

A COMPREHENSIVE EVALUATION OF A FIVE-YEAR IGERT GRANT

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Introduction: IGERT

- Developed to educate U.S. Ph.D. scientists and engineers with an interdisciplinary curriculum
- Goal is to support young scientists:
 1. Becoming leaders & creative change agents within chosen careers
 2. Facilitating diversity in student participation and preparation
 3. Contributing to a world-class, broadly inclusive, and globally engaged science and engineering workforce
- Seeks to establish a new graduate education model that promotes a cultural change for students, faculty, and institutions



Program Design

- Ph.D. engineering students gain exposure to the following:
 - Economics
 - Public policy
 - Communications
 - Psychology
 - Multi-cultural aspects of renewable energy through internship and summer abroad program
- This evaluation report was guided by two questions:
 1. What are the experiences of IGERT students and faculty/administrators?
 1. What are the students' educational outcomes as a result of participating in IGERT program?



Methodology

- Mixed methods approach: quantitative (student survey) and qualitative (student and faculty interviews):
 - Student interviews ($n=9$), IGERT student survey ($n=2$) non-IGERT student survey ($n=16$), and faculty interviews ($n=3$)
- Data gathering focused on IGERT students
 - relevant knowledge base;
 - general experience with IGERT
 - relevant skill sets and how these are developed through IGERT;
 - beliefs/commitments to sustainable energy from participation in IGERT; and
 - plans to conduct themselves as future scientists, and how this has been influenced by participation in IGERT.



IGERT Interviews

IGERT Students Interviews

- Conducted fall 2015 (in-person or via phone) with third ($n=1$), fourth ($n=5$), and fifth ($n=3$) year cohort students (total, $n=9$).
- On average, interviews lasted 15 minutes and were audio recorded
- Most often, two evaluators were present during the interviews, with one acting as moderator and the other as a note taker. Post-interview the evaluators memo-ed and discussed themes to triangulate findings.

IGERT Faculty Interviews

- Interviews conducted fall 2015 (in-person or via phone) with IGERT program faculty ($n=2$).
- On average, interviews lasted 15 minutes and were audio recorded.



Limitations

- Individual accounts are specific to the context, interpretation and perspectives of each participant.
- Not all students voices were captured therefore we lacked generalizable results.
- A small sample of Non- IGERT students were surveyed for the purpose of this study, but were not interviewed to provide deeper context to understand potential benefits of the program.



Themes

The following themes emerged upon analysis of the data.

- Exposure to Interdisciplinary Courses
- Benefits of Funding Support
- Cross-culture Exposure
- Collaborative Communication
- Structural Inefficacies



Theme 1: Exposure to Interdisciplinary Coursework

IGERT and non-IGERT students were asked to respond to a survey regarding coursework and internship experiences:

- Only 50% ($n=8$) of the Non-IGERT respondents selected *yes* they had taken an interdisciplinary course at the University.
- Over 75% ($n=12$) of the Non-IGERT answered that it was either *very important* or *important* for scientists to be trained in a multidisciplinary field.

“Benefits like doing the econ stuff was really useful. Thinking about projects and having an end goal and marketability and keeping that in mind start to finish. And the other ones were a little difficult because it was material I wasn’t exposed to before, but good in case it comes up (Energy for 21st Century).”

-5th Cohort Student



Theme 1 Continued: Exposure to Interdisciplinary Coursework

- Faculty thought the IGERT program was a “valuable opportunity” and would continue to participate if funding was available.
- Students exposure and ability to meld new skills into their expertise was cited as a vital aspect of their future trajectory.

I think it is really beneficial to the students to consider the technical issues associated with their research, but they also take into account commercial viability, market potential, and policies that would be necessary to really affect their, the technologies they are working on. I think it really helps them become a more well rounded or understand the tradeoff, not just “here is the technical solution.” It is much more than that.

-2015 IGERT Faculty

I think the interdisciplinary component of the program was beneficial...doctoral education in science is extremely narrowly focused, so including this program, including their time in Africa and courses, gave them broader experiences.

-2015 IGERT Faculty



Theme 2: Benefits of Funding Support

“IGERT enables me to go to a national lab for my research...I think because of IGERT I was able to do my PhD, because of the funding and the experiences. Funding and being able to be in a national lab, I was able to put everything together and start working...”

-4th Cohort Student

- Opportunity to seek out specific faculty advisor.
- Opportunity to pursue alternative programs.
- Ability to secure internships that may lead to future employment.



Theme 3 Continued: Cross-culture Exposure

Cross-culture exposure:

- When speaking about the international experience, 4th cohort participants spoke about their goal of sustainability, such as maintaining contact in order to support continued development of science in Swaziland.

