

---

## **AC 2011-1660: TIPS FOR SUCCEEDING AS A NEW ENGINEERING ASSISTANT PROFESSOR**

**Stephan A. Durham, University of Colorado, Denver**  
**Wesley Marshall, University of Colorado Denver**

Wesley Marshall is currently an Assistant Professor of Civil Engineering at the University of Colorado Denver and co-director of the Active Communities Transportation (ACT) Research Group. He specializes in transportation planning, safety, and sustainability as well as urban design, congestion pricing, and parking. Recent research involves defining and measuring the street network and an empirical study considering the role of street patterns, connectivity, and network density in road safety and sustainability. Having spent time with the UConn Center for Transportation and Urban Planning, Sasaki Associates, and Clough, Harbour and Associates, Dr. Marshall is a native of Watertown, Massachusetts, a graduate of the University of Virginia, and he received his doctorate from the University of Connecticut. Dr. Marshall is also a recipient of the Dwight D. Eisenhower Transportation Fellowship and the Charley Wootan Award for best TRB paper.

# **Tips for Succeeding as a New Engineering Assistant Professor**

## **Abstract**

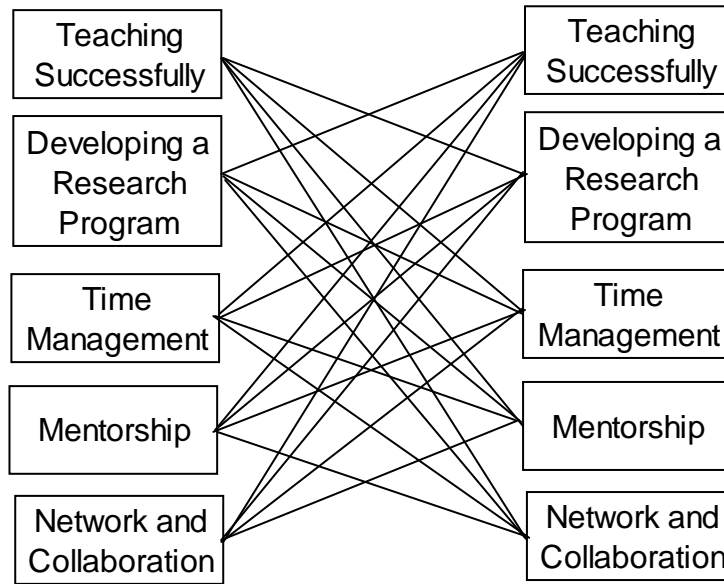
New assistant professors in engineering programs across the United States are being asked to accomplish more than ever before. The pressures of obtaining high levels of externally funded research, publishing quality journal papers, and advising and graduating master and doctoral level students – in addition to being a quality teacher in the classroom – can be overwhelming. This paper offers recommendations for new engineering assistant professors for succeeding as both a contributing member of the engineering faculty and as an engineering educator.

We as engineering educators are rarely provided with formal or even informal training in teaching courses. In fact, most new assistant engineering professors have not taught a course prior to becoming an assistant professor. Because of the lack in experience and training, engineering faculty must depend on help from teaching workshops and other university programs. Another strategy to help overcome this lack of experience is reaching out to senior faculty members for mentorship. Typically, senior faculty will be able to provide guidance not just with teaching and course development but also with student advising, grant writing and submission, service on department and university level committees as well as other important focus areas of a tenure-track faculty member. Many departments and universities have established programs in which junior faculty members are paired with senior faculty. They meet on a regular basis to monitor progress of the junior faculty and help answer any questions the junior faculty may have since the previous meeting. Teaching workshops such as the American Society of Civil Engineer's Excellence in Civil Engineering Education (ExCEED) also present great opportunities for tenure-track faculty in developing new and effective ways of teaching. Such workshops teach faculty about the different learning styles of students, how to engage students in the classroom setting, and methods of course delivery.

Some new faculty find balancing teaching with research and service a difficult proposition. New assistant professors should be warned against participating on too many professional, department and university committees. On the other hand, collaboration with other faculty on externally funded research should be encouraged. It is critical for new faculty to teach both undergraduate and graduate courses, in part because it can help them identify potential graduate students. These suggestions, as well as a multitude of others included in this paper, offer guidance on how to succeed and thrive as a new faculty member needing to obtain high levels of externally funded research, publish peer-reviewed journal papers, graduate students, as well as evolving into a high-quality teacher in the classroom.

