

## Responses to Guiding Questions for Faculty

### Workshop on Education Research Positions in STEM Disciplinary Departments

From PK Imbrie, Department of Engineering Education, Purdue University

Based on responses from 9 engineering education faculty:

**1. *What are your responsibilities for teaching, research, and service? (e.g., teaching loads, courses, coaching/mentoring roles, types of research, liaison roles with education department)?***

Respondent 1: I have teaching, professional development, and service responsibilities. We are primarily a teaching institution so a full time "teaching" faculty member will teach 12 credits a term as well as conduct at least 20% of their time in professional development and provide service to University and Department. Professional development is defined in the faculty handbook as consulting, applied research, workshops, publishing, etc. It allows a lot of flexibility in job description. We are also expected to advise students (about 20) and mentor one senior design project. In addition, if a faculty member has excessive service or an administration position, they are granted release time. For example, I am 1/2 time teaching, 1/4 time university administration, and 1/4 service for university and departmental assessment. Finally, if a faculty member is conducting applied research that brings overhead into the University from contracts, they are also granted release time.

Respondent 2: At the present time I am a full professor and an associate chair which is 1/4 of my appointment and also assistant to the Dean which is also 1/4 time. So in effect I have a half time faculty position. As such, my teaching responsibilities are 2 courses per year and I advise one PhD candidate and 3 MS candidates. My research responsibilities are similar to the rest of the faculty of 2-3 journal publications per year and \$300,000-400,000 per year of expenditures (this is actually reduced to \$100-200,000 per year because of my 1/2 time regular appointment). My service responsibilities are part of my job as associate chair such as scheduling classes and responsibility for ABET, but if I were a regular full time faculty the responsibility would be to serve on 3-4 committees and chair one of them. For 3 or 4 years I tried to do both technical and educational research, but I found that not to be possible because of the necessity to keep up with the literature in the field and to attend the appropriate conferences and meetings with sponsors etc. So I shifted full time into engineering education research, which I have enjoyed greatly. I am effectively the engineering school liaison with the education college, although it is an informal relationship.

Respondent 3: I am a new Asst. Prof in Engineering Education, so I have a half-teaching load for the first three years (works out to be 2 courses per year on a semester system). My research responsibilities are mostly related to current research projects (I lead a program as part of an engineering education center grant, and I am a Co-PI on two engineering education research grants). My plan is to write proposals this year to launch

my next phase of research activity (carrying forward old ideas, exploring new ones). I am in the process of networking on campus - within education and engineering, as well as likely connections with communication and other fields that link to my research. My sense is that my chair expects me to obtain a certain level of research support, although I don't think there is an exact number. My service responsibilities are still evolving. I am on department level committees as well as college level committees; I participate in local / national / and international groups; I advise graduate level students; I participate in undergraduate level activities (EPICS) - and hope to extend this in the future where it makes the most sense (e.g., a multidisciplinary design program). One thing that I do focus on that isn't in this list is connections with industry. I also network extensively outside of my local setting (national and international). Much of this is related to the nature of my work and to the communities I participate in.

Respondent 4 - I am teaching two two-hour labs currently, and will teach two two-hour lectures and a two-hour lab in the spring. A full-time instructor would teach four sections, so this includes some release because I am expected to research and publish and additional release paid from research grants. This teaching load actually represents an overload in my situation. I have previously had more course coordination responsibility, but another faculty member has taken that due to my heavy research load. My research includes research for the department, college, and university in addition to my externally funded research. I do not have any formal coaching / mentoring / liaison role. I have built partnerships with the School of Education.

Respondent 5 - As a new faculty member, I am teaching two 1.0 credit hour courses-- one for undergraduates (an engineering peer mentoring course) and one for graduate students (ENE seminar). I am establishing my research program in classroom observation instrument development, and I am working on undergraduate research collaborations with the Discovery Learning Center on campus and with faculty in the Electrical and Computer Engineering department. Relative to on-campus service, I am a member of the Engineering Education's Graduate Committee and am involved in national graduate student recruitment efforts for the department.

Respondent 6 - My official responsibility splits are 10% Teaching (one course officially per year though I am responsible for two sections of the Freshmen Orientation courses every fall and spring with 550 students – this is considered service), 25% Research, and 55% Service. The freshmen and transfer orientation courses include mentoring 50+ students in their roles as peer mentors. I am the liaison to the College of Education and the major education center of the university.

