Interactive Session Schedule

I. Overview & Challenges (15 min)
II. Strategies for the Individual PUI Scientist
   Table discussion & report out (12 min)
   Strategy list (8 min)
III. Strategies for the Department
   Table discussion and report out (12 min)
   Strategy list (8 min)
IV. Strategies for the School/College/University
   Table discussion and report out (12 min)
   Strategy List (8 min)
V. Final Q & A / discussion (10 min)

End: 10:20 am
Evolution of the PUI Professor: from teacher to teacher-scholar

Teacher-only

Yes!
• Joy
• Commitment to students
• Intellectualism
• Good work-life balance

No . . .
• Time for research
• Resources for research
• Expectations for research
• Creation of new knowledge
Teacher-Scholar

Yes!
Joy Commitment Intellectualism

Yes . . .
• Growing emphasis on research
• Job ads, expectations
• CUR: Council on Undergraduate Research
• Scholarship of teaching and learning: benefits to students of mentored research
• Identification of signature experiences
• Institutional branding

Research at PUIs

Benefit to students but a cost to the faculty?
An entrée to the literature on the benefit to students of undergraduate research (can be used to argue for research resources/culture at a PUI):

See CUR publications -- http://www.cur.org/publications/publication_listings/
e.g. Lopatto, D. 2010. Science in solution: The impact of undergraduate research on student learning

Selected papers:

Benefits of research to PUI faculty

• Advancing your scholarly program: creation of new knowledge, respect of the scientific community, personal satisfaction

• It may attract resources to your department (grants, budgets)

• It may become in-load = a more varied work life

• Because it likely is done with undergraduates, it can provide the enjoyment of close intellectual engagement with students, and the satisfaction of helping students in a ‘high impact practice’
But we have to do it all:

- teach today’s class
- set up the lab
- help a panicked advisee for an hour
- extract the DNA
- run the PCR
- teach research students to load & run the gel
- eat yogurt at your desk
- teach this week’s lab (without full credit)
- blank gel! start over
- break down the lab
- chair the committee meeting
- call the collaborator
- check, delete/answer 50 emails, or don’t
- plan next week’s lab
- order supplies
- start planning tomorrow’s class
- Work on that paper for 30 minutes – but, wait, have to leave to pick up the kids

Challenges for PUI Researchers

The crosscutting challenge:

High personal and institutional expectations, but not enough support

TIME

- High teaching load
- Mentoring undergraduates in research may not be in-load
- Prioritizing good teaching over getting research done
- Work schedule is dictated by course schedules
- Fragmented time
- Limited opportunity for sabbaticals
- Service demands, especially in a small department
- Creating a balanced personal life
Challenges for PUI Researchers

RESOURCES
• Inadequate space
• Inadequate equipment
• Insufficient in-house funds for expendables
• Insufficient in-house support for travel to conferences
• Insufficient in-house funds for page charges
• Difficulty getting to the point where writing a competitive grant for external funds is possible

Challenges for PUI Researchers

UNDERGRADUATES AS YOUR MAIN RESEARCH PARTNERS
• They are novices; limited research readiness & skills
• Take time and resources to train, with no data produced at first
• They make novice mistakes
• They may be intimidated and not reveal mistakes
• They have limited length of involvement in research
• They have conflicting time demands with higher priority for them (e.g. exams, paid jobs)
• They may not be available when we have the most time for research (i.e. summer)
• May not readily contribute to writing
• They are not our full intellectual partners
Challenges for PUI Researchers

SCIENTIFIC ISOLATION
• No/few research colleagues in the home institution
• May be geographically isolated from potential collaborators/community at other institutions
• Difficult to learn about new techniques in a timely manner

Where do you have the power to reduce these challenges and therefore maximize the benefits of doing research in plant biology at your PUI?
Activity 1 –
The power of the individual plant biologist

At your table:
1. Consider the challenges listed on the handout.
2. Circle the challenges that apply to your institutional context.

Additional time challenge noted by the participants:

• Classes are too big
Additional resource challenges noted by the participants:
• Inadequate support staff for routine procedures – noted by many
• Hiring administrators and adjuncts and not tenure track positions
• Lacking financial support for faculty in the summer
Additional UR challenges noted by the participants:

- Students may not think that a mistake they make is important.
- Students' mental health.
- Students lack confidence to take on projects as their own and do not display commitment needed for research success.
Activity 1 –
The power of the individual plant biologist

At your table:
1. Consider the challenges listed on the handout.
2. Circle the challenges that apply to your institutional context.
3. Give one star to an important one that you most want to do something about right now as an individual, given your institution’s context.