## **Introduction**

Very few faculty members receive any formal training in becoming a new Assistant Professor. In fact, many faculty members end up having to learn as they go. With higher expectations of junior faculty than ever before and limited assistance in terms of training to become an engineering educator, new faculty members are placed under a great deal of pressure to succeed. New faculty members can benefit from a set of interconnected needs. The requirements of a new



**Figure 1. Interconnection of New Faculty Requirements**

faculty member, as depicted in Figure 1, include successful teaching, developing a funded research program, time management, mentorship, and network and collaboration. Each of these needs can benefit one another in several ways and is discussed in more detail throughout this paper. Recommendations include reducing course preparation time after the first course offering, maintaining a level of scholarly writing, incorporating research into the teaching curriculum, and mentorship have been noted in past literature (1; 2). These, along with other recommendations, are explored in this paper in an effort to assist new faculty members in starting a successful career in academia.

### **Lessons Learned**

Expectations of new engineering faculty are higher than ever before. Faculty are expected to publish in top tier peer-reviewed publications, obtain funded external research, advise undergraduate and graduate students, provide service to their department, college, university, community, and profession, and be effective teachers. Because of these high expectations, faculty are spending more hours during each week working on teaching, research, and service activities, often working late nights and weekends at the expense of personal relationships and their health. In addition, many new faculty have difficulty transitioning from graduate research assistants to assistant professors in terms of trying to evolve from the individual that designs and conducts experiments to the individual managing the graduate students that designs and conducts experiments). This section details lessons learned from past studies, interviews with other faculty, as well as personal observations on what distinguishes the successful from the not so successful new faculty members.

Observations by Robert Boice on faculty in their first 3-4 years are documented in *The New Faculty Member* (2). Boice classifies new faculty as either *typical new faculty* or *quick starters*. Characteristics of each faculty group are listed below:

### ***Typical New Faculty***

- Spent considerably less time on writing scholarly proposals and publications. Typically less time than needed to meet promotion and tenure criteria for their university.
- Went to class with too much material rushing to complete the class lecture at the expense of student participation. The *typical new faculty* member admitted to spending 30+ hours per week on class preparation.
- Taught their courses in a manner in which to avoid conflict with students. Concerned that students would complain about content errors in class lectures.
- Had student evaluation results that fell below their expectations and many times blamed these poor results on factors such as class size, schedule, poor students, inadequate rating system, etc.
- Felt isolated among other faculty and were unable to develop contacts that could provide a certain level of mentorship.

### ***Quick Starters***

- Spent at least 3 hours per week writing scholarly proposals and publications
- Incorporated their research within their teaching curriculum.
- Spent 1-1.5 hours per credit hour on course preparation per week after the first offering of the course.
- The pace of lectures was adequate to allow for active participation from students.
- Regularly sought advice from a mentor and/or colleagues. Averaged four hours per week on teaching and research discussions.

Based on Boice's observations, approximately 5-9% of new faculty fit within the *quick starters* classification. *Quick starters* were found to score in the top 25% of peer and student evaluation ratings of teaching as well as their personal satisfaction of being a teacher (i.e. they enjoyed the teaching experience). Boice suggests that the primary difference between the *typical new faculty* member and the *quick starters* was the ability of the *quick starters* to balance the various demands of the faculty positions. In addition, *quick starters* were more likely to network with colleagues than the typical new faculty. To assist *typical new faculty*, Boice developed guidelines for faculty to follow that would help develop a balanced program and lead to a more successful academic career. These guidelines include (2):

- Limit class preparation to a maximum of two hours per credit hour of lecture. Faculty that are able to accomplish this task will find that the pace of class lectures is more conducive to active student participation.
- Spend 0.5 – 1 hour per day on scholarly writing. This helps to maintain a steady level of writing and a greater sense of accomplishment when proposal and publication expectations are met.
- Spend at least two hours per week on teaching and research discussions with colleagues. Regular meetings with other faculty, industry, and research contacts could provide potential research ideas as well as the development of collaborations. In addition, discussions on teaching could help improve a faculty members' teaching as well as provide ideas for classroom activities that engage students.
- Record daily work in terms of time expenditure. This allows the faculty member to monitor their progress towards maintaining the time limitations of the previous guidelines.

