



External Evaluation of the Geo- Launchpad Internship Program, UNAVCO

Geoscience opportunities for
community college students

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Executive Summary

Women and some minority groups are severely underrepresented in geoscience. The Geo-Launchpad (GLP) summer internship program seeks to broaden participation in geoscience by engaging diverse community college students in immersive, technical experiences. The external evaluation of the GLP program used mixed-methods measures, including pre-post surveys, interviews, and observations to assess the impact of the program on students' aspirations, knowledge, and skills.

Key evaluation findings are:

Skills gains

- Students' highest reported gains were in technical skills/instrumentation (survey mean rose from 2.25 to 3.63 on a 5-point scale).
- Students' perceived knowledge and skills rose substantially on all survey scales (including technical skills, scientific communication skills, organizational skills, intellectual gains, career knowledge and career preparation), although students' perceived ability to work in teams fell slightly.

Career knowledge and preparation

- In interviews, students noted the profound impact that the GLP program had on their career knowledge and direction. Two out of the four students began to seriously consider new career paths or fields of study because of their exposure to these options during the GLP internship. The other two students strengthened their commitment to their pre-existing goals, and one of these students began to more seriously consider graduate school.
- All students reported that their knowledge about geoscience careers increased substantially (e.g., survey mean increased from 3.25 to 4.5 on a 5-point scale).
- All students felt more prepared to study geoscience at a 4-year institution (e.g., survey mean increased from 4.0 to 4.5 on a 5-point scale).

Scientific communication skills

- In interviews, students reported that they had a better understanding of scientific language and scientific communication practices (e.g., posters, understanding journal articles).
- All students reported increased scientific communication skills on the survey, particularly knowing how to prepare a scientific poster (e.g., survey mean increased from 2.5 to 4.5 on a 5-point scale).

Introduction

The geosciences have low participation rates of women and underrepresented minority groups. To provide equitable access to STEM careers and to meet national workforce needs, participation in the geosciences must be broadened to women and students from traditionally underrepresented minorities. Geo-Launchpad is an 8-week residential summer internship program for community college students. After a rigorous application and selection process, four students were selected for the summer internship. Some of the essential elements of the Geo-Launchpad internship program are to 1) engage students in an extended technical project, 2) introduce students to instrumentation in the geosciences, 3) introduce students to geoscience concepts, 4) provide students with an overview of geoscience careers, and 5) enhance students' mentoring relationship with a faculty member at their home institution. In addition to field experiences, the GLP program offered career seminars (Career circles), communication seminars, technical seminars, and opportunities to network with working scientists and student researchers from the Research Experiences in Solid Earth Science for Students (RESESS) program.

Evaluation Design and Methods

The external evaluation of the Geo-Launchpad program contains formative and summative elements. Formative evaluation is designed to provide recommendations to modify the program for future implementations, and summative evaluation is designed to assess whether the program has met its benchmarks. The evaluation uses mixed-methods measures, including pre-post student surveys, observations of Geo-Launchpad programming, and student and faculty interviews.

Evaluation Questions

The external evaluation was guided by the following questions:

1. Has students' interest in geoscience careers, their knowledge about career options, and their capacity to pursue these careers increased from their participation in the GLP internship?
2. Have students' technical, networking, and scientific communication skills increased from their participation in the GLP internship?
3. What are the essential program elements that contributed to desired outcomes, and which elements might be modified in the future, if needed, to improve outcomes?

Evaluation Instruments

Data were collected using a modified version of the Undergraduate Research Student Self-Assessment (URSSA) instrument (Hunter, Weston, Laursen & Thiry, 2009). The URSSA was developed with funding from the National Science Foundation to assess students' personal, professional, and intellectual outcomes from participating in undergraduate research, including REU experiences.

Because the Geo-Launchpad is not a research internship, items were adapted to better fit the technical and field work of the Geo-Launchpad internship. The survey gains scales items are rated on a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree). Survey scales have been modified from the original version to better match the focus and goals of the GLP internship. Survey scales include *networking/collaboration*, *intellectual gains*, *scientific communication*, *organizational skills*, *technical skills*, *career knowledge and career preparation*. The survey also measures other aspects of the internship experience, including the impact of the internships on students' educational and career aspirations.

Faculty were interviewed individually at the end of the program to triangulate students' self-reports about their gains from the program and to assess the impact of the program on faculty mentor's careers and professional abilities. Students participated in a focus group interview at the end of the program to gain further detail about the impact of the program on their intellectual, technical, communication, professional skills, and educational and career goals. These evaluation measures were augmented by three program observations, including a Career Circle seminar, professional skills seminar, and the end-of-summer poster internship.

Analysis Methods

The analytic methods described in this section apply to all data collected for this report. The quantitative data were entered into the statistical software package SPSS where descriptive statistics were computed. Frequencies and means are reported for most of the items. Groups of items were clustered into scales to assess student outcomes in a given domain. The average of the individual items that comprise each scale was computed for the scale mean. Items were rated on a 5-point Likert scale. Tests of statistical significance, such as t-tests or one-way ANOVAs, were not conducted due to the small sample of participants.

Write-in responses to open-ended survey questions and interview transcripts were entered into *NVivo* qualitative analysis software and coded using procedures developed by Spradley (1980). Each new idea raised in a written response was given a unique code name. As these same ideas were raised by later respondents, each segment was added to an existing code reflecting that idea. At times, participants' responses were brief and represented a single category, but more frequently, responses contained ideas that fit under multiple categories, and these were coded into each category separately. Codes were organized into larger, descriptive categories, or "domains." Domains were generated deductively, from the program goals, and inductively, from the data itself. The domains and codes within them reflect the major themes that manifested in the interviews.

