

Responses to Guiding Questions for Administrators

Workshop on Education Research Positions in STEM Disciplinary Departments

From Chris Gould, Associate Dean for Administration for the College of Physical and Mathematical Sciences and former head, Department of Physics, North Carolina State University

Subject: Synthesis of discussions and exchanges with Dean Dan Solomon (College of Physical and Mathematical Sciences), Associate Dean Richard Keltie (College of Engineering), Associate Dean Ken Esbenshade (College of Agriculture and Life Sciences), Loek Hemmick (Interim Head, Mathematics), Sastry Pentula (Head, Statistics), Ken Hanck (Past Head, Chemistry)

Background:

NC State has a total enrollment of about 30000 students, predominantly in engineering, science and technology curricula. The numbers in basic science and math courses are substantial: Math teaches about 12000 students per year, chemistry about 9000 per year, and physics about 6000 per year. Math, chemistry, physics, statistics and MEAS departments are housed within a College of Physical and Mathematical Sciences When formed in the 1960's the College was primarily focused on undergraduate service teaching. But the mission rapidly evolved to include graduate teaching and a strong research agenda. Today all faculty who are hired in tenure track positions are expected to develop significant research programs, to publish in the appropriate scholarly journals, to advise graduate students, and to generate external funding consistent with the national norms in their specialties. To cover teaching needs as the research inactive faculty have retired, and in the face of rising enrollments and shrinking budgets, Departments have adopted a number of the strategies seen everywhere: hire lecturers on year by year appointments, hire "teaching assistant professors" or "professors of the practice", move to larger and larger sections

But mindful of the educational mission of the institution, departments have also focused on quality in innovative ways: developing new instructional methodologies, developing new curricula and text book materials, developing new laboratory experiences, increased use of web-based technologies for testing and assessment. And in the physics and chemistry departments, much of this work was lead by faculty whose research area was education in the disciplinary area.

1. For what purpose(s) did you create one or more educational research positions within your department? For what purposes did departments within your school create these positions?

At NC State, these positions have been created in Physics (3) and in Chemistry (1). The original motivation in chemistry was to match perceived existing positions in big-10 schools, to bring the NCSU program more in line with the aspirational peer group. The original motivation in physics was to address a teaching need in the instructional laboratories. This rapidly evolved with the realization that physics education research was emerging as a legitimate area of scholarly activity which could also have real impact on the teaching mission of the department. For both Departments, the positions keep the spotlight on the educational mission, institutionalizing a commitment to innovation in the classroom. And it's good public relations too. The presence of education research

faculty, in these regular full time positions, counters the (erroneous) public perception that in research universities, undergraduate education is getting short shrift.

1a. What was your "theory of action" about how to achieve these purposes by creating educational research positions or by supporting departments that created such positions?

Both physics and chemistry started with the assumption that the faculty hired in these positions would think of themselves as the same as faculty hired to pursue disciplinary research areas. We expected them to be creative, to generate scholarly activity, and to impact the teaching mission of the Departments. In physics we had minimal ground rules (first hire was to do something about the labs, second hire was to get a graduate program going, third hire was targeted at reforming the content of the calculus based physics course). I'm not sure we even cared so much as to whether they were charismatic teachers who would automatically win teaching awards each year. (As it happens, they have in physics, but that was not at all the primary objective). As with any faculty hire, the Department should provide supportive mentoring, and foster the expectation of success. In all cases the faculty have gone in creative new directions that were not at all anticipated in the initial discussions.

2 What challenges have you encountered in establishing and supporting these faculty positions, both institutionally and culturally?

The biggest challenge to establishing these positions lies within departments themselves. Upper level administrators (even the Board of Trustees), seem to understand well the value of these faculty positions to the institution. At the Department level, competition for scarce faculty slots, and the need to get teaching covered, creates pressures to focus more on hiring lecturers or adjuncts. I think a strong department head can overcome this with support from the Dean. Once hired, the faculty have to fit in with all the standard metrics of success. Funded research probably dominates here, so it's critical that there be good opportunities for competitive peer-reviewed grants. If publications, conference talks, grant support, and external recognition are there, then the faculty will be accepted fully, and will sail through the promotion and tenure process. In fact, the toughest hurdle will likely be getting out of the Department. The PER and CER faculty who were hired untenured, gained tenure without difficulty.

Mathematics has had joint positions (2) with the college of education for a number of years. The focus was more on K-12 compared to college level. These faculty members are close to retiring and the Department is debating whether and how to fill these positions. The Department Head has said he would like to continue these joint positions. He's concerned that an untenured faculty member would today have a hard time making it through. He speculates the best way forward for him at present would be to hire a tenured more senior faculty member. He also said it would work better if the math education program was in the math department (cf Arizona State) as compared to being in a separate college.

Statistics has hired teaching assistant professors in recent years. They are not tenure track, but technically have longer term contracts than lecturers and in principle, more status. They teach more than regular faculty, but otherwise have similar duties. The College of Agriculture and Life

Sciences (CALs) also has a number of these positions. Promotion and performance criteria for these positions are not as well understood institutionally as they are for standard tenure-track faculty.

3. What lessons have you learned about these new positions? How have you addressed or do you plan to address the unique challenges associated with these positions?

The most important lesson is that these positions have to be treated exactly like positions in standard disciplinary research areas. They should have the same duties, the same expectations for performance, and meet the same criteria for promotion and tenure. It is important however, that faculty members in these positions have an impact on the broad teaching mission of the Department. So there is an additional burden to reach out that's not there for, say a researcher in astrophysics or nanoscience.

4 Do you plan any steps to increase/decrease such positions or to provide less/more support for departments that have such positions?

This is the hard question. The budget and enrollment pressures at NC State do currently seem to be driving departments more to hiring lecturers and teaching assistant professors, compared to investing tenure track lines in disciplinary education research. Nobody thinks this is the preferred route. A number of people are worried even that it is not a sustainable model for maintaining the concept of tenure.

Upper level administrators clearly do support fulltime regular tenure-track positions in disciplinary education. As mentioned earlier, the resistance may come primarily from departments themselves, particularly where there's no track record to indicate the positive benefits. At the risk of invoking the standard solution – give us more money – I could speculate that bridging support (say ½ salary for 3 yrs) from a federal agency could seed these positions more broadly and get Departmental buy in. I was able to hire 14 new people over the last five years, by taking advantage of multiple half-salary deals on and off campus.

National workshops for new faculty, sponsored by the American Association of Physics Teachers, have also had an impact in bringing Physics Education Research work to the fore front of the Research I university faculties. These have been held for nine years now. About 700 faculty have attended, from about 2/3 of the research universities. I believe these have helped bring about broad acceptance of PER as a real discipline, and have helped make the case that faculty hires in this area are not risks, but are instead worthwhile investments.