

Student Science Fair International Collaborative  
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FULBRIGHT DISTINGUISHED AWARDS TEACHING PROGRAM  
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SUMMATIVE REPORT

## **Program experience**

My Fulbright DAT program experience in India for three months provided me with numerous life changing and career- impacting experiences to reflect on and process. I've returned to my science classroom within days of landing back in Los Angeles, so my immediate focus is on applications relevant to my continuing work at my school site.

1. A great impact from my time in India comes from the experiences giving formal presentations to teachers, students and parents... even other Fulbright scholars. An increase in confidence level and refinement of my communication skills has resulted. My DAT experience is somewhat atypical. One reason is that I was not affiliated with a university but with an informal science education institution, so any access to university courses was limited. A similar challenge was finding appropriate professional development conferences and teacher trainings in India, as they were difficult to locate. A third challenge was the timing of my visit which did not coordinate well with school calendars. Gaining immediate support for my curricular project was an uphill negotiation. To find Professional Development conferences through networking, I located a conference sponsored by NCERT (the official Indian national curricular research organization), but it got cancelled. However my application was noticed by the organizers and I was invited to present to the faculty of the SPM College of the University of Delhi. I prepared and delivered a talk on their requested theme of "Innovation in Teaching". Interacting with teacher trainees and their faculty while modeling effective instructional techniques was an energizing experience. This experience now emboldens me to take a more active leadership position at my school, specifically curricular chair to guide adoption of the NGSS.

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2. Though every day in India was memorable and educational, there were challenges navigating through bureaucratic layers to reach students directly, as my project required. Contacts became friendships with leaders in both educational NGOs (Manzil and Reap Benefit) and Maker Spaces (WorkBench Projects). My affiliation with the National Center for Science Museums pressured me to cast a wider net for my project than just within a school or classroom. All of these experiences and more have taught me that education reform must be a community effort.

3. The reason I applied for the Fulbright DAT was to expand my awareness of classroom practices outside my own culture and classroom. The irony of traveling to India to accomplish this was not lost on my supporters within my district. It cannot be understated how isolated most teachers are in their classrooms. Expanding online social networks and activities in professional organizations help counter this isolation, but the culture of the school in the everyday work environment is the main determinant of teacher collaborations. I observed in Indian schools regular instances of teachers supporting each other and calibrating lesson plans together in a way I hope to emulate back home.

4. My main “aha” moment from trying to implement my ambitious project in a short time period is the need to engage parents directly. During numerous school visits I met principals who were enthusiastic to integrate me into their schools. Then with teachers, after getting past some warm collegiality and sharing of cultures, a bit of resignation around their work pressures stalled my progress. When I met students in classrooms and assemblies their response was positively ecstatic, but when that excitement wore off the work fizzled. Through this trial and error, a parent helped me organize workshops for me to lead students. Then I addressed the parents directly and momentum built up. From this insight I determined to ask schools to allow me to speak to parents directly to pitch my project, and I was just starting to do this when the

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grant period ended. As I assume greater leadership responsibility at my current school, I plan to apply this insight to lead parent workshops in understanding the NGSS and what to expect in our curricular reforms.

5. Another surprising and unexpected experience in India came from agreeing to serve on the selection committee for the English Teaching Assistants program at the USIEF Fulbright house. To be on the other side of the grant review process was humbling. I think this experience will help me not just in writing better grants in the future, but in helping my students write more purposefully for grants of their own. By fulfilling my own Fulbright dreams, I have modeled for my students what's possible.

### **Project description:**

#### *Abstract*

As originally conceived, my project was entitled Science Fair International Collaborative and was informed by the action research I conducted for my Masters in Education at California State University Northridge. The problem I am addressing is the lack of enthusiasm that many if not the majority of students demonstrate for doing a traditional science fair project of the kind that can be entered in local and regional competitions. After learning that online collaborative technology tools were not a panacea, and that students were more keen on exhibiting their work than competing with it, I hypothesized that students working with an international partner would be intrinsically motivated by an embedded cultural exchange and the cross curricular connections that would result. As I prepared the project in my home classroom, I expanded student choice and opportunities from strictly a science project to a larger passion project, following guidelines for "Genius Hour/20% Time" that I had trained in over the summer.

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In India I shared my student's projects from a curated webpage, collecting student created 'Ted talk' style videos, with the objective of engaging them with Indian student collaborators. My role was to gain support from teachers and parents to help facilitate the communications between students and supervise and guide the collaborations. The project successfully initiated contact between over 20 students from various schools and regions in India, and the collaborations are still ongoing.

