

Joint Antarctic School Expedition (JASE) 2014 Program Evaluation



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July 2014

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Acknowledgements

The authors wish to thank the members of the JASE team for their input to the evaluation. Each of the team members contributed value feedback to the project. The online journal entries detailing the trip along with follow-up reflections added useful insights to the report. Special thanks to Juan Botella and Lynn Foshee Reed for providing in-depth input regarding the expedition. Finally, thanks to Janet Warburton for her suggestions and input to the evaluation.

On the cover: JASE members on a walking tour of Punta Arenas, Chile. Standing from left to right are Roxana Nahuelcura Lobos, Romina Andrea Quiroga Sanzana, Reynalda de Jesus Zarate Avila, Luke Maillefer, Anna Caldwell-Overdier, Claire Hacker, Estrella Constanza Calderon Almonacid, Catalina Dominique Sanhueza Monsalves, Felipe Kabir pino Novoa. Kneeling from left to right, Lynn Foshee Reed, Constanza Villasenor Parada. Photo courtesy of Lynn Foshee Reed.

Executive Summary

In February 2014, three U.S. students and their teacher from Monona Grove High School, in Wisconsin, embarked on a joint expedition where they met up with eleven Chilean students and five teachers in a scientific and cultural exchange. The Chilean students were winners of an Antarctica Science Fair competition called, “Feria Antartica Escolar”, and they shared their projects with the U.S. team. The U.S. students brought a science project of their own to share with the Chileans. The project is called, “IceCube”, and focuses on neutrino detection. The evaluation shows that all Joint Antarctic School Expedition (JASE) participants benefitted greatly from the exchange of ideas and learning that occurred through the sharing of these projects. The U.S. students who were immersed into different cultural experiences in Punta Arenas, Chile rated their experiences as highly valuable, and they all came away motivated to pursue additional science knowledge through STEM careers and research, possibly in the Polar Regions.

There were several goals of the project, and all were met to some extent. While the group did not make it to Antarctica due to a combination of windy weather and illness, the experience allowed them to work in the Chilean National Antarctic Institute (Instituto Antartico Chileno, or INACH) laboratories alongside scientists, learn about the geology of the area, and visit penguins at Isla Magdalena. The teams developed cultural understanding and built relationships despite some language challenges. Several of the many valuable activities that were completed during the project were: use of the PolarTREC – Teachers and Researchers Exploring and Collaborating (PolarTREC) website where JASE team members regularly contributed to an online journal; and the visit to the INACH lab in Punta Arenas to participate side by side with scientists doing real world research regarding the protectant nature of plant bacteria. Participants also mentioned the welcoming attitude of the Chilean hosts that set the U.S. team at ease; the proximity of the students to their Chilean peers who stayed at the same hostel in Punta Arenas, thus enabling the students to get to know one another and develop friendships; and flexibility with moving to Plan B when the trip to Antarctica was cancelled. As reflected in their journal entries, the disappointment they felt did not overshadow their enthusiasm for the trip, as they went on to explore the beauty of Patagonia, the wildlife, birds, rock formations created by plate tectonics, and more. In addition to science knowledge, the U.S. team explored area and expanded their historical and cultural knowledge.

Students learned how to navigate in the public eye, through TV and newspaper interviews, through the website journaling, and while presenting about the project to different groups, ranging from an 8th grade class at an American school in Chile, at the U.S. Embassy, or during a live webinar event. All of these experiences resulted in the students growing in scientific knowledge, in cultural connections, and in confidence.

There were several key factors that contributed to the success of the expedition. First, the pre-expedition preparation that had occurred, including weekly meetings helped the group develop into a cohesive team. Having the IceCube project to share with the Chileans was extremely

important, since the Chilean student teams had their science projects to present. Teachers and students from the U.S. team expressed their belief that sharing their project with the Chileans was critically important to show that the U.S. team was there to contribute meaningful science and not just tourists in Chile.

Another key factor that contributed to the success of JASE was that the mentor teacher, Juan Botella, is fluent in both Spanish and English and helped the teams learn from one another. While two of the three U.S. students could communicate a certain amount in Spanish, the sometimes challenging environments of a science lab and scientific concepts required assistance to overcome language issues.

The JASE teams acknowledge it takes an enormous amount of planning, collaboration, coordinating with scientists and researchers in Chile and at base stations in Antarctica, to put together an itinerary for an international joint expedition for high school students. The collaboration between the National Science Foundation (NSF) Division of Polar Programs, the Arctic Research Consortium of the U.S. (ARCUS), and ARCUS' PolarTREC staff all provided support to turn the idea of an expedition into a reality. The two U.S. teachers had prior Antarctica experience through PolarTREC, and each acknowledged how incredibly useful those past experiences had been to the success of JASE. The logistical assistance and hospitality of the Chilean hosts, and the sponsorship of the INACH that encourages high school students to pursue Antarctica research, all helped to create an experience upon which the U.S. students can build as they develop their plans for careers in science and in research.

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Photo credits: Photos used in this report came from the online postings from the JASE team members.

Introduction and Background

In February 2014, a small team of three high school students (*Figure 1*) and one teacher from Wisconsin joined with five teachers and eleven high school students from Chile in a pilot joint expedition to visit research stations in Antarctica. The project was called the Joint Antarctic School Expedition 2014 (JASE), a collaborative effort of the National Science Foundation (NSF) Division of Polar Programs and the Chilean National Antarctic Institute (*Instituto Antartico Chileno*, or INACH). The purpose of the program was to bring participants from the U.S. and Chile together to engage in hands-on experience with Antarctic environments and ecosystems, and the research being conducted at the research stations there.



Figure 1. The three students from Wisconsin were Claire Hacker, Luke Maillefer, and Anna Caldwell-Overdier. Photo by Juan Botella.

This is the first time the U.S. has sent a team of students to participate in a joint expedition in Chile. The expedition is an extension of a program that INACH has sponsored for many years with small groups of Chilean students who conduct experimental or bibliographical research and compete in science fairs for a chance to win a trip to the research stations in Antarctica. Staff at INACH in cooperation with NSF and the Arctic Research Consortium of the United States (ARCUS), a non-profit 501 (c) (3) based in Fairbanks, Alaska, coordinated JASE. For over 10 years, ARCUS has

administered PolarTREC (Teachers and Researchers Exploring and Collaborating), an NSF funded program, that brings research and education together by allowing teachers an opportunity to work side by side with scientists who are conducting research in the Polar Regions. PolarTREC staff worked closely with NSF Division of Polar Programs to implement and administer the pilot of JASE.

JASE follows the success of a joint U.S.-Denmark-Greenland project that has evolved over the years. The Joint Science Education Project (JSEP), administered by NSF, brings students and teachers together from different places to participate in polar research and cultural learning in Greenland. JSEP occurs during the summer months. One way that the JASE project differs from JSEP is that the JASE project involved a team of students and their teacher from one high school, who worked together to prepare for the trip, developed a science project to share with their hosts, and worked with an NSF Einstein Educator Fellow to develop relationships with Chilean students, teachers, and scientists at INACH in Punta Arenas, Chile. The agenda included a trip to Escudero Station on King George Island where topics of study would include glaciology, ecology, plant adaptations, and palynology (the study of dust and pollen). This report summarizes the evaluation of the JASE pilot project that occurred in February and March 2014.

Project Goals and Objectives

The goal of the JASE pilot program was to advance polar science education and understanding by students from the U.S. and Chile through hands-on field experiences. The project does this through

planned activities that engage youth in real-world scientific research, and expands student awareness of Polar Regions and the effects of the changing environment on the ecosystems in Antarctica. Specific objectives were to strengthen the U.S.-Chilean Antarctic partnership through joint research, education, and cultural experiences, promote Science, Technology, Engineering, and Math (STEM) education including enthusiasm for STEM careers, and promote awareness of global scientific issues.

ARCUS' PolarTREC staff worked with NSF Polar Programs in collaboration with INACH to design expedition experiences for the U.S. and Chilean teams. Pre-exhibition activities included planning conferences, logistics conferences, student trainings in the use of virtual tools, completion of comprehensive medical packets, and information on what to bring including a science project to share with the Chilean participants. In-field activities included keeping a daily journal and posting entries online, participating in STEM learning activities, and participating in a meaningful cultural exchange. Upon completion of the expedition, students conducted a post-field live event webinar about their experiences, gave presentations to multiple audiences about the expedition, and shared their reflections on the trip in the online journal.

