Laying a Foundation: Best Practices for Engaging Teaching Faculty in Research Computing Departments

By Penny Rheingans, Dan Grossman, and Jeff Forbes

Executive summary

To achieve their educational mission, computing departments at research universities increasingly depend on full-time teaching faculty who choose teaching as a long-term career. This memo discusses the need for teaching faculty, explores the impact of teaching faculty, and recommends best practices.

Essential best practices for departments include:
- Departments should provide teaching faculty with equitable rights and resources, except in limited areas where differing job responsibilities make that inappropriate.
- Departments should encourage teaching faculty to be equal and active partners on projects and committees with the goal of contributing to the department's educational mission.
- Departments should set course, preparation, student, and service loads of teaching faculty at a level that allows for innovation and quality instruction.
- Departments should advocate for titles for teaching faculty that include the term *professor* in order to best convey the professional status, substantial contributions beyond the classroom, and long-term commitment of teaching faculty.
- Departments should provide teaching faculty with professional development and career advancement opportunities to support their advancement and success.
- Criteria for evaluation and promotion of teaching faculty should be clear and explicit, with clear articulation of expectations beyond quality classroom teaching.
- Teaching faculty who are meeting or excelling in position expectations should have job security. While tenure for teaching faculty (either in name or practice) sends the strongest message about their role in the department, rolling multi-year contracts can alleviate the disruption and uncertainty of year-to-year arrangements.

Terms and Scope

Academic departments of computing at research universities have long included *teaching faculty*, whose focus is more on the educational mission of the department than that of more traditional faculty*,* called *research and teaching (or R&T) faculty* in this document. We choose not to use the term "tenure-track faculty" in order to recognize that teaching faculty may be eligible for tenure or its equivalent.

Despite the near ubiquity of teaching faculty, practices defining their work environments vary substantially across institutions for nearly every aspect of faculty life: titles, advancement, length of appointments, career support, voting rights, teaching load, etc. The purpose of this memo is to provide administrators of computer science and informatics departments, schools, and

colleges (called *computing departments* in this document for brevity) with guidance and perspectives on these topics. It is based on a wide information-gathering process including survey invitations and in-person discussions involving CRA-member department heads, teaching faculty, and other members of the academic computing community.

We focus on *full-time* faculty, with the assumption that such faculty intend to make teaching computing at a research university a long-term career choice. Naturally, there is a continuum of less permanent positions for adjuncts, postdocs, visitors, etc., either to fill short-term needs or for practitioners to contribute part-time toward a curriculum. Best practices for such part-time and/or temporary faculty are not our focus.

This document contains three subsequent sections. The first discusses why teaching faculty are critical to computing departments in a way not typical of departments in other disciplines. The second addresses the qualifications, contributions, and impact of teaching faculty. The last section makes recommendations for best practices in research departments.

Computing's Unique Need for Teaching Faculty

Computing is not the only discipline with full-time teaching faculty in research universities. Therefore, many relevant policies and issues related to faculty roles are defined at the institutional level and transcend discipline. However, it is crucial to identify and appreciate several ways in which the role of teaching faculty in computing departments is different from that in other units at a research university and, therefore, may warrant different policies and approaches. This role is also different from that of R&T faculty, with a greater emphasis on the education components of department mission. We call out three particular reasons that teaching faculty are essential in computing departments.

First and foremost, a majority of computing Ph.D.s take jobs in industry, leaving fewer qualified candidates for available academic positions. Computing graduates at all levels have ample employment opportunities with high salaries. While the current enrollment boom and technology surge have made these features more pronounced in recent years, they are *not* a passing phenomenon: Most computing departments have long relied on teaching faculty — with their focus on education and higher teaching loads — to meet a critical part of their educational mission.

Second, the computing curriculum evolves more rapidly than in many disciplines. This increases the need for faculty to stay at the forefront technically, adapt to changing introductory programming language selections, address a rapidly changing landscape of students' high-school preparation, respond to increasing interest in computing from students in other fields at all levels, and incorporate new best practices in computing education for engaging all students, particularly those from underrepresented groups.

Third, the role of computing is increasingly recognized as essential to a broad university education, including offerings open to non-majors and as an integral part of general education. Models for how to best integrate computing with the broader university are still needed.

Characteristics and Impact of Effective Teaching Faculty

The typical computing department at a research university has a handful of teaching faculty members who love what they do — interacting with students, helping shape a rapidly evolving curricular space, and contributing to the maturing practice of computing education from positions in which they contribute primarily to the education mission. When best practices are followed, this specialization is valuable both for the university and the faculty member. Teaching faculty in computing are often shining stars on campus (and nationally), as they frequently serve as the "face of the department" for the many students taking the high-profile introductory courses.

