Being A Successful Academic

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Being A Successful Academic

A successful academic can be defined in many ways.

- Excellent research
- Inspiring teaching
- Important service
- Successful students
- Wide-Spread adoption of some contribution

No one definition serves everybody.

Research and Teaching Themes

Pick research topics that will grow.

- Solving early problems in a new area may mean that your solutions will be used and recognized for many years.
- Consider problems in which you have natural, unexplainable interest – such problems will hold your interest until you can make progress
- Don't be afraid to pursue something if you believe you can make progress.

When possible, teach "right at" your research

- For instance, when teaching architecture, I give the undergraduate students a formal description of a microprocessor ISA.
- Even when your research is good you may find:
  - It's often a lot of work to move something from the "Ah ha" stage to being able to present it in a clear and effective manner
  - That if you can't explain what you are doing to a student, then it's not ready for general consumption nor publication

Planning

Always have a five-year plan with your research and impact goals.

- Such planning sharpens your execution
- It keeps you prepared to write proposals
- It helps you stay focused
- Your plan should identify opportunities if you are successful
- Include what resources will be required for success

Update the plan every year.

- Planning is not an exact process
- Record what worked and what didn't

Don't be a prisoner to your plan – take time to explore new ideas and be sure to exploit breakthroughs

Be Prepared to Run a Small Business

You always need to be able to articulate how your work adds value.

- Have a two-page business plan prepared and ready
- Know your costs, both for yourself and your team
- Learn how to make financial projections
- Learn the business system of your institution

It is important to be able to successfully multiplex between a number of different tasks every day.

- Serialists need not apply
- Make sure that you make progress on multiple fronts each week
- Don't get involved in university administration before you get tenure

Mentors and Role Models

If possible, get a mentor – someone considerably senior to you, someone you can trust, and someone with whom you can really communicate.

- Communicate with colleagues regularly about your work
- Listen to your colleagues describe their work
- Change some of your colleagues in pursuit of stimulation and new challenges

Select role models – for me they are regular and continuing contributors.

- Randy Bryant – combined engineering/modeling skills
- Edsger Dijkstra – pruning and sharpening skills
- Richard Feynman – excellent communicator at all levels

I recommend you read Richard Hamming's "You and Your Research" lecture.

Publish and Read

You may be the world's smartest person, but if you don't communicate your ideas, no one will benefit.

- Develop a trustworthy network of colleagues with whom you can share and discuss your ideas.
- Just write – don't worry about where an article may be published.
- Write for different communities

Read

- Regularly read published articles – try to identify what you think is good and bad.
- Read outside of your area
- Really study other folks' good work

Communicate your ideas to folks outside of your area

- This will sharpen your ability to articulate your ideas
- This will help you write accessible proposals

I recently explained to a kindergarten teacher what I do

- This teacher wanted to know how I identified who might be successful in my area
- After about an hour, this teacher was proud to have basic comprehension of the value of my research.

Rewards and Costs

- Costs of being an academic
  - May think of problems at dinner with your partner
  - Thinking while hosting people
  - May often work late
  - May not think enough of your partner and family
- Limitations
  - Hopefully, you have (or will have) a partner that understands your need to think, study, and write
  - Not so much money
  - Hard to do anything really big
  - Having ideas/approaches out of step with the mainstream
- Rewards
  - Freedom to pursue long-term objectives
  - Freedom to throw out uninspired work
  - Flexibility to manage your time
  - Students with whom to work
  - Belonging to an institution that believes in education
  - The pleasure of creating something new and better
- Fulfilling
  - Teaching and service make obvious contributions to society
  - Respect from your community

My Weaknesses and Strengths

- I have too many weaknesses to list, but I mention a few that might affect your ability to be a good academic.
  - Not inspired by publishing the next "little" twist.
  - For me, writing is hard work
  - Lack of interest in "fighting it out" at conferences
  - Unwillingness to insist that my work is better than others
  - Often have to learn "obvious" lessons on my own – this can be painful
  - I often have too many things going on at the same time
  - Sometimes, I'm too trusting of my colleagues
  - I'm not selfish enough
  - I believe my students should graduate!
- To be a good academic, you need to believe strongly in yourself.
  - I don't mind hard work – I like to work
  - Multi-faceted background – some math, some engineering, some computer science – I think this helps me find research opportunities in the "creases"
  - I believe I see trends and opportunities well
  - I really enjoy the work I'm doing

My Vision

We would like computing systems to be specified by a *formula manual*, a complete precise set of formulas that exactly specifies computing systems (whether hardware, software, or both).

- A formula manual unambiguously describes the functionality being offered.
- A formula manual defines the abstract specification for its concrete implementation.
- A formula manual can be used as the concrete specification for something built on top of it.

We want mathematically specified, mechanically checked computing systems.

- This is a long-term and evolving goal. E is one such step.
  - Systems are increasing in complexity faster than our ability to manage them or control them.
  - If we are aggressive, maybe we can achieve this vision on small commercial designs, e.g, cell telephones, pagers, routers, etc.
- Our ability to field secure systems is based our our ability to specify and validate our computing, networking, and control systems.