Due to unforeseen circumstances, the team did not make it to Antarctica. The expedition was amended to include research activities conducted in the INACH lab in Punta Arenas, Chile and an excursion to Patagonia to study geology, wildlife, and the environment.

Methodology

The evaluation was designed around several questions to measure the impact of authentic research experiences on participating students and teachers. A copy of the data collection tools can be found in Appendix A. The following questions from the project proposal guided the design of the data collection instruments and methodologies:

- 1) To what extent did participation in JASE effect students' understanding and interest in Polar research themes, such as abundance and diversity of Antarctic organisms, global warming, and climate evolution, and the environment?
- 2) To what extent did participation in the joint U.S. – Chilean expedition effect students' post – secondary educational and career plans?
- 3) To what extent did participation in the joint U.S. – Chilean expedition effect teacher participants in areas such as knowledge of STEM practices, understanding of Polar research themes, and educational leadership skills?
- 4) What were the strengths and weaknesses of the joint U.S. – Chilean expedition? What aspects need to be improved for future expedition success?

Several methods were used to evaluate the JASE project and are described briefly below.

Content analysis of on-line journal entries

Beginning in November 2013, the selected U.S. students and their teacher, Juan Botella, posted online journal entries that captured their excitement in having been selected for the expedition, and described

their preparations and expectations for the trip. The journal provides details of their trip including travel from Wisconsin to Atlanta, Georgia, then on to Santiago, Chile and finally to Punta Arenas, Chile, which is a two-hour flight from Antarctica. The journal entries described activities and experiences that occurred in Chile including experiences of a scientific, cultural and historical, and reflective nature. These postings are available on the PolarTREC website (<http://www.polartrec.com>) in both English and Spanish. The online journal was interactive, with individuals following the expedition and posting responses to the team about the trip. The online journaling about the trip followed a process that had been established with previous PolarTREC projects. The journal entries are valuable in capturing the history of the trip with postings and photos, with all members contributing;

Student Input

A survey was developed for U.S. students to gauge the effectiveness from the students' perspectives regarding the success of the expedition in meeting the original goals and objectives. Students were provided a link to the electronic survey. Survey responses combined quantitative methods using a Likert scale and qualitative responses from open-ended questions that have been transcribed and summarized in this report. Three U.S. students completed the survey. The survey was also adapted and translated into Spanish for the Chilean students. Their responses were translated into English prior to analysis. Six Chilean students completed the survey.

Teacher Interviews

Juan Botella, a science teacher from Monona Grove High School in Wisconsin and PolarTREC alumni, and Lynn Foshee Reed, NSF-sponsored Einstein Educator Fellow, traveled with the students and were interviewed regarding their impressions of the project, student reactions to cultural and scientific learning, relationships between the U.S. students and Chilean students, and strengths and weaknesses of the pilot project.

Analysis of Project Activities in Relation to Project Goals

A list of specific project activities have been included in the report that directly address goals and objectives of the project.

Results

This section discusses results from the data collection completed from March through June 2014, including survey data, interview data, and content analysis of the journal entries from the project. The project involved three students from Monona Grove High School, in Wisconsin, and eleven students from various schools throughout Chile, who anticipated traveling to research stations in Antarctica. With a delay due to weather and then illness striking several members of the group, the trip did not happen as planned. However, students were able to visit the INACH labs in Chile and tour Patagonia, see penguins, and more.

The three U.S. students utilized online journals to document their activities from the time they found out they had each been selected for the expedition to when they returned. The journals are available to read (<http://www.polartrec.com/expeditions/joint-antarctic-school-expedition-2014/journals>) and provide an in-depth account of the expedition from the students' perspective and from the perspectives of their mentor teacher, Juan Botella. Also traveling as part of the U.S. team was Lynn Foshee Reed, National Science Foundation Einstein Educator Fellow. Input from both of the U.S. teachers were collected via in-depth interviews following the expedition.

Content Analysis of Journal Entries

Students traveled to Chile in February 2014, but journal entries show the preparation began months earlier. Online journal entries began in November 2013 as the team of three students and their mentor teacher posted introductions and began preparations for the trip. The online journal from JASE is

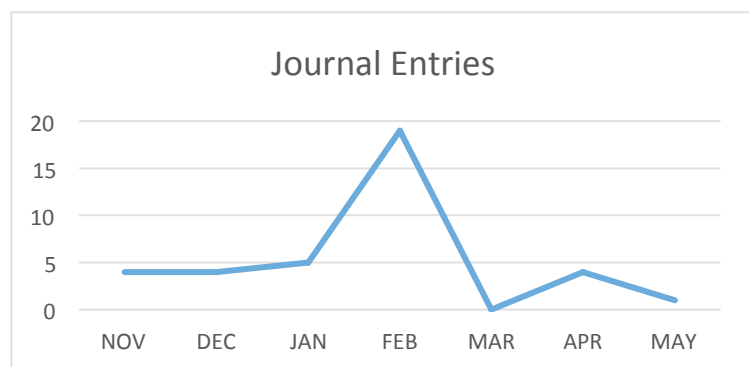


Figure 2. JASE team online journal entries from November 2013 – May 2014

composed of 37 entries that span the earliest postings about the team's impressions and expectations to the final reflections that were posted through May 2014. *Figure 2* shows the number of journal entries posted by the team each month from November 2013 through May 2014. Some of the postings were from the whole group, some were individual, and some had been written by two of the team members. The content analysis of

online journal entries revealed a wide range of postings that were organized into several categories (*Figure 3*):

- Preparing for the expedition and travel
 - Medical appointments, meeting with Wisconsin Public television about doing a feature story
 - Writing about their expectations and what they wanted to gain from the expedition
 - Testing out equipment (satellite phone and laptop)
 - Experiences at immigration, customs
- Science and research learning activities (entries of a scientific nature before and during the trip)
 - The IceCube project and cosmic ray detector they would bring with them to Antarctica for exploring particle physics and astrophysics
 - Testing out equipment
 - New physical environment: plants, trees, birds, animals, scenery
 - New scientific terms/vocabulary
 - Picking up extreme cold weather gear
 - Working with scientists at the INACH lab (plant bacteria, proteins)

- Rock formations, plate tectonics, stromatolites, thrombolites, cyanobacteria
- Magdalena penguins
- Cultural and social learning, language, adaptations
 - Current events in Chile, including a visit by U.S. Vice President Joe Biden and Dr. Jill Biden and the inauguration of new Chilean President
 - Meeting Chilean students, greetings, language, customs
 - History of the area, history of the British explorers
 - Touring Punta Arenas and surrounding areas
 - Trying out new food and drinks
 - Sharing information with U.S. embassy, hearing about overlap between science and diplomacy
- Communications/webinar/presentations
 - Presenting about their trip via a live event webinar
 - Presenting to an 8th grade classroom, and to U.S. embassy employees in Santiago
 - Being interviewed for and featured on a Wisconsin Public Television show
 - Online journaling
- Personal/reflective entries
 - Introductions and thoughts about the trip
 - Descriptions of illness and personal experiences on the expedition
 - Anticipation about whether the expedition would make the trip
 - General perceptions and post expedition reflections

