



Center for Innovation and

Research in Graduate Education

Post-IGERT Career Outcomes: Astrobiology at the University of Washington

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Executive Summary

During the 2009 and 2010 academic year, the Center for Research and Innovation in Graduate Education (CIRGE) administered a web-based survey to PhD recipients of the Astrobiology (AB) Integrative Graduate Education Research Traineeship (IGERT) program at the University of Washington. As part of an ongoing, formative, multi-year evaluation of the AB IGERT program, this survey provided anonymous feedback to the program faculty regarding what impact participation in the Astrobiology IGERT program had on graduates' subsequent career opportunities, career choice, and overall job experiences.

Highlights

- Overall, the surveyed PhD recipients were satisfied with the AB IGERT program and reported they had more career options as a result of participating in the AB program and it helped them to obtain their current job.
- All of the graduates are currently working in higher education jobs (teaching and research).
- Given the structure of the AB IGERT program, students had many opportunities to interact with other students, faculty, and scientists across disciplines and beyond the University of Washington. As a result, graduates noted that this exposure helped promote strong bonds between students, a sense of collegiality, as well as opportunities for social and professional networking, collaboration, and intellectual exchange.
- The graduates reported one of the most valuable benefits of the program was the opportunity to get to know and learn from one another.
- The majority reported that in their current jobs they considered themselves being better prepared to do interdisciplinary work, in terms of knowledge and skills, than their peers.

The evaluation also identified several areas of improvement for the program:

- Several respondents expressed that they had not received sufficient teacher preparation from the program.
- The program needs to not only expose students to different disciplines, but it also needs to help students integrate the knowledge they've gained.

Purpose of the Survey

The Center for Innovation and Research on Graduate Education (CIRGE) is completing an evaluation of the Astrobiology IGERT program at the University of Washington. In this final year of the contract (2005-2010) the primary focus of CIRGE has been to survey PhD recipients who completed the Astrobiology program regarding their career outcomes. To this end, a survey was designed and administered in an effort to assess what impact participation in the Astrobiology IGERT program had on students' career preparation, career opportunities, career choice, and overall job experiences.

Survey Methods

This online survey was developed by CIRGE and was administered by Catalyst. Catalyst is a unit at the University of Washington that provides tools, resources, and support to help faculty teach and do research with new technologies. The questionnaire was composed of five sections: (1) current job, (2) being on the job market, (3) post-doc, (4) experience in and with the astrobiology program, and (5) demographic information. The survey consisted of yes/no questions, multiple choice and some open-ended questions.

All ten former students of the Astrobiology IGERT program, who received a PhD from a degree-granting program at the University of Washington, were contacted to participate in this survey. They were initially contacted by Dr. Woody Sullivan, the PI and Chair of the Steering Group of the Astrobiology Program, via email to solicit their participation in the survey. A follow-up email was sent by the CIRGE Research Assistant which included the link to the survey. Participation in the survey was voluntary and respondents were free to withdraw from participation at any time. The survey was posted on the web for one week starting March 28, 2010 until April 2, 2010.

Demographics of Participants

Of the ten former students who were contacted, nine of them completed the survey. These nine individuals received their PhD's between the years of 2004 and 2009 from the following disciplinary areas: astronomy, earth and space sciences, biology and oceanography.

Among the graduates, the large majority were white, male, and U.S. citizens. During their doctoral education the majority of them were married or in a committed relationship and none of them had any children.

With regards to the Astrobiology IGERT program, all of the respondents completed the program requirements and only one did not receive the Astrobiology certificate. This respondent said he had been promised one, but had yet to receive it.

Career Goals

Research has shown (Nerad 2009, Nerad and Cerny 1999) that students often begin their PhD with certain career aspirations which change over the course of their education. As a result, we asked about respondents' career goals both at the beginning and end of their doctoral education, whether or not they had changed and if so, why?

Respondents were able to select as many choices as they wanted for their career aspirations at both the beginning and end of their PhD (Table 2).

Table 2. Career Goals of Graduates at Beginning and End of PhD

Career Goals	Beginning	End
To become a professor in my field	3	3
To do research in an academic setting	6	7
To do research in a non-academic setting	1	1
To become an administrator/manager in an academic setting	-	-
To become an administrator/manager in a non-academic setting	-	1
To work independently, e.g., as a freelance consultant	1	-
To start my own business	-	1
No formulated career goal, only intense interest in the field	3	1
Other:	1	-

All of the participants received a follow-up question that specifically asked those whose career goals changed between the beginning and end of their program, if it was at all a result of participating in the Astrobiology program. Three of the respondents indicated that their career goals had changed during their doctoral education.

One participant did not have a formulated career goal at the beginning of the PhD, but by the end had decided that he/she wanted to do research in an academic setting.

Somewhere along the way I realized that I like research more than I thought I would. I can attribute this to AB as it was the main focus of my graduate career.

Another participant stated that his/her career goal at the start of the PhD included becoming a professor, doing research in an academic setting and/or working independently. At the end of the PhD, his/her goal had changed to becoming an administrator/manager in a non-academic setting and/or to starting his/her own business.

The broad and significant nature of my graduate work sparked an intense interest in a career in planetary science.

