engineering education pipeline, the first year of a student's college experience sets the tone for the future and, indeed, whether a student decides to remain in the engineering program at all. Engineering programs around the country experience difficulty in assisting students with the transition from high school to college, and struggle with the delicate balance between supporting a student's transitional needs and maintaining academic rigor in a demanding major. The first year confronts students with a curriculum that challenges their long held beliefs of "being good in math and science." Their first introduction to engineering education throws them into the realm of learning through experience and discovery. This at times can be overwhelming and challenging, on the way to achieving the goal of providing them with enough information to help them understand the breadth of the engineering profession and to prepare them for their sophomore year in engineering. During the summers of 2006 and 2007, engineering educators gathered at the University of Notre Dame to engage in discussions on how best to achieve the goals of this complex first-year experience. This paper elaborates upon three specific discussion points that have emerged from these summer workshops, including: (1) the relationship between persistence in engineering and the first year experience; (2) how to prepare first-year students to "stay the course"; and (3) trends in first year engineering program design. Finally, this paper will discuss the attendance at and feedback received from the workshops so that other universities can consider this as an opportunity to host their own regional first-year engineering workshop.

Background & Introduction

Many of today's engineering educators recognize the need to develop a first-year engineering curriculum that takes into consideration the diverse academic, social, cultural, and economic backgrounds of an incoming class of students. Generally speaking, many feel that today's students are more academically prepared, but are less prepared to be individually responsible for the largely self-directed study required in college. Ultimately, these students experience a transition from high school to college that is different and potentially more difficult than in the past. Universities around the country have initiated a variety of programs to ease this transition. Not all programs that are successful at one university will be successful at another, but a discussion of various aspects used by successful programs can raise the level of consciousness or understanding of faculty and provide a basis for dialogue that can lead to the implementation of innovative programs for first-year engineering students. Such topics include developing effective advising techniques, creating learning communities, using technology in the classroom, and addressing the needs of students from diverse backgrounds.

For the past two years, a first-year engineering workshop entitled *Dialogue on Engineering Education: the Role of the First Year* has been held at the University of Notre Dame to engage engineering educators on these and other topics. It was conceived as a way for those involved in first-year programs to discuss current pedagogical approaches and to engage in an open dialogue on issues that pertain specifically to first year engineering education. The workshop offered formal presentation sessions, panel discussions, and breakout sessions.

This paper brings together some of the broad themes addressed at these workshops so that others who work in the first year engineering educational field can benefit. The many questions raised and topics covered essentially collapse into three main areas of discussion:

- What is the relationship between persistence in engineering and the first-year experience?
- How do engineering educator's best prepare first-year engineers to "stay the course"?
- What are the trends in first-year engineering program design?

The Relationship between Persistence in Engineering and the First-Year Experience

Persistence in engineering is affected by a number of factors, some that result from the student's pre-college experiences, and some that result from the student's experiences in the first year itself. Some pre-college factors lend themselves to measurement and tracking such as the student's academic preparation and math proficiency. Other factors tend to be less tangible and more difficult to quantify, but no less important. These include the student's family background and support, financial pressures that might require the student to work while in school or to finish college in the shortest possible time, and the student's own motivation and desire to complete the rigorous and demanding engineering curriculum. Engineering attracts strong and capable students, but these students may come to college with personal and family pressures that can impact their decisions to stay in engineering. These factors are beyond anyone's control, but attempts to understand these factors can benefit both individual students and classes of students as a whole.

The collegiate-experience factors include a rigorous, demanding, and somewhat inflexible course load that causes even students with a strong academic performance records to switch to other majors, often in science or business. The complexities and impact of peer pressure, whether old friends back at home or new college friends in other majors who have a different college experience, cannot be underestimated, and may impact the ability of an engineering student to see the ultimate payoff for the hard work to come. The engineering curriculum, packed with consecutive requirements, may mean that even a small deviation from the preplanned curriculum can lead to an additional year of study because of missed pre-requisites. These strong, talented students often lack the ability to ask professors and similarly talented classmates for help, and faculty advising may lack the sensitivity to understand the complex issues that impact student performance or the student's perception of his or her performance, particularly for women and students of color. Considering these realities helps all engineering programs to develop a first-year program that addresses many of the concerns common to today's students.