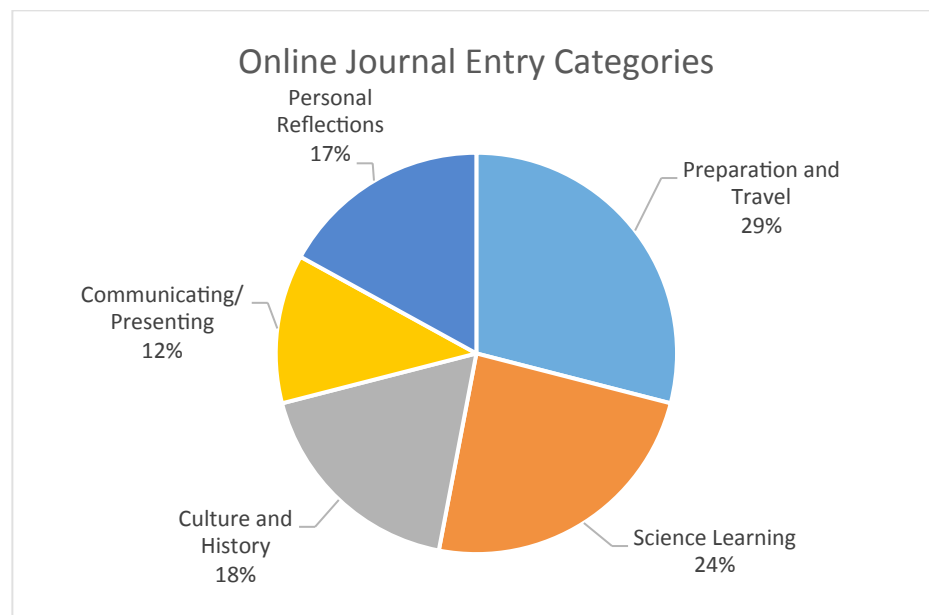


Figure 3: Content Analysis from Journal Entries

Preparation and Travel. The earliest journal entries encompass the excitement and anticipation of the expedition, with each student providing an introduction entry and also a first impression entry of

discovering they had been selected for the trip. Mr. Botella also provided an introductory journal entry. Another activity students completed at the request of the Chilean host was to write a paragraph or two about their expectations for what they wanted to get out of the expedition. These were counted as preparation in advance of the trip. The group posted entries about their travel from the airport in Madison, Wisconsin to Atlanta, Georgia, Santiago, Chile and finally to Punta Arenas, Chile. Also included in these journal entries was the prep work the students did to learn about the IceCube project and cosmic ray detector that would comprise the science project that would be shared with the Chileans. The preparation and travel entries comprised about 29% of all journal entries.



Figure 4. Anna practices using a micropipette at INACH's laboratories. Claire Hacker photo

Science Learning. Had the expedition been carried through as planned, the students would have had much more to report regarding the actual science being conducted at the research stations on King George Island in Antarctica. An analysis of the journal entries indicated that science learning was the topic of about 24% of the journal entries. The on-site science learning included sharing the IceCube science project with the Chilean teams, and all students learned from the science projects that the five Chilean teams presented. Students were exposed to new scientific vocabulary such as *palynology*, the study of dust and airborne matter reaching Antarctica from the mainland. Students wrote about the hands-on science experiments and research being conducted at the INACH lab in Punta Arenas, where they worked side by side with scientists. Students wrote about new experiences in the lab such as micro pipetting and the science behind detecting specific bacteria proteins that are found inside the cells of plant in Antarctica that prevent them from freezing. Students posted entries and photos showing the geology of the area, cave formations, conglomerates, sedimentary layers

and plate tectonics from their tours and travels in Chile. Students learned about stromatolites and thrombolites that are generated in shallow and salty waters. Mr. Botella shared information about the chemistry of Lago Sarmiento and reviewed the concepts of acidity, alkalinity and the pH scale. Students also visited a habitat for penguins on Isla Magdalena. Many journal entries included pictures of animals and birds. Much of the science to which students were exposed on the JASE project was unscheduled and freely explored, in contrast to the itinerary that the trip planners had intended for the project.



Figure 5. JASE students explore a thrombolite at Torres del Paine.

Culture and History. Many of the journal entries, about 18%, concentrated on the culture and the history of Punta Arenas as students took time to explore the city. Even when the travelers did not refer to culture directly, the cultural experiences they were enjoying greatly influenced their impressions and personal growth. From the time the U.S. students met up with the Chilean teams, there was mention of the different customs for greeting, the language barrier that created the need for paying close attention in order to communicate with one another, and the constant comparisons that allowed the students to find common ground. The cultural learning component was clearly present in the postings from the tours of Punta Arenas, and the history of the port and its significance prior to the opening of the Panama Canal. Cultural learning was also present in descriptions of the food and drinks that students tried.



Figure 6. The students make a presentation about their expedition to the U.S. embassy in Santiago, Chile.

Communication/Presentations. One of the goals of the project was to allow students to demonstrate scientific knowledge and cultural learning by presenting about the JASE experience to different audiences. About 12% of the journal entries focused on scientific communication through a live event webinar, and through various presentations. The group presented to a class of 8th graders at an American school, and as shown in the picture above, made a presentation to staff members at the U.S. Embassy in Santiago.

Personal Impressions/Reflections. About 17% of the journal entries contained thoughtful, reflective postings by each of the students and their mentor teacher about personal growth, anticipation of whether the expedition could continue on to Antarctica in the face of adversities such as wind, and the illness that befell some team members that ultimately resulted in the trip being cancelled. Upon their return from the expedition, journal entries provided reflections on JASE and what the trip had meant to

each of them. If one of the primary intents of the JASE project was to provide a scientific and cultural immersion for the students, the journal entries indicate this did happen. While the students did not participate in the science activities on the continent of Antarctica or to the level at which they had expected, they benefitted from the cultural experiences of working with the students and teachers from Chile, and greatly benefitted from traveling to Chile and all that they were able to experience.

Results from Teacher Interviews

The two teachers who participated in JASE from the U.S. side of the project were Juan Botella, science teacher at Monona Grove High School, in Wisconsin, and Lynn Foshee Reed, a science teacher who was an Einstein Fellow at the National Science Foundation Division of Polar Programs from 2012-2014. Mr. Botella's website explains what the ARCUS PolarTREC JASE project is all about at http://www.mononagrove.org/faculty/J_Botella/jase.cfm. Both teachers participated in an in-depth interview about the project. The teacher interview questions can be found in Appendix A.

The mentor teacher from Monona Grove High School, Juan Botella, had been a PolarTREC teacher before and had gone on a previous expedition to Antarctica. That experience, according to Juan, helped him know what the focus would be and helped him guide the students with international travel, online journaling and presentations. He is also fluent in Spanish, and both he and the NSF Fellow and teacher, Lynn Reed, felt that was crucial for the success of the trip. While the students spoke some Spanish, it would have been a difficult struggle to communicate without a fluent speaker who could translate for both the U.S. team and Chilean teams. Juan described another valuable part of the trip was seeing the growth of his students. *"There was something new every day to assimilate. They were very successful in working together. The team [of students] was strong to begin with, but grew more strong and confident every day."*

Lynn Reed stated,

"The expedition reinforced my beliefs that these sorts of international experiences are hugely valuable. They are often transformative for the students in the way they perceive their world and the way that they think that solutions can be found for problems that are affecting people not just in the U.S. but all over the world. The other valuable part is getting teachers from other countries and other disciplines together. Juan had his science background. I've been involved with the Polar Programs for quite some time. Being able to discuss similarities and differences was extremely valuable."

Teachers were asked to describe how the JASE project had furthered their knowledge of Polar Regions and STEM practices.

Juan stated, "I learned a lot from the projects the Chilean students were studying, about biochemistry, plant physiology in Antarctica, about the different approaches the teachers and students in Chile used with their projects. I learned how plants protect themselves and about research taking place extracting antibiotics from plants and how that happens, and that might lead to protecting people in the future. I learned more

about the diversity of Antarctica, the island with an active volcano. I learned about the land, ice, range of temperatures and the physics that allow for bacteria to grow. I had participated in a PolarTREC expedition before and we focused on glaciology and melt, but very little about the Antarctic biology of the land, the peninsula where conditions are not as harsh, where insects have been discovered. All this was completely new to me.”

Lynn added, *“I had more exposure in this project to lab procedures because of what the Chileans had planned for our students to experience in their labs. And all the while, I kept thinking of how I could take what I was learning there in Chile and apply it to my own classrooms.”*

Teachers were asked about the capacity of a joint research project like JASE to further both scientific and cultural knowledge.