Respondent 7 - Now that I am associate professor, I am responsible for 4 courses during the academic year (it was 2 the first year as an assistant and three thereafter). This differs from no one else in my department. Because I work at a research I institution that has 8 month contracts, there is significant pressure to bring in substantial research funding - equivalent to 4 or more months of research. I have been fortunate to bring in sufficient research funding to buy out during the year one to two courses. Further, requirements for me to become full Prof are no different than others. In terms of teaching, my department

pushes for excellent teaching evaluations, but recognizes that there is also an efficiency associated with teaching such that you should put in sufficient time for course preparation, but don't let the research suffer. With regard to service, participation and involvement of conferences and the professional societies should be selective as a junior faculty (i.e. pick one or two things and do well, but don't overdo research funding and papers and don't compromise teaching). As an associate faculty, I am now encouraged to say yes to offers of planning conferences and serving on editorial boards for journals.

Respondent 8 - Teaching load: Usually 1 "major" class (2 or 3 credits) plus 1-2 seminar classes (1 credit classes) per semester; Educational research

Respondent 9 - Teaching: With a half-time faculty appointment my teaching load is half of the normal annual load in my department, so I teach 2 quarter courses per year. [Note: I am currently also half-time Director for the NSF-funded Center for the Advancement of Engineering Education, so I am not teaching at all right now.]; Research: Part of my responsibilities at CELT include research – so my percent of research time is high (hard to estimate total time); Service: My department is very small, and it is really tough to cut down on service load. In addition, part of my CELT responsibilities includes service to the College and University – so on a percentage basis my UW service load is higher than an average faculty load. I also do a fair amount of national professional service.

## **2. In what ways (if any) do your responsibilities differ from your non-education focused colleagues?**

RESPONDENT 1 - I have taken on significant administration and service responsibilities which has reduced my course load. Every faculty member at Lawrence is "education" focused in that they teach heavy course loads. However, most don't keep active in educational literature (JEE, ASEE, etc) or participate in the scholarship of teaching like I do.

RESPONDENT 2 - If I was just a regular full time faculty member, my responsibilities would be similar, but being responsible for ABET is a major part of the reason for my shift into education research. Now that I am involved with engineering education research, my only regret is that I did not move in this direction sooner.

Respondent 3- I'm not really sure. My sense is that there is some expectation that I be a "voice" of education (e.g., regarding assessment, developing curriculum, etc.), and my early sense was that this would be a more subordinate (service) role. To deal with this, I've tried to engage folks from a scholarly perspective and to present myself as someone who is situated in research. Is it working? Not sure. I'm also not sure if the level of work that is expected from me is the same or different. I tend to act oblivious to anyone who suggests I should do "more" of something to be more accepted. My sense is that the leadership in the department has had a large influence on how this department and its faculty are perceived on campus.

Respondent 4 - My Tenure-Promotion-Reappointment guidelines specifically delineate a few ways in which my responsibilities differ from those of my non-education focused colleagues: since General Engineering at Clemson is not a degree-granting program, I am not expected to graduate any MS or PhD students. The graduate students who have worked on my projects have been in degree-granting programs elsewhere in the university. Similarly, I am expected to publish and develop an externally funded research program in engineering education.

Respondent 5 - I have to balance both rigorous research responsibilities and student-centered mentoring and learning activities. Because engineering education is my discipline, I think that I must be a high quality teacher, mentor, *and* researcher.

Respondent 6 - My responsibilities are far more student focused. In addition, my research is more student focused in that others have grants that are majority faculty time and equipment whereas my grants are majority student funding.

Respondent 7 - Absolutely none! I'm fortunate that my institution/school of engineering/department value my research. As my Dean has indicated me - continue to do my research and be the best in my field - as it makes the SOE look good. He has been very supportive of the research and helps where possible. However, he has indicated that as an engineering school - his focus should be on advancing core engineering research.

Respondent 8 - Colleagues in ChE seem to teach 1 3-credit class per semester

Respondent 9 - Within my department my responsibilities do not differ much from my colleagues (though there is somewhat of an assumption that I'll be involved in things like ABET committees). Where my responsibilities differ from those of the colleagues in my department it is in large part due to the service component of CELT at the College level (the faculty development part of CELT) Rather than the fact that my area of scholarship is education.

### **3. What positions have you held and do you currently hold in your department?**

RESPONDENT 1 - Assistant professor and Coordinator of the CE Department Assessment Program.

RESPONDENT 2 - At the present time I am associate chair and have been for 5 years and prior to that I was in charge of the materials program for 5 years. As I said I am also working for the Dean ¼ time on K-12 outreach and associated engineering education research.

