UK College of Engineering

First Year Engineering - Year-End Report

2nd Evaluation Report
August 2017 – June 2018

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June 15th, 2018

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EXECUTIVE SUMMARY

The University of Kentucky College of Engineering contracted with the UK College of Education Evaluation Center to gather student and faculty *perceptions* of the First-Year Engineering program, implemented in the 2016-2017 school year. The goal of the evaluation is to provide on-going feedback to CoE and the FYE program to improve programmatic implementation that will assist future assessments of programmatic impact on key metrics of student success and retention. Because the program is still early in its implementation, the 2017-2018 evaluation was focused on providing FYE with stakeholder perceptions and comparing these perceptions to data collected in 2016-2017 to assist in improving implementation. As a result, the 2017-2018 evaluation was driven by the following three questions that were born out of the logic model initially developed to explain program functions (see Appendix A):

1. What are faculty perceptions of FYE and its implementation?
2. What are Engineering students' perceptions of FYE and its implementation?
3. How do these perceptions change over time?

Data were collected from faculty focus groups and online surveys administered to department faculty, administrators, current CoE students (both those who have participated in FYE and those who have not), and Engineering alumni. Because the program is still early in its implementation and, as a result, continually being refined, results from these inquiries were coded and analyzed using the traditional Strengths, Weaknesses (Areas for Improvement), Opportunities, Threats (SWOT) method to maximize potential use of information. Finally, using stakeholder suggestions and the synthesis of the data, recommendations were then generated for CoE and FYE to consider as implementation continues. These results and recommendations are as follows:

Results:

Strengths:
- Student and faculty buy-in
- Student and faculty perceptions of program benefits, including improved academic performance and student satisfaction
- Improved program communication and transparency
- Positive student experiences
- The formation of collegiate cohorts

Areas for Improvement:
- Major-exploration aspects of FYE curriculum is seen as less than effective by departmental faculty
- Faculty and students' increasing frustrations regarding student skill development
- The perception that EGR 101 and EGR 102 may not be as rigorous as students and faculty would like

Opportunities:

- Faculty and student have similar perceptions of important skills that need to be learned in an FYE-style class
- Faculty want to collaborate more

Possible Threats:

- Faculty frustrations with program policy and implementation
- Variations in students' previous exposure to programming and other components may impair the development of curriculum to meet all students' needs
- The lack of an integrated support structure for the FYE program and instructors, and
- Perceived lack of long-term planning and infrastructure for FYE

<u>**Recommendations:**</u>

- **Find ways to foster connection and encourage collaboration between FYE and departmental faculty**
    - o Work with departments to refine how skills are incorporated into FYE and subsequent courses
    - o Encourage more faculty involvement in major-exploration component of FYE
    - o Hold social events, open forums, or professional development sessions
- **Improve lines of communication and points of contact between departments and FYE**
    - o Develop a detailed communication plan
    - o Create faculty committees for both communication and collaboration
    - o Share with faculty long-term program goals and efforts to further develop FYE support structures to promote understanding and improve transparency.
- **Explore ways to revise the Major-exploration component of FYE**
    - o Have local industry people speak on engineering from a real-world application perspective
    - o Have 101 focus on the coursework of each major
    - o Utilize K-week to hold an "expo" style info-session on all the majors
    - o Encourage more student "intrinsic self-study"

As with any data collection, the 2017-2018 evaluation has limitations that should be noted. First, faculty perception data collected primarily reflects perceptions of the first year of implementation and may not reflect adjustments made to the program after initial implementation in 2016-2017. Second, response rate on the student survey was low (total n=312; see Appendix D) and may not fully reflect student perceptions. Finally, student perception data may not be able to capture programmatic benefits since FYE students are still early in their academic careers. Despite these limitations, collected data still provides enough information to assess the overarching evaluation goal: to gauge current perceptions of the FYE program.

The following report provides a more detailed overview of the 2017-2018 evaluation and our findings. The report is broken down into the following sections, in order:

1. An **Evaluation Overview** outlining the evaluation goals, previous data collection, and current data collection methods;
2. **Results** broken down by each category,
3. Our **Recommendations** based on the data collected,
4. A **Conclusion** that highlights our recommendations and next steps for the evaluation, and
5. **Appendices** that contain the initial evaluation plan, the instruments used for data collection, and detailed summaries of collected data.
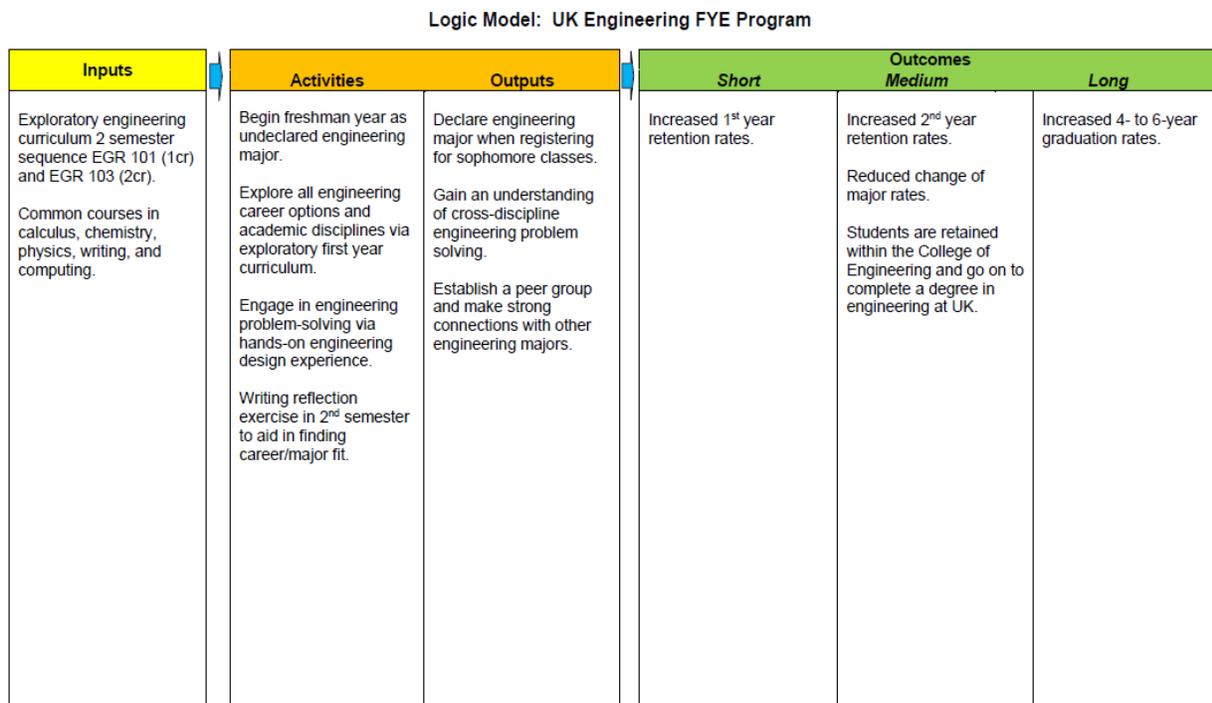
Taken together, our key findings and recommendations paint a picture of a College that *wants* the First-Year Engineering Program to work but feels it needs changes to make it successful. Stakeholders on all sides seem to recognize the program is still in early stages of implementation and are optimistic about its potential, but perceptions of the program may change if perceived issues aren't addressed in the coming years. Our findings also suggest that faculty and students are aligned in their perceptions of what skills are important to learn in FYE. Furthermore, faculty want to be involved in improving the program. By leveraging this information and by getting faculty involved in major-exploration program components and the development of course content, FYE administrators may be able to reduce potential negative perceptions of the program and strengthen the program as it comes out of its developmental stages. Attempting to engage faculty stakeholders is particularly critical given that any direct changes made to the program will not be visible to faculty until a year after implementation: the majority of faculty do not interact with FYE students until the students' second year. Given this limited view of the program, FYE should strongly consider various outreach efforts.

Finally, while collecting evaluation data early in a program's implementation may provide insights that may assist in improving overall implementation, early perceptional data cannot provide a complete picture of the program's impact. To assess programmatic impact, FYE should continue to collect perception data from students as they progress through degree completion. New data collection methods—questions added to the Teacher Course Evaluations (TCEs)—beginning in academic year 2018-2019 should provide FYE with longitudinal student perceptional data linked at the individual student level. Just as importantly, FYE should continue to elicit perceptions from faculty, who can provide a pre/post perspective that cannot be gained from students. Over time, this longitudinal perceptional data combined with institutional data on retention, attrition, and completion should assist the College of Engineering in determining the impact of the FYE program and how the program may continue to be refined.

EVALUATION OVERVIEW

The College of Engineering implemented their new First-Year Experience (FYE) program in the Fall of 2016. Several faculty and program administrators were interested in studying the roll-out and long-term evolution of the FYE program, and, as a result, FYE program administrators contracted with the Evaluation Center to serve as external data collectors for a series of faculty focus groups conducted during the 2016-2017 academic year. Faculty focus groups and surveys from the past two years have asked respondents to explain their understanding of the program's rationale and what evidence of a successful program would look like to them; this model was developed to describe what the program is meant to do, enabling us to fully engage with faculty responses.

In response to the data collected from the faculty focus groups in 2016-2017, the scope of the Evaluation Center's work expanded in 2017-2018 to include student perspectives. To determine how best to utilize student perspectives, the Evaluation Center returned to the logic model representing the program's activities, intended outcomes, and goals. A logic model is a visual representation of the workings of a program, designed to explain how resources (inputs) go into a program and activities are executed, resulting in tangible outputs and specific program goals (outcomes). The logic model for FYE was developed during the initial phases of program development by Brad Hubbard, an intern with the Evaluation Center at the time as well as an undergraduate academic advisor. The visual representation of the logic model is represented in Figure 1 below.