Evaluation Results

This section begins with an overview of the application process and recruitment strategies. Student outcomes are then discussed, followed by a brief section on faculty outcomes, and program recommendations.

The Application Process

In all, 30 university or community college students applied for the Geo-Launchpad internship in 2015. Almost all of the applicants met the review criteria in at least some, if not most areas. Applicants were rated on the following criteria:

- Is the student enrolled in a university or community college?
- Does the student have a cumulative GPA >3.0?
- Has the student completed college algebra with a minimum grade of B?
- Has the student completed at least one additional geoscience course with a minimum grade of B?
- Does the student have at least one semester of college left after summer 2015?
- Does the student application convey a strong interest in geosciences?
- Do the students' research interests align with areas of focus within the geosciences?
- Has the student articulated their career goals or their thoughts towards a career focus?
- Does the students' life experience support the GLP mission?

Three reviewers separately rated students' applications on these criteria with a scoring rubric from 1 to 3 (1=does not meet, 2=yes/meets, 3=yes/exceeds). Students were also assessed on their connection with their mentor, their past academic performance, and their potential for success. Students were given a weighted score and ranked according to these initial scores. Phone interviews of the top candidates were also conducted. The selection committee discussed the applications during a conference call in spring, 2015 and four applicants were selected. All of these four students accepted the GLP summer internship position.

Recruitment

In interviews, students and faculty mentors were asked how they became involved with the GLP internship. Three of the faculty mentors noted that their students had first learned about the program through the Geological Society of America (GSA) meeting or other geoscience venues and had approached them to be their mentor. One mentor reported that she had learned

about GLP through a listserv and had identified a bright student from one of her courses. The mentor commented:

She was a student in my class in the fall, and her academics and her questions during class were so much higher than every other student in the class. I thought that she needed extra opportunities than what the other students were getting, so I forwarded the e-mail to her.

Faculty members were also highly motivated to become involved in the GLP program, recognizing that it was a unique opportunity for their students and themselves. Another mentor commented:

She's just an amazing student. She's just such a go-getter and once I read about the program I just was like, whoa, this is so cool. I can't believe they're doing this. And to give our students a chance to see science in action, to give our students a chance to actually see people doing these world-class science things. It's just, nobody would ever get that chance. So I just thought that was so cool and I wanted to come. I wanted to see these things too. So I thought, 'wow, this is really neat.'

Faculty mentors spoke highly of their students, often mentioning that their student was one of the top students they had ever taught and needed extra opportunities in science.

She's the best student I have ever had in 20 years of teaching. Of course I want to help her out in anything I can and letting her pursue her goals. There was no trepidation on my part that she would not be qualified for this thing. Not at all.

Students also realized the value of the GLP intern program, viewing it as a way to build knowledge and skills over the summer, as a student commented in the focus group interview.

I was excited to learn more about science. Getting some more experience. Also, having a productive summer and being able to learn something.

Student Demographics

Four students participated in the GLP program. Their demographic backgrounds are as follows:

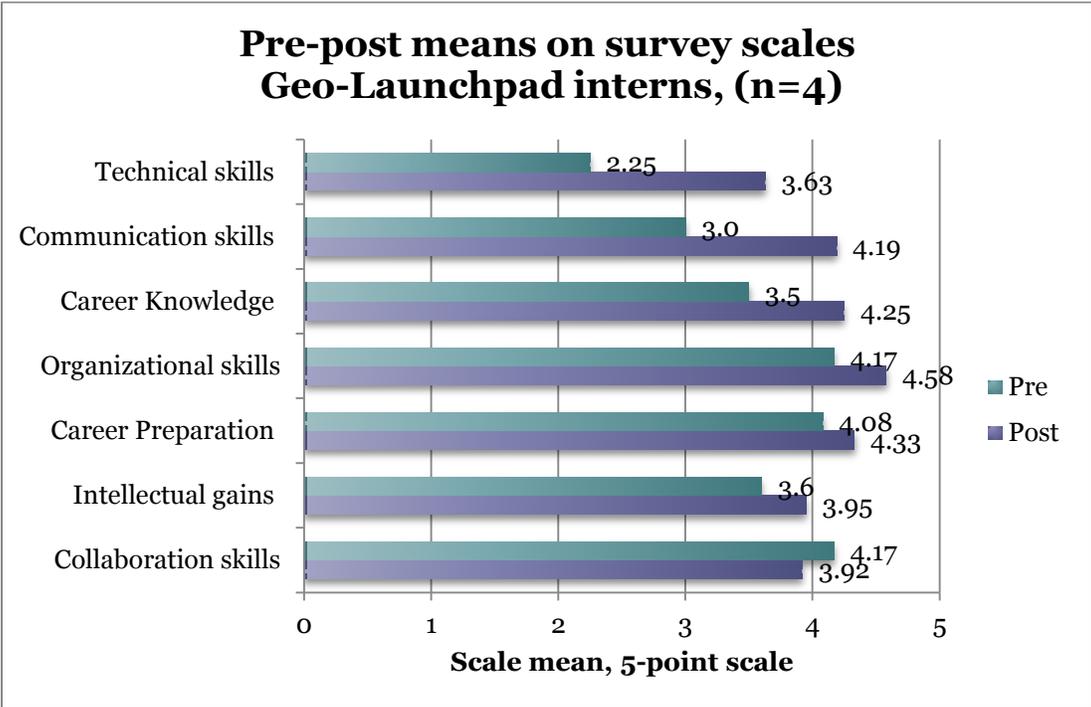
- Three were enrolled at community colleges and one was enrolled at 4-year University.
- Three of the students were female and one was male.
- Two are enrolled part-time at their institutions, while the other two are full-time students.

