

Enhancing the Success of Early Career Faculty in STEM Fields During Uncertain Times

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Early-career faculty face numerous challenges when working to establish an upward professional trajectory, particularly those in STEM fields. Almost without exception, federal resources for basic and applied science have diminished since ARRA (American Recovery and Reinvestment Act) funding ended. As a result, the academic careers of many early-career faculty may be in jeopardy, particularly since federal grant funding is usually expected for tenure in STEM fields, and is often essential for conducting scientific research. Currently, many programs at NSF and NIH remain at funding levels that are at or below 10%.

Clearly, this presents some national challenges in determining how federal funding can be leveraged to maintain our national standing as a leader in scientific research. Alberts et al. (2014) recently laid out specific recommendations for how this may be achieved at the level of graduate training. This also presents local challenges within universities, since the investment in tenure-track faculty is often substantial (particularly in STEM fields), and the loss of faculty members through tenure denials is far from ideal.

In this article, I will not attempt to tackle the national problem of scientific funding since it is well beyond the scope of my own experience and expertise. Rather, I will provide practical ideas and insights into how academic leaders can help early-career faculty members attain their highest potential, as well as meet the current standards for achieving tenure at research institutions. These recommendations are based upon practices that had a positive outcome in my own career, as

well those of my closest colleagues who have become highly successful faculty members in their own right. Some of my recommendations come with little to no cost, whereas others may require resources and time on behalf of university leaders.

Although much of the success of early-career faculty is driven by their own desire to work hard and succeed, the university can also play a major role in facilitating the success of these faculty members. This is certainly true in my case, and I will provide insights as to how the University of Kansas helped me attain my goals. I have had a successful early through mid-career path, while raising two children with the support of a spouse who was also a faculty member in the biological sciences. I maintained continuous funding for my research through NSF, including a CAREER award. I also received the Presidential Early Career Award for Scientists and En-

gineers (PECASE) in 2009. I was also fortunate to have received an endowed position at the University of Kansas for early-career faculty, the Wohlgemuth Faculty Scholar Award, through a private donation. I have worked with the National Academy of Sciences as a Kavli Fellow for both the Arab-American and Japanese-American Frontiers of Science Programs.

These professional successes were due in part to an innate drive that many scientists possess to answer important questions, as well as the commitment to work hard to achieve these goals. Importantly, these successes were also due to factors beyond my own personal drive and ambitions, through a willingness by my university (University of Kansas) to provide tangible support at vulnerable points in my career when I needed resources and/or time to remain competitive in the realm of grant funding and research. These successes were also due in part to the mentorship of several senior faculty members and administrators that helped me to understand how the university works, and to make informed choices about how I spent my time and how I approached my scientific endeavors. Below I will describe several strategies taken by the University of Kansas that aided me, as well as my colleagues, in moving through the early faculty ranks. The majority of my closest colleagues include my spouse, as well as women faculty members in the biological sciences who also have substantial family responsibilities (e.g., raising of children, assistance with elderly parents, spouses who are also scientists), and who have been highly successful at receiving grant funding, gaining tenure, receiving national awards, and publishing articles in prestigious

journals. My ideas in this article are based on my own perspectives, as well as information that I gathered from numerous discussions with my closest colleagues on successful strategies for elevating the productivity and success of early-career faculty.

Practical Strategies for Enhancing the Success of Early-Career Faculty Members in STEM

1. Short-term teaching release to enhance the momentum of early-career research programs

Early-career faculty members are generally hired with traditional 40-40-20% (Research-Teaching-Service) appointments, and most already understand (or quickly learn) that course development and teaching are very time-intensive processes. This has become even more relevant over the last several years as more efforts have been made to flip courses and to reform approaches to STEM education. In my experience, the vast majority of early-career faculty members are committed to providing high quality teaching in their courses, and many invest time in teaching that extends well beyond the typical 40% appointment. When taken to an extreme, this can have negative consequences (sometimes disastrous) on the research programs of early-career faculty, particularly if the faculty member is unable to refocus their time through their own efforts, or from advice of a close mentor or departmental chair. Thus, an important component of the early-career transition is to effectively manage time, and be efficient at achieving an appropriate balance between research, teaching, and service. Department chairs should be quick to address these issues if they are not being achieved by early-career faculty.