It is necessary to engage students on a personal level, to help them to believe that they can succeed in this worthwhile endeavor, and to show them how their eventual success will bring them personal fulfillment. In a very practical way, these relationships can help students learn to exercise a degree of control over their academic future. Building schedules that work within the realities of their academic preparation and their daily lives is the first step. The option to proceed at a pace that suits them as individuals is imperative. And for students who thrive on challenges, this personal interaction at an early stage can help to build mentoring relationships that lead to meaningful research experiences and heightened interest in the breadth and depth of engineering study.

The key to persistence in engineering is infusing the first-year experience with the human element. Students must be shown that ideas and personalities have been and continue to be essential to engineering success. Further, students must be privy to the transformative power of engineering, to the idea of how engineering has changed society, often for the better. In addition to these broad themes, however, bringing the human element to engineering in very personal and real ways can be accomplished by engaging a student's personal accomplishments and struggles to show that someone cares about their success. Students must be taught more than just calculus, physics and chemistry; they need to have opportunities to learn to be resourceful and resilient.

Preparing First-Year Engineers to “Stay the Course”

Many engineering programs provide introductory engineering courses in the first year so that students can “experience engineering” early on in their academic careers and thereby make an educated choice about their futures. The courses present engineering problems that emphasize the use of math and science so that students learn to apply these subjects to solve real engineering-related problems. But educators of students in first-year programs find themselves involved in a balancing act between nurturing the first-year students through the transition to college life and letting students figure out some things on their own. Faculty have a responsibility to the institution to prepare them technically for what is to come in the engineering curriculum, as well as to set the expectations for both work load and critical thought. Many programs have leaned too far in one direction or another, neither of which is good. If the environment is too nurturing, then students get shocked when they hit the sophomore year. If the environment leaves them on their own to “sink or swim”, then retention numbers are negatively impacted and students that have the aptitude, ability, or desire to pursue a degree in engineering may make a decision prematurely out of fear or frustration.

From a student's perspective, being 18 years old and trying to make a decision on what you want to do for “the rest of your life” can be overwhelming. Engineering educators need to offer exposure to the vast opportunities that are available through engineering while being careful not to intimidate students before they see what engineering is all about. In the past, engineering education has taken the “sink or swim” approach, but today, when students come in the door as first-year students, they are still in many ways high school seniors. Thus educators need to take the steps necessary to critique and improve pedagogical approaches to align with the desire to have a group of students that are prepared for sophomore year and have made an informed decision to continue in engineering.

One key aspect of preparing first-year engineering students to stay the course is to avoid exposure to negative messages, as explained by a panel discussion in the First Year Dialogues II (Summer 2007) that included Dr. Stephen Carr from Northwestern University, Dr. Pablo Debenedetti from Princeton University, Dr. Matthew Ohland from Purdue University, Dr. Sven Bilén from Penn State University, and Dr. Dan Budny from University of Pittsburgh. Unfortunately, students encounter these negative messages even before they can fully consider engineering as a career. Dr. Ohland focused specifically on pointing out these negative messages, such as “everyone procrastinates” and “no one does the assigned reading.” These messages subconsciously allow students to live down to lowered expectations, which can be a set-up toward failure later on. Instead, Ohland advocated an approach to educational pedagogy

guided by the mantra, “because dreams need doing.” He stressed that dispelling the notion that “engineering is hard” by pointing out to students that being good at anything requires hard work. He noted that an effective way to bring this point home is through the use of sports analogies, as there will usually be some athletes in the classroom who can relate to the idea that hard work leads to success. Did they compete without practicing? Probably not. And so it is with the engineering curriculum. The course work allows a student to practice being an engineer, so the harder a student works at such practice, the better prepared the student will be for success as an engineer.

Another form of negative message is self-imposed by many of our students: failure is anything other than an ‘A.’ Because of their “failing” grades; some students choose to switch to a different major where they will be “successful.” Institutions of higher education can be quite humbling for most students. Many identify themselves as being “smart,” but when they have to struggle their way through course work, they do not feel smart anymore and self-esteem takes a hit. Dr. Budny made the point that engineering students do not know how to deal with failure. He deals with the problem head-on by introducing the book *Jane and the Dragon*¹ as an allegory for following one’s dreams, facing one’s fears, and making an enemy a friend, relating the dragon in the book to the dragons of math and physics and conquering fear of the dragon through perseverance and practice. He strategically incorporates this into the classroom right after the first major engineering exam when many students have likely just experienced “failure” for the first time.