- Incorporate research interests and results into class lectures. This provides for greater enthusiasm for teaching as well as generating interest from prospective graduate students.

In a similarly themed article, Felder mentions that most academic faculty discover how to become successful faculty through trial and error (1):

*“We start teaching and doing research, make lots of mistakes, learn from some of them, teach some more and do more research, make more mistakes and learn from them, gradually more or less figure out what we’re doing.”*

Suggestions for new faculty by Felder include:

- Work with both teaching and research mentors for the first two years of your academic career.
- Seek research collaborators who are strong in areas that you are weakest.
- Ask colleagues to edit proposals and papers prior to submittal.
- If proposals and/or papers are rejected, do not take it as a reflection of your capabilities. Keep submitting!
- Learn your student’s names. Address them by their name during class lecture and greet them in the hallway.
- Give students something active at least every 20 minutes during class lectures. Students begin to lose focus after approximately 10 minutes.
- Work through your exams from scratch and note how long it takes you to complete it. Ensure that students have three times longer to take the exam than it took you to complete.
- Grade tough on homework and easier on timed exams.
- When someone asks you to do something you are not sure you want to do (i.e. chair/serve on a committee, organize a conference, do a presentation, etc.), tell them that you need time to consider. Think about the negatives and positives, and if you choose to not do it, then kindly decline. Keep in mind that you should do some service, but not too much.
- Retreat to a private space for several hours on a regular basis (home, library, etc.)
- When problems regarding academic dishonesty or conflicts with other faculty arise, seek help from other faculty or administration.

Becoming a new faculty member is a significant change for those that have never been in this position before. From creating new course materials, developing a research program, writing proposals and peer-reviewed papers, conducting service, advising students, and more, new faculty are strained with higher expectations. Common themes in the literature in terms of promoting a successful establishment to a new faculty member’s career include limiting class preparation time, daily writing time, seeking mentorship, networking, and incorporating research into class lectures.

### **Teaching Successfully**

We as engineering educators are not provided with formal training in teaching courses. Many of our teaching philosophies and techniques develop from our own past experiences. These past experiences derive from former professors, current colleagues, and our own experiences. When people are asked to describe the best college professors they had, most people use similar

adjectives such as enthusiastic, knowledgeable, interesting, accessible, challenging, and concerned about my learning (3). Even though these adjectives are specific to describe what students find desirable, they do not provide any level of detail in terms of how to achieve excellent teaching status. Outstanding teaching at the college level most often includes fostering an active learning environment that cultivates thinking, problem solving, and communication.

Teaching workshops such as the ASCE sponsored Excellence in Civil Engineering Education (ExCEED) teaching workshop provide educators with effective teaching techniques. Communication with colleagues (especially those from other universities) that teach similar courses as your own can help provide ideas for class activities, projects, and other methods of engaging students.

Teaching is a skill that few faculty excel at upon becoming an Assistant Professor. Because engineering educators are hired as teachers does not mean they instantaneously become effective teachers. Some people are “born teachers” and know how to teach by intuition (4). Though it may be a slow process, others must learn how to teach effectively. Some faculty consistently work to improve their teaching by finding better ways of engaging students in their classes while others spend their careers teaching unproductively. One growing set of resources are the teaching workshops, videotaped lectures, and teaching consultants that many universities now offer. However, these programs cannot fix this problem entirely.

Most of all, colleges have faculty that are acknowledged as outstanding teachers by their peers and students. Such faculty are consistently able to actively engage students during class lectures, develop creative and stimulating homework assignments and projects, and give fair but challenging exams. One issue is that while faculty tend to collaborate on research, there is rarely collaboration with regards to teaching (4). Therefore, knowledge gained by one faculty is not relayed to other faculty members. Felder provides suggestions for both new faculty and mentors for improving teaching at the college level.