There are, however, times when early-career faculty members would greatly benefit from teaching release for short periods of time (1-2 semesters) in order to enhance their research programs, and this may be essential to their success. This is not a recommendation that is intended to correct poor time management or work ethic, and these are rarely problems for successful early-career faculty members. Rather this recommendation is in response to the increased demands that are placed on early-career faculty members to produce competitive grant applications that will rank among the top 10% in the country (to allow for funding). In addition, this is necessary for developing research programs to a stage where funding is more likely, which includes publications in top-tier journals that are also becoming increasingly more competitive. In other words, I am referring to the needs of early-career faculty who are excelling at teaching and research, and would greatly benefit from additional time to devote to research. These are faculty who are most likely to produce a strong return on an investment made in their time.

My recommendation for short-term course release is based on two main factors: (1) it is difficult to attain one's first research grant from federal sources, and (2) it is even more difficult to compete for a renewal of ongoing research. Generally, in many STEM fields, faculty members are granted teaching release for their first semester in order to set up their research laboratory and this is a highly recommended practice. Teaching release may also be applied in cases of pregnancy and other family emergencies- and again, this policy is not only wise, but may be critical for the health of the individuals involved.

Here, however, I am recommending teaching release for early-career faculty to attain the momentum needed to sustain a long-term research career, and this may be best applied in mid- to late stages of the pre-tenure period. This recommendation comes when hours invested in research can range from upwards of 40-60 hours/week. This approach can also be coupled with the availability of bridge and/or seed funds that help promote acquisition of preliminary data for grant proposals. To allow for teaching release without adversely affecting students, there may need to be a temporary redistribution of teaching duties within a department. Such an approach allows for increased momentum of an already high-quality researcher, and this ultimately benefits students, since faculty members can bring the results of their own research into the classroom and can train undergraduate and graduate students in the practice of research within their laboratories through grant support.

A previous Dean of the College of Liberal Arts and Sciences at the University of Kansas implemented this approach with an amazing level of success. A number of early-career faculty members (approximately 7) requested teaching release from the Dean during a meeting to discuss how the early-career experience could be enhanced at the University of Kansas. Following agreement from the departmental Chair, the Dean granted permission for a one-semester course release for each early-career faculty member. This release was implemented across several years in order to allow for full coverage of courses. The outcome of this approach was the funding of two NSF CAREER awards, a PE-CASE award, and three additional NSF

research awards. Together, these successes also directly benefitted students at the University of Kansas since grant resources were ultimately used to support undergraduate and graduate research in faculty labs. Thus, when short-term investments are made to enhance time for research among promising early-career faculty, the outcomes can be dramatic, long-term, and beneficial to all constituents involved.

2. Opportunities for networking among early-career faculty to enhance research collaborations

The arrival of new faculty members (at all ranks) brings a multitude of new talent and expertise to a university campus each year. In many cases, new faculty arrive with knowledge of the newest challenges and approaches in their respective fields, as many had previously been focused on research and scholarship. Oftentimes, early-career faculty are eager to develop close networks with other colleagues that may be in different, yet complimentary fields. This may facilitate the formation of large multi-disciplinary teams that will eventually be highly competitive for large grants. Development of these networks can be particularly strong within new cohorts since all are adjusting to new positions at a new university, which presents a number of challenges that are best shared and discussed. In addition, these early-career networks can last many decades, and strong networks within cohorts can facilitate retention of faculty over the long-term.

