

Tips for Greasing the Tenure Track 3

David R. Finley
Tri-State University

Abstract

Utilizing knowledge gained from participation in NSF's New Century Scholars (NCS) Workshop at Stanford University as both a scholar (1999) and subsequently a senior scholar (2000), best practices for new engineering faculty are identified based upon the author's four years of personal experience in academia. This third paper in the series, all by NCS senior scholars, provides the perspective of an engineering educator at small, private, undergraduate engineering college in the Midwest.

First, the academic environment at the author's home institution, Tri-State University, is presented. The author then reviews his job functions as a newly promoted associate professor and department chair: teacher, mentor, administrator, and consultant. A "Top Twelve List" of best practices for new faculty, based upon personal experiences and utilizing NCS materials, is then offered. In addition, the success of incorporating a specific project-based learning activity, design and calibration of water bottle rockets, into a freshman-level introductory course is discussed. Finally, an illustration of how specific elements of the NCS Workshop have impacted the author's teaching practices is presented. These elements include:

- knowledge of learning styles
- use of formal and informal student course evaluations to improve teaching
- setting goals to achieve important, not urgent, objectives in life

These elements are tangible suggestions for new (and more experienced) engineering educators to take back to the classroom and try for themselves.

I. Introduction

Tri-State University (TSU) is a private, undergraduate institution with a rich tradition of providing an affordable, "hands-on" engineering education. Located in Angola, Indiana, TSU is approximately 45 miles northeast of Ft. Wayne and 60 miles west of Toledo, Ohio. From its start in the late 1800's as a normal school, TSU has grown into a regional educational leader for the 21st century specializing in engineering, business, and teacher education. Of the more than 1200 students on campus, roughly one-half are enrolled in the School of Engineering and Science (SOES).

Begun in 1909, the Chemical Engineering (ChE) Department at TSU has remained a small undergraduate program with a focus on career-oriented higher education. Total departmental enrollment currently stands at just over 60 students, having dipped as low as 37 in the late 1980s. With as few as 20-25 students entering the program each year, retention is a critical issue for the viability of the program in a primarily “tuition-driven” budgeting environment. Three full-time faculty members, with the support of a laboratory technician and a half-time secretary, teach all core courses in the ChE curriculum. Thus, the teaching load for faculty is 12 credit hours per semester. No special allowances are made for laboratory or design courses. This load is reduced to 9 credit hours per semester for the departmental chair.

II. What Do I Do?

As departmental chair, workday activities can be grouped into four major categories: teaching, mentoring, administrating, and consulting/research. This list is rank-ordered based upon time typically spent on task. However, the job of departmental chair can consume much more than one-quarter of each day even at an institution that focuses on teaching. Hence, there are many days that administrating occupies more time than mentoring.

While I truly enjoy my job as an associate professor, it is just one facet of my life. My family is certainly of paramount importance, but I also pursue several other individual activities, including running, camping, and genealogy.

Perhaps one of the greatest challenges we have in life is finding the right balance between our work and the other aspects of life that define who we are. It is tempting, particularly when one is just starting out in academia, to focus on job success at the expense of these other aspects of life. As stated in the text currently used to teach TSU's *Introduction to Engineering* course¹, "one analogy frequently used is to look at a person as a wheel. A wheel cannot roll if it is flat on one side. Similarly, people cannot function optimally if there is a problem area in their life." Thus, we must guard against one or more segments of the tire being grossly over-inflated or under-inflated. These five key "segments" of life are intellectual (presumably your job), social, emotional, physical, and spiritual.

This concept of finding the proper balance in life was recently reinforced for me when listening to a sermon about a year ago. During the sermon, the minister posed the following fill-in-the-blank question. "Life Will Begin When..."

Typical responses of the laity were offered that included:

- when I graduate from high school
- when I get a job, or when I get a different job
- when I find the perfect mate/get married
- when I have children
- when the children go to college
- I retire

In academia, an analogous list of answers might include:

- when I pass my preliminary examination or qualifier
- when I defend my thesis
- when I get a post-doc position
- when I secure external funding
- when I get tenure, etc.

The real answer to this question is that life is now! And, it is important to find the proper balance between living for the moment and planning for the future.

As academicians, we have been groomed to be goal-oriented. We have been extensively trained in an environment that rewards us for working hard to achieve the next level of success. The tendency to believe that everything will be wonderful (or at least easier) once that next barrier is cleared is a difficult mindset to break. This idea that life's troubles will suddenly be lessened or removed following the completion of some goal is a perilous trap in which to fall.

In many respects, life can be thought of simply as a series of hurdles. Unless you intend to “turn your brain off” upon achieving tenure, the demands your job places upon you will only increase. With this being a truism, it is very important to make the most of those long hours put into the job, so that the other aspects of life can be savored and enjoyed.

III. Top 12 List of Recommendations

To address the need to most efficiently use the time spent on task, the following list of successful strategies has been compiled. It draws, in part, from knowledge gained at the NSF New Century Scholars (NCS) Workshop at Stanford University in the summers of 1999 and 2000. Combining this knowledge with my four years of professorial experience, I suggest that you:

1) Teach/Mentor Well

This, of course, is the principal duty at a teaching institution. In many respects, everything else you do is of secondary importance. You may not receive resounding accolades as a result, but you will certainly be noticed and negatively typed if your teaching skills are not up to par.