Logic Model: UK Engineering FYE Program

Inputs	Activities	Outputs	Outcomes		
			Short	*Medium*	*Long*
Exploratory engineering curriculum 2 semester sequence EGR 101 (1cr) and EGR 103 (2cr). Common courses in calculus, chemistry, physics, writing, and computing.	Begin freshman year as undeclared engineering major. Explore all engineering career options and academic disciplines via exploratory first year curriculum. Engage in engineering problem-solving via hands-on engineering design experience. Writing reflection exercise in 2nd semester to aid in finding career/major fit.	Declare engineering major when registering for sophomore classes. Gain an understanding of cross-discipline engineering problem solving. Establish a peer group and make strong connections with other engineering majors.	Increased 1st year retention rates.	Increased 2nd year retention rates. Reduced change of major rates. Students are retained within the College of Engineering and go on to complete a degree in engineering at UK.	Increased 4- to 6-year graduation rates.

Figure 1. FYE Logic Model as developed by Brad Hubbard in 2015-2016.

Several evaluation questions are suggested by the logic model:

1. To what extent does FYE improve Engineering students' retention?
2. To what extent does FYE reduce time to degree?
3. What are faculty perceptions of FYE and its implementation?
4. What are Engineering students' perceptions of FYE and its implementation?
5. How do these perceptions change over time?

Questions 1 and 2 are beyond the scope of the current evaluation—and are not likely answerable given the fact the program is still only in its second year of implementation. As a result, the Evaluation Center focused on the last three questions for this year's evaluation. To answer these questions, the Evaluation Center collected data from the following sources:

1. Faculty Surveys
2. Student Surveys
3. Faculty Focus Groups

The Evaluation Center also intended to collect additional data from Teacher Course Evaluations (TCEs) for 2017-2018. The goal with the TCEs was to add a small selection of questions to the TCEs to assess student perceptions of their experiences in FYE; however, timing issues prevented the addition of evaluation questions to the TCEs in 2017-2018. These barriers have been overcome and TCE data will be collected in 2018-2019; thus, this data is not included in this report. The full evaluation plan for 2017-2018 is available for review in the Appendices section of this report.

The collected data was reviewed individually and synthesized to provide formative feedback during the 2017-2018 year to FYE administrators. The data was then reviewed collectively from the lens of the three evaluation questions listed above and was evaluated using a SWOT analysis. SWOT analysis is a strategic tool that aids in project planning and implementation. It explores the Strengths, Weaknesses, Opportunities, and Threats of a program, highlighting what is going well, identifying growth areas, looking for untapped potential, and revealing obstacles before they become a problem. Individual, detailed summaries of data collected along with instruments utilized in 2017-2018 can be found in the Appendices section of this report.

Below we provide a brief overview of findings from last year's evaluation to provide context for this year's work, and we also provide details on the methods used to analyze collected data.

2016-2017 REPORT SUMMARY

The 2016-2017 final report was designed to provide baseline data from the first year of program implementation. It was also intended to provide program administrators with timely formative feedback. The report presented themes from the faculty focus groups and faculty survey administered in 2016-2017. Those themes included:

1) The majority of faculty expressed support or cautious optimism about FYE, and reported the program had many of potential benefits to students and the college. A few tenured faculty members were less supportive of the changes and expressed some doubt that the potential benefits would come to fruition.

2) Potential program benefits included improved retention rates, improved ability to choose a major, increased sense of community, a common first-year experience, and team-building.

3) Concerns included doubts about the quality and content of the FYE courses, ability to recruit students, inconsistencies in the FYE courses, FYE Instructor work-load, physical space constraints, communication gaps, and ad hoc changes to FYE curriculum.

4) Faculty defined program success as represented by improved retention rates, including at upper division, improved graduation rates, and reduced time to graduation.

The report had the following recommendations:

- Define clear avenues for communication.
- Consider the need for, and access to, classroom and lab space that is appropriately equipped.
- Clarify expectations for consistency in course content and delivery, monitoring components for which equivalence is imperative.
- Ensure that faculty in the majors are kept informed about substantial FYE curricular changes, and provide clear opportunities for their feedback

METHOD AND DATA SOURCES

The data presented in this reported were gathered from the following sources:

Faculty Survey: An online survey was distributed to all Engineering faculty members through a link embedded in an email. The survey was accessible from August 17, 2017 through September 21, 2017 on REDCap. It consisted of multiple choice demographic questions, four open ended questions, and a Likert-type response matrix. Survey questions asked respondents their faculty status, Engineering department, perceptions and concerns regarding the FYE program, and the importance of several 21st century skills.
 Of the 176 faculty members invited to participate, 76 responded, yielding a response rate of 43.18%. Response break-down by department: Chemical and Materials (17), Civil and Mechanical (14), Biosystems and Agriculture (13), Electric and Computer (9), Mining (7), and Computer Science (3). Responses by tenure status indicated 50 respondents had tenure, 19 were tenure-track, 7 were lecturers, and 14 did not disclose their status.

A thematic analysis was conducted on the open-ended questions using a latent, constructivist approach. Each discrete idea/topic within response narratives were open coded. The open codes were analyzed for

recurrent themes. Then the response narratives were close coded for theme(s). Each question yielded approximately 20 unique codes. The theme-codes with the highest occurrence rates were reported. The faculty survey and aggregated responses can be found in Appendix C.

Student Survey: The survey was distributed to undergraduate students and alumni who had graduated within the past 3-5 years. The Dean's office sent an email containing a link to the survey to a listserv of 3,000 undergraduate students on October 10th, 2017. Subsequently the Dean's Alumni office sent an email with the survey link to recent graduates. Department Chairs also emailed the survey link to their undergraduate student listservs in early November 2017. The Dean's Office sent a follow-up email to all students and alumni in January 2018. FYE instructors also sent reminders to their students throughout the fall semester.

The survey consisted of multiple choice demographic questions, a series of open ended questions, and Likert-type response matrices. Survey questions asked respondents their class standing, major, what introductory courses they took, perceptions and concerns regarding the FYE program, experiences in FYE, and the importance of several 21st century skills.

Data were pulled on February 9th, 2018 for a total of 312 responses, yielding a response rate of approximately 9% (the exact number of alumni solicited is unknown at this time). Of the 312 responses, 153 records were incomplete. All 312 responses were analyzed for response frequency. Thematic analyses were conducted on the open-ended item responses with a latent, constructivist approach. Between-group comparisons were conducted by class standing and engineering major. Between-group differences were non-significant. With a small sample, it is difficult to generalize to all College of Engineering students, but the findings do provide insight into student perceptions of the FYE program. The student survey and aggregated responses can be found in Appendix D.

Faculty Focus Groups: Focus groups were held between March and April 2018. Department Chairs, Directors of Undergraduate Studies, FYE instructors, FYE advisors, and department advisors were sent targeted emails inviting their participation. These emails included a link to doodle-polls allowing volunteers to select preferred times. To recruit other faculty, department chairs sent a generalized email via listserv to their department members. These emails included several date and time options. Focus groups were held in conference rooms in the College of Engineering and conducted by the Director of the Evaluation Center, Dr. Shannon Sampson, Associate Director Josh Parsons, and College of Education Department of Education Policy Studies and Evaluation faculty members Dr. Beth Goldstein and Dr. Jeff Bieber. Participants discussed their perceptions of FYE, potential benefits and concerns, changes they've made to accommodate FYE, perceived student response, etc.

The audio recording of each focus group was transcribed by Evaluation Center Research Assistants. The transcriptions were analyzed by thematic analysis using a latent, constructivist approach as described by Charmaz (2006). Responses were open coded for content meaning, then focus coded for connotative

meaning. The codes were organized into themes and described. The focus group question protocol and codes can be found in Appendix E.

LIMITATIONS

As with any data collection, the 2017-2018 evaluation has limitations that should be noted. First, while faculty perceptional data will assist in assessing programmatic impact from a pre/post perspective, faculty not directly involved in the program are only seeing the program secondhand. As a result, current faculty perceptions have not caught up to changes made to the program after the first year of implementation.

Second, again because the program is early in implementation, student perceptional data may not be able to capture the effects of the program: student who have gone through the program are only in their second year and may not be able to articulate if the program provided any benefit.

Additionally, response rate on the student survey was low (total n=312; see Appendix D) and was highly variable as students were not mandated to answer questions; however, student responses still provide valuable insights that assist in evaluating perceptions of the program.

Finally, as with any evaluation study, our findings are based on data from samples of participants over samples of time, using samples of questions. While faculty who conducted the focus groups have a wealth of experience in qualitative research methods, students and faculty may not be able to fully articulate their perceptions within given constraints. The results we present are based on themes that were consistently noted across settings and modes of data collection. Much of the analyses are qualitative in nature, which is inherently subjective. We have invited faculty to review our analyses, and have sought to incorporate feedback from stakeholders. It is our goal to be thoughtful and thorough in data collection and analysis, to present data transparently, and to communicate findings in ways that are accessible to various audiences and useful in guiding program implementation.

EVALUATION RESULTS

The following results are organized and presented in accordance with SWOT analysis structure. Key points are presented for each theme (Strength, Weakness/Growth Area, Opportunity, and Threat), followed by specific data from each data source supporting and elaborating on the point.

STRENGTHS

Students and faculty participants identified many FYE program strengths. The most frequently discussed strengths include 1) student and faculty buy-in, 2) recognition of future benefits, 3) continuous efforts by program coordinators to refine and improve FYE, 4) agreement on the importance of skill development, and 5) cohort building. A detailed discussion of these findings follows.

Despite some frustrations with wrinkles in the implementation, student and faculty continue to talk about the value and potential of the program. Their language indicates support and cautious optimism about the program's benefits to both students and the College as a whole (see Appendix D and E). One focus group participant said, "I'm supportive of first year engineering. I think EGR 103 is designed poorly, but [it] is a very, very important project." Another stated, "I think for sure you can say a good point about this is that the freshman are getting more attention than they were getting beforehand." One Department Chair gave anecdotal evidence that previously unsupportive faculty members have begun to "buy-in" to FYE, "[the faculty member] thinks the sophomores are performing better than they had in the past and has essentially sort of pulled back his judgement and said maybe this [FYE] is an okay thing." The Student Survey (see Appendix D) asked whether those individuals who had taken FYE courses would recommend them to other students; 54 of the 103 responses (52%) said they would recommend FYE.