Another recommendation made during the workshop for helping first-year students was having dedicated first-year faculty in introductory courses. Unfortunately, many institutions treat the first year engineering course as being no different than other courses in the curriculum and many instructors shy away from having to teach first-year students for a variety of reasons. One such reason is the perceived lack of “prestige” of such a course. Yet, it is essential to have faculty that are energetic and approachable teaching the introductory courses, so that they can help support the student’s transition and encourage the student to really give engineering a chance. Furthermore, faculty buy-in is essential to the first year experience: if a faculty member is teaching an introductory course out of obligation rather than desire, then the lack of interest will show and will be expressed as a negative message to the students. The first year is a formative experience where the expectations for students are being set; engineering programs need to stress the importance of the first year experience by hiring faculty devoted to promoting the first-year curriculum, assigning motivated faculty to teach the courses within that curriculum, and developing ways to raise the prestige associated with such courses.

Trends in First-Year Engineering Program Design

Certain trends in first-year programs have emerged in response both to the issues noted above and in an effort to address recruitment and retention. External forces have had some impact, including a paradigm shift from a teaching environment to a learning environment at the earliest stages of a student’s K-12 education. Additionally, the need for measurable outcomes that are in accordance with ABET EAC criteria 3(a)-(k)² have also inspired engineering faculty to rethink the first-year curriculum. Thus, engineering programs are developing innovative approaches to first-year education in areas beyond traditional engineering studies. First-year engineering

programs have become more than just a place to learn how to write a computer program or implement a CAD drawing. These programs have developed engineering design experiences accessible to first-year students, altered curricula to extend education beyond four years, and gone beyond engineering basics to convey the concept of engineering as a profession, and about what it means to be a university student. Faculty have also begun to address issues of assessing outcomes and understanding the factors that affect student success. This section brings forth some of the ideas discussed at the workshops in these areas.

Engineering Design

One important trend common to many first-year programs involves the introduction of open-ended engineering problems to first-year students. Experiential learning allows teams of students to work collaboratively on projects to meet established design objectives. Through ongoing critiques, discussion within teams and feedback from the instructor, students develop their own solutions to design problems. These projects teach students how to apply basic math and science principles to a practical problem, to integrate concepts from other courses, and to understand the engineering methodology, all of which together help to answer the elusive question, “What is engineering?”

Project-based courses move beyond the traditional lecture approach, which involves a one-directional flow of information from faculty to students. Thus, project-based courses have the potential to make significant change in faculty-student and student-student relationships. Faculty and students become involved in solving problems together. Students learn from their classmates and from upper-class students assigned as project mentors. In this way, these projects stimulate an active learning community infused with a spirit of inquiry.

When implemented properly, structured learning modules can increase in complexity and depth throughout the year, as students gain more experience and have more foundational course experience upon which to base more elaborate solutions. In addition, learning modules can provide examples of analysis and design from each of the engineering disciplines to expose first-year students to the breadth of the engineering profession.

Five-Year Programs

At many institutions it is not unusual for some engineering students to take more than four years to complete the bachelor’s degree. A variety of reasons account for this trend, including the course offerings of the school, a student’s decision to take courses at a slower pace, a student’s decision or a school’s requirement to participate in a co-op or internship program during the academic year, a student’s decision or a school’s requirement to participate in a study-abroad program, or even personal needs that stretch out an academic career. It is clear that the four-year “norm” for an engineering bachelor’s degree requires some reassessment, and even perhaps some recalibration of student expectations at the beginning of their academic career. That is, if a student (as well as the faculty) recognizes that a degree might take more than four years to complete, all can relax a bit and take advantage of other opportunities presented through university life, rather than stressing about “how long” it is taking to complete the engineering degree. Such information is therefore beneficial to the student, parents, and faculty members alike.

Along with this reality has emerged a discussion of altering engineering education so that the first professional degree actually is the master's degree, earned in another year after completing the bachelor's degree. Such an idea is already commonplace in other professions such as accounting and architecture. The debate about the wisdom of such proposals focuses on whether there should be yet another barrier to the profession, as if calculus and physics were not already barriers enough, and on whether the traditionally structured and rigorous four-year curriculum serves our students, and the profession, well.

Conveying the Concept of Engineering

During a panel discussion with undergraduate engineering students, it became abundantly clear that even strong students do not have a clear picture of what engineering is. ***For those involved in the field, it has proven difficult to answer the “What is engineering?” question. Two main reasons seem to be that because engineering as a field has such breadth that it is difficult to convey in a concise manner, and even engineers do not agree on a single definition.*** However, a good explanation of engineering as a field of study and as a profession is critical for effective recruitment and retention of engineering students.