- All three community college students plan to transfer to 4-year institutions; in fact, one of them will be a student at University of Texas, Austin this fall.
- Three of them work outside their studies—one works full-time and the other two work part time. One is a lab assistant, one is a dining hall employee and the other did not write down a job.
- One student is a returning adult student with a family.
- Students also had diverse ethnic backgrounds – one reported she is white, while the other three were multi-racial (reporting white/Hispanic, Hispanic/Asian, and white/American Indian ethnicities).

Student Outcomes

Student surveys and interviews demonstrate moderate to strong growth in most areas, including communication skills, technical/instrumental skills, and knowledge of geoscience careers. Students' strongest reported growth on the pre-post survey was in technical/instrumentation skills (see figure 1). Students also reported strong gains in communication skills and knowledge of geoscience careers. Students demonstrated moderate growth in other areas, such as organizational skills, intellectual gains, and career preparation, largely because they entered the program with stronger views of their skills/knowledge in these areas.

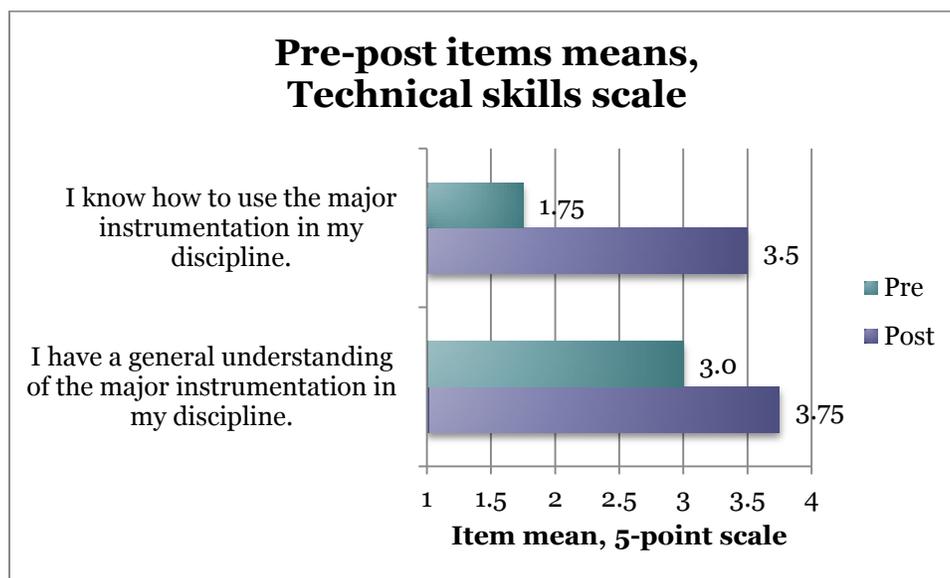
Figure 1. Pre-post means on survey scales, GLP interns (n=4)



Technical Skills/Instrumentation

Students’ strongest perceived skills gains were in their ability to use instrumentation in geosciences. Students also felt that they gained a general understanding of the major instrumentation that is used in geoscience. Therefore, students became more aware of the available instrumentation and gained the ability to use some of it (see figure 2).

Figure 2. Pre-post individual item means, Technical skills scale



Although technical skills were students' largest gains on the survey, they less frequently mentioned learning about and using geoscience instrumentation in interviews. However, in interviews, students noted that working with the instrumentation available at UNAVCO provided a real-world context for science that they had learned about in coursework or in the media. For instance, a student commented:

In the media you hear about the glaciers melting, climate change and I worked with the GPS stuff, and it was really interesting to see how they really use that to mark these changes, and I didn't realize that at all. I knew kind of the idea, like the concept, but it's coming up more and more and it's a really strong tool for that. Being here at UNAVCO specifically and working with that instrumentation and really getting to understand it was helpful.

Students also liked the topics of the technical seminars and felt that they learned new geoscience concepts and tools from them, as demonstrated in the following focus exchange. It should be noted that one student did not feel that the technical seminars aligned with her research interests and she felt like she learned less overall from them.

Speaker #1: I learned how to use Google Earth to make different measurements.

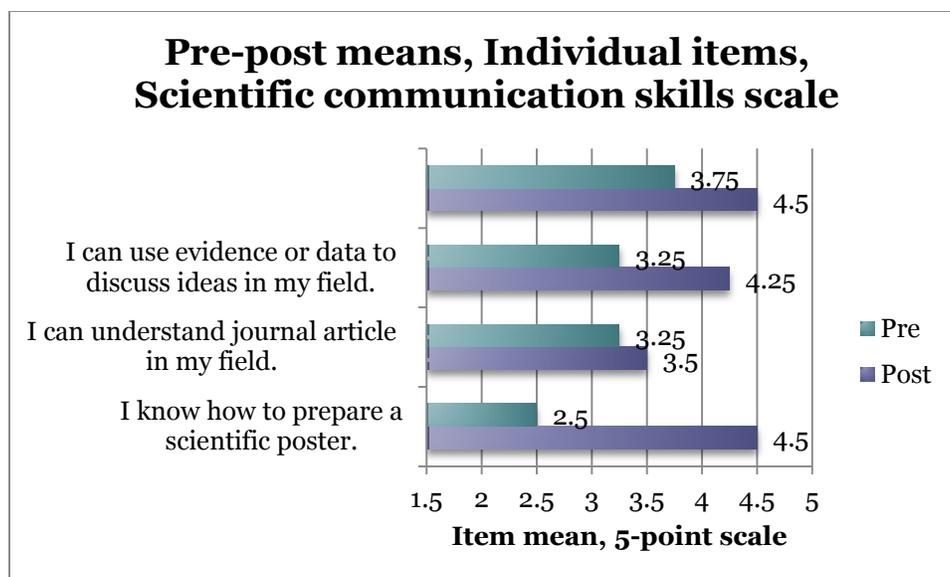
Speaker #2: I liked [the technical seminars] too.