2) Publish—teaching pedagogy

While teaching is of utmost importance, publishing and other scholarly endeavors provide fulfillment and recognition, both on and off campus. These activities enable one to demonstrate expertise and participate in cutting-edge research. One of the challenges at a teaching institution is that there is little time, except for summer break, to focus on these activities. By authoring papers about what I do on a daily basis during the academic year, I am able to integrate publishing and teaching. (Please be warned, however, that many institutions devalue or even penalize this type of work in favor of

"real research". In any case, it's a question that needs to be asked by new engineering faculty.)

3) Build “bridges” with colleagues in academia and industry

Increasing the teamwork and communication skills of our students is currently an area of considerable emphasis in the engineering curriculum. These same concepts can reap great rewards for a newly minted professor. To master the complexities of interdisciplinary design, teams of researchers now attack problems of greater scope than individuals can master. Networking with fellow faculty can lead to such collaborative opportunities. Similarly, local industry can provide opportunities for field trips and consulting. (Please note that too much collaboration with only one or two co-authors can cause questions about how much of the work is one's own. Random collaboration with lots of co-authors, but also many different ones, can alleviate this concern.)

4) Be active in ASEE/other professional societies

This is particularly important for continued professional development and networking outside of your current institution. Life in most business organizations, academia included, is like life in a submarine. It is important to leave this closed environment occasionally; lest you lose perspective and begin believing that it represents the entire world. (See also strategies 3 and 12.) Just as there are opportunities for collaborative efforts with fellow faculty, there are also similar external academic opportunities.

5) Stay out of politics

In all organizations, there are political alliances and power shifts. There are assassinations and misdemeanors. Unfortunately, office politics are human nature. Thus, it is especially important at the beginning of your career to step cautiously. It is not immediately evident whom you can trust or ask for help. Conversely, who wants to thwart your progress? Many of your colleagues will directly or indirectly have input on your promotion, and it is important not to offend or be perceived as belonging to the enemy camp.

6) Toot your own horn with press releases

The only way that others in your institution will learn of the good work that you are doing is if they hear about it. Of course, the department chair that conducts your reviews will know about these activities, but to grow a positive campus-wide reputation the word has to get out. Don't, however, walk around expounding your endeavors. Instead, work closely with the campus publications department to prepare articles about significant teaching, research, and service activities in which you are involved.

7) Learn to say “no”

8) Put a lock on the door and use it

Both of these items are about optimally managing your time. If you haven't already realized this, everybody wants a piece of you. Whether it's students coming for assistance outside of office hours, fellow faculty looking for advice, or administrators

wanting you to serve on another committee, your already scarce time is in demand. In order to accomplish important, not simply urgent, tasks, it is vital that you retain control of the use of your time.

9) Live close to campus (save commute time)

As with strategies 7 and 8, this is a very tangible approach to maximizing productive work time and something I discovered only after my daily commute was drastically shortened. Living in a major metropolitan area, a 35-minute one-way commute consumed over an hour a day. Now, I spend ten minutes getting to work by walking five blocks! This shortened commute time provides more time for family activities, or it can give me additional time on work projects, as needed.

10) Employ undergraduate work study students

This strategy initially read “use undergraduate work study students”, because that is precisely what is done to leverage your time. Time-consuming, but worthwhile, tasks can be delegated and completed with relative ease. Moreover, students also gain from the experience as a service learning activity, and it provides them proximity to departmental faculty and staff. The key here is identifying highly motivated and self-directed students.

11) Choose activities wisely—“get the biggest bang for your buck”

As originally expounded by Stephen Covey^{2,3}, it is imperative to differentiate between important and urgent tasks. Completion of tasks that are both important and urgent, such as remedying crises or completing deadline driven projects, is a necessity. While tasks that are important, but not urgent, provide renewal. These tasks include values clarification, planning and relationship building. Unimportant tasks, urgent or not, are simply deceptive or wasteful. Thus, it is important to prioritize activities daily and focus on those that are important to get the biggest “bang for the buck”.

12) Be kind (courteous, flexible, fair, outgoing, personable, friendly)

For those of us who find ourselves in an office setting, it is by definition a closed environment. It is wise to take note of how you conduct yourself. Do you wear well as an office companion? Do you smile and say “hello”, or are you pessimistic in nature? Do you stick to the facts, or do you gossip? This strategy ultimately centers on maintaining and conveying a positive and upbeat attitude. Strive to become a leader by example!