Many universities also offer courses that inform students more directly about the various disciplines of engineering as an alternative to or in conjunction with project work. These informational courses take many forms and may involve a number of faculty members. In some cases, students might register for a discipline-oriented course, such as one focused on mechanical engineering, offered over several weeks or a semester, and then shift to another discipline-specific course and possibly even a third in one year. The difficulty of such an approach is that it requires involvement from several faculty members, and such courses often revert to the one-way flow of information, instructor to student, which could cause some students to disengage.

Other universities have found it effective to build in discussions of each discipline at appropriate points within the project-based learning modules, working through the specific tasks or thought processes a particular type of engineer would engage in while trying to solve the problem at hand. Although a less direct approach than a course focused on a particular discipline, such an approach can more subtly engage the student in the thinking and problem-solving skills pertinent to a specific discipline or common to all.

Another effective and relatively new approach for engaging first-year students involves bringing in practicing engineers as role models in the first-year course. Although such engineers often speak on their specialties in upper-level courses, having them address first-year students on their work can be effective in engaging students with the human side of engineering practice. Small-group question-and-answer sessions afterward can also help to make the engineering profession more accessible to first-year students. If the practicing engineers are willing, involving them in project design and evaluation can bring some needed realism to what is otherwise often simply an academic exercise.

Becoming a College Student

When a high school student visits a university, the impressions the student takes away become very important, because these impressions guide the student's educational decision. Similarly, the impressions of university life that a student develops during the first semester orientation

period will guide the student's behavior and academic progress and, consequently, are even more critical. Thus, universities have begun to focus on the transition from high school to college, addressing such issues as the transition from parental to self-supervision, from schools managing time to students themselves managing their time, and from well-understood expectations to a new realm of learning and discovery. Numerous studies document the importance of educating new students with their new academic setting³⁻⁷. Indeed, helping students anticipate and understand life changes can help the university realize a significantly higher first-year student persistence rate⁸. Courses that focus on orienting students to the rigors of engineering study have proven effective at some institutions, and can be a helpful addition to actual course work.

Assessment and Surveys

Institutions use various assessment instruments to gather information on student characteristics, progress, and needs. These instruments report achievement, provide a measure of the level to which a program meets its objectives and present results that can be used to improve a program. Predictive systems, such as surveys, can be used to improve retention rates by providing information to faculty for the improvement of engineering programs. Such efforts, when combined with direct assessment measures, are particularly important when employing novel approaches to student learning and development, to satisfy not only accreditors, but also the faculty in the more traditional engineering courses who depend on the first year to prepare students for the rigors to come.

The Benefits of Engaging in Dialogue

Participants in the two workshops held over the last two summers at the University of Notre Dame have confirmed the benefits of engaging in dialogue on the issues outlined above. This section addresses some of the issues faced in organizing this type of workshop, to guide others in establishing similar regional workshops. Overall, over 100 participants from more than 80 engineering programs around the country attended each of the past two sessions.

Although a range of topics have been considered for inclusion in the workshops, most participants really appreciate the opportunity to talk about the actual classes being offered by other institutions. For example, rather than talking about the need for humanities courses in the engineering curriculum, participants would prefer to understand how others are handling math, chemistry and physics requirements in the first year. Thus, most participants, in follow-up evaluations, indicated a preference for discussing "how" to implement something rather than "whether" to implement it. Some issues of broad interest to consider could include topics related to student-body diversity, student preparation, and student engagement. However, focusing on the actual courses offered and student response to the curriculum both in terms of performance and other measures of student satisfaction should take center stage.

A challenge for any such workshop is the range of colleges and universities that participate. Large state universities will necessarily have different challenges than small private colleges. Whether large or small, public or private, elite or more mainstream, each type of institution can bring something to the discussion. Therefore, when planning panel discussions and presentations, care should be taken to include representatives from a range of institutions.

Finally, much of the best engagement in a dialogue-focused workshop occurs outside of the organized sessions; it occurs at meals, informally in the hallways, and when milling around between sessions. Thus, such a workshop should leave plenty of time for the participants to talk with each other. A positive component of the workshop should be sessions with no scheduled speakers, but instead scheduled topics that allow the attendees to discuss a topic from their own experience. And, it might even be a good idea to facilitate interaction among individuals from similar types of institutions by having lunch tables set aside for representatives of different types of schools, or for people who want to talk about a particular issue.