** Do not focus on what you could not change right now **
4. Discuss the one-starred challenges. If there are people who did not star your challenge, ask why – what do they do in their own practice so that it is not a challenge for them? Make a note about it on the back.
5. A few tables will report-out about one of the table’s challenges; be prepared to share.

Strategies at the individual level - TIME

1. Write 20 min/day: ideas, protocols, results, grant section, letter to collaborators, manuscript. (see ‘Research productivity: some paths less travelled’ by Brian Martin, in Australian Universities’ Review 51(1), 2009).
2. Go through email 1x per day.
3. Close your door.
4. Put research work time on your schedule and consider it taken.
5. Say no; be selective in your service obligations.
6. Only mentor student research that has a direct connection to your program: (e.g. one pair of students = one data figure), but do it developmentally so that they take ownership.
7. Only take the optimal number of students for your productivity.
8. Scaffold your lab; use peer mentoring & group training.
9. Ask your Chair for a class schedule that gives you longer sections of open time.
Strategies at the individual level - TIME

10. When you write grants, include funding for a technician or post-doc.

11. Use available funds strategically or obtain funds to outsource time consuming protocols.

12. Once your courses are in good shape focus less on teaching.

13. Share teaching materials; do not reinvent the wheel.

14. Develop more student-centered learning strategies to shift responsibility to the students (note: developing these can take as much time as writing new lectures).

15. Schedule meetings adjacent to existing scheduled time commitments to preserve open blocks.

Strategies at the individual level - RESOURCES

1. Take advantage of every possible on-campus resource:
   • leverage course lab budgets
   • apply for in-house grants
   • ask administrators for small amounts for a special project, or to bring something to fruition

2. Apply for small external grants; work with your grants office to find funders.

3. Apply for big grants (even if you do not get it the planning will increase your productivity). Apply and reapply.

4. Apply for ROA supplements to a collaborator’s existing NSF grant.

5. Barter with collaborators or colleagues at other nearby institutions for equipment use.

6. Design upper division lab courses around research related to yours, with potential to provide useable data/information.
Strategies at the individual level - UR

1. Go to a CUR Institute: *Beginning a Research Program in the Natural Sciences at a Predominantly Undergraduate Institution*; join CUR and take advantage of all of its resources: www.cur.org

2. To increase research readiness, bring CUREs into your lower level classes and recruit diverse students from them.

3. Allow students to shadow experienced research students early; develops skills, identifies those who are serious and adept.

4. Recruit research students early and retain for as long as possible.

5. Make your expectations very clear and provide formative, if informal assessment; only retain those students who do what is expected.

6. Have students keep a time log and lab notebook; check periodically and make them count toward the grade.

7. Expect mistakes and provide for them in your research timeline and budget.

8. Get them writing!

9. Use lots of plant examples in intro classes.

Strategies at the individual level - ISOLATION

1. Take advantage of any possible scientific colleagues you DO have at your PUI: invite them to have a weekly lunch with you where you each discuss your research (and not the campus parking situation of the new Dean); hold joint lab meetings.

2. Regularly attend research talks in your field at a nearby R1 university, if possible.

3. Develop a collaboration with a nearby colleague; having to answer to another keeps you on track.

4. Find collaborators by putting your name out for seminars and presenting at conferences.

5. Ask a somewhat more senior colleague in your field to be an informal mentor to you: someone you can call, ask to read the manuscript, etc.

6. Serve on grant review panels; let the funding agency know that you are willing.

7. Develop a regional network of plant biologists as PUIs with regular networking.
Activity 2 – Department-level changes

At your table:
1. Look again at the challenges you circled.
2. Double-star the one that you most want your department to work on, given your institutional context.
3. Discuss the two-starred challenges. If there are people who did not star your challenge, ask why – what does their department do so that it is not a challenge for them? Make a note about it on the back.
4. A few tables will report-out about one of the table’s challenges; be prepared to share.