Lynn stated, *“The science knowledge is just integral in a program like this. The students and the teachers are there sharing projects. There’s the opportunity to practice your communication skills, listen to others, learn to ask questions of other projects that are not in your field. I think that’s very valuable. Being exposed to new science about topics you have not heard of or studied before. Regarding the cultural aspect of it, the students stayed together in the same hostel, had meals together, and shared rooms so there was a lot of opportunity for discussions. That was very valuable.”*

Juan stated, *“It’s important to see the science content in the context of how others approach the questions. The teams were together in one place, at the hostel, and it allowed for a lot of informal interactions. Interactions between students, teachers, researchers and scientists was very important. As far as cultural exchanges, it was amazing to see everyone learning about different cultures all the time. I was able to talk a lot with the Chilean students about their values, culture, expectations and stereotypes.”*

One of the goals of JASE and other PolarTREC projects is to expand the education leadership skills of the teachers who participate. The evaluation asked the teachers to speak to their growth as educational leaders as a result of the project.

Juan commented, *“I am more confident about leading groups outside of the classroom. For example, when we toured the south of Chile, we were not there just as tourists, but to experience science informally, like at the Torres. I feel confident about my experience to talk about science when it’s not in a textbook, not in a classroom, but out in the real world. I am more comfortable talking with researchers and approaching them, perhaps asking them to spend some time with students who are interested in a topic they are researching.”*

Teachers were asked what they see as the long term benefits of these joint activities in the areas of 1) sharing scientific research and 2) building cultural relationships through these types of exchanges and 3) providing opportunities to high school students.

“One benefit”, says Juan, “is to see how science can be done with little resources. As a teacher, I was impressed with how teachers have motivated their students to learn and explore, how students work on a project for a whole year. I was very impressed with passion for science and how they convince others to get involved. For example, in the Science Fairs and the ambition they have to go places in science. We don’t have that level of involvement in Science Fairs at my school and at many high schools. I hope to replicate a Science Fair where students are doing meaningful science, creative science, collaborate with universities, find connections. The trip inspired me to do more with that. And it’s good that our students brought a science project to share with the Chilean students and teachers. We arrived there with a project that was new to them that they learned from. The IceCube project is something they were not familiar with. It was important that we brought a project of our own to share with them. It showed we were there for science. We were not just tourists.”

Given the many ways in which the teachers had learned and benefitted from the program, they were most excited about the effect the expedition had on the students. The statements below are responses to a question that asked the teachers to describe the value the project had on the high school students and students’ reactions to what they were experiencing.

“It was valuable to them on so many levels. It solidified the idea of a science career for them. I saw them testing themselves as they tried out new things, and helped answer their questions about what direction they should go. For one of the students, the field test showed that he was perhaps not a lab person, but a field researcher who enjoyed being out in the world, photographing and exploring. It showed them that all science is not the same. They could think about what their niche is. It was very important for them to experience that. Also the way they had to communicate, some could communicate in Spanish but sometimes they had to find other ways. They had to figure things out and collaborate and make connections to accomplish their goals. They had to learn how to work efficiently within another culture. They saw the level of science content that other people their age were studying and the projects they were doing, and it was inspiring to them.” (Juan)

When asked what he liked best about the expedition, he immediately replied, *“Seeing the growth of my students. Seeing the students themselves being amazed by the experience. Seeing the students interact with a completely new world around them. And I enjoyed interacting with the Chilean teachers and students.”*

Lynn added, *“The students were extremely engaged all throughout, with what they were learning, what they were hearing, questioning one another. Lots of eye contact and*

trying to get their thoughts and ideas across, even sketching out on paper. That was exciting to see. There was science, but there was also the cultural piece, and wanting to share and learn from each other.”

Results from Student Surveys

Collecting student feedback was an important part of evaluating the program. An online student follow-up survey was completed by the three U.S. students and by six of the 11 Chilean students. Results appear in Table 1. Several questions regarding applying to participate in JASE, preparing for the trip, and international travel were asked to the U.S. students but were not included on the survey for the students in Chile. The Chilean survey referred to the *Expedición Antártica Colectiva de Estados Unidos y Chile Encuesta Para Alumnos* rather than the JASE project. Those questions that differ between surveys are denoted in the table with an asterisk.

Figure 6 presents results from student surveys that address the primary goals of the JASE project to ***inspire students toward future studies in science and research***. For the U.S. students, all three strongly agree that they are motivated to continue pursuing their own science knowledge as a result of JASE, the gained confidence as a young scientist as a result of JASE, and it is highly likely they will pursue a career in a scientific or research related field of study after high school. Two out of three students (67%) indicated that the JASE project increased their interest in research being conducted in Polar Regions.

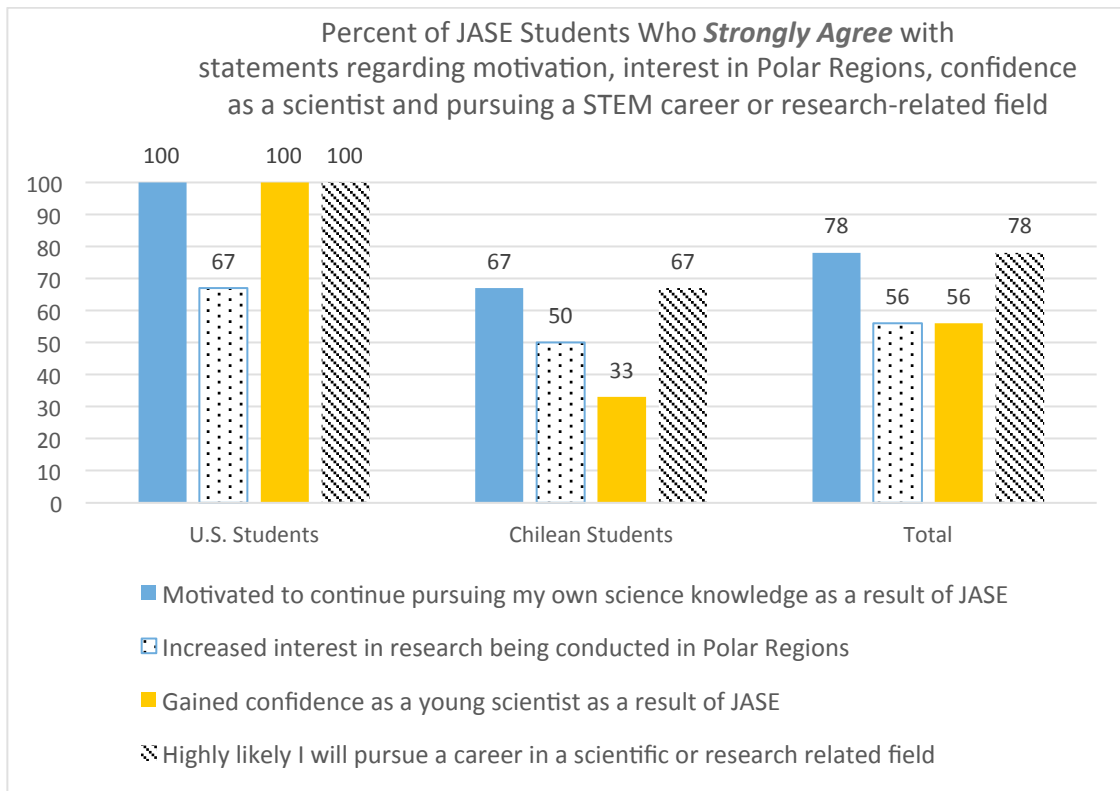


Figure 6

The joint expedition offered a cultural immersion for the U.S. students who traveled to Chile to participate in JASE activities. As shown in the Figure 7, 100% of the students from both the U.S. and Chile ‘strongly agree’ that *the sharing of cultural experiences was an important part of this project and enhanced my learning*. All of the U.S. students strongly agreed that *the expedition motivated them to learn more about languages and cultures as a result of participating in JASE*. Two out of three U.S. students, and 67% of the students overall strongly agree that *the collaborative relationship between the U.S. and Chile has been strengthened through the project*. Two out of the three U.S. students strongly agree that they have gained confidence in international travel. This question was asked on the U.S. student survey only, since international travel did not apply to the Chilean students.

Results indicate that the motivation to learn more about cultures and languages are enhanced when students have the opportunity to visit another country and immerse in the new culture.