Both students and faculty report they expect the FYE curriculum will translate to improved academic success and student satisfaction. Students responding to the Student Survey reported Preparing for Major-related Courses was an important aspect of the FYE program rationale. For Student Survey Question 33: *What is the most valuable aspect of FYE?*, the most common responses were Skill Development, Choosing a Major, and Preparing for Major-related Courses (see Appendix D). Even with a small sample of student and alumni responses (n= 312), the data suggests students see FYE as a tool to increase their success and help them choose the best fitting major. Future data collection will allow us to determine more precisely the representativeness of this sample. Improved student performance was an often-cited metric of success in the Faculty Survey and Focus Groups. One faculty member stated: "A successful program will produce students better prepared for their upper-level engineering classes, with good study habits and time management, and a passion for engineering." Another wrote that in FYE, "Students are introduced to techniques and tools to enable their success in their engineering majors."

Faculty discussed improvements in FYE program communication and transparency and expressed appreciation for these changes. While several faculty also noted communication as an issue that still needs to be dealt with (see areas of improvement), many faculty expressed that they could see efforts being made to improve communication. Participants cited the FYE Canvas shell as evidence of improved communication. One focus group participant said, "[FYE] provided a forum for us to ask questions about the nature of the program... that's where we ended up getting access to the one section in Canvas." A participant in another group said, "they've been very open with sharing what topics are covered [in FYE]." Another shared "[FYE administration] are very responsive if something needs corrections- this is not that they are only swinging to make those corrections- they actually listen." A Faculty Survey respondent agreed, "I think they're … trying to reach out and communicate with us what's going on." (See Appendices C and E).

FYE has been successful in fostering student relationships and in the development of a cohort community. "Cohort" was a common theme among Student Survey responses to questions about the program's rationale and the most valuable aspect of FYE (see Appendix D). While "cohort" was not the most common theme among the small student sample, the responses suggest that it is an appreciated by-

product of students' time in FYE. Faculty members have also noted the strengthening of peer relationships. One participant observed, "[FYE] has … instill[ed] a sense of community and connection with the college." An advisor shared anecdotal evidence of interdisciplinary friendships, "a lot of [students] talk about 'my friend who's an ME, my friend who's a CS major, my friend who's an Electrical major', whereas the older students are more- all of their friends are all CMEs or all Mining students."

AREAS OF IMPROVEMENT

Participants discussed several sources of frustration and less effective aspects of FYE. The most frequently mentioned growth points include: 1) underperforming Major-exploration components, 2) frustration with the programming skill aspect, 3) perception that students' ability to understand and apply cross-disciplinary concepts and skills remains underdeveloped, and 4) the perception that EGR 101 and EGR 102 may not be meeting faculty and students' expectations of rigor.

Major-exploration components of FYE may not be as effective as intended in fostering informed decision-making and boosting confidence in declaring a major. Many student responses reflected that the four information sessions and related assignments were not effective in helping students choose a major or feel confident in their decision (see Appendix D). Students wrote that these assignments felt like "busywork," and were "never directly tied" to class discussions. 'Choosing a Major' was the strongest theme in responses to questions about *FYE's rationale* and *how would FYE be helpful*, however it was the 2nd strongest theme in *Improvements to FYE* and a weaker theme in *Least Valuable Aspects of FYE* responses. Furthermore, only 12% of student respondents reported having changed their intended major as a result of FYE. This supports Faculty members' reports of low attendance and lack of student involvement during information sessions. One faculty member shared, "I attended the recruit events hosted by our department…. We got very few students showing up." Several faculty participants expressed doubts that students were actually exploring their options by considering all the disciplines; "We ask how many of [the students] have not made up [their] mind, when they raise their hands …that's a small chunk." Another shared, "the students … came already decided." Advisors gave anecdotal evidence that students' confidence in their chosen major had not improved, and that the exploration assignments come too late in the year to assist them in declaring a major in time to register; "They feel like they've not been exposed to the range of majors… So, they had to just stick to what they had or they still don't know." Another added, "they certainly don't seem able to connect what they're doing in class with major exploration." Ultimately, faculty and students believe that Major-exploration is an important component of FYE that has yet to be fully developed.

The introductory programming skill component of FYE is not meeting the needs of every student. Faculty members from multiple departments expressed concern that Computer Engineering and Computer Science students were being under-prepared for their subsequent course-work. A faculty member reported, "I've heard concerns about [EGR] 102 being like cut and paste coding in a way, like 'here's how you code, now copy and paste this into your assignment.'" Another said, "I've noticed that now they can do little projects with programming but they don't know the fundamentals, where as I would try and push them to add the projects and apply it in our area, and now, they don't know the fundamentals but they

know how to kind of apply it." Several described FYE having a stratifying effect in that students with previous programming experience were very prepared and confident while students with only FYE-taught skills were struggling. One shared, "that's a bipolar situation that I'm seeing also in our next programming course. Students who don't get it and students who are bored. And that's just an unacceptable, totally unacceptable situation." The faculty members expressed frustration as they explored ways to support the struggling students without alienating the more advanced, saying "the problem of students who are failing, they don't get it, they are not ready for [CS] 215, the way the previous cohort of students was ready, and we just designed [CS] 215 in a more accommodating way… at the expense of those students who are more ready for more programming." Others reported being concerned that the programming situation would inhibit retention, and result in lower student satisfaction and longer completion times; "Last semester, a third of my [CS 215] class withdrew. I mean, that's unprecedented." One participant said, "I have had students who have completed EGR 102… with an A or a B, and who get into that next class, [CS] 215, and they don't feel prepared for it – they have even dropped that course and they're going back and taking CS 115."

Stakeholders from various perspectives reported concerns about students' ability to understand the interdisciplinary application of various skills and concepts, an outcome included in the logic model. Faculty members shared concerns about students being unable to connect various skills and concepts to interdisciplinary applications, while many students reported many of the skills and topics taught in FYE seem irrelevant to their major-related courses. One faculty member said, "a lot of time, they knew some of the fundamentals but they really had no idea what that meant in the real world." Another shared, "when they're asked to apply knowledge and techniques that they're learning in class to solve a problem, that there's a big disconnect there." One faculty member said about non-CS/CPE majors, "I've had students say that they didn't wanna spend so much time on MatLab, but I'm like 'That's cuz you don't know, down the road, you're gonna need that.'"

"They don't understand why they're doing the things that they're doing."

Students who had taken FYE courses expressed similar feelings about FYE. The strongest theme from the Student Survey question, *How do you feel first-year engineering program courses will prepare you or have prepared you for success in your major coursework?,* responses was *Feeling Unprepared.* The most frequent codes for this theme were "Feeling unable to apply concepts" and "Irrelevant skills." The question *What is the least valuable aspect of the FYE program?* also had "Irrelevant skills" as a very frequent code. These results support faculty's anecdotal evidence that some students have a less developed ability to connect and apply general interdisciplinary concepts and skills than anticipated; however, it should be noted that students who have taken FYE courses are only in their first full year of major coursework (approximately sophomores) and are likely not fully able to identify possible benefits of the program yet.

Both faculty and students shared the perception that the rigor of EGR 101 and 102 was not consistent with the number of assignments and credit hours. In the 2016-2017 and 2017-2018 focus groups, faculty

members provided anecdotal feedback that certain courses required a large time investment but did not contribute to their critical thinking or application abilities. Based on this feedback from the 2016-2017 focus groups, students were asked to rate the challenge level of the FYE courses they had taken (Figure 3): Of the 61 students who had taken EGR 101, 48 rated it as "Not Challenging," while EGR 102 responses (n= 70) leaned towards "Just Right." (See Figure 2 below).
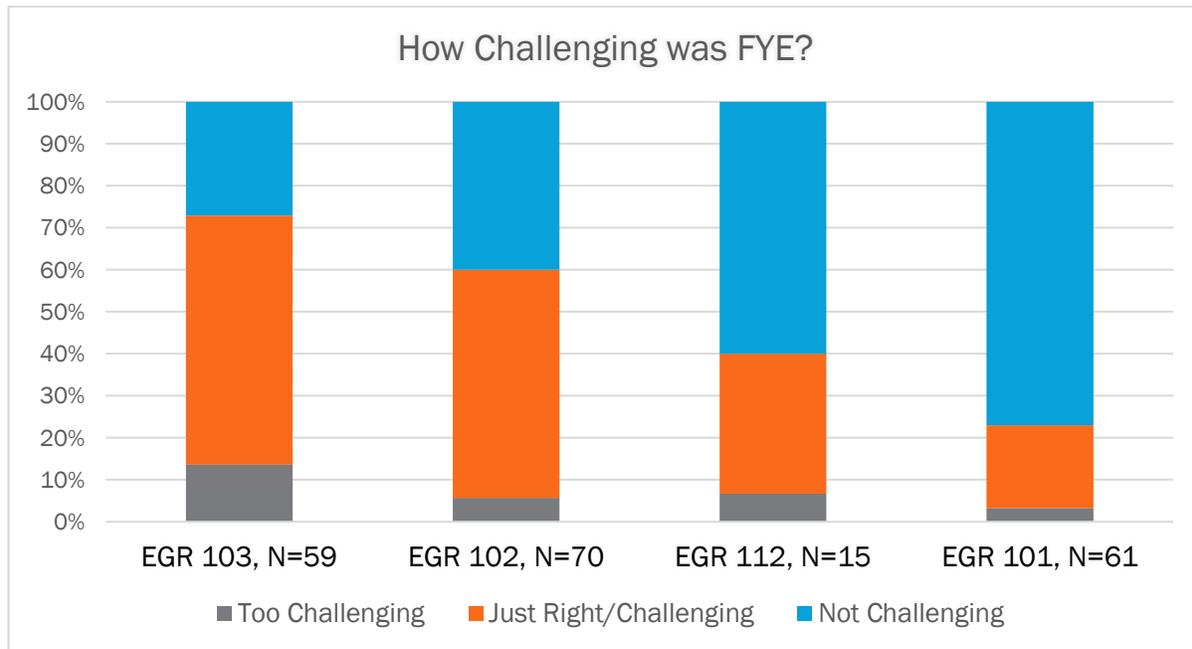

