

Gathering Employer Assessment Inputs from Focused Discussion Group Sessions with Campus Recruiters*

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The Accreditation Board for Engineering and Technology (ABET) requires all accredited engineering schools to assess the capabilities of their graduates. One source of program outcome assessment data is feedback from employers concerning the work performance of engineering graduates. This paper describes procedures for planning and conducting focused discussion group sessions with corporate recruiters. A review of literature related to gathering employer assessments is presented. Following the description of the protocol for the discussion sessions is a summary of observations from focused discussion group experiences over two semesters on the Clemson University and the University of Florida campuses.

INTRODUCTION

THIS PAPER describes the development and initial testing of a focused discussion group protocol for gathering assessment information from employers of engineering graduates. The project teams on the Clemson University and University of Florida campuses who developed and tested the protocol were supported by the Southeastern University and College Coalition for Engineering Education (SUCCEED), a National Science Foundation funded engineering education coalition. The work was motivated by a need shared by the faculty of all engineering programs accredited by the Accreditation Board for Engineering and Technology (ABET) to find practical ways to document the achievement of their educational program outcomes.

In the ABET Engineering Criteria 2000 [1], a portion of Criterion 3 reads:

Each program must have an assessment process with documented results . . . The assessment process must demonstrate that the outcomes important to the mission of the institution and the objectives of the program . . . are being measured. Evidence that may be used includes, but is not limited to the following: student portfolios, including design projects; . . . employer surveys; and placement data of graduates.

A campus recruiter focused discussion group session provides a forum for discussion of pre-selected facets of the preparation and/or

performance of engineering program graduates. Primary participants in the discussion are corporate recruiters who have come to campus to interview students for post-graduation full-time employment, summer internships, and/or cooperative work/study assignments. A focused discussion group session provides an environment where employer viewpoints can be gathered for program assessment as well as program enhancement.

The focused discussion group strategy is an alternative to the more traditional mail survey method for gathering assessment data from employers of engineering graduates. The focused discussion group method overcomes some of the difficulties associated with securing useful responses from employers through mail surveys. It also provides opportunities to examine issues of concern in detail through group interactions. Additionally, the convenience of using the campus-recruiting visit for more than one purpose is practical as well as frugal. Employers will have paid the participant travel portion of expenses associated with conducting the session as a byproduct of the recruiter's job-filling efforts.

LITERATURE REVIEW

Numerous studies have appeared in the literature describing assessments of engineering programs. These studies can be categorized using themes such as sample selection, method, focus, or indicators. The following brief summary of literature identifies weaknesses as well as strengths of

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obtaining employer feedback for improving educational programs.

One key factor in classifying the literature is the selection of populations to be sampled as reported by the response rate. Survey populations have included employers, baccalaureate degree alumni, associate degree alumni, and current students [2]. Unfortunately, finding ways to reach employers of recent graduates with mail surveys is difficult, and the number of employers who respond to mail surveys is typically small and decreasing as more academic programs seek employer input. In Cole and Finn's [2] research, thirteen percent of the alumni (155 respondents) responded to their survey and fourteen supervisors (nine percent of the return from graduates) responded to the second survey instrument. Edmonson and Untener [3] increased the rate of return on their alumni survey to approximately forty-four percent (241 respondents) using hand written Post-it[®] notes from faculty members to help graduates realize the importance of filling out the survey instrument. They also received approximately a sixty-nine percent response from employers that the alumni respondents identified, which resulted in employer surveys for thirty percent of the alumni. Martin and Richardson [4] sent both e-mails and surface mail to their alumni. These efforts resulted in a forty-two percent response (40 responses).

A second literature-classifying factor is the method used to define and assess educational outcomes. For instance, Besterfield-Sacre *et al.* [5] used focus groups and affinity diagrams to define educational outcomes for an industrial engineering program. Leonard and Nault [6] described the use of telephone surveys of employers, mailed surveys to alumni and employers, and focus groups of employers to determine employer as well as alumni satisfaction. Cole and Finn [2] used mailed surveys to learn what skills employers, alumni, and current evening students found most and least important in the workplace. It should also be noted that employer responses to self-administered surveys tend to be very positive. The reliability of the survey data may be limited based on the research of Banta *et al.* [7].