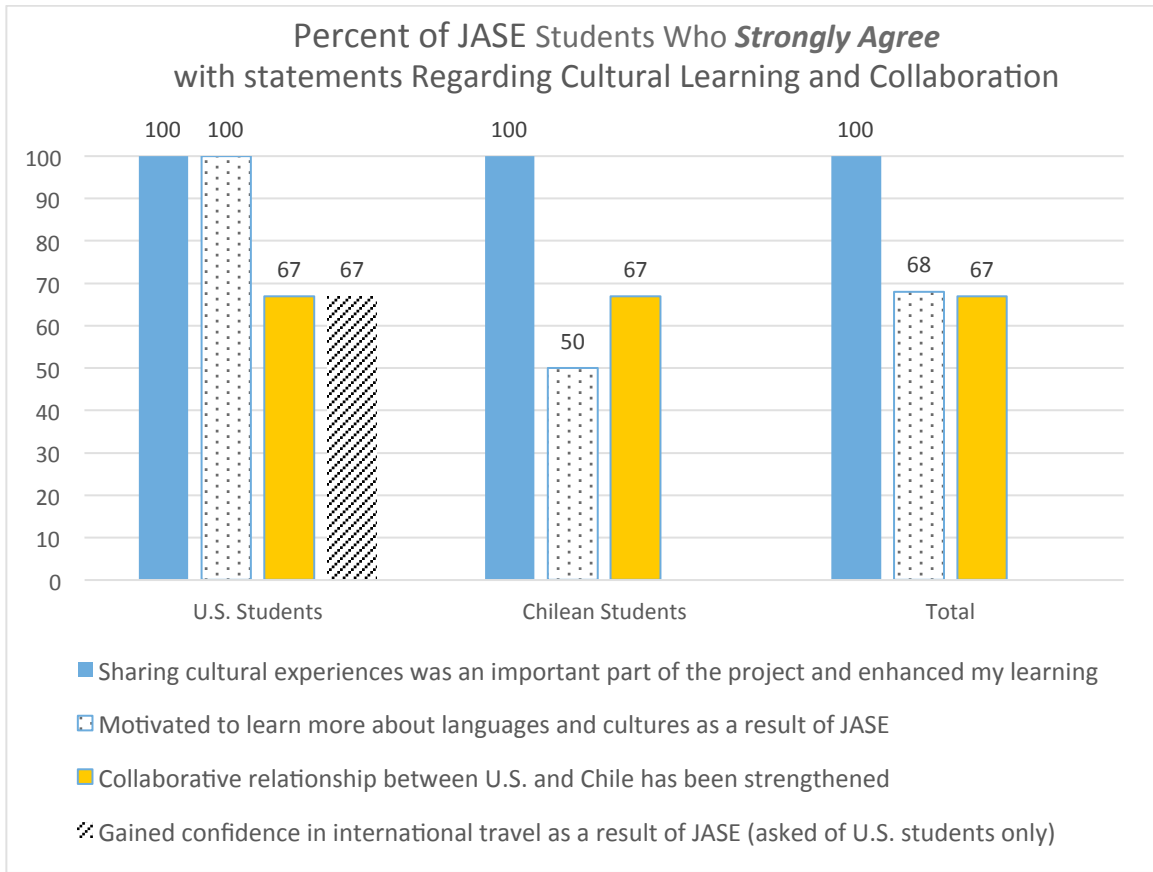


Figure 7

Students responded to several additional questions that measure the value placed on having participated in the JASE project. Figure 8 shows the percent of students who strongly agree with a series of statements regarding future expeditions. All of the U.S. students who participated in the project strongly agreed with the statement *I would value another opportunity to visit a research station in Antarctica*. Likewise, 100% of the students strongly agree with the statement *I would highly recommend this type of experience to other students*, and 100% of U.S. and Chilean respondents strongly agree that *JASE or similar projects should be continued in the future*.

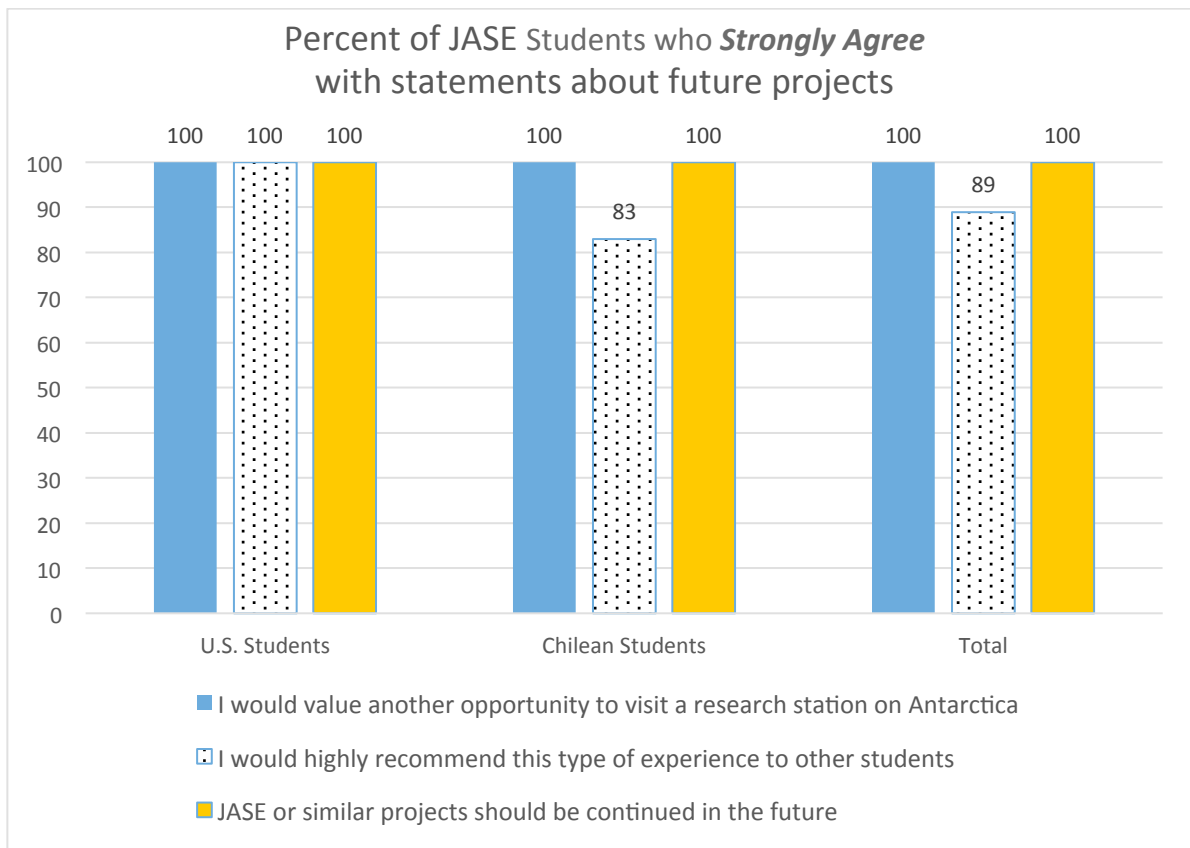


Figure 8

Table 1 on the following page presents the complete set of student survey responses. Included are responses from U.S. students, Chilean students, and the overall result.

Several results from the student survey have already been reported in Figures 6, 7, and 8. Students also indicate growth as communicators through their online journals and presentations. All of the students agreed (and two out of the three, 67%, strongly agreed) with the statement *the online journals and blogs were an important part of my JASE learning experience*. All of the students indicated they had shared their experience with at least one audience since returning from the expedition.