“We had an amazing experience. Practical things like weather...people were wonderful. Very shy, but then very welcoming and warm. We just learned a whole lot. And now we have great contacts there. And the fact that it is a very small country...central location...enabled us to go to a lot of different places in the country. We loved it so much. Before we had left, we had already started talking about going back...our responsibility to go back.”

-4th Cohort Student



Theme 4: Collaborative Communication

Cohort collaboration:

- 4th and 5th cohort students noted positive experiences and successful internship experiences, particularly international internships, in large part “because of our team...great coordination...worked really well together.” -4th cohort student
- Although not part of the original grant, students were expected to plan their international and domestic internships themselves. Previous cohorts who travelled to Africa mentored current cohorts in planning/organizing their international internship experience.

It was a good experience, definitely interesting...a good trip to go on, difficult to plan. If I were asked to do it again, I would know what I know now. I didn't know what I was getting into in the beginning...turned out very nice. I think we have had a much better experience...nicer climate...less mosquitos...our group has done more work than the other groups. I think we had more people willing to plan than other groups...versus one or two leaders. We had each person tackle one piece of the trip.

-4th Cohort Student

It was great. There was six of us, we basically planned a lot of the meetings with schools; we planned everything as far as the solar panel construction. We would teach the HS...it was a great experience. We went to four different schools. We put things on our schedule doing science demonstrations and demos. We had such a great team. We all worked together, we all contributed to something somehow. It was really great. It was an awesome experience. We did a lot in so little time.

-4th Cohort Student



Theme 4 Continued: Collaborative Communication

Cohort collaboration continued:

- Across cohorts, participants cited camaraderie as one of the most significant benefits of IGERT; participants often described their cohort as a support group and were cited as essential for degree completion



“For me...there [was] a possibility I would have quit grad school if not for the program...being able to have people to support you.”

-4th Cohort Student



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Theme 5: Structural Inefficiencies

All cohort participants cited lack of communication/direction from leadership and lack of clear/explicit of fellowship logistics as negative aspects to the program.

I would of liked more upfront for what I had to do. I didn't know what all the stipulations were for the fellowship...we got a calendar...and even Violet said we had to move things...planning my class load around that was a little difficult. Would have been a little better to have it outlined a little better.

-4th Cohort Student

Transparency around resource allocation for conferences and trips would have proven helpful as students planned budgets.

We had no idea if we could have fun...no idea of what we could or couldn't do because there was no oversight...but it would have been nice to have a dos and don'ts list.

-4th Cohort Student

When reflecting on experiences, students spoke about confusion around course registration and lack of transparency in resource allocation.

"I think one [recommendation] would be more organization in the summer economics course we took, because I don't know if we ever got registered for that. And maybe just more organized in regular meeting with the cohorts. Sometimes there wasn't a lot of notice." (5th Cohort Student)



Theme 5 Continued: Structural Inefficiencies

Challenges to IGERT continued:

- One student noted that *“the program has improved a lot since last year. The program director is participating a lot...he was quite happy with what we did.”*
- However, an undertone of lack of support from program leadership was cited across cohorts. A set meeting schedule, structured agenda, and ongoing meetings would have been beneficial.

At the beginning of the program, our coordinator was able to support us, but then she was overwhelmed and overloaded, spread thin. - 4th Cohort Student

I think what I have noticed is that we are not having enough meetings. I do not want to be bureaucratic but even if it were just lunch and talk about an interesting article that came out, if there was more frequent gatherings I think that would be better. We are all working in different buildings so we do not see each other often enough. - 4th Cohort Student



Theme 5 Continued: Structural Inefficiencies

- Faculty cited lack of: prolonged engagement with students to connect and incorporate new skills into graduate research, communication from leadership, and program organization

I had hoped for a much more positive experience overall. The whole idea of IGERT was that I would continue working with some of these grad students to bring economics and policy decisions into their dissertations. And I think that hasn't really happened. There hasn't been an ongoing connection with the IGERT students that I had hoped.

-2015 IGERT Faculty

- Faculty felt students lacked clear direction/communication regarding program's focus on renewable energy and planning of the abroad internship. A dedicated leader(s) on an initiative is pivotal to program's success.

I think it is a challenge to successfully implement something like this. You need a strong champion.