A third participant, an assistant professor, had no formulated career goal at the beginning or end of the PhD, but said the following:

I became more interested in philosophy in part as a result of my participation in the astrobiology program.

Given the participants' comments it would seem that the interdisciplinary exposure students received by participating in the Astrobiology program did influence their perception of career opportunities and exposed them to topics they might not have otherwise been exposed to. In all, there were no dramatic shifts other than the number of people who came in with no real clear career goal and who left with a better sense of what they wanted to do.

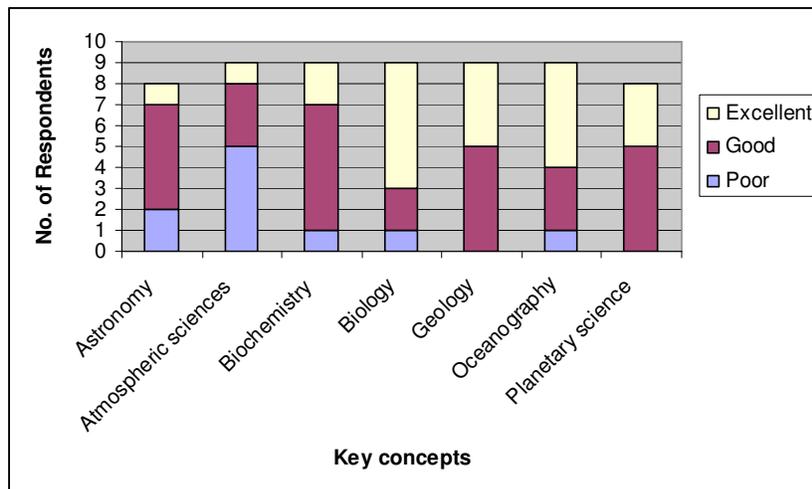
Astrobiology IGERT Program

Throughout the duration of the IGERT program, CIRGE has provided ongoing feedback on incoming and continuing students' experiences in the Astrobiology program; however, this is the first survey to specifically focus on those individuals who had completed all of the program requirements and had received a certificate. These respondents, who graduated from 2004-2009, answered several questions that specifically focused on their experiences in the program and what value added they perceived as a result of participating in the program.

Knowledge of Astrobiology Fields

Given that the field of Astrobiology is shaped by the perspectives of multiple disciplines, this survey asked respondents to estimate their knowledge in the following areas: astronomy, atmospheric sciences, biochemistry, biology, geology, oceanography, and planetary sciences.

Figure 1. Knowledge of Key Concepts in Astrobiology*



*One respondent selected two responses for astronomy and planetary science and was therefore not included in the data.

On the whole, respondents were least confident of their knowledge of atmospheric sciences and most confident of their knowledge of biology and oceanography. It is not

imminently clear why they were not as confident in atmospheric sciences. Given that these respondents' home departments were astronomy, earth and space sciences, biology and oceanography; it is no surprise that students were more confident in the areas of knowledge most closely related to their PhD discipline.

We also asked graduates to self-assess how much they had learned about the field of astrobiology overall. Eight of the respondents reported that the astrobiology program provided them with a thorough understanding of the field, only one individual did not. This same individual also said that, overall, he/she was somewhat dissatisfied with the Astrobiology program. This respondent indicated participation in the program created a minor conflict with his/her advisor and with his/her personal relationships.

Astrobiology and Dissertations

Another facet of these graduates' experiences was their estimation of how much of their dissertation was related to Astrobiology. Two of the respondents did not provide a percentage. One said that the dissertation was minimally related to astrobiology and the other said it was overtly related with one major chapter devoted to the field. However, he/she did add that his/her doctoral research had broader relevance to Astrobiology.

The remaining respondents did provide a numerical percentage (Table 3).

Table 3. Percentage of Dissertation Related to Astrobiology (n=7)

	20%	30%	50%	100%
No. of Respondents	2	1	1	3

The Astrobiology program required students to have a minimum of two AB faculty members, representing the biological and physical sciences, on their dissertation committees. Graduates responding to this survey would have needed to comply with this requirement. In the last two years the AB faculty also approved a new regulation requiring that at least one chapter of a student's thesis be on an AB-related topic. However, this is unlikely to have impacted the respondents to this survey. As a result, it is remarkable that for the majority of respondents, some portion of their dissertation was related to Astrobiology, with three of them relating 100%. Although students graduated between 2004 and 2009, there was no pattern over time in how much of their dissertation related to Astrobiology.

Conflicts as a Result of the Astrobiology Program

Given the additional requirements expected of those who are participating in IGERT programs it is likely that these students might experience conflicts with their home departments and in managing their time in and out of school. With regards to their overall experience in the program, we wanted to know whether or not these graduates had experienced any conflicts with their advisor and/or home department and then in their personal relationships as a result of participating in the Astrobiology program (Table 4).

Table 4. Conflict with Advisor and/or Home Department and Personal Relationships

Nature of Conflict	None at all	Minor conflict	Some conflict	Serious conflict
Conflict with advisor or department	5	2	1	1
Conflict in personal relationships	6	3	-	-

More than half of the respondents experienced no conflicts with their advisor and/or home department and in their personal relationships. Two individuals identified having minor conflicts with their advisor and/or home department and they elaborated as to what these entailed:

There's always tension between doing projects connected to one's main disciplinary field and extraneous projects that might not go anywhere. An advisor wouldn't be responsible if he or she didn't express some concern, etc.