Speaker #3: I liked them because I think that it was a very ... For example, we learned Illustrator as well, which you can apply that to a lot of stuff. Just getting that intro to it, I really liked it.

Communication Skills

Students reported strong gains in communication skills from the GLP internship. Students' highest reported gains were in their ability to prepare a scientific poster (see figure 3). Students also reported strong growth in using data to discuss ideas in geosciences and explaining geoscience concepts to people outside of their field.

Figure 3. Pre-post means, Individual items, Scientific communication skills scale



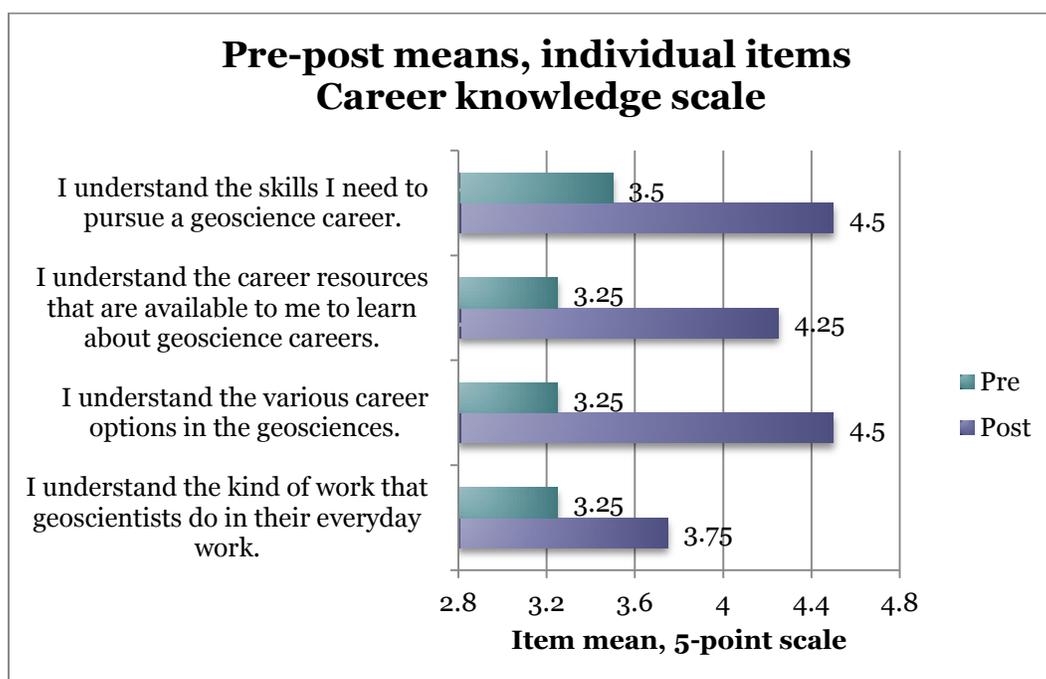
Similar to technical skills, students demonstrated large gains in communication skills on the survey, yet discussed these gains less frequently in the focus group interview. Students commented that they had learned how to prepare a poster which was a new experience for them. Another student described what she learned about scientific language:

A big concept for me that I learned this summer is that words in science have very precise meanings and you have to be careful about what you say. You need to communicate very clearly.

Career Knowledge

One of the primary goals of the GLP internship is to introduce students to the range of careers available to geoscientists and to provide students with the resources to learn more about those careers. Students reported very strong gains in career knowledge from the GLP internship, particularly in understanding geoscience career options and gaining awareness of the resources to learn about careers (see figure 4). Students also reported strong gains in understanding the skills necessary to pursue geoscience careers. Students demonstrated moderate growth in understanding the everyday work of geoscientists.

Figure 4. Pre-post means, Individual items, Career knowledge scale



Faculty mentors noted that students gained the most from interacting with professional scientists and learning about career options in geoscience. A mentor commented in an interview:

She was like on the moon. It's like, "This is so cool and these people go to Greenland and Antarctica and they do these amazing projects." I think what she got out of it was science. As a student you read about it in textbooks, but you don't see it in action. Having this contact with the people that were actually doing the science, that was probably the most important thing, that she could see where this could lead.

Students also broadened their worldviews by spending the summer in Boulder and working at UNAVCO which enabled them to see life beyond college or their local community. A faculty mentor noted:

I think just opening her eyes to the enormous amount of opportunity. In [our town] especially it's just very difficult for so many of our students to have a broader perspective, a vision that's outside of the community. It's really tough. She's no exception. That's how she started out. I think these opportunities have just, like, "Wow, I can go here. I can go there." That's pretty impressive to see that.

Mentors also noted that students were able to see the full range of career opportunities in geoscience and use this knowledge to inform their own career direction. A mentor mentioned:

One of the things that he really benefited from was meeting with the people in different careers and talking with people from industry, people from academia, graduate students, people in different aspects of industry, consulting, things like that; so, just getting a sense of what people do. What are the career possibilities out there? See, if you don't even know what the options are, it's hard to know where you want to go. He said that was particularly rewarding, so that was good.