### ***New Faculty Recommendations***

New professors should pair with colleagues who have earned recognition as excellent teachers to teach their first two courses. In the first course, the mentor would hold the majority of responsibility. The mentor would develop the syllabus, course objectives, planning and conducting class lectures, and creating homework assignments and exams. Both professors would attend each class with regular meetings between the two to discuss what worked, what did not work, and what to do next. The new professor would gradually take on more and more class responsibility throughout the semester and ultimately gain full responsibility by the end of the semester.

In the second course, the new professor would take sole responsibility from the outset of the course with the mentor serving as a consultant to the new professor. Again, regular meetings to discuss the class should be held throughout the semester. Such partnerships are most effective when the college recognizes the significant amount of time required to be a teaching mentor in this program and considers this time when selecting teaching assignments for the mentor during the semesters when providing assistance to new professors.

### ***Mentor Recommendations***

When new professors get into trouble during class lectures, mentors should resist the urge to rescue them immediately. These situations should rather be discussed in the regularly scheduled meetings where there is time to develop ideas as to how to prevent such situations from arising again. A mentor should offer suggestions to the new professor rather than telling them specifically how to teach. Over the long-term, a mentor should help the assistant professor develop their own style of teaching that is best for their strengths and personality.

As engineering educators work to become more effective teachers, such efforts will be reflected in improved student performance, course evaluations, and retention. This cycle can help faculty find more joy and value in teaching (5).

### ***Teaching Workshops and Programs***

The Georgia Institute of Technology's Center for Enhancement of Teaching and Learning (CETL) helped create a new atmosphere among faculty by establishing a program centered around regular teaching workshops (6). Now they are finding that faculty are more prone to discuss classroom practices and teaching methods far more than before the center was created. This program not only has tenure-track faculty but a larger number of tenured faculty seeking to become better teachers. Participants in the CETL program have also garnered stronger student evaluations, more enthusiasm for teaching, and greater creativity in the classroom, which has demonstrated the benefits of teaching workshops and programs.

### **Developing a Research Program**

One of the most critical areas for a new faculty member to develop in terms of reaching tenure is a sustainable research program. This includes submitting and obtaining competitive private, state, and federal grants, publishing peer-reviewed journal articles and conference proceedings, and advising and graduating both M.S. and Ph.D. level students.

The items below have been shown to aid in the development of a successful research program:

- Meet with prospective research sponsors –  
New faculty should meet with prospective research sponsors soon after arriving at the university. One strategy includes taking the prospective sponsors to lunch to discuss your research background, potential research topics, and future collaboration. Such a meeting typically helps introduce you to them and is more effective than simply emailing or speaking with them over the phone.
- Integrate research topics/results into class lectures –  
When faculty are able to successfully incorporate their research into class lectures, they are often more enthusiastic about teaching the class topics, which the students detect. In addition, this promotes the faculty member's research to prospective students that may be interested in attending graduate school.
- Collaborate with other faculty –  
New faculty should seek to collaborate with faculty that are strongest in some of the weaker areas of the new faculty member. In addition, the new faculty should not rule out collaborating with faculty in other areas within their discipline (i.e. a structural

- engineer working with an environmental engineer) or even across disciplines (i.e. transportation engineer working with a faculty member in the college of public affairs). By working with faculty across disciplines, more innovative multi-disciplinary research is often accomplished.
- May have to start small to get big –  
In some cases it may be worth conducting a research project with a sponsor for less money and shorter time to demonstrate the quality of work that you can produce. Establishing a strong research record, even with a smaller project, can help pave the way for much larger (both money and time) grants in the future.
  - Stay connected with your research sponsors –  
New faculty member should stay connected to research sponsors even during times that no research with that sponsor is occurring.
  - Spend time each day writing research proposals and peer-reviewed publications –  
This will help to maintain a steady level of writing and accomplish proposal and paper submission goals.
  - Encourage journal writing from M.S. and Ph.D. students –  
The new faculty member should encourage co-writing papers with current and past M.S. and Ph.D. students. This will assist the faculty member in producing increased levels of peer-reviewed publications. If the student writes the entire article, consider having the student as first author on the journal paper. If the student writes some, but the faculty member is responsible for the majority of writing and editing, include the student as a corresponding author.
  - Attend industry, professional organization, and other meetings that may help identify potential research topics and partners –  
Many professional engineers working in the industry have great research ideas and interest but limited time to write proposals and conduct research. Consider working with these engineers as consultants on these potential research projects.
  - Work to acquire the needed laboratory materials and equipment to be successful in your research area –  
New faculty must make sure that are able to secure the necessary equipment and materials needed to be successful in their research area. If specialty equipment is too costly, consider working with government agencies or other local universities that have this equipment until this equipment can be purchased.

