

**2008 IGERT Project Meeting  
Session VI: Technical Session  
Biological Engineering**

**PI Responses:**

- **How to ensure IGERTs are leading the way on transformative interdisciplinary research?**
  - For one to be continuously transformative, to overcome the hurdles so we can become continuously transformative
    - Accomplishments are just coming to fruition at year 5/6 when graduations and pubs are just getting put together
    - 5-yr PhD program does not allow for integration throughout the program process
    - Need to get university administration involved; NSF carrots to administration to promote and recognize the multidisciplinary program development, implementation and sustainability
    - University administrators are supportive (prestige, other) but where are the resources for continuation when there are as many/more other programs that need similar support;
    - University structural issues for multidisciplinary programs – departments/programs; could consolidate/centralize administrative support to manage training grants – more at school/college/institute level than at department level
    - Engaging faculty so they know their role in the transformation
  - Renewal; once you start figuring out what you are doing, then you are challenged to continue to create/implement the transformation – bridging to research-based or center-focused program
    - Fund the transformation – carrots and sticks
    - Re-competition – should be a separate competition from a new application
    - To keep faculty investment/involvement during that bridging stage while continuation funding for center grants or additional training/research grants
    - Mandate cost sharing from administrative

- Engage faculty
- **How to optimally integrate interdisciplinary research and education?**
  - Remain flexible and identify the rubric that works
    - Don't stay married to what you proposed – include additional faculty if they match with the goals
    - New faculty – young faculty need to be rewarded for multidisciplinary research but may need to rewrite (transform) understanding of P&T
    - Ph.D. plus program (nanobiomedical engineering?) – Ph.D. in traditional discipline plus value-added
    - IGERT as
      - admitting program for training then transition to traditional discipline
      - one option; 2 mentors (IGERT and discipline)
      - two program disciplines with 2 different mentors
  - **how to integrate research training**
    - Attraction of new faculty
    - Journal clubs (journal tutorial in first year) of multiple disciplines with cohorts
    - Common space or training research labs to create
    - Create portfolio for student
- **How has globalization of interdisciplinary research in your topic area had an impact on graduate education and research?**
  - Hard to get the international portion of the graduate training until year 3; international collaborators wanted more “mature” students
  - Only send students to international labs where faculty have been or where the mentors/laboratories are familiar to the PI or IGERT faculty
  - One limitation is that can only fund U.S. students; international travel is one-way as U.S. students can go one way

- How to reciprocate? Can we bring in international students or researchers for 3-month or so?
  
- **What are the career opportunities for Trainees, and how are Trainees being prepared to be successful?**
  - Annual symposia with external participants, industrial consortiums and internships, external speakers to campus, mini-grant (student proposal-writing experience) or formal proposal writing course, conferences
  - Gap in education training and industry description of opportunities – industry descriptions of positions are more traditional (cannot capture this in a current 5-6 yr IGERT program; will not demonstrate institutional or industry impact) disciplinary training
  - Does industry recognize the training of the IGERT? Are “soft skills”/interdisciplinary approach recognized to get the position? Are companies thinking broader vision for position descriptions?
  - Faculty involvement with getting the message to industry – description of skills and expertise and value
  - The IGERT experience/training should not be/is not limited to IGERT funded students
  - Giving them life-skills for learning
  
- **What role does the interdisciplinary research in your topic area play in recruiting and retaining a diverse group of trainees? (Please think: Broadening participation)**
  - REU for recruitment – including underrepresented, HBCU
  - Dependent on topic and mindset of PIs – looking for opportunities
  - Native American – connection to Native American studies department or office
  - Grassroots effort but HBCUs are being heavily recruited
  - Pre-existing relationship with HBCU faculty (preferably with scientific focus or as participating university in the IGERT)
  - Associates program to help recruitment (\$5K for each undergrad associate)
  - Biology is an exciting field so that is very helpful

- Interdisciplinary part helps close the deal
  
- **How can the IGERTs in this topic area collaborate or cooperate to further the goals of each IGERT?**
  - Access Grid – funding
  - The PI meeting should have a focus on this – more PI to PI discussion and IGERT administrator/program manager to administrator/program manager discussion
  - PI institutional meeting should include all that are interested; PI program meeting should be more inclusive
  - Short-term exchanges of trainees/IGERT faculty if there are complementary programs/research topics – campus exchanges
  - More PI-trainee cross-talk (outreach discussion had some)

## **Trainee Responses:**

- **How to ensure IGERTs are leading the way on transformative interdisciplinary research?**
  - Look what universities are doing in other countries to support interdisciplinary research. IGERT has encouraged this.
  - Advisement by experts of at least 2 disciplines would help with having good research.
  - Deliverable of peer reviewed journal article by student with two experts.
  - Force co-advisor concept.
  - Lab based classes with various disciplines cause us to work together with our strengths.
  - PIs must be committed to interdisciplinarians. Not just a free student.
  - Train PIs. Not really incentive for PIs to be interdisciplinary.
  - More accountability at PI level to make sure students are doing interdisciplinary research.
  - Money for PIs to buy equipment needed for interdisciplinary work.
  - IGERT funding only for 2, 3 years but research takes longer, fund for longer.
  - But money only meant to be start up?
  - Need new fellowships to be available to recruit students to do extra work.
  