IV. Water Bottle Rockets

With respect to Recommendation 1 (Teach/Mentor Well), both the 1999 and 2000 NCS Workshops and recent literature extol the merits of incorporating hands-on, product-based learning activities into the teaching repertoire of faculty.^{4,5} Water bottle rocket design and fabrication was used in the NCS Workshops to demonstrate of this type of activity. In 1999, rockets were designed and constructed in a two-hour period to fly the furthest distance⁶. In

2000, they were built to hit a pre-determined target at a specified distance that was varied for each team to reduce the competitiveness of the exercise.⁷ Information concerning the construction or purchase of water bottle rockets and launchers is readily found on the Internet.^{8,9,10}

This project serves as an instructional activity upon which to initiate discussions of the science and engineering principles that govern the rockets' flight. Subjects that can be introduced include thermodynamics, fluids (statics, free body diagrams, Bernoulli equation), propulsion, dynamics (linear momentum, static stability, and center of pressure), structures, and materials.¹¹

In the TSU Chemical Engineering curriculum, the water bottle rocket design project is used as a four-stage assignment over three lectures for freshmen. In the first stage, students are introduced to the project and given instructions for water bottle design and construction. This stage culminates in a competition for furthest flight distance. In the second stage, completed as homework in the intervening week between lectures, students refine their designs for accuracy and develop fabrication instructions that can be handed off to others. The third stage of the project is that of construction, following the fabrication instructions of another team in the class, and a precision launch. Finally, the students are asked to identify the science and engineering topics that govern the success of a launch and review the teamwork process. Throughout the project, students see the value of developing their communication skills.

V. Impact of Specific Elements of New Century Scholars Workshop

Personally, participation in the New Century Scholars Workshops provided a renewal of spirit gained from seeing the energy and enthusiasm for great teaching on the part of all attendees. Yet, the greatest tangible benefit was knowledge gained regarding the different styles of student learning. These styles are the aggregation of a preferred mode of learning in each of several dimensions. These dimensions of learning include perception (sensing vs. intuitive), input modality (visual vs. verbal), processing (active vs. reflective), and understanding (sequential vs. global).¹² This information coupled with exposure to Bloom's Taxonomy of Educational Objectives¹³ has enabled the development of improved course objectives and lectures.

With a realization that many students are visual, active, sensing learners, I have incorporated more demonstrations and in-class questioning into my lectures. I also strive to place a five minute interactive activity in the middle of a 50-minute lecture to break the monotony and re-focus student's attention on the topic at hand.

I have now begun using informal mid-semester student evaluations in my classes in addition to the formal course evaluations given at the end of the semester. End-of-the-semester evaluations only allow the instructor to make corrections for the next group of students. Use of a much less formal evaluation early in the semester demonstrates to the students that you really do care about their education, and it allows you to respond to their suggestions and make mid-course

corrections. The following nine questions are included on the midterm course evaluation with these instructions:

We have decided to give a midterm questionnaire because we want to be able to use your feedback this semester while you can benefit from it. This is completely anonymous, so please feel free to tell us what you really think.

- How is the pace of the course? Too fast? Too slow? Just right?
- Do you like the text? Have you been reading it? Do you complete the world-wide web activities?
- How would you rate the instructor's lectures (+ any specific details)?
- How could the course content (material) or structure (tests, quizzes, lectures) be improved?
- Have the assignments been reasonable? What would make them better?
- Has the grading been reasonable? What could be improved?
- The thing(s) I like most about this class, or that there should be more of:
- The thing(s) I like least about this class, or that there should be less of:
- Any other constructive comments?

Finally, the 1999 NCS Workshop emphasized the importance of setting goals to achieve important objectives in life. By closing your eyes, you can imagine what it might be like to watch your own funeral. Your friends and family are there, of course, grieving, but also commenting on your character. How do you hope that you will be remembered?

She answered her email promptly. OR

He wrote over 100 papers. OR

She made a difference in ... (children's lives, student's lives, research area)

To ensure that my daily activities are consistent with what is important in my life, I prepare a sheet of personal goals, which is updated annually around the holidays. This season usually provides a good time for reflection. These goals are grouped into the following categories: Intellectual/Cultural, Physical/Recreational, Financial, Professional, Social, and Spiritual. Reviewing this list of personal goals on at least a weekly basis assists me in prioritizing daily tasks.

VI. Conclusions

Many of the "Top 12 Recommendations" offered for new engineering faculty center around developing networking and time management skills. These are important attributes to develop early in one's career. Moreover, knowledge of the various modes of learning can assist new faculty to better reach all students in the classroom regardless of learning style. Both formal and informal course evaluations by students can assist the instructor to stay on target and meet

student needs. Finally, it is important to set goals to differentiate between the important and urgent tasks in our lives such that we can focus on the former.

It must be realized that each environment in which we teach is unique. Universities pride themselves in having a distinct character and focus. As such, it is not possible to apply these recommendations carte blanche to every situation. However, it is suggested that you take a few that particularly appeal to you and try them. If they work for you, great! If not, discard them and try other recommendations until you find an optimal mix.

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DAVID R. FINLEY

David R. Finley is an Associate Professor of Chemical Engineering and Chair of the McKetta Department of Chemical Engineering at Tri-State University in Angola, Indiana. In addition to his courses in Chemical Engineering, he teaches a summer course, Weather and Climate, which is being developed into one of Tri-State's first on-line courses. Dr. Finley received his B.S. and M.S. degree in Atmospheric Science from the University of Michigan and an M.S. and Ph.D. in Chemical Engineering from Wayne State University in Detroit.