In the focus group interview, students concurred that one of the most important aspects of the program that they will take with them is greater knowledge about career paths in geoscience. Students learned about the life and work of scientists from working side-by-side with field engineers and other professionals, as a student noted in the focus group interview.

I learned the most from being able to work with field engineers. Getting exposed to so many things technical, professional. It was just like an insight, like opening your eyes and also getting to know what my interests are by doing this work is something that I will take from this. Like working with programs like RGIS and handling equipment. I really enjoyed it, so I might tailor my undergrad studies to that after this.

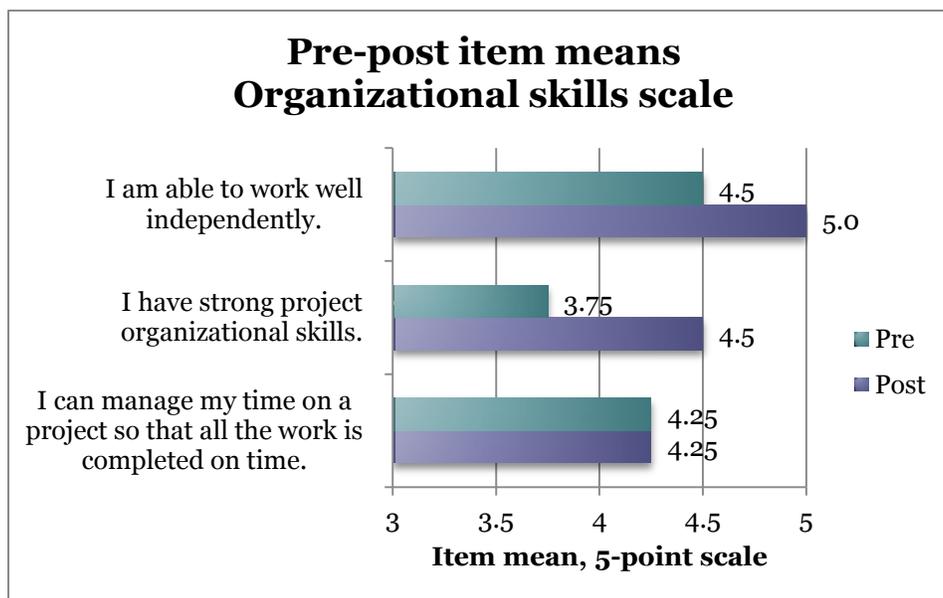
In particular, students highlighted the Career Circles as an essential element of the internship. The Career Circles introduced students to new career paths, such as consulting or environmentally-oriented careers in industry. Students especially liked the informal and personal interaction of the Career Circles.

I feel like during these career circles, towards the end they would open up and then they would start talking about their undergraduate studies and the different jobs they had. I always looked forward to the end, because that's where they would loosen up and talk more about their experiences. It's kind of like being able to relate with them, with those stories. I mean, we're not there yet but seeing ourselves doing the same thing and doing different jobs before getting to higher positions like that.

Organizational and Project Management Skills

Students entered the GLP internship with strong beliefs in their organizational skills, however, their skills still increased over the summer. Students reported the most gains in project organizational skills and their ability to work independently. Students' time management skills remained steady during the summer (see figure 5).

Figure 5. Pre-post item means, Organizational skills scale



Although students felt that they entered the internship with solid organizational skills, both mentors and students did note some gains in this area. A mentor noted that his student gained confidence in her ability to carry out a large project, a necessary skill for future educational success.

Confidence. I think if anything I think what this program provides for all students is confidence. That they can get a project and they can also see the realities of dealing with other folks, of having issues that creep up. It is sort of the reality of projects and the that confidence you can start and finish something. It may not end the way you think it should end, but having that confidence that you can take on a significant project that appears to be daunting in the beginning or at least intimidating in the beginning.

Students also felt that they gained an appreciation for field work and the necessity of working with the vicissitudes of weather or other uncontrollable factors. They noted the need for preparation, organization, and flexibility to deal with the inherent uncertainty of field work.

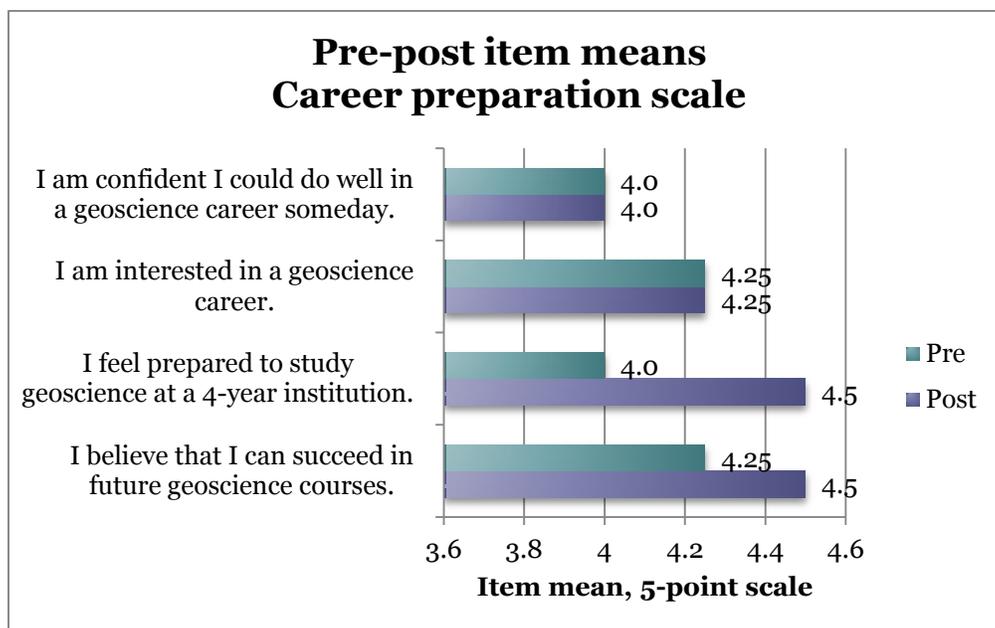
You have to work with what you got data wise, or supplies. Also, preparation. Time management and preparation, I feel are really important valuable things that can be applied to almost all aspects of life.