Table 1
Responses from JASE Student Surveys
U.S. and Chilean Responses

*included only on the U.S. student survey	Students	Strongly Disagree	Disagree	Agree	Strongly Agree	Not sure
The application process to participate in JASE was fair and clearly communicated.*	U.S.	0	0	33.3% (1)	66.7% (2)	0
I was given the information and support that I needed to be ready for the expedition.*	U.S.	0	0	33.3% (1)	66.7% (2)	0
Our mentor teacher helped prepare us for our trip to Antarctica.*	U.S.	0	0	0	100% (3)	0
The sharing of cultural experiences was an important part of this project and enhanced my learning.	U.S.	0	0	0	100% (3)	0
	Chilean	n/a	n/a	n/a	100% (6)	n/a
	Total	0	0	0	100% (9)	0
We were able to accomplish the goal of learning about scientific research being conducted in Antarctica.	U.S.	0	66.7% (2)	33.3% (1)	0	0
	Chilean	0	0	33.3% (2)	50.0% (3)	16.7% (1)
	Total	0	22.2% (2)	33.3% (3)	33.3% (3)	11.1% (1)
I am motivated to continue pursuing my own science knowledge as a result of JASE.	U.S.	0	0	0	100% (3)	0
	Chilean	0	0	33.3% (2)	66.7% (4)	n/a
	Total	0	0	22.2% (2)	77.8% (7)	0
My interest in research being conducted in Polar Regions has increased.	U.S.	0	0	33.3% (1)	66.7% (2)	0
	Chilean	0	0	50.0% (3)	50.0% (3)	n/a
	Total	0	0	44.4% (4)	55.6% (5)	0
We were provided high quality science learning experiences.	U.S.	0	0	100% (3)	0	0
	Chilean	0	0	16.7% (1)	66.7% (4)	16.7% (1)
	Total	0	0	44.4% (4)	44.4% (4)	11.1% (1)
We conducted relevant, hands-on research on the expedition.	U.S.	0	33.3% (1)	66.7% (2)	0	0
	Chilean	0	0	50.0% (3)	33.3% (2)	16.7% (1)
	Total	0	11.1% (1)	55.6% (5)	22.2% (2)	11.1% (1)
We learned about polar ecosystems and environmental impacts.	U.S.	0	33.3% (1)	66.7% (2)	0	0
	Chilean	0	16.7% (1)	33.3% (2)	50.0% (3)	n/a
	Total	0	22.2% (2)	44.4% (4)	33.3% (3)	0

*included only on the U.S. student survey	Students	Strongly Disagree	Disagree	Agree	Strongly Agree	Not sure
I am motivated to learn more about languages and cultures as a result of JASE.	U.S. Chilean Total	0 0 0	0 0 0	0 50.0% (3) 33.3% (3)	100% (3) 50.0% (3) 66.7% (6)	0 n/a 0
I would value another opportunity to visit a research station and work with scientists at Antarctica.	U.S. Chilean Total	0 0 0	0 0 0	0 0 0	100% (3) 100% (6) 100% (9)	0 n/a 0
JASE helped us experience first-hand the integration of research and education.	U.S. Chilean Total	0 0 0	0 0 0	33.3% (1) 16.7% (1) 22.2% (2)	66.7% (2) 83.3% (5) 77.8% (7)	0 n/a 0
I gained confidence in my abilities as a young scientist as a result of JASE.	U.S. Chilean Total	0 0 0	0 0 0	0 66.7% (4) 44.4% (4)	100% (3) 33.3% (2) 55.6% (5)	0 n/a 0
I gained confidence in international travel through this experience.	U.S.	0	0	33.3% (1)	66.7% (2)	0
The online journals and blogs were an important part of my JASE learning experience.	U.S.	0	0	33.3% (1)	66.7% (2)	0
I have shared my experiences with at least one audience since returning from the expedition.	U.S.	0	0	33.3% (1)	66.7% (2)	0
The collaborative relationship between U.S. and Chile has been strengthened as a result of the JASE project.	U.S. Chilean Total	0 0 0	0 0 0	0 16.7% (1) 11.1% (1)	66.7% (2) 66.7% (4) 66.7% (6)	33.3% (1) 16.7% (1) 22.2% (2)
I would highly recommend this type of experience to other students.	U.S. Chilean Total	0 0 0	0 0 0	0 16.7% (1) 11.1% (1)	100% (3) 83.3% (5) 88.9% (8)	0 n/a 0
It is highly likely that I will pursue a career in a scientific or research related field.	U.S. Chilean Total	0 0 0	0 0 0	0 0 0	100% (3) 66.7% (4) 77.8% (7)	0 33.3% (2) 22.2% (2)
JASE or similar kinds of projects should be continued	U.S. Chilean	0 0	0 0	0 0	100% (3) 100% (6)	0 n/a

*included only on the U.S. student survey	Students	Strongly Disagree	Disagree	Agree	Strongly Agree	Not sure
in the future.	Total	0	0	0	100% (9)	0

From the survey results it appears the only areas where some students disagreed that the JASE project had enhanced their learning were statements regarding specific activities that likely were planned to occur at King George Island. When asked to respond to the statement, *we were able to accomplish the goal of learning about scientific research being conducted in Antarctica*, two of the three U.S. students disagreed with the statement, as did two Chilean students. Similar results were seen for the statements that asked about *conducting relevant, hands-on research on the expedition* and *learning about polar ecosystems and environmental impacts* (two of the nine students disagreed, or 22%). Most students agreed that these types of experiences had happened to some extent, but not to the level of their expectations.

The student survey included several open-ended questions. First, students were asked to describe the benefits of participating in JASE. One student wrote,

“The benefits of JASE are numerous. First I would say it has offered a completely unique experience. I was able to travel with my teacher and two fellow students across the country. We were immersed in another culture and able to make cross cultural connections. We also presented to an American school and a U.S. embassy. I probably never would have been able to do something like that without this trip! The second would be that as an aspiring scientist, having gone on a trip like this has opened my eyes to what a career in science could look like.”

Another wrote,

“There were so many benefits to JASE. I developed closer relationships with the other U.S. students and teachers. This was useful on the trip itself, since we were navigating an unfamiliar country and culture together, but it will continue to benefit us as we continue our outreach and potentially begin our own research. As for developing relationships with the Chileans, that was one of the most powerful experiences of the trip. All of the students were extremely welcoming, friendly, patient, and curious. Another benefit of JASE was exposure to science and research. I didn’t get as much experience as I had hoped since we did not make it to Antarctica. But what I did learn has definitely motivated me more to study science. A major part of this was hearing from the Chilean students about their research. They all presented about the research projects they had done for the Science Fair and it was incredibly impressive. I couldn’t believe students my age or younger had done such advanced research. Seeing these students already making contributions to science makes me eager to go out and start learning and contributing, too.”

Students described how a program like JASE promotes cultural understanding and scientific knowledge. Here are responses from two of the students.

“All the expedition members came from different backgrounds but we were united by our interests in science. It really is inspiring to see your fellow peers so interested in science and it makes you want to pursue a career in science! And by meshing two groups of different cultural backgrounds, you are able to really get to know them and understand in a different way.”

“JASE allowed us to be completely immersed in a different culture and in a different scientific community. We couldn’t help but come away from the experience with increased knowledge of the world. The Chileans learned about our culture as well and we shared our scientific knowledge of IceCube with them to increase their realm of experience. The students from both countries were all interested in science, and that helped tie us together despite our cultural differences. Cultural understanding and scientific knowledge went hand in hand for this program.”

Students were also asked to describe ways in which they had already used what they had learned as a result of the expedition. Responses included the following:

“I learned a lot on the trip and have been able to share it with my community, family, and friends. I learned that things don’t always go as planned but if you persevere and keep working you can still learn a lot and have a trip of a lifetime! I’ve used this knowledge to motivate me to keep working on my goals even if there are setbacks.”

“I feel that my JASE experiences have already increased my confidence in communicating with others. In Chile, I was interviewed three times in Spanish, twice for TV and once for a newspaper. I also communicated with the Chilean students and researchers on a daily basis and I gave part of our presentation on IceCube. For me, those would be significant accomplishments even in English.”

Students were also asked to describe what aspects of JASE went smoothly, and what was difficult or challenged. Here is some of what the students shared.

“In the course of two weeks, our team of Juan, Claire, Anna, Luke, and Lynn, were able to bond close together. I also thought that meeting and getting to know the Chilean students went smoothly. Another wrote, I think the whole trip went very smoothly. We were all very able to adapt to any changes. The biggest change of plans occurred when we found out we would not be traveling to Antarctica. Although this was horrible news at first, it still did not prevent us from enjoying the rest of our trip, learning as much as we could, and sharing our experiences with students and at the U.S. Embassy in Santiago. The transition to Plan B was handled very smoothly and altogether, I can’t think of anything that didn’t go well during the trip.”