### **Topic**

Science Fairs have been a mainstay of science education for generations. My own childhood experiences with science fairs was not positive: I can still remember getting a good grade for a project I had little to do with, that was mostly created by a friend's parents. Like many science educators, I have been pressured to include a science fair project and to enter projects into competitions to help bring recognition to the school. With seemingly ever increasing pressures of new standards and standardized testing, projects that do not serve an explicit curricular purpose are marginalized. Nevertheless I have been an enthusiastic supporter of science fairs, integrating them into my curriculum, guiding students through every step of the process, and above all attempting to popularize the events for students who don't identify science as a preferred subject.

For the past 12 years I have been striving to improve and modify how I teach and guide the process. Students predisposed to science are easy to sell it to, but even these students rely on a coerced and required "assignment" with a deadline in order to be successful. Less inspired students wait until the last moment and either turn in low quality work or nothing at all, which damages their grade and reinforces a negative attitude towards science. Students benefit from explicit instructions and chunking of the process into manageable assignments, but this requires

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dedicating a substantial amount of class time to this instruction. I accomplished the mission of having several outstanding projects that competed successfully in larger science fairs, but I felt that I was not being successful with the majority of students.

We might designate “science fair” as an option only for those inclined, perhaps as an after school club, but that would only further marginalize its integration into the curriculum. So, I labored to find solutions that might work for everyone. One idea I tried was to assign experiments for students to conduct that, compiled together, would cohere into a curricular goal, such as simple different biology experiments. Another idea was to reduce the display board size so that it could fit in student lockers and be worked on in school under my guidance and not be done by parents. Another idea was to focus on developing student oral presentation skills because most students (and adults!) do not look forward to speaking in public. I had students set up their display board and materials in groups of 4 and present to a small group of peers. The trick was to present numerous times in order to gain practice and to polish their oral presentation skills before presenting to a larger audience.

One year I focused predominantly on helping students craft a testable hypothesis, organizing a “Hypothesis Fair” a year before the school science fair. After years of seeing similar projects culled from the same books and websites, I placed more value on originality. The next year I learned that that science doesn’t really work exclusively from “originality” but from repetition and fidelity to procedures and quality experiences collecting and analyzing data.

Later came the availability of computer devices and online collaborative tools, and my attempt to innovate and better serve students was directed towards that. Suddenly the entire process of crafting a hypothesis, procedure, results and more could be made transparent through Google Documents. Student work itself could be tracked through looking at revision histories. Students

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could be guided individually from commenting privately on their work ,giving feedback on a level unimaginable before. Moreover, parents and student peers could review their work and collaborate together. I felt certain that these tools would boost intrinsic motivation to do these science fair projects we were compelled to do but had struggled to integrate.

When the projects were completed, I could “publish” the student paper by changing the document properties, then embed a link to it with a picture of the student giving their presentation in class, and wrap it around an abstract. This became an “online science fair” that complimented and expanded the one evening physical event that was “science fair” .

The purpose of the online tools and publication was to provide students with 21st Century skills and access to an authentic audience. It was my hope that this would boost intrinsic motivation and inspire colleagues and administrators to follow my lead. However the results of my action research tempered my enthusiasm for online tools as student feedback was not as positive as I had expected.

I furthered my professional development with more explicit lessons about the Nature of Science itself. Topics such as the differences between science as research and science as application, or what makes for good science and the errors that lead to bad science became my focus for science fair. I initiated a common in-class experiment to embed these concepts instead of doing the traditional science fair.

But one of aspect of science that continued to intrigue me was its international nature: the need for repetition of experiments to increase our confidence in results. Also the way science can serve to transcend social, cultural or economic differences led me to Fulbright. Most importantly, science and it’s applications solve real world problems, so my Fulbright inquiry project began as my attempt to synthesize everything I had learned into something never

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attempted before. I chose two possible paths to facilitate student collaborations on projects. The first path was to give students freedom to choose a topic and problem they wanted to solve so that it would thoroughly engage them. My primary objective was to make the project meaningful, voluntary and hope to set the student on a career path trajectory towards science and engineering. My “plan b” that I thought would be attractive to schools in India was an engineering internship curricula. Provided schools had some technology infrastructure (even mobile phones if not computers), I had negotiated with a vendor to grant me access to use the curriculum with schools in India. Students partnered together across the countries could work on the lessons over the course of a two week unit. The logistics of this path would be difficult but the exposure to the curriculum and discussions it would inspire were expected to open school doors for me.

Finally the event to present these international collaborations was to be a “School Maker Faire” to serve as the total reinvention of the science fair into a popular and cross-curricular celebration of human creativity, problem solving, in addition to creative whimsy. My local school district is very excited about expanding this concept as it elegantly lines up with our reform towards the Next Generation Science Standards (NGSS) and integration of Engineering Practices across the curriculum. As my work on this project continues, it is hoped that schools in India will reproduce similar school based events.