Respondent 3-- I'm on committees; I'm also on sort of invisible committees (e.g., identifying potential recruits for the department and inviting them to give a seminar). I'm expected to help bring in new students as well, using various networks. I'm very new, so it's still evolving.

Respondent 4 - Our department is small, and many responsibilities are shared without need of assigning "positions." I chair the General Engineering Assessment Committee, which means I control most of the assessment procedures.

Respondent 5 - My primary position is as a member of the Graduate Committee within the ENE department.

Respondent 6 - Assistant Professor, Director of Engineering Education, Associate Dean for Education

Respondent 7 - I'm pretty much focused on research. I am the point person in our department for ABET; and my department chair has supported my efforts for it (i.e. gave me a month of support and funded a graduate student of mine for one term). I also have served on ad-hoc for faculty searches within and across the school.

Respondent 8 - Assistant professor

Respondent 9 - Industrial Engineering Department: Associate Professor from 1998-2003, Full Professor from 2003-present (promoted based on scholarship in engineering education).

College of Engineering: Director of CELT from 1998 – present.

**4. In what ways (if any) do your current position and your career prospects differ from your non-education focused colleagues? (e.g., title and rank, paths to tenure, resource issues, joint appointments with other departments).**

RESPONDENT 1 - None

RESPONDENT 2 - I achieved my current rank, position, and most salary raises along a technical route and then, after 15 years, shifted into engineering education research. I do not believe that any faculty member in the School of Engineering has achieved promotions from their education research (we probably have about 4-6 faculty out of 200 who are active in educational research). For the technical route to promotions and salary increases it is probably expected for assistant profs to bring in \$100-200K per year with 2 publications per year along with good teaching and moderate service and an emerging national reputation in the field of expertise and for full profs about \$300-400K per year with 2-3 publications per year and PhDs every 2-3 years and an established national reputation along with good teaching and service. If an educational researcher could achieve these levels of productivity I believe that they could advance at the same rate as a technical faculty member. However, I believe it is easier to raise larger sums of money in a technical area than it is in doing education research which usually involve team efforts. In terms of resources technical researchers have large start up packages which they need for facilities and supplies whereas education researchers probably need less in start up. Joint appointments are probably possible but currently none exist between technical and educational departments, although many exist between technical departments.

Respondent 3-- My sense is that the tenure and promotion process is being aligned with the more traditional path in engineering, and that joint appointments are handled similarly. There is a strong expectation of getting tenured - so I don't feel that I have been tracked into an unsuccessful path. I think resource issues are very different. I am part of a group that wants to create a website that identifies available resources on campus. All the things that people anticipate going in the database are relatively useless to me - don't fit my kinds of research (e.g., various experimental equipment). I don't think it is a question of getting more/less resources, but rather not having visible lines of resource opportunities within the traditional sense of "resources." It's like not having a line item on a budget sheet or request. If I don't have a line item, the likelihood of getting a resource is low.

Respondent 4 - I was tenured this past year -- a year ahead of schedule. We received feedback that the TPR package was highly regarded as a shoo-in at all levels. Feedback from other faculty, department chairs, the Dean and the Provost indicated that there was no concern that my research was inappropriate in a College of Engineering and Science. I have been offered a joint appointment with three departments. I have also had a significant amount of support from a wide range of institutional faculty and staff. My research partners include faculty from various departments in various colleges, and I have had particularly strong support from the Institutional Research office.

Respondent 5 - All of the aspects of my position are the same as my non-education focused colleagues. However, the resources that I need are not as technical or lab-oriented as my colleagues. At this phase of my career, primary funding would be applied to hardware and software purchases for classroom assessment. I also differ from my colleagues in that my research findings are heavily dependent upon interactions with faculty in other engineering disciplines. I am constantly located for partnerships across disciplines.

Respondent 6 - I am more administratively focused than most of my colleagues. They aspire to be Department Heads and I need to be in more of a dean/provost role in order to have the impact on students that my research needs/deserves.

Respondent 7 – None. As indicated, I am fortunate to be at a school that has supported my efforts; and faculty members across the various departments have also shown value and support to my efforts.

Respondent 8 - Probably you'd get more accurate information if you talked to non-education focused colleagues (rather than collecting my impressions of their prospects).