Regarding challenges, one student wrote that *“One of the biggest challenges besides not making it to Antarctica, was communicating in Spanish. I was definitely willing to try my best, but it was a difficult task. I was glad to struggle and try to improve my Spanish. I think this reflects well on JASE; the difficulties I faced were ones that helped me grow, not anything that lessened my experience.”*

Finally, students who were in this pilot project were asked to describe in what ways the program could be improved. Their suggestions included the following ideas.

“Our group did a science project before the trip and I think it was valuable to be able to share it with the students. So I think you should make part of the application process for JASE doing a science project. That way I think the winners would have more science related projects to share with the Chilean students.”

“I think that any future expeditions should definitely continue to post blog entries to a website, as we did. I am so glad we took the time to do that. Everything we’ve written will help others understand what we did, and the website is also something for me to look back on and remember the details of this trip. Future expeditions should also continue to stay in a hostel rather than a hotel or other arrangements. We all stayed together, we had Chilean roommates, ate meals together and had a common area to spend time together. This gave us many opportunities to interact with the Chilean students. For future expeditions I think the availability of English resources needs to be the same if not better than this time. We were fortunate that two of the U.S. students had decent Spanish and our teacher spoke fluent Spanish but even still, communication was difficult at times. I’m thinking especially of our day at the INACH laboratories. It was extremely challenging for me to understand the lab and the science we were learning from the Spanish instructions. I think future expeditions definitely need to include someone fluent in both Spanish and English, and for the U.S. students, Spanish skills would help immensely.”

The project did not accomplish the goal of traveling to a research station on King George Island on the continent of Antarctica, and while the entire team was undeniably disappointed, the data collected for the evaluation leaves no doubt that the team benefitted from the project in significant ways.

Sharing the Learning Experiences with Others

One of the goals of the project was to share the knowledge and experiences of the JASE team members with a wider audience. Before leaving Chile, the U.S. team had several opportunities to share both their knowledge and experiences with others.

- On February 25, 2014 the students participated in a live event webinar from Punta Arenas in Chile through Polar Connect. The purpose of the webinar was to share some of what they had learned and experienced during the expedition. The webinar has been posted on the PolarTREC web site.

- On February 27, 2014 the students gave a presentation to a group of 8th grade students at an international school, Nido de Aguilas.
- On February 27, 2014 the students presented information about their trip and their experiences to a U.S. Embassy group in Santiago.
- The JASE project was highlighted in the spring 2014 issue of *Witness the Arctic* (<http://www.arcus.org/witness-the-arctic>). Authored by Lynn Foshee Reed, all members of the team contributed to the article that describes their experiences.
- A profile of the JASE project and students from Monona Gove High School was featured on a Wisconsin Public Television program called *Wisconsin Life* on May 6, 2014. The program can be accessed at <http://wilife.tumblr.com/post/84934303484/field-trip-of-a-lifetime-watch-as-three-students>. Students were interviewed about the expedition, described their scientific and cultural experiences, and shared personal reflections on what the trip meant to them. The feature was called *Field Trip of a Life Time*.
- The online journal entries that recount the adventure are available on the PolarTREC website.

Program Strengths and Weaknesses

With all of the data collected for the project, it is important to identify what had made the project successful. Here are several key components that were identified through the data collection and analysis that contributed to the project's success.

- **Pre-expedition preparation** including building a strong, cohesive team of students from the same high school working with a mentor teacher who would accompany them on the expedition. This scenario most closely resembled the Chilean teams, where 11 students and 5 teachers worked in small groups of 2 or 3 to complete projects for an annual Science Fair competition. Says Juan, *"The students got to know each other from the work we did pre-expedition. We met once a week for quite a few months before the trip. This helped build connections. I would ask the students to write about what their biggest fears were about the trip, and we shared those and talked about it. I think that was successful in preparing the team and it was very important to do that. We became a solid group. And the Chileans saw that. It was important for the Chileans to see that."* The team building included weekly meetings, working together on the science project that would be shared with Chilean students and teachers, and taking the time to form bonds with each other and answer questions and deal with uncertainties. The three students and teacher were from the same high school, while the NSF Fellow was located in Washington D.C. This made it difficult for her to participate fully in the pre-expedition activities. One suggestion is to find a way for all members to form a cohesive bond as a team so that when the travel time comes, the relationships have been closely established.

- **Contributing a science project** to share with Chilean students and teachers that showed the team from the U.S. was interested in science and in sharing that interest with others.
- **Prior experience** with an Antarctic expedition on the part of the U.S. teachers. According to Jaun, *“The PolarTREC experience helped me enormously in being prepared for this trip, not just traveling but communicating what we were doing and why. The blogs and journals we kept for PolarTREC helped. I knew what had been successful with PolarTREC and I could apply it to JASE. This was very helpful. It was crucial. I knew what it took to get the journal entries written and posted. Each day I would ask the students, “Who is going to write this?” to keep everyone involved and on track with this part of the trip. It was very important to do that.*
- **Partnering** with teachers in other countries who welcomed the joint expedition. This helped in all aspects of JASE, to assist in developing an itinerary, navigate the different policies, and manage the logistics.
- **Lodging together** in the same location (in this case, a hostel in Punta Arenas) to ensure maximum opportunities for communication and exchange. Teachers and students mentioned the time spent together getting to know each other and communicating were extremely valuable.
- **Mentor Teacher Traits.** Another strength of the program was the high level of mentor teacher competence and involvement before, during, and after the project. The mentor teacher, Juan Botella, ensured the students had an exciting Antarctica-related science project to share with the Chilean students and teachers. He shared the science of neutrinos with the students, the IceCube project and cosmic ray detector. Mr. Botella established himself as an encouraging and capable mentor who was instrumental in helping students express their experiences in writing and in photos to be shared through the online journal entries. The fact that he is fluent in Spanish and was able to translate for the U.S. students and for the Chileans added to the success of the project. Having a fluent Spanish-speaking teacher accompany the students to help with communication and translation was an asset and contributed to the project’s success. The team faced some challenges with illness and uncertainty, and Mr. Botella was a positive role model in his flexibility. When illness prevented full participation in the expedition, resulting in the trip to Antarctica being canceled, he modeled resiliency in the face of the disappointment that encouraged others to do likewise.

The expedition could have been improved if the group had indeed been able to travel to Antarctica, experience firsthand the research being done there, tour the research stations, participate in real world scientific activities, and advance their science knowledge as had been expected from the start. Given that this did not happen, the U.S. team and their Chilean hosts and students, nevertheless came away from the experience with new scientific knowledge learned from their peers and at the INACH lab, many cultural connections, new friendships, stories and memories, and heightened curiosity about Antarctica, with an inner drive to one day, get there.

Summary and Conclusions

Evidence from the evaluation confirms that despite setbacks, each one of the program's goals and objectives were met to some degree through the JASE project.

This report has presented data that indicates there were many strengths to the JASE project even in spite of circumstances that prevented them from reaching Antarctica. The goal to expose high school students to scientific field work resulted in each of them stating they are nearly sure they will pursue a career in a scientific field or in research. The increased motivation came not just from getting to travel to Chile and visit the INACH lab. The increased motivation largely came from seeing their same age peers involved in meaningful science that can potentially change the world.

Results from the evaluation indicate there is value to offering polar field research experiences to students, where hands on learning takes place in the research locale. Students came away from the expedition with new knowledge about science and cultures that motivate them to learn more. The program was clearly successful in building cultural relationships in a scientific context, where everyone shared an interest in the topics being studied, regardless of background and country of origin.

Results also indicate that students had ample opportunity to share and present information about the trip in numerous venues including a live event webinar, interviews for TV, newspaper, and magazine articles. The group made presentations to a variety of audiences and returned to their communities to share their experiences with the School Board, classrooms, and for a feature on Wisconsin Public television.