### **Project process**

The process for the project began during the summer when I refined my technology skills and gathered resources from the CUE Rockstar camp, earning Google Educator Certification, Nearpod Educator Certification and taking the ‘Genius Hour’ Master Course online. Over the summer IIE secured my affiliation with the National Council of Science Museums and I began a

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dialogue with my academic advisor. At the Fulbright orientation conference in Washington D.C. in August of 2016, I met the two Indian Fulbright DAT grantees and networked with them. They both proved invaluable in helping me locate progressive schools to visit. The specific schools were the Heritage School in Gurgaon, New Delhi and the Valley School in Bangalore. When my school year started immediately after the Washington orientation, I began the process of leading my students towards creating projects that they would be ready to share before I left for India. In November I went to the National Association for Gifted Children conference, met and networked with a teacher from the American School of Bombay in Mumbai.

Equipped with three highly esteemed schools to begin with, from Los Angeles I initiated emails and Skype meetings with administrators from the schools, gaining invitations to visit, observe instruction, present my project and collaborate with their teachers. Despite getting little guidance through my academic affiliation, I was confident and hopeful that I would be successful once in the schools themselves. I hoped to be so successful with the project in my first choice of school (The Heritage School) that I could devote even the entire three month residency to working only at that school. Effective teaching is about developing relationships with students, which simply takes time, so I believed that the best result would come from a deep dive into one school.

After landing in India and getting oriented, I visited the Science Center in Delhi and was immediately immersed in science fairs and presenting my project to students and parents. I discovered that there are various types of science fairs regularly scheduled at many of the regional Science Centers and Museums. While exciting and engaging to observe, and interactions with students that were wonderful, the events themselves did not match my project structure.. The events were rigidly competitive and there was no public audience or

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community outreach. Also the students presenting were mostly high school students (my age group is younger), and were winners from school competitions. They were not the more average type of students who need more engagement with science, which is central to my project.

The other important lesson learned from these early experiences at Indian science fairs is that these inspired Indian students have project ideas of their own they wanted to share. We discussed ways to share their projects with students in Los Angeles, but without explicit directions and support it was unlikely to occur. Students and their parents expressed interest in viewing videos of my student's presentations, but to my surprise most students did not have email addresses of their own. I expected to find internet access spotty but that did not seem to be the major obstacle. The challenge seemed to be a lack of support from parents and schools and I was not fully prepared to deal with this right away.

When I began visiting schools, I expected that to change. Unfortunately, the first school I visited welcomed me only as a short term visitor and not for a serious collaboration. After days of meetings and waiting, I was finally allowed into selected classrooms but I was never given an opportunity to address students directly. Realizing that the "deep dive" wasn't going to happen, I reached out to USIEF for even more contacts and they connected me with more schools and especially Fulbright alumni who were more sympathetic to my project goals.

I contacted and made appointments with every person I was referred to, giving my elevator speech again and again. While the Science Museum was perhaps not a great fit, I made contacts at the National Council of Educational Research and Training (NCERT) and other researcher groups that would prove helpful. I gained access to the textbooks and teacher training materials so that I could walk into most classrooms and adapt quickly. But the impression I was

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getting from academics was that while my project was a fantastic idea, it would meet resistance due to its innovative nature and simply the timing of my visit during “exam season”. It was also suggested that I visit a wide range of schools including government schools, even though they could not help implement my project, it would be instructive for my understanding of the national educational system.

The next school I visited was another renowned progressive school, the Sanskriti School in Delhi. My reception there was only slightly better than at Heritage, and by this time I was wondering if I would be able to find a fit for my project at all. I kept on visiting schools wherever I could get invited, including a government school in Delhi. Finally a school in a suburb of Delhi seemed more eager to have me and even arranged for my transportation. When I arrived there was quite a welcoming fanfare and I was allowed to visit multiple classrooms. The teachers had apparently been instructed to welcome me in and even turn the class over to me for a few minutes, but I was not prepared for that and struggled to improvise something to fit with the lesson they had just learned. It was a wonderful day. I presented my project in depth to the Principal and she loved it, but still there was no urgency to get to work on it immediately as I wanted to do. We agreed to collaborate on an art project between our schools and I networked my colleague back home with their art teachers. With school visits leaning now towards breadth not depth, I printed out several color flyers to try and get the word out to students directly.

The move to Bangalore was more hopeful because a Principal had offered me a long term residency. She was willing and eager to introduce me to a multitude of schools in the area. The day I arrived I was already presenting to groups of about 400 students at a time, sharing the project process and getting the students excited about it. As I walked around the school in the

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days to come, I was treated to celebrity level adulation by students literally clamoring for an autograph. That was a bit strange. Two or three students expressed serious interest in participating in the project itself but only for guidance on projects they already had in mind. I didn't really have the access to the students to help them with their projects unless their teachers joined me in the effort. Despite the Principal's and the students intense enthusiasm, the teachers were less enthusiastic. