

Developing Graduate-Undergraduate Neuroscience Connections

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This past year I had the pleasure of developing a grant proposal entitled, "The Faculty for Undergraduate Neuroscience Post-Doctoral Residency Program." The concept entails establishing a national network of post-doctoral training positions in undergraduate neuroscience programs. The residents and the training sites would be selected through competitive applications. Regardless of whether the proposal gets funded, its development was personally illuminating. However, it is not my personal benefit that is of particular importance. I collected a great deal of interesting information about undergraduate neuroscience programs, graduate neuroscience training programs and the ambitions of many neuroscientists in training that needs to be shared with undergraduate educators. The contents of proposals don't see much light outside of the room that houses the review panel. However, the *JUNE* readership may be interested in learning about some of the observations I made so that if not now, someone, if not me, can continue to work on the needs and interests I uncovered.

First, we, as undergraduate educators, can congratulate ourselves. As neuroscientists at primarily undergraduate institutions (PUIs) [how I hate that acronym] we are a dynamic educational force on many campuses. Gleaned from the programs I visited or otherwise know about, we are convergence zones of liberal arts activity, guiding students in creative scientific critical thinking and working cooperatively in interdisciplinary activities with our colleagues. I am sure we are aware of reports by both public and privately funded study groups prescribing that undergraduate education must increasingly provide hands-on experiences for undergraduates. Our colleagues are already doing so. The intrinsic interest students have in neuroscience brings them through our doors in great numbers and our professional training makes us willing and able to teach them and actively participate in our research. Although undergraduate research funding is hard to come by, many of us have been very successful in attracting it and we are also fortunate to have many administrators who recognize neuroscience's potential and devote as much campus resources to our programs as is feasible. Undergraduate neuroscience educators are pioneers. Virtually all of us are the first generation developers of our programs, carving out niches within natural and behavioral science programs. Our colleagues hold us in the highest esteem and wish it would be easier to attract more neuroscientists on the faculty. We have initiated many interdisciplinary programs and work not only with biologists, chemists and psychologists on our staffs, but also physicists, computer scientists and philosophers. The interdisciplinary *zeitgeist* of the times is a natural for us.

With these competencies, we should consider bearing some important responsibilities. Jerry Gaff, vice-president of the AAC&U, in several insightful articles characterizes a troubling "disconnect" between graduate and undergraduate education. Increasingly, graduate programs have only a laser-focused research mission. There are few incentives for graduate programs directors to develop concerns about undergraduate education other than when the time comes to find positions for their new PhDs, and then often dismissively. However, undergraduate programs need talented professionals who are not only well trained scientists, but also well trained educators that can roll up their sleeves and assume vital roles in developing scientific literacy and directing talented youth into scientific careers. In so far as neuroscience is prototypical of research oriented graduate education, it is as guilty as its allied graduate disciplines in maintaining this disconnect. Suggested remedies for the disconnect problem generally target graduate lab directors. It is suggested that graduate mentors need to seek ways to foster teaching as well as research skills. However, I've reached the conclusion that this is likely to be an ineffective solution. We need to consider seriously that undergraduate educators must be partners in solving the disconnect problem.

Why do we need to share the responsibility? For one thing, the *raison d'être* for graduate laboratories in neuroscience has to be research. Research pays all of the bills and supports the staff. With some notable exceptions (that it was my pleasure to meet) most graduate faculty regard their role as educators to be limited to those who they mentor in their lab. I did speak with graduate faculty who are committed to a broader educational role for graduate programs that would promote teaching excellence, however they admit it is sometimes difficult to maintain such a stance among their colleagues within their programs. In addition to a general lack of interest graduate faculty have in undergraduate classroom issues, there is also a logistical problem. Many neuroscience programs are located in medical school complexes set apart from the main campus. There are simply no undergraduate students around. Given the realities of funding and setting it is difficult to envision a wellspring of graduate program directors who would work on the disconnect problem. But, if nothing else, neuroscientists recognize the value of specialization, and it is time to consider that the specialists needed to reconnect graduate and undergraduate education are not graduate research faculty but those with the real educational expertise, undergraduate faculty. We are the ones, through our on-job experience, that know how to tailor the content of our field to those we teach and understand the challenges of conducting research in undergraduate settings. As a group, the FUN membership

populates institutions that have as their mission effective and innovative teaching. With our skills and experience we are the ones who can most effectively contribute to the professional training of new neuroscience PhDs who are interested in the dual roles of researcher and educator.

Are new PhDs interested in what we have to offer? From my travels to a variety of graduate program sites, there is no doubt that there is a large number of very talented graduate and post-doctoral students who are extremely interested in the residency training site concept I proposed. In fact, my interest in developing the proposal was initiated with the conversations I had with graduate students in post-docs in a variety of settings, one of which was the annual FUN social at the Society for Neuroscience meeting. Visits to several graduate sites during my travels were organized by highly motivated graduate and post-doctoral students who are part of a large cohort that is very vocally forthright about the lack of substantive teaching training through their programs. Altruistic offers of help to get a residency program initiated abounded. I am sure we are aware of the abundance of talent there is among the students in neuroscience graduate programs. If this talent is bottled up and unable to reach the general college population because of inadequate preparation for undergraduate faculty positions, it becomes a national problem.

During my visits I not only received enthusiastic encouragement from the students and young professionals interested in residency positions but also several graduate faculty who were particularly sensitive to the variety of training needs for their students and understood the disconnect problem. Several noted that the need for the teaching residencies I described is self-evident and are happy to see an attempt to develop a program to meet a very salient problem. They can serve as very important allies.

So during the process of my grant development activities I think I identified most of the needed dots – an ample supply of undergraduate sites that can provide exemplary training experiences, a substantial cohort of talented neuroscience trainees who would be interested in these experiences, and members of the graduate training faculty who recognize the need for such a program. What we as undergraduate educators need to do is experiment with ways to connect these dots. I've proposed a connecting pattern in the grant proposal I authored. Knowing the vagaries of funding agencies, I'll bear the outcome of the evaluation process with equanimity. However I encourage others to try also. There is a multitude of interested neuroscientists out there and they are begging for ways to find connections between neuroscience graduate professional training and neuroscience undergraduate education.

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