Respondent 9 - My path does differ a bit many of the colleagues in my department but I believe it is more because I run a center at the College level than because my area of scholarship is learning. I have joint appointments with two departments in engineering (Mechanical Engineering and Technical Communication). I also collaborate with colleagues in the College of Education and I am on the advisory board of the University level Center for Instructional Development and Research. I was recruited to the UW with

my area of scholarship already in engineering education, and was promoted to full professor at UW with that area of scholarship.

**5. To what extent and how does your department (or school or university) support your position and your research? (e.g., financial support, cultural support, etc.)**

RESPONDENT 1 – They provide good financial support for travel and Raises for outstanding service to the University. They also provide good cultural support for my scholarship and assessment initiatives. They encourage my career choices and reward my endeavors accordingly.

RESPONDENT 2 - The Dean strongly supports education research and has allocated one faculty member a ½ time position and myself a ¼ time position. There is currently a faculty line open for a position in engineering education research but the chairs feel that the minimum level would have to be associate professor since it would probably be best if the person was tenured. He also supports CRESMET (Center for Research on Education in SMET) activities in general quite strongly. He strongly encourages quality teaching but the technical research demands on faculty make it difficult to spend the amount of time desirable to develop innovative and contemporary approaches to education. Overall, I believe that the level of engineering education research that has gone on and is going on here at ASU puts the institution well ahead of the average engineering college, but possibly not at the level of some other institutions, especially those that have created engineering education degrees. At ASU we have come far since I began 24 years ago, but we still have a long way to go.

Respondent 3 - Again, because the dept. is engineering education - there is strong alignment between my career goals and my academic position and career path.

Respondent 4 - I have received merit pay Raises each year they have been offered in recognition of my work in developing a strong research program. See my previous comments regarding support.

Respondent 5 - My department has provided me with a start-up package that would fund two graduate students for two years. I also am given financial support to attend disciplinary conferences and workshops. External and internal funding opportunities are consistently disseminated within the department. There are several on-campus opportunities that are available to support me culturally (e.g., the Purdue Black Caucus).

Respondent 6 - There is support from those that benefit from the funding I bring in, such as Department chairs. However, I was promised a comparable position for a faculty member in education research that has not ever come through. Not all colleagues support my research due to either their not recognizing education research as being real research or due to the fact that I have control over what is/ or is not taught and that impacts their courses.

Respondent 7 - When submitting proposals, the Dean helps where necessary (i.e. providing letters, in-kind matching to include hard monies - e.g. hardware needed, etc.), the department chair often offers course reductions for any faculty in the department to further focus on writing proposals/papers. In other words, I am treated with the same respect here as any other research driven faculty.

Respondent 8 - Very supported financially and culturally (e.g. eligible for PRF awards, colleagues outside ENE very willing to partner).

Respondent 9 - Enabling elements for the success of CELT are listed below.

*a. Combination of Bottom-Up/Top-Down Support*

Bottom-up support from faculty – CELT meets the needs of faculty who want to improve their teaching and proposal writing (on the education portion). Consultations with CELT a) answer questions faculty members have about how to improve their teaching and about engineering education in general, b) are kept confidential and, c) come at no financial cost to users of the service.

Top-down support from department chairs – CELT meets faculty needs to improve teaching. This helps department chairs as they provide support for faculty in their teaching mission.

Top-down support from the dean - The director of CELT (Cindy Atman) was recruited to UW to found CELT by the dean at the time (Denice Denton). The dean provided critical support and resources, some of which are listed here:

- Securing resources for CELT was made a top priority
- CELT was part of the dean's strategic plan for excellence in engineering education on campus and on the national scene
- CELT was part of the dean's strategic plan to provide resources to support faculty and students from underrepresented populations in engineering
- CELT's director was a member of the College "Executive Plus" Committee (made up of chairs and directors of academic centers). This gave CELT a place at the leadership table on an ongoing basis.

*b. Securing resources*

The dean made securing resources for CELT a top priority, including:

- allocation of half a faculty line for the director position
- start-up funds from the College and University
- making CELT a priority for the development team to secure an endowment and funding from corporate partners
- note: funding for research is secured via soft money grants

*c. People*

- A nationally known leader in engineering education was recruited to direct the center.
- There were already leaders on campus, many of whom had worked with the NSF-funded EXCEL coalition

*d. Promotion and Tenure Criteria*

- Excellence in scholarship on the teaching and learning of engineering was added as an eligible area for scholarship in the promotion and tenure guidelines in the College of Engineering.

*e. University environment*

- Interdisciplinary work is encouraged and supported by the University at the top levels