The literature also shows variation in the focus of program assessments. Satisfaction/dissatisfaction, performance in the workplace, and employment patterns are examples of the objectives of assessment analysis. Using a mailing list from the university alumni relations office, Edmonson and Untener [3] targeted graduates over the last five years. The graduates were provided with two survey instruments: a graduate survey and an employer survey. The alumni were instructed to fill out the graduate survey and forward the employer survey to their supervisors at work. The survey examined satisfaction with academic preparation, job performance, and ability to begin work with a minimum of training. Leonard and Nault [6] described the use of a similar approach to assessment information

acquisition. Rather than focusing on satisfaction, Coowar *et al.* [8] examined common sources of difficulties in working after graduation. They identified skills that employers would like to see in the professional engineering workforce. Coowar and colleagues used questionnaires to examine the employment pattern of engineering graduates and to determine the relevance of their engineering educational background.

The literature includes reports on the use of a number of different indicators to document achievement of the program outcome requirements associated with ABET Engineering Criteria 2000. Scales *et al.* [9] reported on a survey of types of outcome indicators currently used in engineering program assessment including alumni surveys, capstone design courses, student surveys, the Fundamentals of Engineering (FE) Examination, and employer surveys. The result of this outcome indicator survey showed that employer surveys were judged as a useful outcome indicator for assessments. Employer responses can indicate how well students are prepared for the workforce, and they can help a program faculty to assess how well parts of their curriculum relate to industry needs. Fisher [10] developed strategies and implemented plans for continuous improvement through outcome assessments of undergraduate engineering programs. These plans included conducting a 'Stakeholder Focus Group' as one of the activities for gathering employer feedback.

A focused discussion group session offers the opportunity to ask probing questions in a social setting with a group of participants. This use of group interaction may yield data and insights that are unlikely to emerge from individual responses to a personal interview or a survey questionnaire [11]. However, the number of topics that can be covered in a single discussion session is limited, and participants may be unwilling to discuss sensitive subject matter in a group setting. Moreover, under normal circumstances, it is not possible to generalize about a study population from focus group data [12].

Clearly there are a number of problems associated with securing employer assessment data by mail survey. The focused discussion group approach to gathering assessment data provides an opportunity to probe for deeper understanding of responses. It also provides a relatively low-cost alternative to other methods of obtaining employer input, particularly if the discussion sessions are held concurrently with regularly scheduled recruiting activities.

FOCUSED DISCUSSION GROUP PROTOCOL AND ITS APPLICATION

The planning process for holding focused discussion group sessions includes many components. Elements of the protocol include identifying individuals responsible for conducting the sessions,

selecting topics to be addressed, formulating questions to be asked, identifying and inviting employer representatives, and confirming session arrangements. The focused discussion group protocol described here has been used as the basis for planning and conducting discussion sessions on both the Clemson University and University of Florida campuses during the calendar year 2000.

The responsibility for planning and conducting focused discussion group sessions resides with interested members of the faculty, perhaps the members of a departmental assessment or curriculum committee. On both the Clemson University and University of Florida campuses, departmental ABET program coordinators led the focused discussion group planning effort.

Session arrangements should be coordinated with the campus career planning or placement office, and with college recruiting managers of the firms represented by participants in the focus group session. The campus placement office is likely to have, or have access to, the best data on recruitment, interviews and placement and to have on-going relationships with corporate recruiters. The campus placement office and faculty, working together, can make the necessary arrangements, which typically involve choices of representatives of participating firms, the general topic of the discussion and related questions, session date, time and place, facilitator, and recorder(s).

The choice of discussion topic and questions for each focused discussion group session is the first step in the session planning effort. The program faculty should make these decisions as much as two months in advance of the target date for a discussion session. The areas of inquiry and selection of particular questions will reflect the interest of the department hosting the interview. Types of questions asked at the Clemson University and the University of Florida discussion sessions were:

- to discover employer expectations,
- to better understand the strategies recruiters used to assess specific competencies in the students they are interviewing,
- to elicit feedback on a specific engineering program competency,
- to better understand the nature of the transition a student makes into the work place as a new hire.