Figure 2: Students indicating they took an FYE course were asked to rate the difficulty of FYE course(s). Total response numbers vary based on endorsed courses.
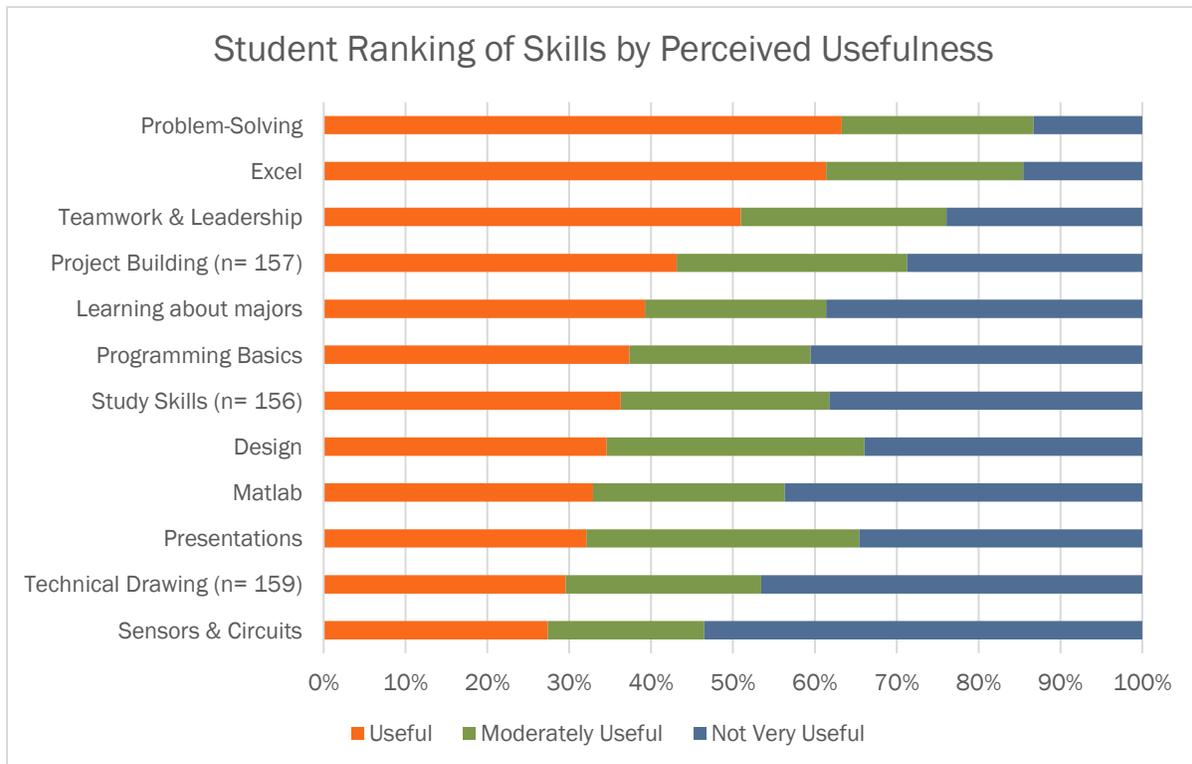
The most common student responses to Survey Question 34: *What is the least valuable aspect of FYE?* were "too easy" and "101." Furthermore, many students stated EGR 101 and 102 consisted primarily of "spoon-fed" instructional content and "busy-work" assignments which did not contribute to their understanding, critical thinking, or ability to apply the information. While the response rate was quite low, this does support the faculty's anecdotal evidence and suggests that there is room for improvement.

Additionally, doubts about the program rigor were a frequent concern mentioned in the Faculty Survey, while every non-FYE faculty focus group discussed concerns that FYE's rigor was not consistent with the rest of the college. One participant said, "if it's more like a high school class... students kinda get comfortable with that and think that that's what it's gonna be like when they get in my class." Another added, "maybe that's the right interpretation of more rigor-to expect more from students, because every minute counts." Other faculty members clarified that they were not concerned with FYE's rigor per se, but surmised that students would be overwhelmed and discouraged when they entered their more challenging major-related coursework after the relative ease of FYE: "This is not about scaring them off. Rather, [being] realistic about what [students] need to expect. Otherwise, we are doing them some disservice because when they move up and come to other classes, then they are going to keep dropping the course."
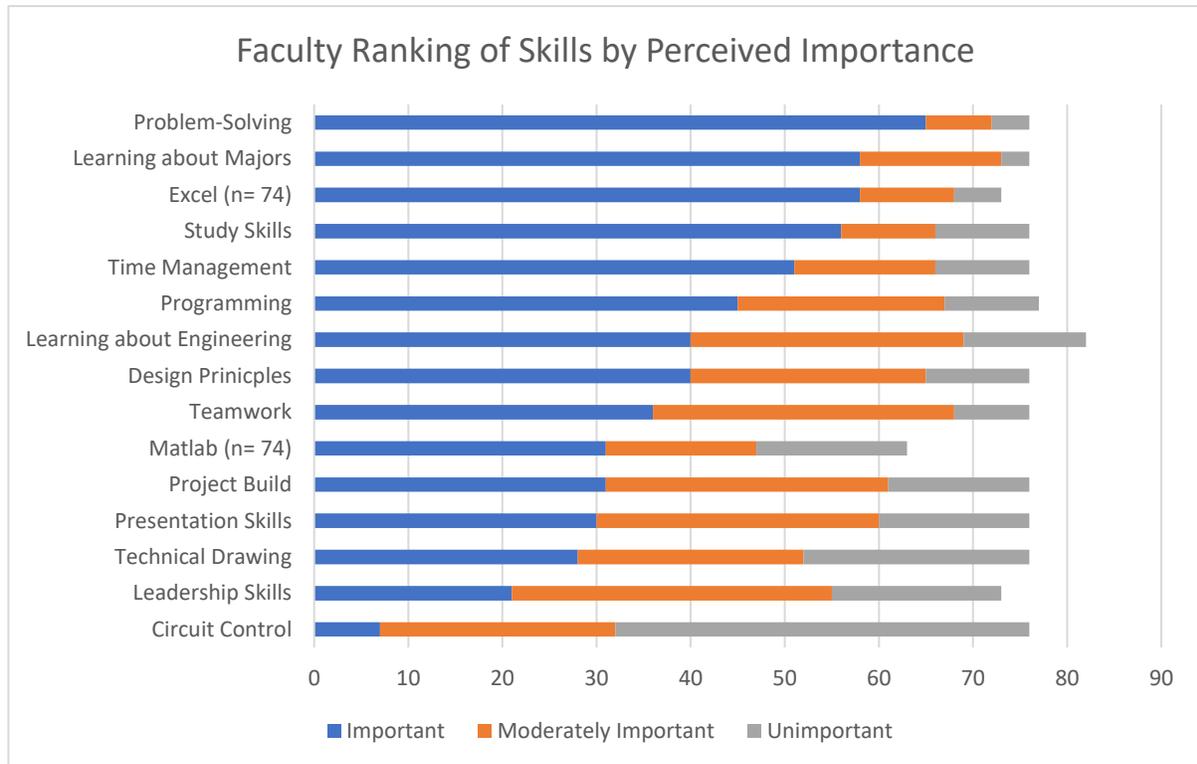
OPPORTUNITIES

This theme explores potentially advantageous situations and perceptions. It discusses areas of the program and college that may be underutilized or recognized as opportunities. We found two significant opportunities that could help FYE actualize its full potential: 1) Faculty and students align in perceptions of skill importance and 2) Faculty members want to get involved.

There is some overlap in which skills faculty feel are important to Engineering and students' perception of how well those skills are addressed by FYE courses. In the Faculty Survey, Problem-Solving skills, Learning about Engineering Majors, and Excel were most endorsed as important skills for future Engineers to master, while Circuit Control, Leadership skills, and Technical Drawing were the least endorsed (see Figure 3). The student survey asked participants to rate how useful the skills taught in FYE courses were in their major-related courses; Problem-Solving, Excel, and Teamwork & Leadership skills were the most endorsed "Useful" skills, while Presentation skills, Technical Drawing, and Sensors & Circuits were more endorsed as "Not Very Useful" (See Figure 4). Furthermore, skill development was the second strongest theme among student responses pertaining to how well FYE prepared them for upper division courses. These data suggest that FYE courses are adequately addressing those 21st century skills that faculty members deem most important and that most students report their skill development is adequate for their major-related courses.

Figure 3. Student responses to survey question 16: Given the specialization courses for your major, how useful do you feel the following skills sets taught in FYE are for your major's courses?. Note: Response rate varies, n= 157 unless otherwise noted.

Faculty Ranking of Skills by Perceived Importance

| Skill | Important | Moderately Important | Unimportant |

Problem-Solving
Learning about Majors
Excel (n= 74)
Study Skills
Time Management
Programming
Learning about Engineering
Design Prinicples
Teamwork
Matlab (n= 74)
Project Build
Presentation Skills
Technical Drawing
Leadership Skills
Circuit Control

0 10 20 30 40 50 60 70 80 90

■ Important   ■ Moderately Important   ■ Unimportant

Figure 4. Faculty responses to the survey question "How important are the following skills for 1st year students to learn?" Note: Response rate varies, n= 76 unless otherwise noted.

Faculty members across the departments communicated they want to be involved in FYE's evolution. One participant said, "We all invested a lot of time and efforts in designing the program…. so, it's important to know how it is evolving." Many faculty participants indicated they hoped they could work together with FYE to collaboratively and proactively fine-tune the program and actualize its benefits college-wide. A faculty member stated, "I really wanna be involved- this is where my future students are coming from." Another suggested that creating a policy that would get faculty members involved in the FYE program would be a "good thing." Faculty participants used inclusive, self-involving language when discussing FYE and its attendant challenges, for example, "*we* have to find a solution" (emphasis added). Another participant said, "We're problem solvers, we're trying to figure this thing out." This language further suggests faculty members see themselves as involved and necessary to the future development of the FYE program.

THREATS

Because the program is still in the early stages of implementation and continues to grow and evolve through the inevitable "growing pains" of initial program implementation, the threats highlighted here attempt to identify issues that could impair or impede the development and efficacy of the FYE program. This evaluation identified three potential obstacles: 1) faculty frustrations with program implementation and development, 2) lack of an integrated support structure between FYE and the College, and 3) a perceived lack of long-term planning and infrastructure.

