

Responses to Guiding Questions for Faculty

Workshop on Education Research Positions in STEM Disciplinary Departments

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(Based on interviews with 5 respondents and own experience. All respondents were at the Full Professor rank except 1, who is an Associate Professor. All but 1 are at a Ph.D. granting institution (1 is in a chemistry department that only offers Masters).

1. What motivated you to specialize in discipline-specific education research? What did you hope to achieve?

Serendipity played a part. I began as an organic chemist but realized I was not sufficiently interested to make the kind of sacrifices that an organic research position would entail. I began by teaching at a small school and realized that this was my true bent, and moved into a chemical education tenure track position at a research university. I moved into research gradually, from being a curriculum developer to research into what works and why.

The initial hook was a general frustration with the results of traditional teaching methods in my classes. Students didn't seem to learn as much as I would ideally have liked to see them learn. If I was going to change my methods, the question became "what would be better and how would I know it?" Initially this question focused on students impressions rather than student learning, but slowly, through conversations in places like the Gordon Conference I morphed towards making measurements of student learning (rather than student liking) whenever possible.

I had a strong interest in education before I entered (conventional) graduate school, and got into chem ed practice work as an Assistant Professor. That may have been unwise at the time, but it opened me up to thinking more seriously about research questions associated with educational change. Then I got a job that required me to focus almost entirely on education and it was natural to add education research to what I was doing. I hoped to achieve better documentation of educational outcomes (specifically to show whether my practice-based projects mattered) and, more recently, to develop data and analysis associated with what happens when students learn. Bottom line: a combination of practical evaluation needs and basic curiosity.

I had several absolutely rotten, poor instructors in my science and mathematics courses as an undergraduate and as a graduate student. While in graduate school, as a TA, I was asked by two-three professors to guest lecture while they were out of town at meetings. I was determined to present a better lecture than the professor so I prepared, planned, did demos, etc. The students told me I was ten times better compared to the professors, however, the students performance on the exam for the topics I lectured on were the same as the other topics. I was struck with disappointment. I then went to a science

education meeting in Indiana and heard J. Dudley Herron's presentation on Piaget's Theory of Intelligence. That did it for me.

To be an excellent teacher by way of creating activities for students to do so that they might have a good chance at learning the material. A chance to influence other chemistry instructors to use effective methods in teaching and learning. Recently, I hope to be able to elevate the field of chemical education research. One way of doing this was to get the ACS to have an award for excellence in chemical education research. Another way is to have JACS publish a CER paper

Well, I have a rather different career trajectory than most of my colleagues in that I began as a high school science and math teacher. I earned my MS in chemistry (chem ed research), then PhD (in p chem). I had to decide whether I wanted to race after research dollars in p chem or return to something that I actually had some enthusiasm for (did I actually write that?). So, I returned to pursuing questions related to learning and teaching in chemistry. I love physical chemistry, so that is the niche that I have worked in for the majority of my career.

I think in my first five years I naively believed that one could carry out research that would have a wide national or even modest local impact. I now realize that change is very, very incremental in most cases (PLTL aside). So I now am ready to settle for pursuing research that would perhaps have as its impact colleagues who consider teaching differently--in ways that would help their students learn.

2. 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)?

My teaching responsibilities are the same as other research active faculty – one course per semester. I have a research group of three Ph.D. students who are funded from research grants. My service load is much higher than a traditional faculty member, I am the undergraduate coordinator responsible for scheduling, advising, curriculum – basically everything to do with undergraduate education in the department. I also have a joint appointment with Education.

I nominally have the same responsibilities as any other faculty member EXCEPT my appointment had additional service written into the contract (gen chem coordinator, liaison with programs, undergraduate recruiting and retention, etc.). Even though we have created a chemical education graduate seminar and graduate course, I have never been able to offer them since we don't have sufficient faculty in the dept. (Because of retirements and other attrition). So I have only taught large intro courses or our graduate orientation course.

When I started my teaching load was defined to be 4 courses per year while the rest of my colleagues had a load of 3. I achieved parity about 3 years later when I had an outside offer. Now my load is formally 1 and 1, roughly equivalent to the top science

researchers in the Dept. (although this year, because of on-campus committee work, I have a 0 and 1 load.) I have traditionally had a heavier service load than most of my colleagues, and that continues today, even though I have a larger national service load as well. Aside from the added service, my teaching and research load is similar to my colleagues, and my research explicitly includes both Computational Chemistry and Chemistry Education Research.

All of the above. You left out forming and maintaining networks of faculty and K-12 (well, high school) teachers. These are more than a task; they are my educational research and practice community. I have basically got enough grant dollars that I have only to teach one full course a year, but the problem is that I want to teach more than that.