-2015 IGERT Faculty

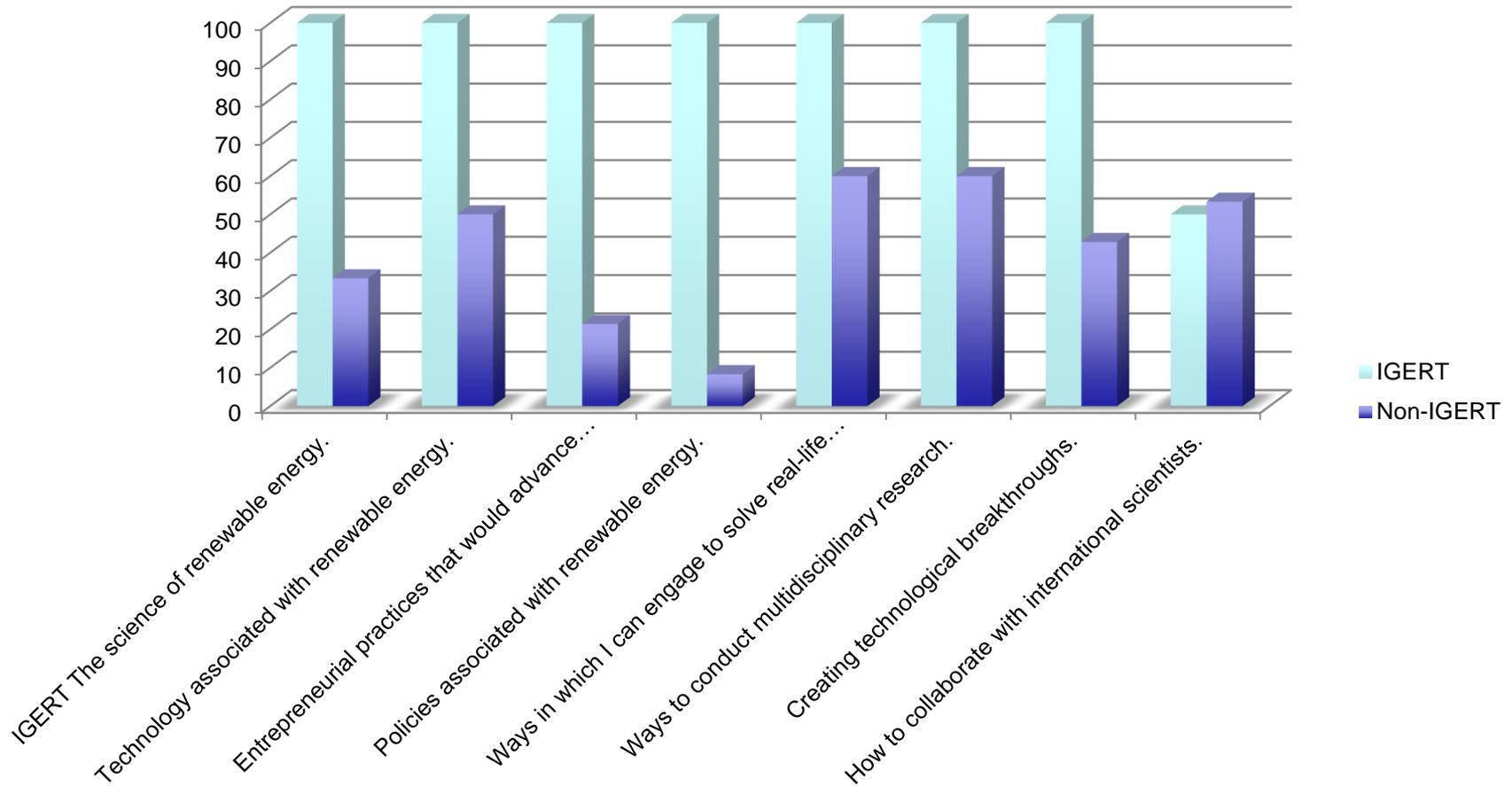
I think a big lesson is these programs have to be lead...there should be an infrastructure that even if the administrator leaves.

-2015 IGERT Faculty



IGERT and Non-IGERT students *Strongly Agreed* or *Agree* with the following statements.

As a part of IGERT/Graduate training I have learned about:



Implications

- IGERT provided exposure to interdisciplinary courses, renewable energy, funding, and collaborations that Non-IGERT students may not have had experience with during their time at the university.
- Despite some major structural issues IGERT did have some unintended benefits to its students. Due to changes in leadership, students took on leadership roles (beginning with cohort 1) to guide their own IGERT program of study (especially internship experiences). This turned into a mentor-like program where previous cohorts supported the subsequent cohort in planning/organizing their international internships. This created unintended benefits of student self-advocacy, and coalition formation and mentorship between and within cohorts.