Faculty members have expressed frustration with inconsistencies in program policies and implementation and program components which appear to be less effective than expected. Several focus group participants shared that the constant changes and "tweaks" to the program were "difficult to keep up with," and left them wondering "where things were" in terms of policies and content. One participant said, "there was a big difference with what I thought it was going to be, to … what ended up being implemented." Another said, "I feel like in theory it's a great idea. It's just making it work is…(sigh)." Themes and codes from the Faculty Focus groups indicate frustration with Programming Disparities, Less Prepared Students, and Recruitment. Communication issues also remain a frustration among shareholders; "I believe we still have some issues with transparency." Faculty have also expressed discontentment with the isolated and segmented relationships between FYE and College departments. Several faculty shared that they were "unsure" who the FYE instructors were, while others said they only had contact with the FYE instructor "housed" in their department. While this frustration is not yet a threat to the program, if left unchecked these feelings could engender a lack of support for program growth and may inhibit collaboration and inclusion. "I think people are aware that there are issues but are willing to give it a chance if some of those flaws are worked out."

Several faculty members have expressed concern about a perceived lack of support structures for FYE and its instructors. Some faculty discussed the lack of support staff for FYE, resulting in FYE instructors having to perform time-consuming management tasks, such as "room reservation requests", "janitorial work", and "supply management", in addition to their instructional load. "We do all the administrative stuff. The course scheduling, the room finding, the janitorial… all of the detail-y stuff in addition to content building and teaching, and you know… ordering materials." One participant said, "[I'm] not sure if it has sufficient staff to support all the initiatives." Others shared anecdotes about FYE instructors staying "half an hour after class ends just cleaning the classroom." Some faculty members expressed concern about FYE's lack of dedicated space, instructor turnover, and workload, saying that these small frustrations and inconveniences could slowly erode the quality of FYE and instructors' job satisfaction.

A small but consistent number of faculty members noted a perceived lack of a long-term plan for program development and supporting infrastructure. These faculty expressed concern about the program's funding and ability to be financially viable long-term, instructor career paths, and the potential structural effects of FYE's lack of departmental status on other disciplines budgets and staffing. One response from the Faculty Survey shared concerns about "the reward and promotion processes for the faculty working in the [FYE] program and managing their workload." Another participant said, "many of them are lecturers with one- maybe two-year contracts, and I think that is bound to have an effect on them." A faculty member shared, "The way the program is structured in terms of the instructors being housed in the individual departments, and the way funding works for the program, and all those kinds of things - I don't think is really fully implemented in a sense…. I think there's serious organizational issues to be resolved around that." Another stated, "there aspects of funding or other issues related to FYE that are worth fighting for / getting sorted out." If faculty perceive the lack of a long-term vision or misconstrue administration goals, it could affect faculty and departmental support of FYE and their willingness to cooperate or collaborate in the future.

RECOMMENDATIONS

The provided recommendations come both from the Evaluation Center and directly from the collected data, and these recommendations are geared primarily toward addressing the primary threats and weaknesses identified through the evaluation. Because of the perceptional focus of this year's evaluation, the recommendations are also focused on improving perceptions, particularly among CoE departments. We recognize these recommendations are likely not "new" to FYE, but based on the collected data, we feel these are the things that need to be focused on in the coming year.

Below we lay out a general recommendation along with a brief explanation of the reasoning behind the recommendation. Then we provide specific suggestions related to that recommendation both from us and from faculty and students. We recognize that not all ideas are likely feasible; however, the hope is that these specific ideas may help begin the conversation for finding ways to address the issues presented.

Find ways to foster connection and encourage collaboration between FYE and departmental faculty. Collaboration between departmental faculty and FYE could result in stronger, more universal FYE course content, while encouraging innovation and continuity in departmental curriculum. One participant stated, "ultimately, for the health of the program, there needs to be you know energetic back and forth and participation of the individual departments." Another shared, "sometimes I feel like I'm being the Debby downer, like I don't want to shoot holes in something just for the sake of shooting holes in something, but you also don't want to sit there when you see problems on the horizon and say nothing." Collaboration may help resolve some of the lingering issues with FYE, by encouraging multiple perspectives and expertise; "Ask for our input, we can easily tell you this why this isn't going to work and we can predict those challenges of why it's not going to work better."

Long-term collaboration and planning between FYE and the Engineering departments may help ensure that course content is consistent, meets students' needs, and that the program is growing stronger and more effective. "[If we] collaborate … we can propose what to improve and how to improve. So, in that case we need feedback from not only students but also from faculty members over a period of time." These interactions may also foster improved collaboration, cooperation, and transparency on both sides.

>   **Suggested ideas by faculty include**:
>
>   - forming working groups with departmental faculty to "refine how skills and concepts" are addressed in both FYE and major-related courses.
>   - Work with departmental faculty to make the major-exploration component of FYE more robust
>   - hold college-wide mixers, meetings, or working groups to encourage FYE and departmental personnel to develop working relationships and community.
>   - hold COE-wide open-forum meetings "so that faculty could hear some of the things that come up from recruiting, the SEAM program, the advisors, and from the records office. I think it would be beneficial to them and it would be beneficial to us to be able to communicate at

those meetings or wherever we were all together… to be able to identify each other, and then, that turns into being resources for each other."

- "maybe … in the summer … where you've got 2 hours for a PD thing, have [everyone] in and – if they stabilize what we do year to year, then it's just a matter of telling us what about the curriculum is gonna change and hearing back from us."

Improve lines of communication and points of contact between departments and FYE. Improved communication may improve understanding of and support for FYE, as well as fostering a stronger sense of community, collaboration, and inclusivity among the College. Additionally, sharing information such as long-term goals and infrastructure building may help alleviate faculty fears about the program's long-term feasibility. Several faculty members shared that they seldom discussed their concerns or ideas for FYE with FYE instructors or administrators, saying "I don't communicate with anyone outside the department." Others said they were uncertain if their feedback was being communicated with FYE administrators. A participant said, "whether or not these discussions go any higher is up to our leadership. I mean, [the Dean of the College] hasn't contacted me about this. But you know, nobody upstairs has, so, I don't know if the information is getting up there or not." Other participants shared, "I think that maybe part of the challenge is that the communication really isn't very streamlined, so by the time someone's like 'oh, have we told [so-and-so]?' 'oh, I thought you did' – there isn't a real clear pathway" and "there is always room for more communication."

Suggested ideas to improve communication:

- Develop a communication plan that includes audience, intended message, mode of communication, timing of communication, and responsible party. Review with stakeholders to make sure no stakeholder is missed, then share communication plan with departments and make sure plan is executed.
- Develop a faculty committee to meet on a regular (monthly, bi-semester, once a semester) basis to discuss FYE
- Encourage College administrators to share long-term plans and infrastructure development with department faculty and other stakeholders.

Explore ways to revise the Major-exploration component of FYE. Refocusing Major-exploration in the classroom and assignments may help students gain a better understanding of what every discipline does and what they would learn as that major. Revising these components may improve student satisfaction with their declared major, academic performance, and reduce the number of students who change their engineering major. Faculty and students have expressed dissatisfaction with the current Major-exploration exercises, saying they are not as effective as they anticipated they would be. One faculty member said, "It's unclear whether those sessions have significant impact on students changing their minds. I don't think they do." Another stated, "They feel like they've not been exposed to the range of majors is what we're hearing. So, they had to just stick to what they had or they still don't know."

Suggested ideas to improve Major-exploration:

- One student suggested, "Invite people from industries near UK [and professors from the UK departments] that can explain what it means to be their type of engineer to give students the opportunity to understand what they are."
- Another said, "Turn 101 into an extended FYEIS session where the actual course work in each field is performed for a week and a half."
- Make the Exploration content "more explicit," exposing students to "each discipline" and "elaborat[ing] on what would be learned and what you can do with the major."
- Several faculty members suggested holding a "mini version" of the info-sessions during K-week, having a "big exposed quad" filled with information about "what the different disciplines do before they even take the class."
- An advisor suggested including "more discussion" about students' major options, and incorporating more "intrinsic self-study" into the course assignments.

CONCLUSION

This report discussed findings from three data sources; the Fall Faculty Survey, Student & Alumni Survey, and the Spring Faculty Focus Groups. The results of these data was analyzed through a SWOT analysis, enabling administrators and other stakeholders to see how stakeholder perceptions of FYE contribute to program Strengths, Weaknesses, Opportunities, and Threats.

Several Strengths were found. Faculty responses and language use suggest they are supportive of FYE, and wish to be involved in the program's evolution. Both faculty and students report FYE could result in improved student success and satisfaction. Those skills that faculty rank as most important to Engineering are being taught in FYE to students' satisfaction. Another strength of FYE is the development of a first-year cohort and strong peer relationships, participants from every data source named Cohort development as a strong benefit. These strengths indicate that the program, overall, has been well implemented and is on track to meeting its long-term goals (see Logic Model).

Program Weaknesses included the major-exploration component being less effective than many anticipated; the programming aspect of 102 failing to meet the preparatory needs of some students; faculty reports of students' ability to understand the interdisciplinary application of concepts and skills failing to develop as fast as anticipated; and reports of FYE's rigor being inconsistent with the rest of CoE, with faculty's concerns that students will get a false sense of the effort required to become an Engineer. The Evaluation team sees these findings not as weaknesses, but as growth points in the program's development.

Opportunities identified in this report include the faculty's desire to be involved in the program's development to ensure FYE reaches its full potential benefits; the potential for collaboration between FYE and department faculty may improve faculty buy-in and support as well as resulting in improved

outcomes; and improving the lines of communication and points of contact between FYE and faculty may reduce faculty frustration, resolve misconceptions, and foster collaboration. These opportunities could increase faculty involvement and contribute to a stronger, more resilient FYE program in the future.

Threats identified in this report include faculty's frustration with less effective components of the program; the perceived lack of support structures for long-term functionality; and the perceived lack of long-term planning. These threats are not yet problematic for the program's day to day functioning; however, faculty members have indicated that these long-term issues stand to inhibit the growth and feasibility of the program.