I am the Coordinator of General Chemistry - takes 6-8 hours per week. I do have two associate Coordinators of Gen Chem that do a lot of work. I am expected to run the general chemistry program so that NO problems get to the chair. Heavy teaching load - teaching large gen chem courses. I can teach one grad course every other year, but I do this on top of my "normal" load. Heavy academic advising for undergrad chem majors and for chem majors who want to go into teaching. Responsible 100% for TA training. Am expected to publish two papers per year and to acquire on average \$50,000 per year in grants. I have a chemical education research group that consists of one undergrad, three graduate students. I do all of the AP Chemistry decisions on chemistry lab credit. I used to be the academic advisor for the chemistry club. I serve on three chemistry department committees, one College level committee, and University level committee. I am in charge of undergraduate scholarships. I am the one who gets all of the odd ball questions about chemistry from civilians and citizens of Iowa directed towards our department. Example, "You chemists have it easy in your ivory towers, why can't you do something useful like reduce the hog odor problem we have in this State." I have to be diplomatic in all of my replies. I am expected to have a national and international reputation in chemical education.

I teach 3 classes each semester. Many semesters I have zero research time assigned, or less than 1.0 hours. I should also add that this is during a time when I have active NSF grants. I advise the teaching majors and attempt to direct research chemical education (when the time allows). I wish I had more time to direct research. Currently I have one masters student.

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

More service to the university and the department

I took on other undergraduate responsibilities and was asked by the chair (3 years ago) to consolidate them and became the dept's Director of Undergraduate Studies. This was done so I could get "credit" for what I do but as best I can tell, there is little or no reward for this. It is a vice chair position but there is no release or remuneration other than what

I should get a merit time. But service is at the end of our list (research or scholarship, teaching, service).

The main thing is service. This factor takes the form of identifying the "first responder". Whenever the Department is asked about matters curricular or educational, I am called in and often am deemed the only person capable of answering the question. This results in a relatively large ad hoc service load, in addition to a relatively large formal service load. Originally, I was also expected to take on the large lecture sections of the introductory chem classes so that my colleagues wouldn't have to - but now I no longer teach those classes very often.

In some ways, we are all equally responsible for doing what it takes to maintain an nationally recognized program in our area. They have to supervise a group of a dozen or more in the lab (all who are in "their group"), I have to manage a group of a dozen or more in different persons in different projects, few if any who are in my Department research group. That may change...I may have more of a research group, but the network of collaborators is the biggest task difference for me. I long ago shed the mantle of having to do the general chemistry program.

I am one of two faculty members in my department who can be sent to a meeting outside our department and represent our department well, i.e I do not create problems or messes for the chair to deal with. I have a heavier teaching load in terms of numbers of students - I am expected to teach the large general chemistry courses (n = 900). I am expected to be present at and or work/organize all "science education" type events or science teacher events- Science Fair, Science Bowl, Chemistry Olympiad, etc. I am one of three people in our department who can do tours for prospective students and their parents, i.e. recruiting undergraduates. I am one of three faculty called upon to make presentations to potential donors.

I advise the teaching majors (I cannot even begin to explain the new assessment system put in place by our Teachers College. It is a borg like behemoth that seemingly was developed to impress NCATE. Because of that assessment effort I have spent a good deal of time interfacing with campus committees that deal with teacher preparation). I handle the seminar speakers (recruit them, plan their visits, shepard them around, many years this occurs with little to no engagement on behalf of other faculty). I work with my chair on a national grant that requires a good dose of science education expertise.

4. What positions have you held and do you currently hold in your department?

Alumni Distinguished Professor, Professor, Associate Professor, Assistant Professor, Undergraduate Coordinator, Director of General Chemistry, Director of Laboratories.

General Chemistry Coordinator (current, although I am on academic leave and have a 50% admin position). Director of Undergraduate Studies (on leave from position for this

academic year since I am on academic leave for that 50% of my job). Director of the campuswide Center for Teaching (a 50% appt, faculty development--this part pays something)

I started here at UWM as an Associate Professor with tenure in 1994. I have been the Director of General Chemistry since that time. I was Assistant Chair (the person largely responsible for the undergraduate program) for 3 years - I stepped down when I became Director of the Exams Institute. I was promoted to Professor 2 years ago. While it is not in the Department, I am currently a member of the University Committee - which is effectively the Executive Committee of the UWM Faculty Senate.

Coordinator of general chemistry, 1992-2000 and 2003-4; Acting Head and Head, 2000-2005

I am a Full Professor with tenure. I have a chem ed research lab and a chem ed research office in addition to an office in general chemistry. I have a courtesy appointment in the Department of Curriculum & Instruction.