Conclusion

The workshops held over the past two summers at the University of Notre Dame have brought together people from diverse backgrounds to talk about current trends and issues common to all of engineering education. The presentations, panel discussions and participant dialogue have contributed to a broader understanding of the issues that impact our ability to recruit and retain students in our programs. Learning from others in this manner is an effective way to share concerns and develop solutions; participants indicated that they planned to use the insights gained at the workshop in their own programs. Engineering educators from across the country are welcomed and encouraged to examine this model for an engineering workshop to potentially develop similar regional workshop to expand this dialogue about the challenges of first-year engineering education. The workshop sessions are included in the appendix as they offer the listing of all sessions and speakers that were engaged in these dialogues.

Acknowledgements

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Appendix:

Dialogue I – Summer 2006

SUNDAY

4:00 - 6:00 p.m. Registration

4:30 - 5:30 p.m. Campus tour for those interested

6:30 - 8:30 p.m. Reception and Dinner

Speaker: Dr. Raymond Landis, Dean Emeritus of Engineering and Technology, California State University at LA

“First Things First; First an Engineering Student Then an Engineer”

MONDAY

7:30 - 8:00 a.m. Registration and Continental Breakfast

8:00 - 8:15 a.m. Welcome

Dr. Christine Maziar, Vice President and Associate Provost and Professor of Electrical Engineering, University of Notre Dame

8:15 - 10:30 a.m. Session #1: First-year Programs

Dr. Hugh Page, Dean of the First Year of Studies and the

Walter Associate Professor of Theology, University of Notre Dame

“Engineering and the Pursuit of the Renaissance Ideal in the First Year Curriculum”

Dr. Panos Papadopoulos, Panel Leader , Professor of Mechanical Engineering and Vice Chair of Instruction, University of California at Berkeley

Dr. Gary Bernstein, Professor of Electrical Engineering, University of Notre Dame

Dr. Robert Montgomery, Associate Professor in Engineering Education, Purdue University

Dr. Stephen Carr, Associate Dean of Undergraduate Engineering and Professor of Materials Science and Engineering, Northwestern University

10:30 - 10:45 a.m. Break

10:45 - 12:30 p.m. Session #2: What Are Today's Students Like?

Dr. Paul Tougaw, Panel Leader, Coordinator of Professional Development and Placement, Valparaiso University

Dr. Mark Sperling, Assistant Superintendent, Merrillville Public Schools, IN

Dr. John Hutton, Assistant Superintendent (Secondary), Valparaiso School Corporation, IN

Mr. Garry DeRossett, Principal of Boone Grove High School, IN

12:30 - 2:00 p.m. Lunch

Speaker: Michael Littman, Professor of Mechanical and Aerospace Engineering, Princeton University “Educating Future Engineers and Citizens about the Grand Tradition in Engineering”

2:15 - 3:45 p.m. Session #3: The Place of Humanities in the Engineering Curriculum

Dr. Gary Downey, Panel Leader, Professor of Science and Technology in Society, Virginia Tech

Dr. Deborah Johnson, Professor of Applied Ethics in Science, Technology, and Society, University of Virginia

Dr. Cornelius Delaney, Professor of Philosophy and Co-Director of the Arts & Letters/Science Honors Program, University of Notre Dame

3:45 - 4:00 p.m. Break

4:00 - 5:30 p.m. Session #4: Keynote Address

Dr. Sherra Kerns, Vice President for Innovation and Research and Olin Professor of Electrical and Computer Engineering, Olin College “Alliteration 101: Engaging Entering Engineers — Connecting to Contexts; Reveling in Relevance”

6:30 - 8:30 p.m. Reception and Dinner

Speaker: Dr. Ernest Smerdon, Dean Emeritus and Professor of Civil Engineering, University of Arizona. Member of the NAE 2020 Study. Past president of ASEE
“The Challenges and Opportunities of the Engineer of 2020”

TUESDAY

7:30 - 8:30 a.m. Continental Breakfast

8:30 - 10:00 a.m. Session #5: Chemistry, Physics, and Mathematics: Can We Do It Right?