Once a decision on discussion topic and questions is made, the faculty, in collaboration with the placement office, identifies the companies, or at least the types of firms, they would like to have represented by their focused discussion group participants. The choice of firms may be tied directly to the selected topic and questions. If the topic and questions relate specifically to a particular industry or industries, the choice of firms has been made. More typically, the choice of topic and questions will leave some latitude in terms of the choice of corporate representatives. Here, the

choice of corporate representatives will most likely be determined by their availability on the target date selected for the discussion session. The topics and questions selected for examination at the discussion sessions held on the Clemson University and University of Florida campuses did not restrict these sessions to any particular industries.

The date for a focused discussion group session may be selected in one of two alternative ways. The first alternative is to determine the discussion session date and time according to the schedules of the corporate recruiting teams coming to campus for traditional job-placement interviews. With this approach, the faculty chooses a date when several of the companies they would like to participate in the discussion session will have representatives on campus. A second way to set the date for a discussion session is to schedule the session on a day that corporate representatives are coming for a campus-wide career day. Both of these date-setting approaches have advantages and disadvantages. Scheduling focused discussion group sessions at times when traditional job-placement interviews are conducted provides opportunities for more first-line supervisors to participate in the discussion sessions, but there are not as many companies on campus at any one time. Scheduling focused discussion group sessions in conjunction with a campus-wide career day offers the opportunity to have representatives of a wide variety of firms participate in the discussion sessions. One possible limitation of the career-day approach is that the corporate representatives may more likely be members of the human-resources units of their firms, rather than technical managers who are more knowledgeable about engineers' performance on the job.

Clemson University set its Spring 2000 focused discussion group sessions using a calendar of traditional interview schedules, while the University of Florida scheduled its Spring 2000 focused discussion group sessions on a campus-wide career day. On both campuses, Fall 2000 focused discussion group sessions were scheduled in conjunction with campus career days. Clemson ABET program coordinators scheduled their Fall 2000 guided discussions on a campus-wide career day to try that alternative, and to see if there would be any significant differences in numbers of recruiters who would participate in the sessions.

Each focused discussion group session should be held in conjunction with a natural break in the interview or career day, like lunch, to reduce the intrusion of this event into the schedules of the company representatives. The length of the discussion session should be in the range of one-to-two hours. If possible, the discussion sessions should meet in campus career planning or placement facilities to minimize the amount of on-campus travel for corporate participants. Clemson University held its discussion sessions during the one-hour lunch break normally scheduled for recruiters. The discussion sessions

at the University of Florida were held in the late afternoon the day before career day to accommodate recruiters' travel schedules and to avoid conflicts with evening receptions held in conjunction with career day.

The topic and questions to be used in the focused discussion group sessions should be communicated to all participants by fax or e-mail in advance of the session. When possible, a follow-up telephone contact should be made before the discussion session to be sure that each participant understands the selected topic and questions.

Ideally, the facilitator who leads the focused discussion group sessions should be trained and experienced in guiding such discussions. If possible, the facilitator should be comfortable in leading discussions on the topic and questions selected by the session planners, which may require familiarity with engineering education. When a facilitator with this capability cannot participate in the session, a program faculty representative who can address questions that arise related to engineering issues under discussion should be present. The facilitator must move the group from question to question within the selected topic, being sure to stay within the limits of the time allocated for the session but allowing adequate time for discussion of each question. This individual plays the key role in obtaining maximum value from the discussion by drawing the best and most innovative comments and ideas about the selected topic and questions from session participants [13]. At both Clemson University and the University of Florida, the facilitators were not all trained in formal focus group protocol. However, all of the facilitators had experience in methods of group discussion. Additionally, the protocol was reviewed prior to each session, and a debriefing followed each session. Based on the critique of the session, modifications to subsequent sessions were made.

