D Appendix: Local Inquiry Questions

The concluding subsection of Section 2 (Student Learning Experiences) presented a series of questions based on Academic Pathways Study research. These "local inquiry questions" were organized by topic and designed to facilitate reflection and discussion on how each topic plays out on an individual campus and in an individual classroom. This appendix consists of a compilation of these local inquiry questions. See Subsection 2.10 for these questions placed in the context of relevant APS findings summaries. In the word cloud below, word size is proportional to their frequency in the local inquiry questions (excluding the two highest-frequency words, which were "students" and "engineering," and stop words).

http://www.wordle.net/

D.1 Welcoming Students into Engineering

- **Informed Decision Making:** Does your college offer courses or programs (such as speaker series) that reveal to students the range of jobs and careers within the engineering field? How are students encouraged to integrate a variety of experiences into informed decision making on majoring in engineering? Do they have an accurate and sufficient understanding of the field of engineering and their place in it? How is re-examination of their decisions to stay in engineering supported through advising?
- **Migration in:** Are there opportunities in the first years of college at your school (such as "introduction to engineering" seminars or courses) that allow students to explore engineering? How much migration in is happening at your institution? How might this pathway be expanded? Are there institutional barriers that discourage students from transferring into engineering?

- **Pathways:** What is the range of pathways that your students take through your curricula? Where do they find support? What organizations, faculty, student groups, and peers help students navigate through the institution? Does your institution support varied pathways through the undergraduate experience?

D.2 Understanding and Connecting with Today's Learners

- **Listening:** How do you get feedback from students about the effectiveness of various elements of your program? Do faculty listen to students about the effectiveness of their teaching? What mechanisms can be put in place to encourage more timely and effective use of teaching evaluations by instructors? How can what is learned through evaluations be better aligned with program improvement? Do you provide an environment where students listen to each other?
- **Student Passion:** What motivates students on your campus to choose an engineering program? What can they be passionate enough about to keep them in an engineering program? Does your program include elements that will ignite and sustain student passion?
- **Variability/Commonality:** How are students in your college of engineering similar to one another? How are they different from one another? How well do faculty and policy makers on your campus understand similarity and variability in your students' motivation, background, interests, learning challenges, confidence, and future plans?
- **Supporting Diversity:** Do individuals from traditionally underrepresented populations feel supported and included in the engineering community on your campus? Do faculty, students, and administrators recognize and support the important voices brought to engineering from individuals of all backgrounds?

D.3 Helping Students Become Engineers

- **Student Identity as an Engineer:** Do the students you teach know what engineers really do? Do they identify themselves as engineers? How does your program help them do this? Can they articulate what they are bringing to the engineering profession? Do faculty and administrators think about a student's engineering identity as an element of student development in the undergraduate years?
- **Connecting Across the Years:** Does your college connect the early learning experiences in the first two years (math- and science-focused) to the more engineering-focused experiences in the later years? How do design experiences in upper-division courses build on design experiences in early courses?
- **Learning Engineering:** How do you confirm that students have learned and retained the basic skills of engineering? Have your students acquired the language of engineering? Have they mastered the concepts that are difficult to understand? Can they define and solve engineering design problems? Do they have the skills and confidence to meet society's grand challenges?
- **Well-Rounded:** How broadly do engineering students on your campus conceptualize engineering? How many areas beyond math, science, and analysis would students list

as important components of engineering? How skilled are your graduates in the many aspects of the engineering profession?

- **Designing in Context:** Do your graduates have the design skills they need? Do your students consider the broad context of engineering problems as they solve them? Do they think about the users and other stakeholders of an engineered solution, and all aspects of the life cycle? Are they considering global, environmental, societal, economic, and cultural context in engineering design?

D.4 Developing the Whole Learner

- **Balance:** Are your students satisfied with their undergraduate experiences as engineering students? Are they able to balance between their engineering and non-engineering extracurricular activities? Is there balance between individual and team experiences, well-defined and open-ended problems, and design and analysis experiences? Are your students able to find balance between the academic and social aspects of their lives?
- **Significant Learning Opportunities:** How does your institution provide learning opportunities that students consider significant, including experiences that connect with what students find meaningful, present students with a challenge, ask students to be self-directed learners, give students ownership over their learning, and facilitate development of a broad vision of engineering?
- **In-Depth Learning Opportunities:** Do your students have opportunities to have learning experiences that help them extend their understanding of engineering, e.g., internships, co-ops, research or international experiences, and project-based learning? Do you help your students reflect on these experiences and integrate them into their understanding of the engineering profession? How might these reflections be integrated into program assessment and improvement?
- **Learning Environment:** How would you characterize the learning environment on your campus? Is there an atmosphere of students in competition with each other? Do students feel overloaded by a demanding curriculum? Do all students feel that your institution would like them to succeed? Do your students develop confidence in their abilities as engineers? Are your students excited when they graduate, or do they seem to be just sticking it out to the end?
- **Asking Questions:** Do your graduates recognize when they do not know something? Do they have the skills to find the answers to their questions? Do they feel enabled to continue the learning process after they graduate?

D.5 Positioning Students for Professional Success

- **Post-Graduation Plans:** What resources are available at the department, college, and institution levels for guidance in job and career planning? Do your students feel enabled to enter a variety of professions? Are they prepared to be effective in those professions? What plans do your graduating students have? Are they considering a career in engineering, another field, or both? Work in industry or the public sector? Graduate school in engineering or another field?

- **Ability to Practice:** What challenges do your graduates face when they begin practice or graduate school? What helps facilitate their transition? Do they know how to seek out the information and advice they need? Are they prepared for a career or just their first job? Can they effectively communicate their ideas to multiple audiences in the many modes they need to?
- **Interdisciplinary Respect:** Do your graduates understand the value of skills and perspectives from individuals in fields other than engineering? Do they respect both other fields and the individuals who practice in these fields? Are they able to work with these individuals?
- **Meet Grand Challenges:** How prepared are your graduates to take on the wide range of roles—in government, industry, and academia—required for engineers to address the grand challenges that face the globe and its inhabitants?

D.6 Welcoming Students into the Work World

- **Practicing Engineering:** What challenges do your newly hired engineering graduates face when they begin a job? What can you do to help facilitate their transition? Are they supported when they need to seek out information and advice? Are they given appropriate orientation, support and mentoring from others in the organization?
- **Working in Diverse Teams:** Are the new hires able to work with a wide variety of coworkers and customers or clients in different roles and settings? Do they understand the value of skills and perspectives from individuals in fields other than engineering? Do they understand that decisions can often incorporate more factors than those that pertain only to the engineering aspects?
- **Communicating Effectively:** Do the new hires have an appreciation for the needs of different audiences when talking about their work or a problem? Are they able to listen to others and effectively incorporate input? Can they communicate their ideas to multiple audiences in the many modes they need to?