The source of funding did not always match the work being performed.

One respondent identified having some conflict, but did not elaborate. Finally, one respondent expressed having serious conflict and elaborated that it was a result of having "limited advisor choice."

With regards to conflicts that may have evolved in graduates personal relationships the majority of graduates did not identify any conflicts. Three respondents did express having minor conflicts but not one elaborated as to what these conflicts were about.

Impact of Astrobiology Program on Careers

In an effort to determine what aspects of the Astrobiology program were most helpful regarding their careers, the respondents identified the following components that lead to meaningful research on a basis of collegiality and strong bonds among their peers.

The weekly seminar was the critical grounding component and probably provided the greatest benefit overall. The workshops were unforgettable. The experience I gained [working with researchers at another institution]...had a very direct impact on my current position at [institution name]...

The courses were great, as were most of the cognate courses I took. The opportunity to go to multiple meets was great, as I went from being completely overwhelmed to understanding most of the talks within 6 years.

Regular meetings and seminars, the strong bonds among students from many different disciplines thanks to the introductory classes and

workshops and recently the organization of the abgradcon [AB Graduate Conference].

I appreciated the collegiality and the many unusual opportunities the program provided, including those that culminated in meaningful research outside my field.

- 1) The numerous social and intellectual interactions with scientists from different disciplines provided crucial insight into different modes of scientific inquiry*
- 2) Exposure to fields outside my "home" department led me to develop innovative research that is not part of the standard canon of planetary science or geochemistry.*

Networking with colleagues in different disciplines. Being forced to think outside of the box.

Respondents were also asked to identify areas of the program that needed improvement. Students pointed out two areas: the way the program tried to implement interdisciplinary teaching and research and the role students could play in teaching and other program activities.

Need to focus more on challenging projects to force depth of thought as opposed to "surveys", which is more what my training was... maybe it has changed.

The interstices of the disciplines required more attention than they received when I was a student. By this I mean that faculty were comfortable within their own fields and could point to possible areas of contact, but the integration that required faculty to go beyond their fields, whether as teachers or researchers, often was lacking. I frequently thought the result was something like a quilt, the greatest interest of which was the ignored stitches between the patches.

I think the AB research rotation should be more focused on something near the student's area of expertise. I think it is naive and top-down to say that "astronomer" should do "biology". There is simply too much to do and not enough time in science to learn skills that will never be used again. By contrast, learning new skills in a nearby related area, thus expanding ones scientific toolkit and community of collaborators is vital.

As often happens at a research institution, faculty were often scattered in their approach to teaching. As might be expected, students were left to fill the gaps in interdisciplinarity. The program did a fair job of supporting student activities, but student input was not always incorporated into the courses as well as it might have been. Perhaps the core courses could

require teaching input from one or two of the senior graduate students, to the extent that they would be expected to come to every class and co-design all lectures with the faculty instructor. This approach was tried in some of my classes, but it needed further development.

In terms of the benefits to respondent’s careers, it appears that the opportunities they had to collaborate with other scholars across disciplines at the University of Washington, and beyond, did have an impact on some of their career opportunities. Otherwise, the program succeeded in providing what one respondent described as “unique opportunities” (i.e., exposure to different fields, being forced to think outside the box, etc.). The impact that their participation in the program had on their careers was also measured through the question of whether or not participating in the Astrobiology program gave them more career options than their peers who had not been a part of the program; the majority of them felt that they did have more career options (Table 5).

Table 5. More Career Options as a Result of AB Program

	Yes	No	Don’t know
# of Respondents	7	-	2

In terms of whether participating in the Astrobiology program contributed to them getting their current job, respondents were slightly less certain, but the majority of them did agree that it did positively contribute to the successful acquisition of their current job (Table 6).

Table 6. AB Program Contributed to Getting Current Job

	Yes	No	Don’t know
# of Respondents	6	-	3

Finally, we wanted to know whether or not participants felt that the Astrobiology program and their home department prepared them for their current job. The results are compared in Table 7.

Table 7. How well did Home Department and AB Program prepare them for current job?

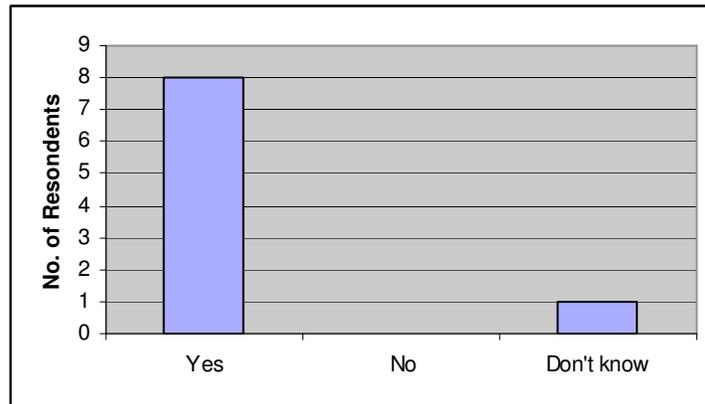
	Not at all	A little bit	Fairly well	Significantly prepared
Home Department	-	1	3	5
Astrobiology Program	-	1	4	4

Overall, the PhD recipients stated that participation in the Astrobiology program did have a positive impact on their career options and opportunities.