Preparation Paths

The roles of teaching faculty vary widely across institutions and departments. Accordingly, the professional preparation paths that teaching faculty follow vary substantially. Some faculty have preparation similar to what is expected of R&T faculty such as a Ph.D. in the discipline. Other faculty are well prepared to teach undergraduate courses with a Ph.D. in computing or engineering education, a non-terminal degree such as a MS in computer science, substantial industrial experience, or substantial experience teaching at the high-school level.

Job Titles

Since there is a great deal of diversity in the preparation, role, and responsibilities of teaching faculty, one size of title won't fit all. The job titles for teaching faculty differ by institution and expectations. Teaching faculty report that titles are meaningful and can impact how teaching faculty are viewed from within and outside the department, as well as highlight opportunities for advancement and recognition. Job titles should accurately indicate the scope of contributions expected from a faculty member, the degree of commitment between the university and the faculty member, and the experience level of the faculty member. Titles including the term "professor" and offering a sequence of levels (for instance, assistant, associate, full, and distinguished) should be used for positions with an expectation of a long-term commitment and substantial, ongoing contributions to the department and institution.

Impact

Effective teaching faculty can have substantial impact on a department's educational mission and visibility. While most faculty teach, teaching faculty have a particular focus on teaching excellence and innovation. That passion and emphasis on engaging students is particularly crucial in a field where very large introductory courses are increasingly common, requiring pedagogical best practices in order to engage students in a potentially isolating atmosphere as well as to develop and manage large student staffs. Since teaching faculty often are responsible for teaching introductory courses, they play a pivotal role in broadening the participation of underrepresented groups in computing. Furthermore, their role is especially critical because many students do not discover computing until college and many career decisions are made by students during their first year based on how well they learn and how welcomed they feel in these introductory courses. The impact of teaching faculty goes beyond the classes they teach. Teaching faculty in computing departments advance curriculum development and further

national advocacy and visibility on issues connected to computing education. With their expertise, teaching faculty perform service on a variety of issues related to students and education. Teaching faculty may engage in the scholarship of teaching and learning — applying and developing evidence-based methods for effective teaching and student learning in computing. Teaching faculty can connect their department with the international computing education community.

Commitment

While adjunct instructors on short-term contracts can fill holes in teaching schedules and bring unique perspectives to campus, the contributions that full-time teaching faculty make require the stability and long-term planning available to faculty in tenurable and/or multi-year positions.

Best Practices for Departments

Department policies and practices should support the productivity, development, and professional satisfaction of teaching faculty. Such an environment reduces turnover, increases departmental stability and efficiency, allows R&T faculty to better balance their time between teaching and research activities, and enables teaching faculty to make the greatest contributions to their departments. **A first principle for best practices is to treat all faculty, both teaching and R&T, as full-fledged faculty, differentiating treatment only in specific areas where job expectations differ substantially.** A corollary to this principle is that teaching faculty should have autonomy over their responsibilities in a manner parallel to that of other faculty.

Role in Teaching and Curriculum Enterprise

Teaching faculty can contribute most fully if they participate in all departmental education activities rather than being limited to introductory courses or delivery of established courses. Full participation includes opportunities to teach upper-level courses and electives, teach graduate courses (if qualified and interested), update established courses, engage in new course development, serve on and lead departmental curriculum committees and initiatives, and innovate in classroom approaches. A variety of different challenges is important for sustaining engagement, especially for experienced faculty.

Contributions to Broader Department Mission

Teaching faculty constitute a valuable resource to support department goals through contributions that extend beyond classroom teaching, providing departments with valuable and expert service and teaching faculty with additional opportunities for creative contributions and professional growth. These supplemental activities include service on department or university committees, membership in student thesis and dissertation committees, supervision and development of student course staffs, advising of student groups, mentoring of other faculty, leadership through administrative roles, engagement in computing education research, and participation in outreach initiatives. Some supplemental activities may be so substantial as to benefit from or require a reduction in teaching load in order to accommodate the time required. Not every teaching faculty member will make each of these contributions, but each should make some of them, with scope increasing as they advance in their career.

Workload Expectations

Teaching faculty can be most effective when their course, preparation, and student loads allow for innovation and quality instruction. In a 2015 survey of CRA member departments, average loads for teaching faculty were about twice the number of courses per term as R&T faculty. This level reflects the fact that teaching faculty were usually not expected to engage in research at the same level as R&T faculty, but does not necessarily allow for substantial contributions outside the classroom. Measuring workload solely in the number of courses, however, can fail to account for the load created by very large courses. Workload expectations should consider the number of course sections, the number of unique preparations, the number of students, and expectations for the supervision or coordination of others. Time and funding for curriculum and tool development should be made available as appropriate.