Overall, perceptions of the FYE program appear to be more positive than in the previous report. Faculty, students, and other stakeholders have reported having positive experiences with the program, and indicate that the potential long-term benefits are worth the current inconveniences caused by the implementation. FYE administrators have worked to resolve communication break-downs, improve the Transfer student experience in EGR 112, and resolve inconsistencies in terms of assignments and course content. Faculty members have acknowledged these improvements and expressed appreciation for FYE administrator's willingness to listen and act on faculty feedback.

FURTHER EVALUATION

After analysis of the 2017-2018 evaluation, the evaluation team makes the following recommendation for further exploration of the program:

Redesign Program Logic Model

Inherently after initial implementation, program activities and outcomes are further refined and developed based on new information and changing needs of the program—this is one of the reasons that evaluation experts always recommend "dating" a logic model to indicate that it is an ever-changing product (McLaughlin & Jordan, 2010). Additionally, with new information that suggests CoE may not have as much a problem with student transfers within majors, it also makes sense to update logic models.

Evaluation team recommends FYE administrators work with evaluation team to redesign logic model, then present model to departments to provide clarity about program activities and outcomes. Such a process will assist in future evaluation and data collection but may also assist in helping departments feel more connected to program.

Target implementation date: Fall 2018

Collect evaluation data on Teacher Course Evaluations (TCEs)

Already put in place, evaluation questions added to key Engineering courses' TCEs will provide evaluators and CoE with longitudinal data on potential project outcomes. Data will be collected in both

fall and spring in 2018-2019. Continued data collection in the coming years will allow for linked longitudinal data to see change in student perception over time.

Target implementation date: Fall 2018 and onward

Redesign Faculty Survey and change distribution timing

After the logic model has been redesigned, the evaluation team recommends redesigning the faculty survey and changing the distribution date to the end of the Spring term. This will allow faculty to comment on students that have progressed through their courses in a given year. Questions for the survey will focus on aspects of the logic model based on FYE administrators and CoE needs and interests.

Target Dates: survey redesign, early spring 2019; implementation, late spring 2019

Redesign student survey

Given the extremely low response rate, the evaluation team recommends an overhaul of the student survey after the updated logic model. Also, to prevent duplications and potentially biased data, survey data collection should ideally be focused within one semester, preferable the spring after students have had the opportunity to progress through either FYE coursework or coursework for that year. Also recommend possibly offering incentives to increase survey responses.

Target dates: survey redesign, late Fall 2018; implementation mid-spring to late spring 2019

Do not conduct Faculty focus groups 2018-2019

Given faculty have been asked to participate in FYE focus groups for three years in a row, the evaluation team strongly recommends not performing focus groups in 2018-2019.

2019-2020 and beyond

Looking forward 2019-2020, the evaluation team recommends the continuation of survey and TCE data collection. In addition, the evaluation team suggests:

1. Senior Survey: Beginning 2019-2020, administer a survey targeted at graduating seniors to assess perceptions of program possibly in 2019-2020 to find out
2. Alumni Focus Groups or Surveys: Beginning 2019-2020, create and administer a separate alumni survey or focus group that is shorter and more targeted to key questions
3. Faculty Focus Groups: Gather focus group data from faculty teaching at the senior/junior level in 2020-2021

REFERENCES

McLaughlin, J.A. & Jordan G. B. (2010). "Using Logic Models" *in* Wholey, J.S., Hatry, H. P., Newcomer, K. E. (Eds), *Handbook of Practical Program Evaluation* (3rd Ed., pp. 55-80). San Franciso, CA: Jossey-Bass.

APPENDICES

A: LOGIC MODEL

Logic Model: UK Engineering FYE Program

Inputs	Activities	Outputs	Outcomes		
			Short	Medium	Long
Exploratory engineering curriculum 2 semester sequence EGR 101 (1cr) and EGR 103 (2cr). Common courses in calculus, chemistry, physics, writing, and computing.	Begin freshman year as undeclared engineering major. Explore all engineering career options and academic disciplines via exploratory first year curriculum. Engage in engineering problem-solving via hands-on engineering design experience. Writing reflection exercise in 2nd semester to aid in finding career/major fit.	Declare engineering major when registering for sophomore classes. Gain an understanding of cross-discipline engineering problem solving. Establish a peer group and make strong connections with other engineering majors.	Increased 1st year retention rates.	Increased 2nd year retention rates. Reduced change of major rates. Students are retained within the College of Engineering and go on to complete a degree in engineering at UK.	Increased 4- to 6-year graduation rates.

B: EVALUATION PLAN

Summary

The First Year Engineering (FYE) program leadership and UK's Evaluation Center developed the FYE Program Evaluation Plan in Fall 2016 to assess perceptions of the newly implemented FYE program. The initial phase of the Evaluation Plan was implemented in Fall 2016 and consisted of three components:

1. Fall 2016 Faculty Survey (administered manually)

2. Spring 2017 Faculty Focus Groups

3. a yearly report delivered in early Summer 2017.

After reviewing recommendations from the yearly report delivered in Summer 2017 and following further discussion of the Evaluation Plan goals, FYE program leadership and the Evaluation Center plan to implement the second year of the Evaluation Plan in Fall 2017 with two additional components and minor modifications and/or anticipated modifications to previous existing components. The second year of implementation will consist of five components:

1. Fall 2017 Faculty Survey: an online version of the Fall 2016 survey with minor modifications

2. (NEW) Fall 2017 Student Survey: an online survey administered to current and former students of Engineering programs, intended to capture data from all students regardless of participation in the FYE program

3. Spring 2018 Faculty Focus Groups

4. (NEW) The development of a short set of questions that the evaluators intend to add to the Teacher Course Evaluations (TCE) distributed to students in ENG courses

5. A yearly report to be delivered in Summer 2018.

Personnel Responsibilities

The Evaluation Center will partner with EPE faculty members Beth Goldstein and Jeff Bieber, who will moderate the focus groups and guide the analysis of the qualitative data. Evaluation Center Research Assistants will assist in the development of the surveys, the preparation of IRB forms, the collection and analysis of survey data, and the development of the yearly report. Josh Parsons, the Evaluation Center Associate Director, will coordinate the project and assist in the supervision of the research assistants and the preparation of the yearly report. Shannon

Sampson, the Evaluation Center Director, will provide oversight across the project and the yearly report.

Project Deliverables Timeline			
Task	**Deliverable**	**Responsible Party**	**Deadline**
Faculty Survey	Survey	Evaluation Center	8/20/2017
Student Survey	Survey	Evaluation Center	8/28/2017
Faculty Survey	Summary	Evaluation Center	10/15/2017
Student Survey	Summary	Evaluation Center	12/15/2017
Faculty Focus Groups	Focus Groups	Evaluation Center	2/15/2018
Faculty Focus Groups	Summary	Evaluation Center	4/15/2018
TCE Questions	Summary	Evaluation Center	6/1/2018
Yearly Report	Final Report	Evaluation Center	6/30/2018

C: 2017 – 2018 FACULTY SURVEY

In August 2017 an email was distributed to all faculty in the College of Engineering with an embedded link to an online survey. The survey was hosted on REDCap from August 17, 2017 through September 21, 2017. The survey received 76 responses, resulting in a 43.18% response rate.

The aggregated responses to the survey are presented below. Each question is presented exactly as it appeared on the survey, followed by the questions various response options and the frequency individuals chose that response. Open ended responses are presented as overall themes, followed by the codes and response frequency for each code.

1. **What is your department?**
   - Biomedical = 0
   - Biosystems & Agriculture = 12, *15.8% of responses*
   - Chemical & Materials = 17, *22.4%*
   - Civil = 14, *18.4%*
   - Computer Science = 3, *3.9%*
   - Electrical & Computer = 9, *11.8%*
   - Mechanical = 14, *18.4%*
   - Mining = 7, *9.2%*

2. **What is your faculty status?**
   - Tenured = 50, *65.8%*
   - Tenure-track = 19, *25%*
   - Lecturer = 7, *9.2%*

3. **What is your understanding of the rationale motivating this curriculum change?**
   - *Supporting student performance*. This theme represents 37 responses, capturing the intention of improving student performance and success within the COE. Codes include Choosing a Major, Essential Skills, Engagement, Understanding Engineering, and Student Success.
   - *Improving COE statistics.* This theme represents the 35 responses referencing improvements to the College's standing. Codes include Retention, Recruitment, and Graduation rates.
   - *Updating programming.* This theme represents 16 responses reflecting faculty's feeling that the FYE program was a need change to first-year programming. Codes include Standardizing the First-year, Building a Cohort, Meeting Industry Standards, and Supporting First-years.
   - Other responses included "It's a fad," "idk," Money, and Control of Programming.

4. **From your perspective, what are the potential benefits of the FYE program?**

- *Preparing Students.* This theme captures 59 responses reflecting improvements to course content, skill development, and exposure to Engineering disciplines. Codes include Essential Skills, Choosing a Major, Understanding Engineering, and Exposure to Concepts.
- *Improving Student Performance.* This theme captures 32 responses reflecting FYE's indirect effect on student performance. Codes include Standardizing the First-year, Cohort Building, Engagement, Performance, Motivation, and Relationships with Faculty.
- *Increasing College Numbers.* This theme captures 25 responses reflecting FYE's contribution to improved College-wide statistics, such as Retention, Recruitment, and Enrollment rates. Other codes included in this theme are Use of Resources, and Tuition Dollars.
- Other responses include "Over-promised," Negative Student Response, "Difficulty seeing advantages," and "not apparent in the 1st class."

5. **What concerns do you currently have regarding the FYE curriculum model?**
    - *Questioning FYE Content*. This theme captures 46 responses reflecting concerns about the course topics, assignments, difficulty, and FYE's effect on upper-division course content. Codes include Discipline Bias, Lack of Rigor, Skills & Concepts, Course Sequencing, and Major Exploration.
    - *Challenging Implementation Policies.* This theme captures 31 responses reflecting concerns about the day-to-day functioning and implementation consequences of FYE. Codes include Curriculum Model Changes, Lack of Contact with First-years, Negative Student Response, Recruitment Issues, Instructor Experience, Communication Breakdowns, and Student Engagement.
    - *Struggling with Program Intentions.* This theme captures 27 responses reflecting faculty concerns about aspects of FYE's purpose and more abstract consequences of the FYE program. Codes include FYE Being Required, the Credit Hour Cap, Loss of Control Over Content, Constant Changes to Curriculum, Retention, and Loss of Time in Major.
    - Other codes include IDK, FYE Instructor Career Tracks, First -years, and "Wait and see."