## **Time Management**

One of the major pitfalls of new faculty is mismanagement of time. The two primary areas of this are in teaching and service. Because many assistant professors desire to be excellent teachers, they spend an enormous amount of time developing and preparing class lectures. New faculty are typically asked to develop three to four courses to be their own that they can teach on a regular and rotational basis. Initially, the development of the course lectures, homework assignments, projects, and more require a significant amount of time. However, after the first several offerings of the course, the amount of preparation time should be reduced. Consider teaching all courses on specific days of the week and allowing for the other days of the week to be devoted to research. For example, the faculty member should teach all of his/her courses on Tuesday and Thursdays allowing for proposal and paper writing to be conducted on Monday,



Wednesday, and Friday. In addition, once the courses have been developed, class preparation can be performed on the days of the class offerings (i.e. Tuesday and Thursdays for the example previously mentioned).

Another pitfall is being involved in too much service. Service is part of a faculty member's obligation; however, too much can be detrimental to the performance of the faculty member's teaching and research. This is a great area to have a mentor in terms of someone that can tell the new faculty member which service projects would actually be beneficial to the tenure process, those that may not necessary, and to inform the new faculty member when too much service is reached.

## **Mentorship**

Mentorship is critical to the success of faculty as Assistant Professors and someday as tenured Associate and Full Professors. Mentors can provide a source of feedback for new faculty and whether they are meeting institutional expectations. It is important for the mentor and the new faculty to meet on a regular basis such that the new faculty can inform the mentor of current progress toward specific teaching and research goals.

If mentors are not chosen for new faculty, the new faculty should take a proactive approach and seek out a mentor with a strong teaching and research background that is willing to assist the new faculty in there transition and development into an Assistant Professor.

The Tenure Track Faculty Mentoring Program at the University of Colorado Denver provides assistance to new faculty in their professional development. This program pairs new tenure-track faculty with tenured faculty. The mentor, in many cases, is faculty outside the discipline of the new faculty. Areas in which the mentor can assist the new faculty member include being an advocate, serving as a career guide, and as a resource of information (7).

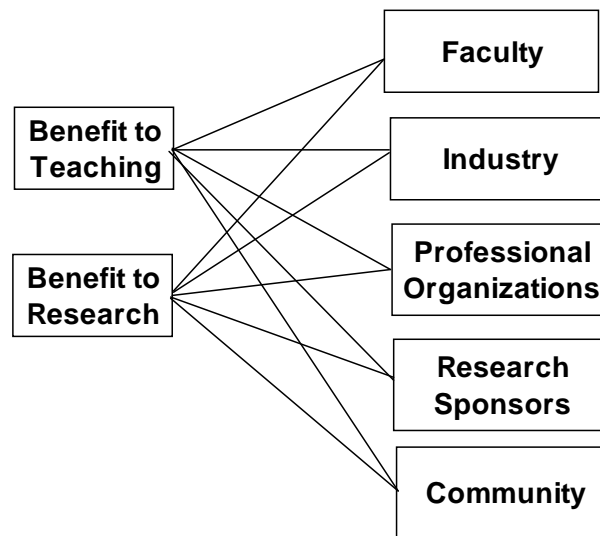
## **Networking and Collaboration**

Networking is an important part of developing successful teaching and research programs. New faculty should network with faculty within the department and college as well as across colleges and other universities. In addition, faculty should network with members of the local industry, professional organizations, potential research sponsors, and the community. Figure 2 illustrates the potential collaboration between a new faculty member and network groups.