Dr. Dan Marlow, Panel Leader, Professor of Physics, Princeton University

Dr. Michael Hildreth, Assistant Professor of Physics, University of Notre Dame

Dr. Nathan Klingbeil, Associate Professor of Mechanical & Materials Engineering Wright State University

10:00 - 10:15 a.m. Break

10:15 - 12:00 p.m. Session #6: What Do We Do Now?

Dr. Douglas Tougaw, Panel Leader, Chair of the Department of Electrical / Computer Engineering and the Frederick W. Jenny Jr. Professor of Emerging Technology Valparaiso University

12:00 - 1:30 p.m. Buffet Lunch and Checkout: Location - Engineering Learning Center

Conference Panelists/Speakers

Dr. Gary Bernstein, Professor of Electrical Engineering University of Notre Dame

Dr. Stephen Carr, Associate Dean of Undergraduate Engineering and Professor of Materials Science and Engineering Northwestern University

Dr. Cornelius Delaney, Professor of Philosophy and Co-Director of the Arts & Letters/Science Honors Program University of Notre Dame

Mr. Garry DeRossett, Principal of Boone Grove High School, IN

Dr. Gary Downey, Professor of Science and Technology in Society Virginia Tech

Dr. Michael Hildreth, Assistant Professor of Physics University of Notre Dame

Dr. John Hutton, Assistant Superintendent (Secondary), Valparaiso School Corporation, IN

Dr. Deborah G. Johnson, Professor of Applied Ethics in Science, Technology, and Society University of Virginia

Dr. Sherra Kerns, Vice President for Innovation and Research and Olin Professor of Electrical and Computer Engineering Olin College

Dr. Nathan W. Klingbeil, Associate Professor of Mechanical & Materials Engineering Wright State University

Dr. Raymond Landis, Dean Emeritus of Engineering and Technology California State University at Los Angeles

Dr. Michael Littman, Professor of Mechanical and Aerospace Engineering Princeton University

Dr. Robert Montgomery, Associate Professor in Engineering Education Purdue University
Dr. Dan Marlow, Professor of Physics Princeton University
Dr. Hugh Page, Dean of the First Year of Studies and the Walter Associate Professor of
Theology University of Notre Dame
Dr. Panos Papadopoulos, Professor of Mechanical Engineering and Vice Chair of Instruction
University of California at Berkeley
Dr. Ernest Smerdon, Dean Emeritus and Professor of Civil Engineering University of Arizona
Dr. Mark Sperling, Assistant Superintendent, Merrillville Public Schools, IN
Dr. Douglas Tougaw, Chair of the Department of Electrical and Computer Engineering and the
Frederick W. Jenny Jr. Professor of Emerging Technology Valparaiso University
Dr. Paul Tougaw, Coordinator of Professional Development and Placement Valparaiso
University

Dialogue II – Summer 2007

SUNDAY

4:00 - 6:00 p.m. Registration
4:30 - 5:30 p.m. Campus tour for those interested
6:30 - 8:30 p.m. Reception and Dinner Entertainment and greetings
8:30 - 10:00 p.m. Cracker Barrel discussions

MONDAY

7:30 - 8:00 a.m. Registration and Continental Breakfast
8:00 - 8:15 a.m. Welcome
8:15 - 9:15 a.m. Session #1: Keynote
Dr. Gerald Jakubowski, President, Rose-Hulman Institute of Technology Past President of ASEE
“Personal Thoughts on the Recruiting and Retention of Engineering Students”

9:15 - 11:00 a.m. Session #2: How Do We Prepare First Year Engineers to Stay the Course?
Dr Stephen Carr, Panel Leader, Northwestern University
Dr. Pablo Debenedetti, Princeton University
Dr. Matthew Ohland, Purdue University
Dr. Sven G. Bilén, The Pennsylvania State University
Dr. Dan Budny, University of Pittsburgh

11:00 a.m. - 12:30 p.m. Session #3: What are Today’s Students Like?
Student Panel - High School Seniors and First Year Students
Dr. Douglas Tougaw, Panel Leader Valparaiso University

12:30 - 2:00 p.m. Lunch Speaker: Dr. David Billington
Professor of Civil and Environmental Engineering, Princeton University
“Engineering in the Modern World”

2:00 - 4:00 p.m. Session #4: Small Group Discussions (Session Chairs will be Leaders)

4:00 - 5:30 p.m. Session #5: Open Forum – Summaries and Questions and Answers

7:00 - 8:30 p.m. Speaker: Dr. Joseph Cuseo, Professor of Psychology and Director of Freshman Seminar at Marymount College (CA) “Student Success and College Quality: What Really Matters”