At Clemson University one or two recorders accompanied the facilitator at each session to help insure that an accurate record of the discussion is made. The recorder(s) used a flip chart pad or white board to record and post key points for easy recall by the participants in the discussion. Voice recording of the sessions were also made at Clemson University with the participants' understandings that, at the end of the session, they could ask that the tape be erased. Review of the audiotapes was especially helpful in clarifying what was said about important issues. Neither scribes nor voice recordings were used in the discussion sessions held on the University of Florida campus, because of the concern that scribes and voice recording might inhibit frank discussion.

FINDINGS FROM THE FOCUSED DISCUSSION GROUP SESSIONS

Focused discussion group session leaders for the Spring and Fall 2000 sessions at Clemson

University and the University of Florida were ABET program coordinators for the engineering disciplines being discussed. On the Clemson campus, one or two graduate students and the Director of the Office of Assessment joined the program coordinators. At the University of Florida, the program coordinators were joined by ABET committee members, and in one instance by a department chair.

Participants

The recruiters who participated in the focused discussion group sessions represented six disciplines. At Clemson University, seventeen different recruiters participated whereas there were nineteen recruiters participating at the University of Florida. Table 1 displays the number of recruiters by disciplines by institution who participated in focused discussion groups during 2000.

Questions

The structure of questions asked in the University of Florida focused discussion group sessions was curriculum-specific so that recruiters could provide detailed comments with respect to particular courses. One example of the questions directed to program educational objectives is:

- 'Do Industrial and Systems Engineering graduates have an adequate understanding of the principles of system modeling . . . ?'

The questions asked in the Clemson University sessions related to general characteristics and skills required by employers of engineering graduates. An example question directed to a Criterion 3 outcome.

- 'Are our Computer Engineer and Electrical Engineer graduates able to communicate effectively with co-workers and management?'

Questions to discover employer expectations included:

- 'What key personal characteristics are you seeking in Industrial Engineer baccalaureate graduates?'
- 'What does a computer engineer need to know?'

To better understand the strategies the recruiters use to assess specific student competencies, the recruiters were asked:

Table 1. Number of participating recruiters by discipline by university.

Discipline	Clemson University		University of Florida	
	Spring	Fall	Spring	Fall
Ceramic/Materials	2			
Computer Science			1	2
Electrical and Computer	3	4	2	2
Industrial [and Systems*]	3	5	1	5
Mechanical			2	4

* at the University of Florida

- ‘How do employers judge if graduates have an understanding of their ethical and professional responsibilities?’
- ‘How do employers judge if graduates are aware of current/contemporary issues?’

The feedback from the following questions provided insight into specific program competencies:

- ‘Are our Computer Engineer and Electrical Engineer graduates able to function effectively in teams with other engineers?’
- ‘What suggestions do you have for improvement in their preparation for effective teamwork?’

Open-ended questions such as:

- ‘What do you usually find takes the longest time for new hires to understand or get used to?’

provided a better understanding of the nature of transition of the student into the work place. These can reveal deeper insights and more useful inputs than multiple-choice questions that are commonly employed in surveys. Open-ended questions can also be employed in a survey, but a facilitator can elicit more meaningful responses from a focus group.

Interestingly, regardless of how the focused discussion group sessions were directed, the recruiters who participated in either the Clemson University or the University of Florida sessions expressed similar ideas about desired characteristics for job candidates. In general, the key assessment inputs from both sets of discussion sessions relate to personal characteristics and general engineering skills and most support ABET Engineering Criteria 2000, Criterion 3 Outcomes 3(a) through 3(k) [1].

The feedback indicated clearly that recruiters want to hire engineering graduates who are highly motivated, enthusiastic, self-driven, well rounded, and able to make decisions. The recruiters also view ability to adapt to different environments, to be open to challenging ideas, and to be flexible as important traits because in their companies employees need to change their focus frequently.

The recruiters expect engineering graduates to have both technical and non-technical competencies including oral and written communications skills and appropriate computing skills. Statistical methods, including design of experiments, were highlighted as important technical skills. The recruiters noted that ability to communicate via e-mail plays an important role in business communications. In addition, the abilities to work in teams as a leader and as a member of the team are critically important. Project management skills have taken on increased importance in the workplace. Knowledge concerning evolving technologies is an indicator that students may have open minds for continuous change and improvement. Some recruiters make judgements about individual competencies or skills by using structured exercises to evaluate how well candidates

function in team environments and how well they can solve specific problems.