Astrobiology Program and Becoming an Interdisciplinary Scientist

We were interested to learn to what extent the respondents felt their participation in the Astrobiology program made them think, feel and act like interdisciplinary scientists.

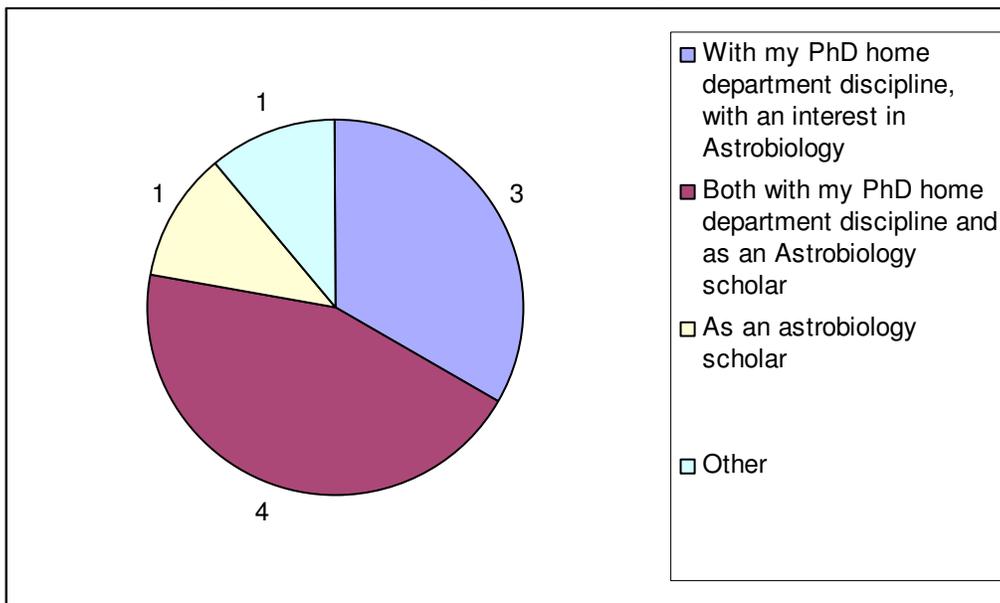
Figure 2. Astrobiology Program Impact on Becoming an Interdisciplinary Scientist



The large majority of respondents stated that the Astrobiology program made them think, feel and act like an interdisciplinary scientist. However, this does not necessarily mean that they identify as such.

We asked the participants how they identified as scholars.

Figure 3. How Participants Identify as Scholars



In all, the majority of the respondents do see themselves as Astrobiologists to some degree. Almost half of the participants identified both with their PhD home department discipline and as an Astrobiology scholar. Only one person identified him/herself as an Astrobiology scholar. The person that said “Other” elaborated by saying that at his/her institution there are no departments thus suggesting that he/she did not identify with any discipline or field. Nobody identified solely with their PhD home department discipline.

Impact of International Experiences on Careers

Increasingly graduate educators, governmental agencies and others are promoting and encouraging doctoral students to participate in some type of international research learning (Nerad and Hegellund 2008). We were interested in how many of these respondents participated in international research during their PhD and whether this experience had any impact on their job search and career.

Seven of the nine graduates did participate in international research activities during their doctoral program. While some respondents gave more general comments regarding the positive effects of “traveling to interesting destinations”, others reported work experience in foreign countries provided “experience and connections that have proven instrumental to my current work.” Several respondents have worked (or are working) as postdoctoral researchers abroad, in jobs they lined up through field work in foreign countries as well as through participation in international conferences and workshops. (Respondents’ comments are quoted in full.)

It is a small world.

Very little, though I enjoyed the opportunities and learned from them.

I may consider a second postdoc in Europe if the cards align. Overall, I would say that the ability to travel to interesting destinations is a plus for my career choice.

My field work in (Country), as well as my participation in international conferences in (Country) and (Country), inspired me to seek an international postdoctoral appointment. Connections I made in (Country) have opened up a potential future opportunity in that country. The IGERT travel stipend made it possible for me to visit the (name) lab, where I was later employed to perform some analyses for my PhD research and investigate the possibility of working in that lab.

I have a post-doc in a foreign country.

My work in (Country) exposed me to the European space agency and to international science in general. The experience and connections I acquired through that work have proven instrumental to my current work on planetary science missions.

The two individuals who did not participate in any international research activities graduated the earliest (2004 and 2005). It is possible that their short duration in the program did not afford them the time to be able to participate in any international experiences, unlike the other students.

Dual Degree

An ongoing conversation in the Astrobiology program is whether or not student participants should be awarded a dual degree from their home department and from the AB program. As a result, we wondered to what extent the graduates would see having a dual-degree as positively or negatively impacting their career opportunities.