There are relatively simple, yet highly effective, approaches that can be implemented to facilitate networking within new faculty cohorts. One ap-

proach that worked quite well at the University of Kansas when I arrived in 2003 was a series of introductory receptions for new faculty. These involved a number of units on campus such as the Chancellor's Office, the Provost's Office, the Kansas University Center for Research, Endowment, International Studies, a variety of centers, and Athletics. They included many different venues and styles, such as an informal buffet lunch, an evening reception with drinks and appetizers, as well as a tailgate party and tickets to a football game. These receptions tended to be well done, informal, and facilitated faculty interactions by having new members introduce themselves and provide a description of their scholarship/research. Then time was allotted for new faculty members to meet each other and to discuss their research in a social setting. By the time this series of receptions was completed at the end of the first year, most new faculty members knew each other well, and some had even begun to collaborate on research projects. There were also many lasting collaborations that initially developed from these receptions and that persist to the present day, and these groups often recall that it was simply a few "get-togethers" that allowed them to compile such highly productive teams.

Most likely, these receptions were initially meant as simply an informal welcoming tool, although in the end these produced some very notable outcomes.

I will expand on some of my own experiences with early networking as a result of these events. At several receptions, it became clear that a number of new faculty (at both early- and mid-career stages) had strong expertise in climate change research. This ranged from areas

involving geology, biology, and the social sciences. In response to this, the new faculty quickly organized as a team within the first two years to acquire funding from the W. M. Keck Foundation for development of a stable isotope facility that is required for climate change research in a number of fields. It is important to note that since hiring is usually done at the departmental and/or college level, it may not be obvious that new faculty from different academic units will be complimentary.

Thus these events are critical to allow for the organic organization of highly effective multidisciplinary research teams. I firmly believe that the successful Keck proposal would not have materialized if these new faculty receptions had not occurred. In addition, I have written two separate grant proposals with faculty colleagues outside of my department whom I met at these receptions. A number of my other colleagues have built similar collaborative projects following these early interactions as well. In my view, this is a very simple and inexpensive approach to enhancing multi-disciplinary collaborations beginning at the early stages of a faculty member's career. This likely worked because these receptions allowed natural bonds to build between faculty members rather than forcing these interactions, and faculty discovered that they did not have to look outside of the university to find the collaborative expertise that they needed for their research. Furthermore, faculty members in their first year tend to be more open to considering collaborations with other colleagues, and quite frankly, this is a time when faculty are more likely to attend university functions before becoming more isolated in

their own departmental and lab environments.

3. Engagement with the university through strategic service

Service expectations typically comprise 20% of early-career appointments at research-oriented universities. At the national and international levels, service by early-career faculty can be quite prestigious and should be encouraged, particularly when it involves serving on grant panels, STEM education reform, editorships, and planning national meetings or symposia. Along with this, service is required at the university level, and I will mainly focus on those types of service commitments here.

Within departments, there tends to be a movement towards minimizing hours spent conducting service for early-career faculty, mainly because this allows for greater time for teaching and development of research programs. I strongly agree with this practice, as the demands on early-career faculty can be overwhelming, and teaching and research productivity will be more heavily scrutinized when tenure decisions are being made. Thus, it is critical that for the service component that does exist, it should be carefully selected by/for the early-career faculty member such that these efforts are of value to both the university, and the faculty member alike. In several cases that I have observed at the University of Kansas and a number of other universities, early-career faculty were placed in service commitments that were not particularly important to the faculty member, or to the university for that matter. Such service committees tend to be characterized by ineffective leadership, unproductive meetings, and few tangible outcomes. Although these were most

likely honest attempts to “protect” the early-career faculty member from “excessive” service, this may place the faculty member in a position to develop poor leadership skills through example, may prevent potential access to senior faculty and administrative leaders, and may result in early-career faculty members devaluing the role of service on a university campus. Furthermore, when service resides only at the departmental level, the university loses the potential for new perspectives from its early-career faculty at higher levels. Thus, I would argue that service commitments need to be selected carefully for all faculty, but especially for early-career faculty members who have limited time to devote to these endeavors, yet have the highest potential to benefit from them.

During my pre-tenure years, I was engaged in numerous university committees that began with my election to the University Athletics Committee, and that grew to university strategic planning for research, trustee for the Kansas University Center for Research, and a number of Dean and Director search committees. In looking back, I likely overcommitted my time to university service, although I would never trade this experience due to the benefits it provided me. First, I became more effective at national service in my own field following service on these university committees. This was particularly obvious to me as I chaired the Frontiers of Science Program for the Japan-American Program (Kavli fellow) and helped to plan the Arab-American Frontiers of Science program. These programs require a high level of sensitivity in working with people from different cultures, as well as a high level of organizational skills, and I acquired these skills while

working with senior faculty members at the University of Kansas through university service commitments.