### ***Teaching Benefits***

- Networking with other faculty can provide a source of new teaching ideas and methods, potential multi-disciplinary teaching, and support for continued growth as an engineering educator.
- Members of the local industry make great guest speakers for courses. These individuals are able to bring real-world applications to the classroom. In addition, these industry contacts are potential employers for the students being taught. This connects students with the local industry.

- Professional organizations are also a great source of information. Many organizations provide free resources to students in terms of CDs, codes, journal papers, industry contact information, etc.
- Research sponsors can also indirectly benefit teaching. Faculty that network with potential research sponsors are more likely to obtain externally funded research projects, which can then be incorporated into class lectures. In addition, research studies provide opportunities for undergraduate and graduate research.
- Community projects such as Habitat for Humanity and collaboration with local governments, parks and recreation authorities, etc. provide opportunities for students to take classroom knowledge to the field.



**Figure 2. Collaboration Between Faculty and Network Groups**

### ***Research Benefits***

- Faculty within the department, college, and university can make for great research collaborators. Specifically, it is helpful to find faculty that can provide additional ideas and growth to a research study (i.e. life cycle analysis to a high-volume fly concrete research study). In addition, this is a great way of creating a multi-disciplinary aspect to a faculty member's research program.
- Industry individuals are also a great source of research ideas. Many practicing engineers have a wealth of ideas but little time or resources to complete such research. By collaborating with industry members, the faculty member is able to have the knowledge of the industry member as a consultant in addition to the university resources (laboratories, research assistants, etc.).
- Many professional organizations have their own peer-reviewed publications. These publications are a great conduit for submitting research papers.
- Faculty should begin meeting research sponsors soon after being appointed Assistant Professor. It is important to develop a connection with potential research sponsors in

order to share your own research specialties, interests, and ideas. In addition, new faculty should plan to meet regularly with such prospective sponsors.

- Community outreach is an important aspect of many research projects. The community and local governments provide opportunities for laboratory research to be implemented in the field.

## Conclusions

There are many obstacles facing new Assistant Professors in engineering programs across the United States. These include inadequate training on how to teach, guidance on becoming a new faculty member, and little support in terms of a new faculty member's progress toward tenure. The interconnection of faculty needs – such as teaching support, development of a research program, time management, mentorship, and network and collaboration – will only help increase the odds of a new faculty member's success. Major recommendations for faculty success include:

- Limiting class preparation time after the first several times a course has been offered.
- Maintain a steady level of proposal and paper writing.
- Seek a mentor if one is not provided.
- Incorporate research into class lectures.

With the creation of teaching workshops, mentorship programs, and increased awareness and support from university administration, the prospect of success for a new faculty is more likely than ever before even with such consistently high expectations.

## Bibliography

1. Felder, R., (1994). "Things I Wish They Had Told Me." *Chemical Engineering Education*. 28(2), pg. 108-109.
2. Brent, R., and Felder, R., (1998). "The New Faculty Member." *Chemical Engineering Education* 32(3), pg. 46-47.
3. Lowman, J. (1995). *Master the Techniques of Teaching*. 2<sup>nd</sup> Edition. John Wiley and Sons, Inc. Publishing. San Francisco, CA. pp. 344.
4. Felder, R., (1993). "Teaching Teachers to Teach: The Case for Mentoring." *Chemical Engineering Education*. 27(3), pg. 176-177.
5. Lord, M., (2009). "Those Who Can, Teach." *Prism*. American Society for Engineering Education. November, 2009.
6. GT (2011). Center for the Enhancement of Teaching and Learning. Georgia Institute of Technology. <http://www.cetl.gatech.edu>. Accessed January 17, 2011.

7. UCD. (2011). Tenure-Track Faculty Mentoring Program. University of Colorado Denver. [http://www.ucdenver.edu/FACULTY\\_STAFF/FACULTY/CENTER-FOR-FACULTY-DEVELOPMENT/CAREER\\_DEVELOPMENT/Pages/Mentoring.aspx](http://www.ucdenver.edu/FACULTY_STAFF/FACULTY/CENTER-FOR-FACULTY-DEVELOPMENT/CAREER_DEVELOPMENT/Pages/Mentoring.aspx). Accessed January 17, 2011.