- **How to optimally integrate interdisciplinary research and education?**
  - *Kick-off* research projects within classes.
  - A lot of extra work for professors. But not so much if incorporated into curriculum (graduate or undergraduate)
  
- **How has globalization of interdisciplinary research in your topic area had an impact on graduate education and research?**
  - Think about implications of research as it relates to other countries and areas.
  - Worldwide set of collaborators to work with

- International internships in facility that is similar to yours.
- Visit government lab in other country.
  
- **What are the career opportunities for Trainees, and how are Trainees being prepared to be successful?**
  - Increasing numbers of interdisciplinary/ joint appointed faculty positions.
  - Easier to work with various groups once hired. Do better in job.
  - Difficult to find positions that are not interdisciplinary.
  - Internships help with preparation
  - Teaches us to work in teams.
  - Trains us to talk to others outside our area.
  - Trained to go into lots of different areas (policy, writing etc .) by focusing on communication skills.
  - Able to get jobs globally.
  
- **What role does the interdisciplinary research in your topic area play in recruiting and retaining a diverse group of trainees? (Please think: Broadening participation)**
  - If research is interdisciplinary, people with other specialties come and continue to grow program
  - Biomedical is in and of itself interdisciplinary, recruiting from many disciplines.
  - It differs in different universities if you start IGERT your first year before having an advisor/project or if you get IGERT after already having an interdisciplinary program.
  - If get IGERT after choosing project it makes sure project will be interdisciplinary.
  
- **How can the IGERTs in this topic area collaborate or cooperate to further the goals of each IGERT?**
  - Read posters at sessions to know what else is going on.

- Video conference class/meeting for many different IGERTS that are similar.
  - UC's collaborate, have retreat together.
  - Different programs so different, hard to collaborate. But can network. But could use expertise of other groups.
  - Database of IGERTS so you know what others are working on and who to contact for collaboration. Have resource if you need it.
- **PLEASE feel free to add any other questions you wish and provide your input!**
- People quit if program at university requires too much extra effort. But you get more out of the effort that what you put in. Not for lazy grad students. Different at different universities.
  - Open new areas to trainees due to extra classes.
  - Have problems getting students to really be interdisciplinary, cling to their fields, won't talk towards others, avoid embracing other fields. More oversight (PI participation) might help.
  - Freedom from NSF is a strength of the IGERT program. But there are big differences between programs at different universities. Some students think that more oversight would be beneficial. Ability for students of IGERTs with problems to appeal. Nice to have representative to contact if problems (Ombudsperson)

#### Things that are working well in different IGERTS

- Conference funding for international conferences – regardless of PI funding situation
- More years of funding (3) as opposed to two so more focus on research
- Project-based course between IGERT trainees of different disciplines
- Participating PIs already have a history of interdisciplinary work before joining program
- K-12 outreach component is strong: sign-up for elementary schools and high school visits
- Journal clubs at lunch or breakfast where questions can be asked in informal setting. You get the chance to know people in other fields this way

- All 2<sup>nd</sup> year students are in a year-long project: proposal, review article, research project (team building and effort besides journal club) which is mentored by an IGERT participating faculty member
- 3 semester project-based class with other IGERT trainees from your year (team!)
- The requirements make sense for all departments (no extra classes or JCs) so not excessive workload
- Funding for conferences, getting to network with people in your field (biomechanics)
- Public speaking events (at least once per year) to a multi-disciplinary audience of scientists
- Lab-based class (engineering + science) with set modules ex: controlling the firing rate of a neuron using engineering systems
- No extra burden. Lab modules in the summer. Leaves time for research!
- Industry and academia together. Ex: career panels (gives trainees perspective about future)
- There were already two NSF-funded research initiatives which shared a common issue that lent itself to the creating of an IGERT that was between those different disciplines (brought experts together)
- International internships are valuable, could not be done without IGERT funding
- For trainees: Seminar series (open to the entire university) brings speakers that students want to hear from across the US.
- The requirements of the IGERT actually provide a break from lab monotony and give trainees time to consider the “big picture” on a regular basis
- Collaboration is easier, although the projects have been hard, having a list of participating (willing) PIs with their research interests has made it easier to find people to work with
- Science in society (ethics) class, science and policy trip, gave trainees perspectives that they would not otherwise have had in their traditional graduate program

- Classes and other activities were stimulating (good reason to get out of the lab) and actually help with your project and meeting other students ended up helping project