In addition, I was able to gain mentors at the highest faculty ranks (e.g., distinguished professors) as a result of serving on university committees. In a number of cases, these distinguished faculty members guided me to make better choices in my professional development, and were effective at helping me to more effectively manage my time. I am indebted to the mentors that I met through university service for helping me to become a better faculty member and to be more highly engaged within the administrative structure of my university. Such interactions also facilitated my involvement in the University of Kansas C-CHANGE IGERT program that was sponsored by NSF (PI: Joane Nagel) and that allowed me to gain a multi-disciplinary perspective on climate change issues through inclusion of the social sciences. All of these benefits were attained from having been active in authentic service roles at my university at a relatively early stage, and these have benefitted me to the present day.

4. Internal recognition for achievements made at early-career stages

Early-career faculty are often highly anxious about the prospects of gaining tenure, and this occurs among the most successful of STEM faculty in my experience. I would argue that too much energy is expended at this stage in worrying about tenure, and this is counter-productive for making progress in teaching and research, especially in uncertain times. This is also not beneficial to the health of the individual or the families involved.

To help rectify this problem, early-career faculty require excellent senior faculty mentors, and these mentors need to be clear if deficiencies exist that may block the candidate from gaining tenure. The mentor should then work with the early-career faculty member to overcome these deficiencies as soon as possible. On the other hand, when early-career faculty are thriving, and are clearly on a trajectory to gain tenure, it is imperative that faculty mentors convey this information to the candidate as well. There tends to be a culture within many departments that is hesitant to recognize achievements made at the early-career ranks. Perhaps this is because there are concerns that positive feedback in early stages of the pre-tenure period could eventually be used against the university if tenure is not granted. However, one needs to realize that competition at the national level for gaining grants and for getting research published in top-tier journals far exceeds the challenge of acquiring tenure at most universities when considering the success rates of each (although these factors are obviously not independent of each other).

As a result, the combination of excessive pressure while competing at the national level, matched with lack of positive feedback at the departmental level, can have severe negative consequences on the physical and mental health of early-career faculty. I therefore recommend that department chairs as well as senior faculty mentors be clear and fair at both ends of the spectrum by alerting early-career faculty when tenure is truly in jeopardy, while simultaneously recognizing the achievements of those that are likely to attain tenure and that are excelling in the pre-tenure period.

Along with excellent mentoring at the departmental level, the university can also provide mechanisms for recognizing outstanding achievements made at early-career stages among its faculty. For example, endowed chairs at the pre-tenure stage may be highly beneficial for retaining faculty through enhanced resources for salary and research, and may serve to elevate the confidence of such faculty members as future university leaders. Such endowments may also allow early-career faculty to get to know their donor in some cases, and these individuals may serve as additional mentors and sources of support for the early-career faculty member. In addition, early-career faculty members should be considered for university teaching and research awards, and their major accomplishments should be highlighted in media releases made by the university when appropriate. Overall, this allows the early-career faculty member to recognize that they are valued within the university, particularly when external pressures at the national level for research funding are possibly more intense than they have ever been. This may also allow a university to retain their best early-career faculty, and this is absolutely critical during uncertain times.

In conclusion, I have laid out a number of practical solutions (some obvious, maybe some not so obvious) that may be highly beneficial for enhancing the success of early-career faculty in STEM fields. If I have achieved my goal, readers who are early-career faculty should be shaking their heads in agreement that these represent at least some of the major issues (and solutions) that confront them. I also hope that I may have reacquainted readers that have not been in the early-career stages for some time with some of

the challenges that they experienced in the past, and introduced them to some new areas of concern and strategies for overcoming these concerns. My greatest hope is that this article will promote increased dialogue among administrators and faculty at a variety of career stages concerning the challenges that confront early-career faculty in order to enhance

the success of future cohorts of STEM faculty at research institutions in the United States.

References

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