Table 8. Impact of Dual-Degree on Career Opportunities

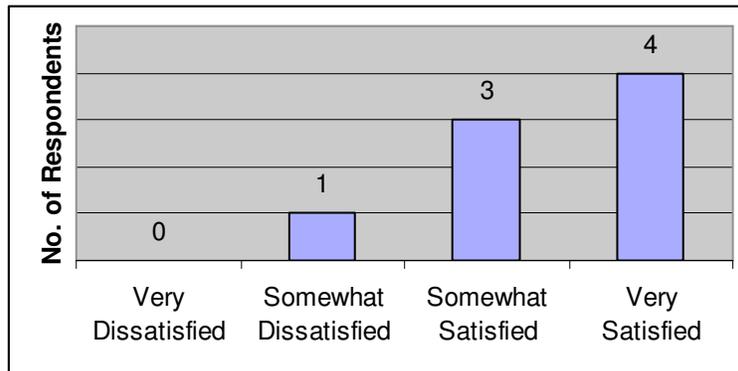
	No response	Not at all	A little bit	Fairly well	Significantly
Positive impact	-	3	1	3	2
Negative impact	2	5	2	-	-

While the graduates indicate that a dual-degree would have more of a positive impact than a negative one on their career opportunities, given their responses to earlier questions (Tables 5 & 6) their participation in the Astrobiology program alone opened up career opportunities and helped them to get their current job.

Overall Satisfaction with the Astrobiology Program

Finally, we asked the participants about their overall level of satisfaction with the program.

Figure 4. Overall Satisfaction with the Astrobiology Program*



*One participant did not respond

The majority of the respondents were somewhat to very satisfied with the program. The one graduate who was somewhat dissatisfied with the program had also expressed having minor conflicts with his/her advisor, minor conflict in his/her personal relationships and did not feel the program provided a good understanding of Astrobiology. This respondent also did not have a formulated career goal at the beginning or end of his/her PhD experience. These might begin to explain why this respondent was somewhat dissatisfied with the program.

Job Search

In order to get a better sense of the job search process we asked respondents what types of jobs they were interested in (Table 9) and what types of jobs they actually applied for (Table 10).

Table 9. Types of Employers Participants Interested in Working for

Types of Employers	# of Responses
Business or industry	1
State or local government agency	-
Federal government agency	3
International agency	-
Foundation or other non-profit	3
Elementary or secondary school	-
University that grants PhD degrees	8
College or university that does not independently grant PhD	3
2-year college or community college	-
Military	-
Other	-

The overwhelming majority of the graduates were interested in working in a university that grants PhD's. One third of respondents were also considering non-PhD granting colleges or universities, federal government agencies and foundations or other non-profit organizations. Only one respondent was also interested in working for business or industry.

In terms of what types of jobs the graduates actually applied for, we separated their choices into those in the higher education sector and those outside of higher education.

Table 10. Higher Education and Non-Higher Education Jobs Applied for

Higher Education Jobs	# of Responses
Post-doc	7
Non tenure track faculty (i.e., instructor, lecturer, or visiting professor)	3
Assistant professor	4
Research scientist	1
Other	1

Non-Higher Education Jobs	# of Responses
Post-doc	2
Research and/or development	1
None/no response	6

Overwhelmingly, this group of graduates applied for post-doctoral appointments in the higher education sector. Two of those also applied for postdocs in the non-higher education sector. The second most popular jobs that these graduates applied for were assistant professor positions. Three of the respondents, at the time of the survey, described their current job as an assistant professor or tenure track position. If the respondents could be surveyed again later, it is likely that most postdocs will hold faculty positions.

Publications during the PhD

All of the respondents had published at least three or more articles during their PhD. While there may be different expectations within each discipline regarding the number of publications students should graduate with, overall these students demonstrated a successful publication record. Moreover, the number of publications does not seem to have any bearing on current job, particularly in terms of academic tenure track jobs, because there is no correlation between what types of jobs respondents currently had and their publication record.

Table 11. Number of Publications during PhD

# of Respondents	# of Publications
1	3
3	4
1	5
1	7
1	9
1	10
1	21

With regard to their length of time on the job market after they graduated, over half of the respondents (n=5) had their jobs secured at the time they graduated. The longest anyone described being on the job market was for 1.6 years. For two people it was just a matter of months (3-6 months) and one person described his/herself jumping from a one-year job to another one-year job for the first two years.

As stated earlier, most of the jobs that respondents started out in were post-doctoral appointments.

Post-Doctoral Appointments

The majority of the graduates (n=8) were employed in post-doctoral appointments after graduation. Two had completed a second postdoc and two others are still in their second postdoc.

We were most interested in the factors that impacted their decision to pursue their first post-doctoral appointment (Table 12).

Table 12. Factors that Influenced 1st Post-Doctoral Appointment

Factors	Major reason	Minor reason	Not a reason	Does not apply
It was a necessary step toward desirable employment in my field	5	1	-	1
I wanted additional training in my PhD field	4	-	2	1
I wanted training in another field	7	-	-	-
I wanted to work in a specific organization	2	1	2	1
I wanted to work with a specific person	4	1	1	1
I wanted to revise my dissertation for publication	4	1	-	1
It was the only acceptable employment I could find at the time	1	1	4	-
I wanted to be in a certain geographic area	3	1	1	1
The location worked for both me and my spouse/partner.	2	-	2	2

The most significant factor that determined the graduate’s choice to pursue a post-doctoral appointment was their desire to get training in another field and somewhat less to get additional training in their field. Several also saw it as a necessary step toward obtaining desirable employment in their field. Being able to work with a specific person and having the opportunity to revise their dissertation for publication also influenced a majority of the graduates and their decision to pursue a postdoc.