6. **What will constitute evidence of success or failure of the FYE program?**
    - *Increasing COE Performance Statistics.* This theme captures 61 responses reflecting success metrics of improved Retention, Enrollment and Graduation rates. Also included in this theme are Recruitment and Tuition Dollars.
    - *Improving Student Success.* This theme captures 38 responses reflecting success metrics of student performance and success. Codes in this theme include Student Performance, Preparation for Major-related Courses, Student Success, Engagement, Satisfaction, and Co-op Placement.
    - Other codes included IDK, No Response, 'Needs Objective Evaluators', and 'Long-term Commitment from Administrators.'

7. **How important are the following skills for 1st year students to learn?**

Response total n= 76 except where noted otherwise.

Skills	Not Important	Moderately Important	Important
Matlab, n= 74	16	16	31
Excel, n= 74	5	10	58
General Programming	10	22	45
Problem-Solving	4	7	65
Learning about Majors	3	15	58
Study Skills	10	10	56
Time Management	10	15	51
Technical Drawing	24	24	28
Presentation Skills	16	30	30
Design Principles	11	25	40
Teamwork	8	32	36
Leadership	18	34	21
Building Project	15	30	31
Circuit Control	44	25	7
Learning about Engineering	13	29	40

D: 2017 – 2018 STUDENT AND ALUMNI SURVEY

The survey was administered to students currently enrolled in the College of Engineering as well as alumni who had graduated within the past five years during the Fall 2017 semester. Responses varied widely by question due responses not being required per question. Total n for each question are noted below.

The aggregated responses to the survey are presented below. Each question is presented exactly as it appeared on the survey, followed by the questions various response options and the frequency individuals chose that response. Open ended responses are presented as overall themes, followed by the codes and response frequency for each code.

1. **Please mark which introductory engineering courses you have previously completed (if none, leave blank); NOT classes you are currently enrolled in.**

   Multiple responses were possible for this question. Percentages were calculated using the total number of responses, n= 477.
   - ENG 101 = 101 students. This represents 21% of the total responses to this question.
   - ENG 102 = 112 students, 23.5% of the total responses.
   - ENG 103 = 93, 19.5% of the responses.
   - ENG 103/112 = 20, 4% of the responses.
   - BAE 102 = 12, 2.5% of the responses.
   - MSE 101 = 8, 2% of the responses.
   - CME 101 = 28, 6% of the responses.
   - ME 176 = 1, 0.2% of the responses.
   - CE 120 = 15, 3% of the responses.
   - MNG 101 = 4, 1% of the responses.
   - EE 101 = 18, 4% of the responses.
   - EGR 199 = 25, 5% of the responses.
   - CS 100 = 9, 2% of the responses.
   - Other = 31, 7% of the responses. Write-ins for Other included: ME 101(n= 23), BAE 103, EGR 111, None, "idk", and "Ingles 2013-14"

2. **Please mark which 1st year engineering (FYE) courses you are currently taking (if none, leave blank).**

   Multiple responses possible. Response n = 142.
   - ENG 101 = 57 responses.
   - ENG 102 = 61 responses.
   - ENG 103 = 11 responses.
   - EGN 103/112 = 13 responses.

3. **How do you feel first-year engineering program courses will prepare you or have prepared you for success in your major coursework?**

- *Feeling Unprepared*. This theme represents 94 responses, capturing feelings of being unprepared, feeling lost in subsequent coursework, feeling frustrated with the course content, and feeling unable to apply concepts. Codes for this theme included: Being Unprepared, Lacking Applicability, Lacking Rigor, and Irrelevant Skills.
- *Feeling Prepared*. This theme represents 56 responses. It reflects students' feelings of being prepared, academically successful, and confident in their abilities. It also includes responses expressing feeling more confident in their choice of major based on exploration activities. Codes included Being Prepared, Useful, Exploring Disciplines, Good Instructors, and Doing Ok.
- *Feeling Frustrated.* This theme represents 54 responses expressing frustration with implementation issues, inconsistencies, workload to credit hour ratios, and requirements. Codes included Inconsistencies, Suggestions, Dissatisfaction with Course Content, and Busywork.
- *Developing Skills*. This theme represents 50 responses. It reflects students' perceptions that skills being taught are relevant and will contribute to their subsequent academic success.
- *Feeling Ambivalent.* This theme represents 21 responses expressing feelings of being only somewhat prepared, prepared in some areas but not others, and general feelings of ambivalence about their FYE courses.

4. **How do you feel taking first-year engineering program courses would have helped or would help you in your major coursework?**
   This question was posed to those students who did not endorse taking or having taken an FYE course.

- *Expressing Doubt.* This theme represents the 32 responses which expressed the belief that FYE courses would not have contributed to their academic performance or success, that implementation frustrations would have outweighed any possible benefits, or expressed a preference for previously offered introductory courses.
- *Choosing a major.* This theme reflects the 19 responses expressing the belief that FYE courses would have helped them choose their major or discipline and saved them from switching majors.
- *Feeling more prepared.* This theme represents 14 responses capturing feelings that FYE courses would have made them more prepared for subsequent coursework and that the skills being taught in the FYE courses are valuable and would contribute to future success.

5. **What is your understanding of the rationale for requiring students to take a First Year Engineering Program?**

- *Choosing a Major.* This theme represents 86 responses expressing the belief that FYE was implemented in order to improve students' ability to make an informed decision regarding their major.
- *Improving Preparation.* This theme reflects the 78 responses indicating FYE was developed to produce students who are more prepared for the academic rigor and content in their major

coursework, to provide foundational knowledge and skills, and otherwise improve students' academic performance and success.

- *Understanding Engineering.* This theme reflects 11 responses which expressed the belief that FYE was established to broaden students' practical understanding of Engineering as a field and career path.

6. **In 150-200 words, describe what the practice of engineering means to you.** (N/A)

   This question was included for research purposes and was not analyzed for this evaluation.

7. **How challenging was EGR 101?**

   This question was posed to those students who endorsed having taken EGR 101, n = 61.
   - Not Challenging = 48
   - Just Right = 10
   - Challenging = 4

8. **How challenging was EGR 102?**

   This question was posed to those students who endorsed having taken EGR 102, n = 70.
   - Not Challenging = 28
   - Just Right = 29
   - Challenging = 13

9. **How challenging was EGR 103?**

   This question was posed to those students who endorsed having taken EGR 103, n = 59.
   - Not Challenging = 16
   - Just Right = 23
   - Challenging = 20

10. **How challenging was EGR 112?**

    This question was posed to those students who endorsed having taken EGR 112, n = 15.
    - Not Challenging = 9
    - Just Right = 4
    - Challenging = 2

11. **What is the most valuable aspect of the FYE program?**
    - *Developing Skills.* This theme represents 37 responses indicating the most valuable aspect as building foundational skills such as problem solving, Excel, and teamwork.
    - *Choosing a Major.* This theme reflects 13 responses indicating exploring Engineering disciplines and making an informed decision for their major choice are most valuable.

- *Being Prepared.* This theme represents 12 responses indicating that being prepared for upper division major-related coursework is the most valuable aspect.
- *Building Relationships.* Four responses cited cohort building as the most valuable aspect.

12. What is the least valuable aspect of the FYE program?

- *Disliking the Course Design.* This theme represents 38 responses expressing dissatisfaction with various elements of the FYE courses' design. Codes include Being Too Easy, Busywork, Irrelevant Skills, Issues with the Group Project, and Lacking Applicability.
- *Rushing Implementation.* This theme represents 24 responses. It captures feelings of dissatisfaction with the implementation of the program, such as inconsistencies, location, it's required status, confusion about applications, declaring "pre-majors," and disliking the courses themselves.
- *Choosing a Major.* Three responses stated that the exploratory aspects of the courses were not valuable and did not contribute to their ability or confidence in choosing the right major.

13. What improvements can be made to the FYE program?

- *Revising the Program Design.* This theme encapsulates 93 responses featuring desires to fix implementation issues, re-design the course content to be more relevant, being more consistent, balancing the workload and rigor, and addressing content issues for computer programming.
- *Exploring Engineering Disciplines.* This theme represents 43 responses expressing dissatisfaction with the exploratory aspects of the program. Suggestions include discussing all nine disciplines in class, adjusting the structure/timing of the info sessions, inviting professionals to talk in class, and re-designing the written reflection assignments.
- *Applying Skills.* This theme reflects 19 responses expressing the desire that the skills being taught in FYE courses be more applicable to all majors, that key concepts behind the skills be taught, and that the skill-based homework assignments reflect application rather than memorization.
- *Making it Optional.* This theme reflects the 10 responses that expressed the desire that FYE courses were not required for all first-year students.

14. Would you recommend any FYE courses to future students?
This question was posed to students who have taken an FYE course, n=103.
- 54 respondents (52%) indicated they would recommend at least one FYE course.
- 49 respondents (48%) indicated they would not recommend any FYE course.

15. What course(s) would you recommend?
Of the 103 who answered question 14, 83 responded to this follow-up question.
- EGR 101 = 12
- EGR 102 = 36
- EGR 103= 32

- EGR 112= 3

16. **Given the specialization courses for your major, how useful do you feel the following skills sets taught in FYE are for your major's courses?**

* The response rate for the following questions is n = 158 unless otherwise noted.

SKILL	Not Useful	Moderately Useful	Useful
Matlab	69	37	52
Excel	23	38	97
Programming	64	35	59
Problem-Solving	23	37	100
Learning about Majors	61	35	62
Study Skills (n = 156)	59	40	57
Technical Drawing (n= 159)	74	38	47
Presentation	55	53	51
Design Principles	54	50	55
Teamwork & Leadership	38	40	81
Project Build (n = 157)	46	45	69
Sensors & Circuits	84	30	43

17. **Did your introductory engineering course(s) help you with the following?**

	Disagree	Neither Agree nor Disagree	Agree
Information re Majors (n= 150)	71	31	48
Learning about Majors (n = 149)	62	30	57
Career Options (n= 148)	62	30	56
Equipment Access (n= 149))	51	32	66
Teamwork (n= 148)	27	34	87
Problem Solving (n= 148)	45	33	70
Understanding Engineering (n=149)	39	21	89
Being a Licensed PE (n=148)	61	22	65
Skills Useful for Major (n= 149)	58	37	54

18. Please answer these questions based on your experience in the FYE program.

Response n= 103.