The JASE project outcomes are positive and everyone involved learned a lot through the scientific and cultural exchange. The project was a worthwhile venture, and as the U.S. students exclaimed at the end of their surveys, *"Thank you so much to everyone who made JASE happen! I am so grateful that I had this unique and wonderful experience"* and another peer who wrote, *"I want to say thank you for the awesome trip! I really hope to be able to go to Antarctica. We made friends and connections in Chile that we would all like to continue. As awesome of a trip this was, our main goal of the trip—getting to Antarctica—remains unfulfilled. Thanks for the adventure and I hope to see this project continue into the future!"*

Juan Botella summed up what other JASE team members had expressed through the interviews and surveys. *He stated, "Even though we didn't fulfill the goal of going to Antarctica, the impact of the project was very strong, for our students and for the Chilean students as well. Most valuable was seeing how people who have different cultures and languages can collaborate with one another through science. Science was the bridge between our groups."*

Appendix A

Data Collection Instruments

Teacher Interview Questions

Joint Antarctica School Expedition (JASE)

Teacher Interview Questions

1. Describe your experience with the JASE project. What were the most valuable things you took away from your experience?
2. How did the experience further your content knowledge of Polar Regions and STEM practices?
3. How does a joint project like JASE further both science research knowledge and cultural knowledge?
4. What do you see as long term benefits of these joint activities in the areas of 1) sharing scientific research and 2) building cultural relationships through these types of exchanges 3) providing opportunities to high school students?
5. What did you like best about the expedition?
6. Did anything surprise you, for example were you expecting something that turned out to be totally different than what you thought?
7. Were you apprehensive at all about the JASE trip? What helped you be prepared?
8. How did the expedition affect your educational leadership skills?
9. What did you observe about the students' reactions to what they were learning, both academically and culturally?
10. Is there anything else you would like to add?

Joint Antarctic School Expedition (JASE) Project

Student Survey

(completed electronically via Survey Monkey)

Dear Students,

As a follow-up to the Joint Antarctic School Expedition (JASE) project, we are collecting information to help determine the effectiveness of the project in meeting its goals. Although we recognize that you were not able to make it to the research station on King George Island, it is our hope that you came away with new knowledge and valuable life experiences as a result of participating in JASE.

Your responses are important to us. Please take a few moments to complete this survey. There are several open-ended questions at the end and we hope you will take the time to share your feedback about your experience.

Please select the response that best represents your belief about each item.

	Strongly Disagree	Disagree	Agree	Strongly Agree	Not sure
The application process to participate in JASE was fair and clearly communicated.*					
I was given the information and support that I needed to be ready for the expedition.*					
Our mentor teacher helped prepare us for our trip to Antarctica.*					
The sharing of cultural experiences was an important part of this project and enhanced my learning.					
We were able to accomplish the goal of learning about scientific research being conducted in Antarctica.					
I am motivated to continue pursuing my own science knowledge as a result of JASE.					

My interest in research being conducted in Polar Regions has increased.					
We were provided high quality science learning experiences.					
We conducted relevant, hands-on research on the expedition.					
We learned about polar ecosystems and environmental impacts.					
I am motivated to learn more about languages and cultures as a result of JASE.					
I would value another opportunity to visit a research station and work with scientists at Antarctica.					
JASE helped us experience first-hand the integration of research and education.					
I gained confidence in my abilities as a young scientist as a result of JASE.					
I gained confidence in international travel through this experience.*					
The online journals and blogs were an important part of my JASE learning experience.*					
I have shared my experiences with at least one audience since returning from the expedition.*					
The collaborative relationship between U.S. and Chile has been strengthened as a result of the JASE project.					
I would highly recommend this type of experience to other students.					

It is highly likely that I will pursue a career in a scientific or research related field.					
JASE or similar kinds of projects should be continued in the future.					
Please describe the benefits of participating in JASE.					
How have you already used what you learned as part of the JASE project? Please explain.					
How might you use what you learned during your JASE project participation in the future?					
What aspects of your JASE experience went smoothly?					
What aspects of your JASE experience were difficult or challenging?					
How does a program like JASE promote cultural understanding and scientific knowledge?					
You were part of a pilot group of students, teachers, and researchers for JASE. What suggestions do you have for future joint expeditions?					
Please add anything else you would like to share about your JASE experience.					
Thank you for participating in this survey.					
Note: the * indicates the question was only included on the survey for U.S. students.					

Expedición Antártica Colectiva de Estados Unidos y Chile Encuesta Para Alumnos

(completed electronically via Survey Monkey)

Estimados Alumnos,

Ustedes formaron parte de la primera expedición antártica colectiva de Estados Unidos y Chile en febrero de 2014. Los primeros alumnos estadounidenses que participaron en esta expedición colectiva fueron financiados por la Fundación Nacional para la Ciencia de Estados Unidos, a la cual le interesa entender las experiencias de ambos los alumnos estadounidenses y chilenos para mejorar las colaboraciones futuras. Aunque reconocemos que no ustedes pudieron llegar a la instalación científica en la Isla Jorge, esperamos que hayan adquirido conocimiento nuevo y experiencias de vida valiosas que puedan compartir con nosotros. Sus comentarios, juntos con los de los alumnos estadounidenses, posibilitarán que la Fundación Nacional para la Ciencia mejore los programas de expediciones colectivas para los alumnos del futuro.

Por favor, tomen algunos momentos para completar esta encuesta para el 9 de mayo, 2014. Su participación en esta encuesta es voluntaria y confidencial.

Para las siguientes afirmaciones, por favor seleccionen la respuesta que mejor represente su creencia sobre cada punto.

	Estoy totalmente de acuerdo	Estoy de acuerdo	No estoy de acuerdo	No estoy de acuerdo en absoluto	No estoy seguro/a
Compartir las experiencias culturales fue una parte importante de la expedición colectiva y amplió mi aprendizaje.					
Pudimos realizar la meta de aprender sobre la investigación científica que se está haciendo en Antártida durante la expedición colectiva.					
Estoy motivado/a para seguir adelante con mi propio conocimiento científico como resultado de la expedición colectiva.					

Ahora me interesa más la investigación que se realiza en las Regiones Polares como resultado de la expedición colectiva.					
Nos proporcionaron experiencias de aprendizaje científico de alta calidad durante la expedición colectiva.					
Realizamos investigación práctica y relevante durante la expedición colectiva.					
Aprendimos sobre los ecosistemas polares y los impactos al medio ambiente durante la expedición colectiva.					
Ahora me interesa aprender más sobre lenguas y culturas como resultado de la expedición colectiva.					
Me gustaría tener otra oportunidad de visitar una instalación científica y trabajar con científicos en Antártida como resultado de la expedición colectiva.					
La expedición colectiva nos ayudó a experimentar de primera mano la integración de la investigación y la educación.					
Ahora tengo más confianza en mis habilidades como científico joven y como resultado de mi participación en la expedición colectiva .					
La relación colaboradora entre Chile y los Estados Unidos se ha reforzado como resultado de la expedición colectiva.					
Yo les recomendaría especialmente este tipo de expedición colectiva a otros					

alumnos.					
Es muy probable que yo siga una carrera científica o relacionada con la investigación.					
Proyectos colaborativos internacionales de educación científica como la expedición colectiva deben continuarse en el futuro.					
<p>Por favor describe los beneficios de participar en la expedición colectiva.</p>					
<p>¿Ya has utilizado lo que aprendiste como parte de la expedición colectiva? ¿Cómo? Por favor escribe una breve explicación.</p>					
<p>¿Cómo podrías utilizar lo que aprendiste de tu participación en la expedición colectiva en el futuro?</p>					

¿Qué aspectos de trabajar con alumnos y maestros de otro país pasaron sin problemas durante la expedición colectiva?
¿Qué aspectos de trabajar con alumnos y maestros de otro país fueron difíciles o exigentes?
¿Cómo crees que un programa como la expedición colectiva fomenta el entendimiento cultural y el conocimiento científico entre alumnos y maestros de los Estados Unidos y Chile?
¿Qué sugerencias tienes para expediciones colectivas en el futuro?

Por favor comunica cualquier cosa adicional sobre tu experiencia con la expedición colectiva que te gustaría compartir.
Gracias por participar en esta encuesta. Tus respuestas se mantendrán confidenciales.