For the two individuals who are currently working on their second post-doctoral appointment they both felt that their job fit in significantly with their long term career goals. One respondent was very satisfied with his/her postdoc position and the other was somewhat satisfied.

Current Jobs

At the time of the survey, all of the graduates were employed. Although almost all of the graduates had completed a postdoc most of them had moved on to other positions. Those graduates who are currently postdocs were on a second appointment.

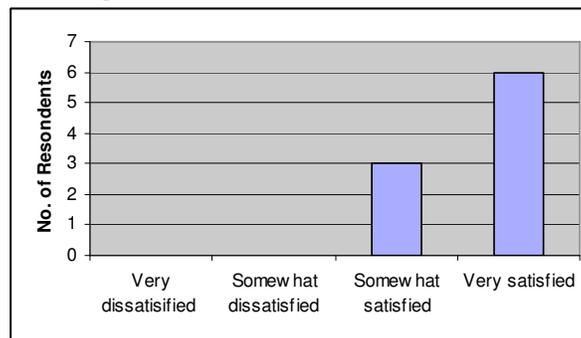
Table 13. Current Job and Current Sector

# of Respondents	Job Title	Job Sector
3	Assistant Professor	Higher Education
3	Researcher	Higher Education
2	Postdoc	Higher Education
1	Lecturer	Higher Education

All of the graduates are currently working in the higher education sector. One of those who is currently employed as a postdoc did specify that he/she was employed at a university via a NASA fellowship, but no one else specified their source of funding.

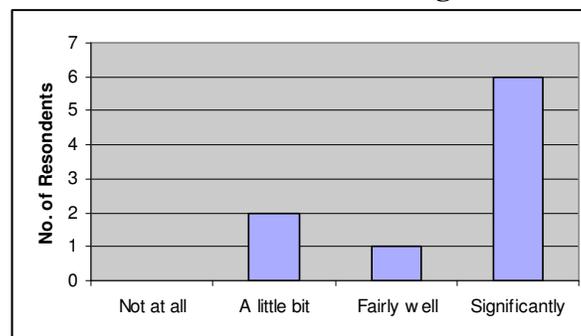
We wanted to know how satisfied these participants were with their current jobs (Figure 5) and how well their job fit into their long-term goals (Figure 6).

Figure 5. Current Job Satisfaction



As Figure 5 shows, the majority of the participants are very satisfied with their current jobs and three are somewhat satisfied even though the majority of respondents identified wanting to become a researcher in an academic setting at the end of their PhD.

Figure 6. Current Job in Relation to Long-Term Career Goals



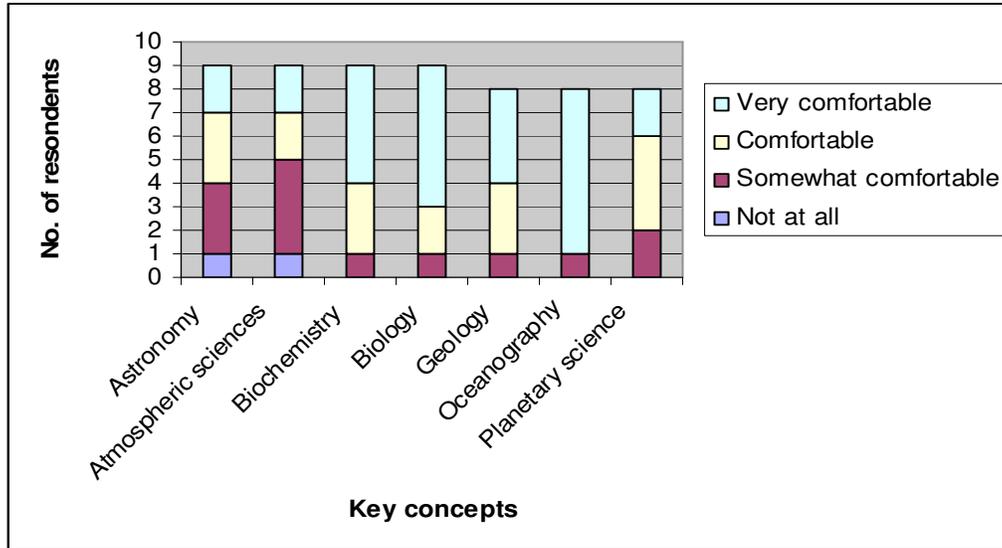
Once again, the majority of participants stated that their current job does significantly fit into their long-term career goals. Those who saw their current job fit in a “little bit” with their long term career goals were currently working as an assistant professor and as a lecturer.