	Disagree	Neither Disagree or Agree	Agree
Applied problem solving skills	54	15	44
FYE Instructors were available outside class	5	22	76
It was a Positive Experience	39	27	37

19. What is your major or intended major? (If dual or more please fill all applicable)
- Mechanical= 38
- Chemical= 32
- Computer Science= 32
- Electrical= 21
- Computer Engineering= 19
- Materials= 13
- Civil= 12
- Biosystems= 6
- Mining= 4
- Unsure= 3
- Other = 3: Biology, Physics, Math Economy

20. What factors are preventing you from choosing your major?

This question received only 5 responses. Two individuals wrote "I don't know my major." The other responses reflected feeling a lack of support and issues with professors.

21. Have you changed your major as a result of FYE?
Individuals who indicated that they had taken or were currently taking an FYE course were asked this question, 72 responses were recorded.
- Yes = 9
- No= 63

22. Which year is this for you at UK?
Responses received, 159.
- 1st year = 33
- 2nd year = 64
- 3rd year = 16
- 4th year = 16
- 5th year + = 9
- Alumni = 21

23. Class standing (based on number of completed hours):
Response n=159
- Freshman = 19
- Sophomore = 43
- Junior = 38
- Senior= 39
- Alumni = 20

24. If you are taking specialization courses (aka "courses in your major"), please list these courses. Use the course number such as "ECE 280."
Not analyzed for this report.

25. Are you a transfer student?
Response n=147
- No = 129
- Yes= 18;
- *"Other" write-in responses*: University of the Cumberlands, US Naval Academy, Harding University, Morehead State University, Northern Kentucky University, Somerset Community College, ECTC, Georgetown College

26. Which (if any) have you been involved with at UK?
- Living & Learning = 92
- Honors = 40
- Volunteer/Community Service = 37
- Internship = 35
- Greek Life = 27
- Co-op = 16
- Education Abroad = 14
- Athletics= 3

27. Please list any/all residence halls in which you have lived. (If off campus list "off campus")
- 25 responses = Wood Glen 1, 2, 3, or 4.
- 8 responses = Ingels, Off-campus
- 7 responses = Champions
- 6 responses = Blazer Hall, Haggins, Kirwan
- 4 responses = Blanding Tower
- 3 responses = Donovan, Holmes, Jewell
- 2 responses = Baldwin Hall, Lewis, Patterson, University Flats

- Single response = Boyd Hall, Central, Commonwealth, Johnson, Keeneland, Newton, Redd Mill, Roselle Hall

28. **Are you a commuter? (Living more than a 30 minute drive away).**
    Response n= 134.
- Yes = 15
- No = 119

29. **Are you from Kentucky?**
    Response n=152
- Yes = 111
- No = 42;
- *"Other" write-in responses*: Ohio (6), Illinois (4), Indiana (3), Missouri (3), Tennessee (2), West Virginia (2), North Carolina (2), Pennsylvania, Montana, Kansas, China, Bulgaria, Wisconsin, Palestine

30. **What is your Gender Identity?**
    Response n =152
- Man = 87
- Woman = 59
- Other = 6: *Agender = 2*

31. **Choose one or more races that you consider yourself to be:**
Response n= 158
- White = 139
- Black = 4
- Asian = 7
- Other = 4; *Iranian/Persian*

32. **Are you Spanish, Hispanic, or Latino or none of these?**
    Response n = 150
- Yes= 3
- No= 147

33. **Do you receive Financial Aid?**
    Response n=150
- Yes= 94
- No= 56

34. **Is receiving Financial Aid a significant factor in your continued enrollment?**
    Response n=152
- Yes= 87
- No= 63

35. **Are you on UK's main campus, Paducah, or BCTC? (if you are an alum, select which campus was your primary campus.)**
    Response n= 152
- Main Campus= 148
- Paducah= 4

36. **Are you the first generation in your family to attend college?**
    Response n= 152
- Yes= 20
- No= 132

37. **Please enter your UK ID number (not required, but helps with future research).**
    The ID numbers are used for longitudinal tracking purposes only.

E: FACULTY FOCUS GROUPS

Focus groups were conducted in March and April 2018. Groups were comprised of 1) Department Chairs, 2) DUGs, 3) FYE faculty, 4) FYE advisors, 5) department advisors, and 6) three department faculty groups. They were conducted by the Director of the Evaluation Center, Dr. Shannon Sampson, Associate Director Josh Parsons, and Advisory Board members Dr. Beth Goldstein and Dr. Jeff Bieber.

The focus groups were conducted via a semi-structured group interview format. Given the semi-structured nature of these discussions, there was some variation in the wording of questions and in which questions were asked of which group. Following is the protocol that the focus group mediators adapted for each group along with aggregated themes and code frequencies.

FYE Faculty Focus Groups – Semi-structured Interview Protocols

Introduction to the focus group:

Thank you all for your willingness to participate in these focus groups. For many of you we know this is your second or possibly even third time participating in a focus group about the FYE program. The goal is to collect feedback for the ongoing improvement of the FYE program. We hope during this hour you will help us think through what you are seeing that is working in the FYE program, what may not be working, and what overall improvements could be made.

While we encourage you to respond to one another's ideas, we also ask that you allow everyone a chance to speak. Before we start with the questions, let's briefly go around the room and identify ourselves by name and program (department?).

The following guided questions are recommended for use in all FYE faculty focus groups:

Perception of Program:

1. Now that the program has been going for over a year, how, if at all, has your understanding of the program changed?

Benefits:

2. What have been the benefits of the FYE program to date?
    a.   Student benefits? Your department/program? College?
    b.   What additional benefits of the program do you see possibly emerging?
         i.   *Repeat question 2a as necessary.*
    c.   What other benefits would you like to see from the program?

Concerns:

3. Last year, Faculty expressed concerns about the quality of communication with the FYE program?

a. What changes have you seen in regard to communication since last year?

b. What issues remain for you in this area?

4. Now that the program has been fully implemented, what concerns do you have with the program?

c. How have you shared these concerns and with whom?

d. How have they been addressed?

e. Do you have any concerns with regards to the current curriculum being implemented in the FYE program?

i. *Repeat questions 3a and 3b as necessary.*

f. What concerns did you perhaps initially have that have been allayed?

Adjustments:

5. What adjustments have you or your department made to your curriculum because of FYE?

a. Formalized curriculum changes?

b. Impromptu changes? In-course changes?

Recruitment:

6. What has been the impact of the FYE program so far on recruitment?

c. Recruitment into the college of engineering?

d. Recruitment out of FYE into a major?

Students (if not brought up specifically in previous questions):

7. What feedback have you received from students about FYE?

Looking Forward:

8. What has been evidence to date of success or failure of the program?

e. What evidence will you look for in the future?

9. What changes, if any, would you make to the FYE program?

f. What changes would benefit your students the most?

g. What changes do you think would benefit all ENG students the most?

Additional guiding questions recommended for use in specific faculty focus groups:

Freshman Advisors/ Engineering Department Academic Advisors:

1. Describe the feedback you have received from freshman FYE students during advising appointments?

OR

2. What patterns/themes are students reporting on that have emerged from your FYE-related student interactions?

Department Chairs/Director of Undergraduate Studies:

1. What changes were/are necessary in your department to accommodate the FYE curriculum?

2. What impact do you anticipate the FYE curriculum implementation to have on your department?

3. What have you heard directly from students about the FYE program? From instructors or teaching assistants?

FYE faculty instructors only:

1. Last year, some FYE faculty expressed feeling isolated from their academic departments because of the FYE program.   What if any changes have there been this year for you in the ways you interact with your academic department?

2. Last year, some FYE faculty expressed concerns with the overall consistency of the program in terms of the content, rigor and curriculum from one section to another;
    a. Do you have any concerns with regards to the consistency this year?
    b. What, if any, changes would you consider making?

3. What other concerns and which have been allayed?

Aggregated Themes from faculty responses:
- *Examining student performance*. This theme captures 93 responses reflecting topics related to FYE's support of student success, challenges to student success, and other student performance related concerns. Codes include: Unprepared students; Stratification in student ability and/or experience; Disconnection between topic or skill and its application; Major-exploration needs going unmet; Needing to focus on practical skills & basic concepts; Problems choosing a major; and Student preparation, performance, & success.

- *Communicating.* This theme captures 54 responses reflecting faculty's perception of communication between the FYE program and departments. Faculty acknowledged communication between the program and departments has improved, especially in relation to the creation of the Canvas shell with FYE course content and assignments. However, most participants felt there was room to improve. Codes include: Listening to student and faculty feedback; Communication Break-downs; Lack of timely communication; Needing more communication, Needing transparency; and Wanting access to program data and evaluation results.

- *Evolving the Program.* This theme captures 36 responses referencing aspects of the program's implementation, functioning, and development over time. Faculty expressed concerns about the frequency of major content and policy changes, while acknowledging their necessity. They also expressed concerns about the changes' effects on later course content, program rigor, and the development of support structures. Codes include: Changes to content; course sequencing; Frequency of changes; Course Rigor, Support Structures; Meeting departments' needs; and Consistency.

- *Evaluating College metrics*. This theme captures 25 responses reflecting faculty's concerns about CoE student success metrics and their effect on individual departments. Codes include: Recruiting; Retention; Enrollment; and Admissions.

- Building Relationships. This theme captures 11 responses reflecting the development of student peer-relationships and the relationship between FYE and CoE departments. Faculty shared anecdotes about students building strong peer-relationships, interdisciplinary friendships, and identity formation. They also expressed the need to promote relationships between FYE personnel and department faculty. Codes include: Cohort formation; Collaboration; Student relationships; Faculty relationships; Not knowing the FYE faculty, and Department lack respect for FYE instructors.

- Other codes include Support for FYE; FYE as GPA booster; Appreciation for FYE faculty; and Questioning the benefit to cost ratio of FYE.