Career Preparation

Students felt reasonably well prepared for careers when they started the GLP internship. However, they still made some gains in educational and career preparation. Students showed

the most growth in feeling ready to study geoscience at a 4-year institution (see figure 6). Students' belief that they could be successful in a geoscience career also increased.

Figure 6. Pre-post item means, Career preparation scale



Mentors felt that students were better prepared for future education because of their experience in the GLP internship. For instance, one mentor hypothesized that students may be more committed to their bachelor degree program after transferring to a 4-year institution because of the introduction to the discipline that they gained through GLP, as noted in the comment below.

If they can keep these very beginning students, if they can keep them by a program like this, and show them how it works, then we're not going to lose them. Especially at the community college level, this is where we typically lose the student. We lose them. They may get their associates and then they transfer to the 4-year institution, but they get lost. It's overwhelming. This class had 200 students and I didn't want to finish it. [GLP] will allow them to see the path.

In fact, two mentors described the GLP program's effect on students as transformational, as described in the following comment.

I think as far as an experience for the students, it's been phenomenal. I really do. I think this has probably been a transformative thing for [my student], and I think for the other three, too, from what they were saying last night. This really is a transformative experience, getting to meet and talk with people that are actually doing high-end research, getting to talk with graduate students. That's the next step for them after they graduate ... and seeing how that transition

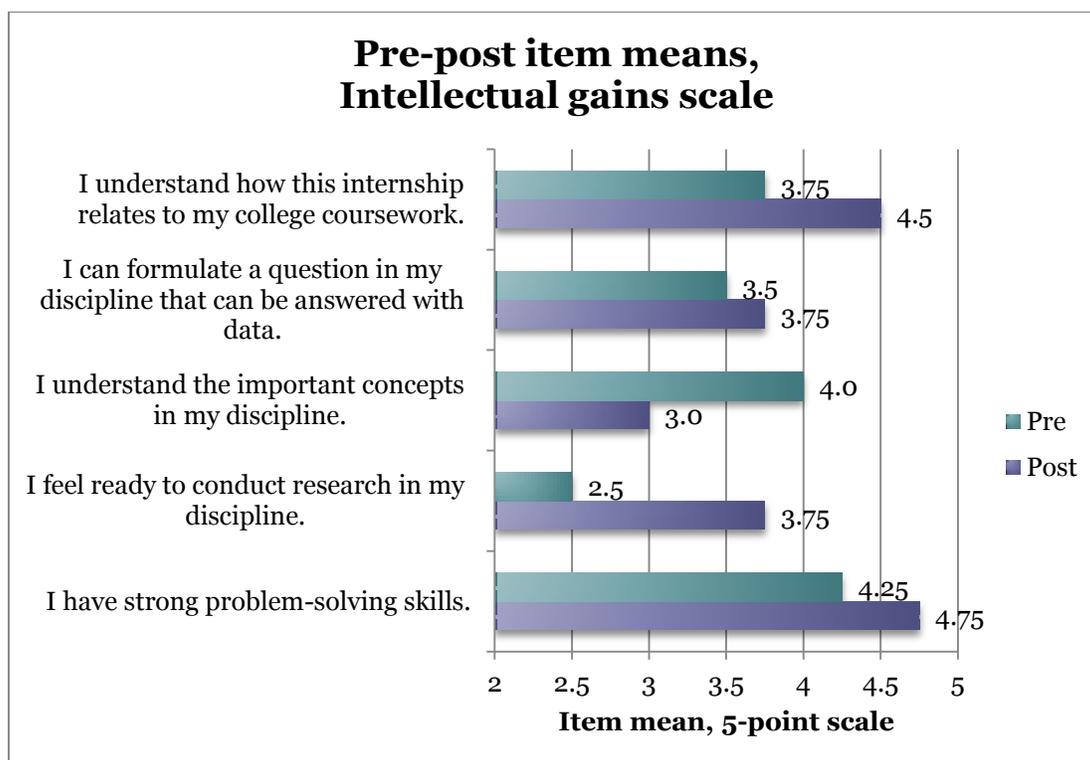
happens. Getting the confidence to be trusted with some really expensive and delicate equipment and actually use it. I think that's really cool.

Students concurred that one of their most important outcomes from the program was to feel more prepared for undergraduate and graduate school success, and to have a better idea of the path they need to take to get there. For instance, a student commented, “I feel more confident knowing kind of what lies ahead.” Another student commented:

I learned so much about the world of academia and talking with the grad students and then also talking to someone who is a professor following these steps and being able to kind of see the routes that people go, but learning more about what it takes to get into grad school. It gives you more of a realistic idea of what it really entails and how to do it.

Intellectual Gains

Students reported fewer intellectual gains than they did in other skills domains, yet they demonstrated growth in understanding how the GLP internship related to their college geoscience coursework and in feeling ready to conduct research in geoscience. Students also reported increased problem-solving skills at the end of the GLP internship, although they less understanding of the important concepts in geoscience at the end of the summer. This might be because the internship helped them to realize how much they still need to learn in the field, suggesting that this item could be revised to better reflect students’ burgeoning understanding of geoscience.