Regarding their current job we asked participants how much of what they are currently doing actually relates to their PhD area of study and to the field of Astrobiology. Eight of the nine respondents did say that their current job *was* in the same discipline that they received their PhD in. *All* of the respondents said their current job was related (n=2) or closely related (n=7) to the field of Astrobiology. One of the graduates who regarded his/her job as related to Astrobiology commented, “In so far as Astrobiology has led me to ask philosophical questions, my current job is related to Astrobiology.” As reported

earlier, all of the respondents found that their home department and the Astrobiology program prepared them for their jobs; more than half thought they were significantly prepared.

In the survey not only did we ask for the participants to estimate their knowledge of the fundamental concepts from the key Astrobiology fields, but we also asked them how comfortable they were in applying concepts from those fields to their current work (Figure 7).

Figure 7. Comfort Level Applying Concepts to Current Job



It is interesting to compare Figure 7 with Figure 1 (page 6) to see that even when most respondents rated their knowledge of a subject as poor; they still felt “somewhat comfortable” applying the same concept in their current job.

Current Job and Teaching

One facet of the survey specifically looked at graduate’s current jobs in relation to teaching. All of the respondents were working in the higher education sector, *five* of whom were teaching. The courses they were teaching ranged from freshman level courses, sophomore seminars, methods, paper discussion seminars, and courses specifically on astrobiology and microbiology. One respondent also described doing regular guest lectures on astrobiology.

In terms of their teaching preparation, we asked how well their PhD program and the AB program prepared them for their current teaching responsibilities.

Table 14. Teacher Preparation from Home Department and Astrobiology Program

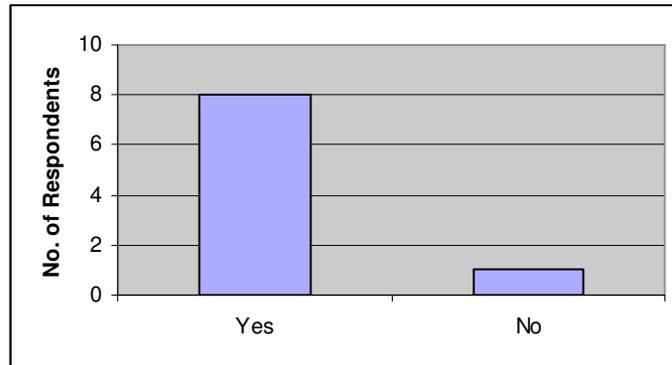
	Not at all	A little bit	Fairly well	Significantly prepared
PhD Program	-	3	2	-
Astrobiology Program	-	4	1	-

The results indicate that the participants feel that they were slightly better prepared for their teaching responsibilities by their PhD program than by the Astrobiology program. However, neither place significantly prepared these graduates for their teaching responsibilities.

Current Job and Interdisciplinarity

Finally, this survey explored to what extent participants identified the work they were doing in their current job as interdisciplinary. The majority of respondents saw their work as interdisciplinary. The one person who didn't is currently working as a researcher.

Figure 7. Interdisciplinarity of Current Job



Of those who identified that their current work was interdisciplinary, they were given a follow-up question to self-assess their level of preparedness for interdisciplinary work in comparison to their colleagues (Table 15).

Table 15. Self-assessment of Interdisciplinary Preparedness Compared to Current Colleagues

Less prepared	Equally prepared	Somewhat better prepared	Much better prepared	Don't know
-	-	2	5	1

The Future of Astrobiology

At the end of the survey we asked a series of open-ended questions allowing respondents to reflect on what they saw as the future of Astrobiology as a field, what types of employment opportunities might be available in the field in the future and any additional comments. (Their complete responses are provided below and all identifiers were removed from their quotes.)

The future of Astrobiology as a field is seen as sustainable if new sources of funding can be found and the necessary depth can be assured. Here again, the “interdisciplinary nature” of the field is addressed as a constitutional factor.

Enduring

The easy money is on its way out so future Astrobiology work will need to be more on target and more competitive.

I see the current state of Astrobiology as sustainable. I doubt that Astrobiology will exist as a university department level discipline unless incontrovertible evidence of extraterrestrial life is discovered. This makes sense to me, as the deeply interdisciplinary nature of direct Astrobiology research (which, in my opinion, is that research that directly addresses the question of extraterrestrial life) requires that individual participants have a deep and lasting ground in a “classic” discipline. Astrobiologists do and should compete for funding from the same pools as the rest of the scientific community, without relying completely on NASA funding...

The interests that I have in Astrobiology are largely unexplored by the field, which remains too driven by funding and poorly examined assumptions.

I'm not so sure that it is a field as much as it is a guiding concept for research. I'm not sure that there will, or should be, a Department of Astrobiology anywhere. That said I hope it will persist as the endeavor has led to interesting research questions that wouldn't otherwise be answered.

I think Astrobiology is a way of thinking about science in an interdisciplinary fashion and allows one to place their area of expertise/background into context. However, it is still imperative to have depth in a field to be able to frame advanced questions. I think that this sort of shift has occurred over the last decade, and nowadays many of the projects in AB are being framed with more scientific depth than they had been.

Astrobiology has always been a field of study, though the name is new.

In terms of what types of employment opportunities might be available in the field of Astrobiology, some of the graduates were fairly optimistic while the others were not so sure that enough jobs would open up in the future.

Up to the applicant. Lots of opportunities.