Potential employees must be able to express themselves, know their strengths and weaknesses, and be able to explain their technical work to others who may not have technical backgrounds. Specific business skills, such as accounting and finance, are considered less important than the ‘professional’ skills described above.

Several recruiters commented that grade point averages give a good indication of the students’ abilities to grasp new things and contemporary issues. However, grade point averages must be balanced with human skills. Co-op assignments and internships are very helpful in developing an understanding of the importance of professionalism and ethics and giving the students vital industry-oriented experience.

Lessons learned

The number of recruiters who participated on both campuses in Spring 2000 focused discussion group sessions was less than expected. The project teams believe that there were two major reasons for such small numbers of participants. First, the authors had approximately one month (including on the Florida campus, the end-of-the-year holidays) to notify the employers who had scheduled campus visits about the focused discussion group sessions. Second, because the current job market for engineering graduates at that time was so good and employers want to secure employment commitments from students as soon as possible, the number of recruiters who come to campuses is significantly smaller in the spring semester as opposed to the fall semester.

In the Fall 2000 semester at Clemson, focused discussion group sessions for the electrical and computer engineering program and the industrial engineering program were held in conjunction with campus-wide career days. There were no significant differences in the numbers of recruiters who participated in the ‘interview-day’ scheduled Spring 2000 discussion sessions and the Fall 2000 ‘career-day’ scheduled sessions. The recruiters who participated in the sessions suggested one reason for the small number of participants at both Clemson sessions was because the sessions were held at lunchtime when they were very busy recruiting students. Both sets of participants suggested that a better time for the sessions would be in the morning before recruiting activities started in earnest.

At the University of Florida, the Spring 2000 efforts provided important information on the process for constructing employer-focused discussion groups and a renewed effort was undertaken for the Fall 2000 campus-wide career forum that would make extensive use of the campus placement center’s database and contacts with engineering employers. From the placement center’s database, a specific set of employers was constructed for, and reviewed and revised by, each participating

department. The director of technical recruiting of the placement center then sent letters of invitation to employers, approximately two months in advance of the event. This concerted effort showed promising success as five companies participated in the industrial and systems engineering discussion session and four companies participated in the mechanical engineering discussion session. Two other programs, computer science and electrical and computer engineering, each had two companies participate in their discussion sessions (see Table 1). Unfortunately, some of the smaller programs did not attract any recruiters to their planned focused discussion group sessions.

The success of the industrial and systems engineering focused discussion group session can be attributed in some measure to direct contacts with recruiters close to the date of the event. The contact that placement centers have with employers is often at the corporate level and invitations to participate in the discussion sessions are not always communicated to the recruiters who will come to the campus. After the employer companies identify the recruiters who will visit, direct phone or e-mail invitations to these recruiters by program faculty appear to increase participation in the discussion sessions.

The experience at the University of Florida in both the Spring and Fall 2000 events indicated that a large majority of the focused discussion group session participants were departmental alumni or from companies that were affiliated with departmental advisory boards. This fact provides added incentive for programs to establish strong ties to their employer constituents and for direct departmental participation in setting up the discussion sessions.

This paper is intended to provide insight into the protocol used by two universities to obtain employer opinions about graduates of engineering programs rather than focusing on curriculum adjustments the faculty have made as a result of findings from the focused discussion group sessions. For robust curriculum development, 'triangulation' of constituent input is desirable. For that reason, inputs from focused discussion group sessions with campus recruiters should be analyzed and compared with inputs from other sources to guide faculty in their efforts to improve their program. However, it is important to note that the university departments participating in the focused discussion group sessions are using the data collected during the process.

The comments and suggestions were mapped to ABET outcomes 3(a)–3(k) and to program

educational objectives. One recruiter noted that students should be able to verbalize experiences where they have used a systematic approach to solve difficult problems. If the faculty acted upon this observation, the program outcome assessment process associated with Criterion 3(e) 'An ability to identify, formulate, and solve engineering problems' might be modified to include an analysis of recordings of students orally describing a problem-solution experience.