Strategies at the department level - OVERALL

1. Set the stage:
   Hold department-level conversations about research as a priority and your collective research goals.
   Be nonjudgmental, supportive, transparent, but answerable to each other: make an annual, vocal commitment and revisit.
   Provide a permanent structure in the department to keep research priorities central; e.g. a Research Committee.
2. Send a team to a CUR Institute on institutionalizing UR.
3. Create faculty peer mentors for new faculty members.
4. Re-think your T&P standards to be equitable and inclusive of research outcomes that predict ongoing success (i.e. not just papers; also count conference presentations, grants including those not funded but well reviewed, and effective mentoring of undergrads).
5. Hire new colleagues who come in with a clearly articulated program of research that will work at a PUI.
Strategies at the department level - TIME

1. Work on a course scheduling system that provides blocks of open time; rotate access to these if necessary.

2. Assign service responsibilities to be equitable, and protect the time of junior faculty.

3. If possible at the dept level, re-think course sizes. Slightly larger classes may afford opportunity to have more in-load research mentoring.

4. Push back against too much out-of-load summer or winter term teaching.

5. Document faculty time spent on routine work to make a credible argument for additional support staff.

Strategies at the department level - RESOURCES

1. Use student work-study funds for research assistants.

2. Allocate some department funds to Independent Research courses and/or to faculty research and page charges (e.g. mini-grants).

3. Provide some course reassigned time for someone to write programmatic grants that will bring in resources.

4. Share resources: equipment, expertise, coordinated purchasing in bulk.

5. Write very well-argued budget requests to the Dean or Dean-equivalent.

6. Garner institutional attention with visible events that showcase faculty-student research: symposia, displayed posters, addressing student government.
Strategies at the department level - UR

1. Agree to incorporate CUREs into all lower-level courses, to increase research readiness; advocate to the administration for resources to support their development: team teaching, summer stipends – if you do not ask, you will not receive.

2. Develop a course for Independent Research that allows students to count it toward major requirements.

3. Develop a formalized research shadowing program.

4. Hold an annual poster session to share your research with students and each other; invite administrators.

5. Offer a grant-writing class for students that will help them obtain summer funding.

6. Build a course into the early curriculum that develops research techniques prior to needing them in mentored research.

Strategies at the department level - ISOLATION

1. Monthly brown bag informal research seminars for each other; join with other departments if you have a small department.

2. Organize writing groups: papers, grants.

3. If possible at the department level, fund (at the highest possible level) travel to present at conferences.

4. Start an invited colloquium series.

5. Fund travel to methods workshops.
Activity 3 – Institution-level changes

At your table:
1. Look again at the challenges you circled.

2. Triple-star the one that you most want your institution to work on, given your institutional context.

3. Discuss the three-starred challenges. If there are people who did not star your challenge, ask why – what does their institution do so that it is not a challenge for them? Make a note about it on the back.

4. A few tables will report-out about one of the table’s challenges; be prepared to share.

Strategies at the institution level - OVERALL

1. Set the stage:
   Make research as much a part of the culture as teaching: e.g. -
   • College-wide faculty colloquia with receptions
   • Faculty research awards
   • Research mentoring awards
   • Annual conference/event that highlights high-level faculty-student collaborative research

2. Make faculty research AND faculty-student research a key pillar within the college’s official mission, strategic plan, and related documents (e.g. signature experiences); work to make resource decision mission- and plan-based.

3. Re-think your T&P standards to be equitable and inclusive of research outcomes that predict ongoing success (i.e. not just papers; also count conference presentations, grants including those not funded but well reviewed, and effective mentoring of undergrads).

4. Get an ‘Enhanced Institutional Membership’ in CUR, which allows all faculty to be members at no additional cost to them.
Strategies at the institution level - TIME

1. Re-think the teaching load across the board. Is there a path to decreasing it? Compare your institution to peer aspirants. Less may be more.
2. Build research with students into the normal teaching load.
3. Re-examine the governance system – can you reduce the faculty’s service obligations?
4. Institutional commitment to provide reassigned time if you have a major grant in order to deliver on the project.

Strategies at the institution level - RESOURCES

1. Permanently allocate financial resources for either reassigned time or funds for faculty research; merit-based or rotate.
2. Re-think class sizes; slightly larger may free up resources for small, research-based mentoring/teaching.
3. Create a policy that allows student work-study for research assistance.
4. Prepare a thorough assessment of facilities and space needs for research; present to appropriate administrators.
5. Organized trips to visit with program officers at funding agencies in Washington DC.
6. Hire a grant writer to help write programmatic grants and support faculty writing of research grants.
Strategies at the institution level - UR

Develop a summer research program for faculty-student research – start small.

Strategies at the institution level - ISOLATION

1. Fund (at the highest possible level) travel to present at conferences.
2. Fund travel to methods workshops.

Q & A and Discussion