Benefits

Teaching faculty can be most engaged and productive when they are treated as valued and respected members of the department, with rights and resources commensurate with their responsibilities. Salaries for teaching faculty should reflect their central role to the mission of their department. *Teaching faculty should be provided with the same resources to accomplish their teaching responsibilities as other faculty.* These resources include offices, laptops and other equipment, teaching assistants and graders, technical support for classes, and the ability to express teaching preferences. *Similarly, teaching faculty should be broadly included in faculty governance on matters related to their roles in the department*, including participation in faculty meetings, voting rights on matters impacting the education mission, inclusion in evaluation of the teaching performance of other faculty, and input on hiring decisions. *Lastly, teaching faculty should be first-class faculty with respect to workplace benefits* such as sick leave, retirement planning, child care, parking, housing, etc. Departments should be particularly mindful to avoid decisions that send indirect signals of second-class status such as excluding them from the "main" list of faculty or putting their offices on a different floor.

Professional Development

Students, teaching faculty, and departments all benefit when teaching faculty have access to the professional development opportunities they need to stay current with technical content, learn about computing education research, develop relevant leadership skills, and pursue personal career goals. *Departments should support professional development of teaching faculty* by providing structured on-boarding procedures; mentoring programs for faculty; funding for conference and workshop travel, teaching circles or other cohort programs; infrastructure for a community of teaching-focused faculty; and sabbaticals or other time to concentrate on professional development. There are vibrant national and international communities that host conferences, provide formal and informal mentoring, and advocate for change in computing education. The participation of teaching faculty in these communities is important for the development of individual teaching faculty, the diffusion of best practices to departments, and the cultivation of a national conversation about computing education. Note that opportunities to keep technical skills current and opportunities for improvements in pedagogy may or may not overlap, but both are important.

Evaluation

The responsibilities of teaching faculty are different from those of R&T faculty, making the traditional research, teaching, and service metrics used to evaluate R&T faculty not entirely appropriate for evaluating teaching faculty. *Teaching faculty should be evaluated for their contributions to innovative instruction, educational leadership, and the scholarship of teaching*, instead of primarily technical research. Examples of these contributions might include new course or curriculum development, textbook or online course authorship, educational tool or system building, educational resource curation, activities to promote the professional development of others, outreach to strengthen and diversify the computing pipeline, service on government and professional committees and boards, and publication of education-oriented research. Student evaluation of teaching is commonly used, but there are a number of potential challenges to its validity as a measure of how well an instructor produces learning outcomes for a given student population, as well as well-documented issues with bias. *Because teaching effectiveness is so central to evaluation of teaching faculty, evaluations should consider more than student input, as well as provide guidance on how to improve.* Possible approaches for evaluating teaching effectiveness include review by other faculty, input from staff of teaching and learning centers, and examination of teaching materials and products.

Job Security and Advancement

Teaching faculty can best have a stable and productive career in a department when they have both job security and a path for advancement. Universities such as those in the University of California system have recognized the importance of teaching faculty by creating a track for teaching faculty designated by Potential for Security of Employment that offers job security much like that of tenure, as well as a path for advancement. *As a core principle, security of employment for teaching faculty should flow directly from the successful execution of explicitly articulated position expectations.* Other practices to increase job security and growth opportunities include multi-year contracts with decisions to renew (or not) made with ample time for career planning, the possibility for differentiated opportunities based on educational and professional background, and multiple position levels with clear promotion paths.

Conclusion

Teaching faculty in computing departments at research universities have long been the norm, but the field has been slow to coalesce on common expectations. The best practices outlined here are designed to benefit everyone: teaching faculty, other faculty, students, and administrators. These best practices recognize the unique and complementary role that full-time teaching faculty play in the educational mission of the academic computing-research community.

Other Resources

- The CRA Taulbee Survey (https://cra.org/resources/taulbee-survey/) reports data on current salary data for teaching faculty.

- The National Academies has reported on booming enrollments in computing and strategies for addressing them (https://www.nap.edu/catalog/24926/assessing-and-responding-to-the-growth-of-computer-science-undergraduate-enrollments).
- Examples of department profiles, policies, and practices and resources from the teaching faculty community will be forthcoming.

CRA Committee on Best Practice for Teaching Faculty at Research Universities
Members include Betsy Bizot (CRA), Michelle Craig (University of Toronto), Susan Davidson (University of Pennsylvania), Jeff Forbes (Duke University), Dan Garcia (University of California, Berkeley), Dan Grossman (University of Washington), Penny Rheingans (University of Maine), Mary Beth Rosson (Pennsylvia State University), and Mark Sherriff (University of Virginia).

Approved by the Computing Research Association Board of Directors, July 2018.