As long as there is support for research into life's origins on Earth and for the study of space and planetary processes, my training in Astrobiology will be relevant.

I do not see much change from the current state of things. I expect that my training in Astrobiology will have a significant, positive impact in my ability to get a job as an assistant professor.

I think Astrobiology is very good in terms of fostering an interdisciplinary network of scientists, even internationally, and providing young scientists with opportunities to pursue skills development and innovative science without being constrained by traditional boundaries. However, I am not sure that being an Astrobiologist is an identity in itself.

There will be more Astrobiology post-docs available than tenured positions in Astrobiology.

I think well-trained scientists will have a good chance at getting jobs. The AB program here trains good scientists, so I think we may have a competitive advantage. Getting a job in "Astrobiology" is not a realistic goal for most of us given that UW is really the only place that has an established academic program, and for some reason, research universities don't like to hire from within. In this case, they have put all these resources into training the best Astrobiologists on the planet, so they may want to consider attempting to retain/hire some of them.

I have no idea.

The following quotes reflect participants' additional comments regarding the Astrobiology program.

In total, I think the astrobiology program is great. I also think that the University of Washington's program was not as good as other Universities, but had the potential to be. The students were superior in the program.

In my opinion what it says on my degree is meaningless. The program should be focused on figuring out how to sustain itself after IGERT

disappears. The strength of the program is 100% rooted in IGERT areas of teaching and graduate research training. I fear that the whole endeavor will evaporate if it turns merely into a research program. Somehow, the focus needs to remain on the graduate students, even if the RA's need to be less lucrative and the field trips need to be less exciting. Getting together graduate students and faculty from different disciplines to hang out, learning from each other, and getting to know each other is far more important than the end result.

I am deeply grateful for the time I spent in the UW Astrobiology program. I think exceptionally organized, and I can't really think of a way to improve it. I only hope that the program will continue to be supported by the University and/or by other sources so that future students will have the opportunities that I had. The specific training that I received in Astrobiology was of course very enjoyable and important to me, but the program offered more than that. Because of the strategic approach to "interdisciplinary" training, I am a significantly better scientist than I would be had I not participated in the program. Finally, it is very important to me that I am able to communicate my scientific work in a way that engages the public. I have found that astrobiology is inherently exciting to people, and as long as I have the opportunity to do research in this field, I will be doing something that is inspiring to me and to people in my community.

Summary

Since 1998 the Astrobiology IGERT program has graduated ten PhD students. Nine of these graduates responded to a survey regarding their career outcomes. The following summary provides an overview of the key findings from the evaluation.

Interdisciplinary Training

The Astrobiology program at the University of Washington explores the study of life in the Universe. This program has begun, and continues to strive, to create a new community of scholars, investigators, and educators who are skilled in multidisciplinary methods and interdisciplinary thinking. Among the nine students who have completed the Astrobiology program and received a PhD, they stated the program prepared them for interdisciplinary work. Specifically the exposure to other disciplines and faculty and students from other fields helped enhance their knowledge of other fields and their comfort level applying concepts from those fields. PhD recipients are working in jobs where they are using their interdisciplinary knowledge and skills and where they consider themselves better prepared than their peers. The respondents also reported that the program impacted their becoming interdisciplinary scientists, as all of the respondents self-identified as interdisciplinary scholars.

Some areas of improvement for the program could be additional efforts to not only expose students to various disciplines but to help them integrate the knowledge and experiences they acquire in the program. One way to do this is to better integrate faculty teaching and not leave it up to the students to make the connections across the disciplines. Another area that requires some attention, according to the graduates, is in the area of teacher preparation. Many of the respondents are teaching in their current jobs, courses specifically in the area of Astrobiology, and identified that there was little preparation in the program for such responsibilities.

Career Goals and Current Jobs

With regards to career goals and current jobs these graduates are for the most part on track with their goals and have high job satisfaction. The majority of respondents intended to do research in an academic setting and they did so. Five of the nine graduates currently held jobs in research positions in higher education institutions. The majority reported they had more career options as a result of participating in the Astrobiology program and that their participation contributed to their successful attainment of their current job. Participants rated their home department as slightly better in preparing them for their current job than the Astrobiology program.

This survey provides but a first spotlight on the careers of AB program graduates. Five years out a survey would allow a better picture of where their careers are heading and of the impact their interdisciplinary training will have had on their research and their professional life.

Valuable Program Components

Some of the key components that the graduates valued about the Astrobiology program was the program's structure and the composition of seminars, courses, workshops, and meetings. For example, one student described the greatest strength of the program as being the "teaching and graduate research training." This student argued that no matter what happened to the program, the focus should always remain on the students.

Within the structure of the program was the opportunity for students to interact with other students, faculty and scientists across disciplines and beyond the University of Washington. This exposure helped promote strong bonds between the students, collegiality, social and professional networking opportunities, intellectual exchange, and opportunities for collaboration. The graduates especially commented on the exceptionality of the students in the program and how getting to know one another was one of the most important end results.

And finally, by participating in the IGERT program the graduates found themselves being forced to "think outside the box." In other words they recognized the program as doing a good job of fostering interdisciplinarity and pursuing skill development that wasn't constrained by disciplinary boundaries.

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