Another recruiter commented on the critical role of ergonomics in industrial engineering workplace design. Knowledge in this area is critical for all industrial engineers. The industrial engineering program faculty could examine its curriculum to ensure that adequate instruction and practical experience in ergonomics is incorporated into the program [Criterion 3(b)]. A specific suggestion made by one recruiter was that a business communications class would be valuable not just for technical document writing but also for all professional communications. This suggestion is particularly relevant, given the ABET Criterion 3(g) outcome 'An ability to communicate effectively'. Perhaps another course will not be required, but confirmation of knowledge of the principles of professional communications taught in a business communications class could be included in engineering program assessment.

CONCLUSION

This paper has presented an approach to gathering employer inputs for program assessment using focused discussion groups. Conducting discussion sessions with campus recruiters offers the opportunity to collect important employer insights while avoiding some of the difficulties associated with other data collection approaches like mail surveys. Clearly the yield from focused discussion group sessions can be improved through refinements in communications with employers about the timing, purpose, and importance of such sessions. Career placement centers can help in identifying potential participants, but direct contact by program faculty, building on previously established ties to employer constituents, is crucial in making the efforts successful. Nevertheless, even with a relatively small commitment of program resources to the conduct of the gathering, a focused discussion group session with recruiters who come to campus can yield important insights as to how engineering employers view the graduates of engineering programs.

REFERENCES

1. ABET, *Engineering Criteria 2000: Criteria for Accrediting Programs in Engineering in the United States*, Engineering Accreditation Commission, Accreditation Board for Engineering and Technology, Inc. Baltimore, MD, January (2001). <http://www.abet.org>.

2. W. E. Cole and C. W. P. Finn, MET Graduate Survey results, *Proc. Am. Soc. Engng Educ. Annual Conference*, Session 3549 (1998).
3. C. P. Edmonson and J. A. Untener, An assessment of the performance of engineering technology graduates, *Proc. Am. Soc. Engng Educ. Annual Conference*, Session 2647 (1998).
4. R. S. Martin and C. P. Richardson, An alumni survey as an assessment tool for New Mexico Tech's B.S. Environmental Engineering Curriculum, *Proc. Am. Soc. Engng Educ. Annual Conference*, Session 3413 (1998).
5. M. Besterfield-Sacre, L. Schuman, C. Atman, and H. Wolfe, Development of customer-based outcome measures for an engineering program, *Proc. Am. Soc. Engng Educ. Annual Conference*, session 3530 (1997).
6. M. S. Leonard and E. W. Nault, Employer input for program improvement: inviting business to the table, *13th Annual SC AIR Conference*, Myrtle Beach, SC, February 22 (2000).
7. T. W. Banta, R. H. Phillippi, and W. Lyons, Critique of a method for surveying employers (unpublished), *Annual Meeting of the Association for Institutional Research*, San Francisco, May 27–29 (1991).
8. F. Coowar, M. Giger, C. Loukides, and K. M. Siddiqui, Employment pattern and education standards of engineering graduates in the Lao PDR, *Proc. Am. Soc. Engng Educ. Annual Conference*, Session 1260 (1997).
9. K. Scales, C. Owen, S. Shiohare, and M. Leonard, Preparing for program accreditation review under ABET Engineering Criteria 2000: choosing outcome indicators, *J. Engng Educ.* **87**(2), pp. 207–210, July (1998).
10. P. D. Fisher, Assessment process at a large institution, *Proc. Am. Soc. Engng Educ. Annual Conference*, session 2513 (1998).
11. E. Van Aken, B. Watford, and A. Medina-Borja, The use of focus groups for minority engineering program assessment, *J. Engng Educ.*, **88**(3), pp. 333–343, July (1999).
12. J. Frechtling and L. S. Westat, *User-Friendly Handbook for Mixed Method Evaluations*, pp. 3.9–3.13, National Science Foundation, Arlington, VA (1997).
13. T. L. Greenbaum, *The Handbook for Focus Group Research*, Macmillan, New York (1993).

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