Mentors noticed gains in students' interest in the discipline and their general understanding of geoscience. A mentor commented:

The technical, she came in with strong technical skills with her background, but I think she gained more of a geology understanding. How much there is to know in geology, because she just had the one course. I think it was more of her growth in that area than the technical skills, which is probably different than the other interns.

Mentors also noticed that students' increased understanding of the broad field of geology had given them direction in their career path.

I was a little shocked [she got so interested in hydrology] because hydrology hasn't really interested me that much. So when she said that and she said, "Yeah and this is the best way I can use it to help people and water's becoming such a scarce resource." I was like, "Wow, that's all from this summer."

Preparation for research

Students also felt more prepared for a research experience from their work in the GLP internship, and from their interactions with RESESS students.

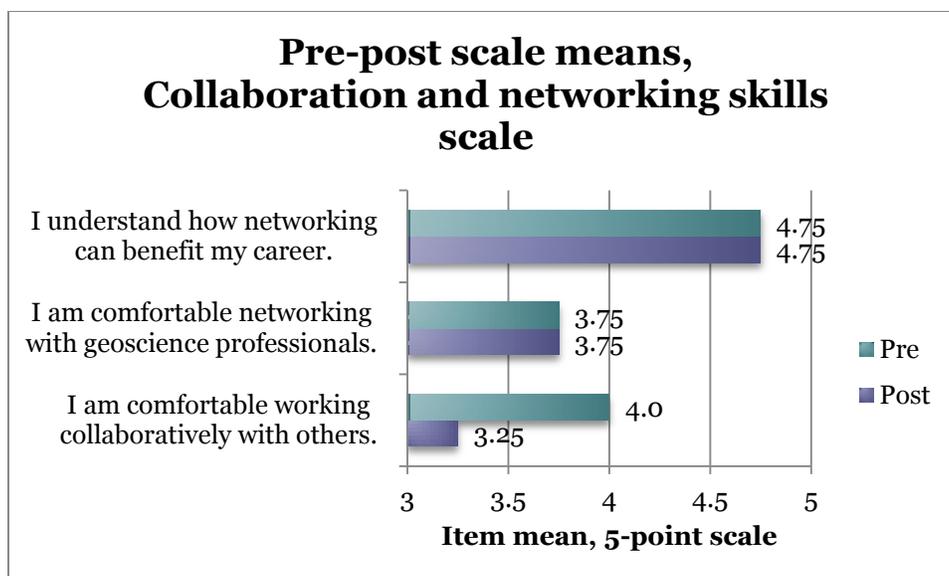
In some ways I feel more prepared for research. I think even just interacting with some of the RESESS Interns and seeing what they're doing. It was really neat to see what other research is being done.

Another student commented:

I would definitely say yes [I feel prepared for research] because of having the experience of designing a project, it's kind of like a pre-overview, I guess, of what the big work is. Having this small experience gives me the drive to actually go and do investigation process.

Collaboration, Networking and Mentoring

Students' beliefs about the importance of networking and their comfort in networking with geoscientists remained steady throughout the GLP internship; students scored both areas quite high on the pre-survey. Students' perceived ability to collaborate fell during the internship, perhaps, in part, due to a professional conflict over work tasks reported by one of the GLP teams.



Mentor communication

A core element of the GLP internship is the provision of an external faculty mentor to guide and advise the student during the summer, and especially, in the coming year. Most students and mentors reported that they communicated relatively frequently over the summer. One pair communicated every week, two pairs communicated every other week, and another pair communicated about once a month. Mentors and students primarily communicated through email and text. Students provided updates about what they were doing in the program and sent pictures. One pair tried to communicate by Skype but it was difficult to find the time to do so.

Mentors noticed that their mentees had gained confidence over the summer, particularly in feeling comfortable networking and interacting with professional scientists. One of the mentors commented on her observations of her student at the end-of-summer events.

She is a very introverted person, and I saw her interacting with so many other people, and feeling comfortable asking questions, and comfortable reaching out that I didn't see as much when she was my student originally.

Mentors also observed the connections that their students made with RESESS students. Mentors felt that the RESESS students served as role models to the GLP interns and provided a glimpse of the next step on their educational pathway. The diversity among students also helped to broaden their horizons. A mentor commented:

The connections that she has made here are fantastic and learning, especially, I think, they really had a close relationship with the RESES students who were from everywhere.

Students were appreciative of the opportunities to meet professionals in geoscience, opportunities that they typically would not have as students.

When do you get to meet ... It's such a great opportunity to meet professionals because you don't just meet people from industry. They don't just come to you and talk to you. Having that space to actually have a conversation with them, I was like, "Wow."

In the focus group interview, students discussed their faculty mentors more often than their UNAVCO mentors, yet they found the entire UNAVCO educational and scientific staff to be immensely helpful and supportive. For instance, one of the students commented:

UNAVCO mentors were helpful. Our Lead, we didn't see him as much, but the others were right there with us and anything that we needed, they were happy to help. We couldn't have asked for better mentors.

Influence on Career Intentions

Two out of the four students reported that the GLP internship had profoundly influenced their career and educational path; another student remained committed to her previous goal of pursuing graduate school. The fourth student began to more seriously consider graduate school.

Students reported that the GLP internship had impacted their career and educational goals. Two of the students discovered new fields of study. Both of these students discovered interests in education and outreach.