Assistant prof, then Associate, and now Full Professor

5. 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).

Career prospects are not significantly different, the only difference is the joint appointment with education so that I could direct graduate students in that area. We do also have a Ph.D. program in chem. Ed in the chemistry department – which was a long time coming. I have been approached by a number of other universities about moving.

Prospects are very good. Many schools have been looking at hiring chem ed people including research schools, comprehensive universities and four year schools. I feel that I am more mobile (from the perspective of potential opportunities not personal situation) than ever. I have been asked by members of our College of Education about a joint appointment but have not pursued that (yet)

When I assumed the role of Director of General Chemistry here, it had not previously existed. This allowed me to define that role, and largely resulted in my having a career trajectory that was similar to my colleagues in the Department. Expectations for publication and grant writing are similar. My approach, with explicit scholarship in education research has helped this department figure out what a Chemical Education Researcher would "look like". This points to one of the two primary differences - I have no CER colleagues in my own Department. Fortunately, the CER community nationally converses regularly via electronic communication and I have the resources to travel and meet with my CER colleagues regularly. This allows for sporadic respites from the relative isolation of being the only Chem Ed person in my department. The second main difference is that I currently only have Masters students in CER (all my PhD students are

in Computational Chemistry.) This is set to change, as the Department voted to allow CER to count towards the PhD in Chemistry once I get the program details in place.

No difference. They know I am different in my activity. I'm only now getting around to figuring out how to do graduate education the way I want, with a critical mass on campus. That involves other departments, though.

Acutally, I've been promoted in a timely manner with ease. In part that's because I have gone after NSF money and become engaged nationally. So I go to national ACS meetings regularly something no one else in my department does. As for career prospects, I have been wooed (invited to apply to) by R1 institutions when positions are open. I am somewhat geographically constrained, but that said, I feel like I have as good of career prospects as my colleagues or maybe better. As for what I can do in my own department, I've gone about as far as I can go. I don't have much desire to become an administrator, and our university has not engaged in a way that will allow us to have any impact on the future of science education in our state.

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.?)

I do feel isolated and unappreciated sometimes, I am the only person in the department at present with a focus on education and so everything that is remotely related to undergraduate education falls in my lap. However, I get the same financial support and access to resources that other faculty get. I get far more respect when I go off campus – or at least away from my department – upper level administrators do seem to value what I do.

My department and colleagues still struggle with chemical education research and scholarship. For example, I have been involved with several books. By some of my colleagues standards, textbooks and books about teaching are teaching activities not scholarship. But at least a third of the 28 faculty strongly disagree with that notion and the rest are somewhere in between. The culture in our dept is to be self-sufficient. There are few, if any, communal resources. But I am treated like all others. We receive (a small) part of our indirect costs, there has been some block allocation of RA (research assistant) money spread around and some travel money too. I have not used the latter two since I have been continuously supported (summer support for me since I have been here, grad student support, travel, supplies, etc.)

I receive the same allotment from Dept. resources in support of my research regardless of whether students are Computational or CER. We have a Carnegie Center for the Scholarship of Teaching and Learning, which I believe is not as rigorous as the way I approach educational research, but does provide some resources (I obtained student summer support from them one year, for example.) As I have shown that I can write successful grants, the "second class status" as primarily a teacher has slowly waned, but it has taken essentially 10 years to beat back that attitude. (I have just recently been granted my "Department Office" on the 3rd floor instead of the 1st floor "teaching ghetto".) I got a startup package that was 10% of what anyone else got. Of course, I

didn't have to build a lab, but that was a big difference. And I am more likely to get faculty colleagues in other departments than in chemistry.

They do not. Example, I asked to be nominated for an Award for Excellence in Research. The chair of our awards committee told me that the award was for real research, not the type of stuff that I do. Others in the department needed it more than I did. We have lost a physics educator researcher and a biology education researcher. The Dean and Department Chairs have no plans to hire replacements. They want to hire "regular" research faculty. I receive no resources from my department or the university. No travel money, no money for phones, paper, etc. I pay for all of this from my grants.

Well, I don't think that its valued for two hoots. My NSF research support does not lower my teaching load or get me more assigned time. My visibility at the national level means little to my colleagues. The fact that I serve on national committees, get invited to NSF conferences, have been a GRC speaker is lost on them--it literally has no impact. What does matter here is mentoring undergraduate researchers. However, there's no tie to actual scholarly productivity. So we have colleagues who mentor lots of undergraduates but publish very little (as in less than one paper in three years) peer-reviewed scholarship. Also, they have very little outside research support, as in none