TUESDAY

7:30 - 8:30 a.m. Continental Breakfast

8:30 - 10:30 a.m. Session #6: Technology and Engineering Education: How Do We Start in FY
Dr. David Berque, Panel Leader, DePauw University
Dr. Jay Brockman, Associate Professor of Computer Science and Engineering, University of Notre Dame “Integration of Conventional and Web-Based Media in an Engineering Course”
Ms. Kerry Meyers “Technology in the Classroom Friend or Foe?”
University of Notre Dame

10:30 a.m. - 12:00 p.m. Session #7: A Conversation on Diversity Issues in Engineering?
Dr. Ray Landis, Panel Leader, Dean Emeritus of Engineering and Technology California State University at Los Angeles
Mr. Ivan Favila, University of Notre Dame
Mr. Derrick Scott, University of Michigan

12:00 - 1:30 p.m. Checkout and Buffet Lunch
Speaker: Dr. David Cohn, Director, Business Informatics, IBM T.J. Watson Research Center
“Engineering 2.0 – Coping with a Flat World”

1:30 - 4:30 p.m. Session #8: Presentations
Dr. Kathy Zerda, et al., University of Houston “A Unique Collaboration between Senior Design Students and First Year Engineering Students”
Dr. Scott Miller/Dr. Jeff Cawfield University of Missouri-Rolla “Advising First-Year Engineering Students: Effective Advising of a Large Freshmen Engineering Cohort”
Kerry Meyers University of Notre Dame “A Working First Year Engineering Model: the Hands-on, Project Based Experiences at Notre Dame”
Ms. Rhonda Wiley-Jones/Dr. Kelly Strong Iowa State University
“First-Year Curricular Integration through Learning Communities”
Dr. Nathan Klingbeil, et al., Wright State University “The Wright State Model for Engineering Mathematics Education: Uncorking the First-Year Bottleneck”

Conference Panelists/Speakers

Dr. David Berque, Professor of Computer Science and Department Chair DePauw University
Dr. Sven G. Bilén, Associate Professor of Engineering Design, Electrical Engineering, and Aerospace Engineering The Pennsylvania State University
Dr. David Billington, Professor of Civil and Environmental Engineering Princeton University
Dr. Jay Brockman, Associate Professor of Computer Science and Engineering University of Notre Dame
Dr. Dan Budny, Associate Professor of Civil Engineering and Director of Freshman Engineering Program University of Pittsburgh

Dr. Stephen Carr Associate Dean of Undergraduate Engineering and Professor of Materials Science and Engineering Northwestern University
Dr. Jeff Cawlfeld Professor of Geological Sciences and Director of Freshman Engineering Program University of Missouri-Rolla
Dr. David Cohn Director, Business Informatics, IBM T.J. Watson Research Center
Dr. Joseph Cuseo Professor of Psychology and Marymount and Director of Freshman Seminar Marymount College(CA)
Dr. Pablo Debenedetti, Professor of Applied Sciences Princeton University
Mr. Ivan Favila, Assistant Director of Academic Affairs and Director of the Minority Engineering Program University of Notre Dame
Dr. Gerald Jakubowski, President, Rose-Hulman Institute of Technology and Past President of ASEE Rose-Hulman Institute of Technology
Dr. Nathan Klingbeil, Professor of Mechanical & Materials Engineering Wright State University
Dr. Raymond Landis, Dean Emeritus of Engineering and Technology California State University at Los Angeles
Ms. Kerry Meyers, Associate Professional Specialist and Course Co-coordinator Introduction to Engineering University of Notre Dame
Dr. Scott Miller, Assistant Professor of Materials Science and Engineering and Assistant Director of Freshman Engineering Program University of Missouri-Rolla
Dr. Matthew Ohland, Associate Professor of Engineering Education Purdue University
Mr. Derrick Scott, Director, Minority Engineering Program University of Michigan
Dr. Kelly Strong, Associate Professor of Construction Engineering Iowa State University
Dr. Douglas Tougaw, Chair of the Department of Electrical and Computer Engineering and the Frederick W. Jenny Jr. Professor of Emerging Technology Valparaiso University
Ms. Rhonda Wiley-Jones, Academic Advisor Iowa State University
Dr. Kathy Zerda, Director, Program for Mastery in Engineering Studies (PROMES) University of Houston