I'm looking more towards grad school. I realized that I need to start applying next summer whereas, yeah, it hadn't been on my mind before. I have a little bit of a background in social science and, I'm realizing that I could combine the geology with the social science.

Another student discovered an interest in hydrology, which was a subject that she had previously known little about. She would like to blend her interest in hydrology with her interest in education.

I really am interested in hydrology. I'm a little intimidated by the math, but I'm going to get through this. I love math and physics. It's really heavy, but I'm super passionate about water. I think it's one of our most valuable resources. It is in my opinion, but that and education as well. I'd like to maybe do some outreach stuff as well. It's been cool to see how this program has changed my life and others in the past and so I'd like to be a part of that as well.

Another student confirmed his commitment to cartography and mapping, and became more interested in pursuing graduate school at some point. He felt that sharpening his scientific

interests and clarifying his career path were some of the most important outcomes of the internship.

I think for me, the most valuable thing [from GLP] was being able to discover things about myself like interests and I now have a clear idea of what I want to do afterwards. I felt like when I compared, if I didn't have this opportunity, I would just be studying undergrad with no purpose. Being able to discover that is just priceless.

Faculty Outcomes

The GLP internship also had an impact on the faculty mentors themselves, re-energizing their commitment to students and providing valuable networking opportunities.

I think for me personally, I've been teaching a very, very long time. This will start my 32nd year. You get kind of cranky and old. This is just like, oh this is so cool. We talked a minute ago about her coming to my class. I have a geology majors class and her coming and talking about this program and opportunities that she's had. That gets me all excited and energetic, ready to go. So I got a lot out of it. I'm getting a lot out of it still.

Faculty appreciated the opportunity to network with geoscientists in the Boulder area and with other community college faculty members.

It gave me a good opportunity to meet up with other people who, as it turns out just coincidentally, were also research mentors of students. I knew them already and they had projects going here, so it was great for me to connect with a few people as well. Being here has been really great. Also, making contact with people at some of these community colleges, that's a resource, that I don't really have access to right now.

Program implementation: Recommendations from students and faculty

Students and faculty expressed a lot of positive feedback about the implementation of the GLP internship. Some of the highlights from interviews and survey written responses were:

- The GLP internship was very well organized with good communication throughout the process and clear expectations. One faculty mentor noted that “a lot of thought” went into planning and implementing the internship.
- UNAVO mentors (including educational and technical personnel) were very helpful to students and were available as needed.
- Students felt that the Career circles and communications seminars were highlights of the program and greatly enhanced their understanding of career paths and the practice of science.

- The field trips were highly beneficial, particularly the opportunity to meet and interact with RESESS students early in the summer.
- The projects selected for students were a good fit for students' skill level.
- Background papers helped students to understand their project and instrumentation.
- Field work and interactions with working scientists were essential aspects of the internship, as noted by a faculty mentor:

I think contact with working scientists is essential. It really is essential. If this program occurred just on a community college campus with no contacts except for their normal community college instructors, it won't be as powerful of a change in their lives. I also think that the step-ladder of being exposed to people that are slightly ahead of them on the career path is important also.

One of the students summed up the impact of the program:

I'm also very grateful that they came up with this program, you don't really see programs out there that are designed for community college students or first and second years. If it weren't for this, I would have had a REU when I was a junior. Having this experience early, I'm like, "Wow." Really grateful.

Advice for future implementation

Students and faculty also had recommendations for ways to refine the program in the future. Their advice included:

Faculty mentor relationship

- Provide more documentation in the beginning about the specific requirements for being a mentor. Provide more training and the mentoring framework at the start of the program.
- Students requested more explicit guidelines about how often to interact with their faculty mentors.
- Help facilitate students' and faculty mentor's communication over the summer. One pair tried to meet by Skype but it was difficult to find the time. UNAVCO mentors could work with students to help them find time in their schedule to have this important face-to-face time with their faculty mentors. None of the other pairs had face-to-face time during the summer which may have been beneficial to the students.

Teamwork

- Students requested more instruction on interpersonal communication, conflict resolution, and teamwork at the beginning of the program. One of the student pairs had

several conflicts over work tasks and other issues and they felt it would have been helpful to have more tools and resources to manage these professional disagreements.

Career Circles

- Students noted that one of the industry presenters did not seem enthusiastic about her job. They felt this did not motivate them to learn more about industry career paths. If possible, try to screen presenters or instruct them to convey some passion for geoscience and their chosen career, while also being realistic about the work and the downsides of their current position.

Skills and communication seminars

- One faculty member requested that UNAVCO staff might share their communication and professional skills workshop slides with faculty mentors so that they can use them or share them in their work at their home institutions. This could serve as another incentive for faculty involvement in the program.

Scheduling

- Students reported that they had a hard time managing the online calendar, particularly keeping current with changes. Perhaps an auto-notification system might help students to keep current with updates.
- Students requested a more detailed outline in the beginning about what they would do over the summer, including more information about their projects and instrumentation.
- Students also requested more advance notice about doing the scientific talks that were held the day before the poster session. They would have liked more time to prepare the talk, while also staying on target to complete their posters.

Conclusion

In sum, students deepened their understanding of geoscience and improved their skills in scientific communication and instrumentation from the GLP internship. Most importantly, students expanded their knowledge of career options in geoscience and began to hone their own interests within the field. Two out of the four students began to seriously consider new fields of study and career paths because of their exposure to these options during the summer. The other two students strengthened their commitment to their pre-existing goals, and one of these students began to consider graduate school more seriously. The GLP internship accomplished its goal of providing immersive, technical experiences in science to traditionally underrepresented students. Students' experience in the GLP internship had a profound impact on their career and educational plans.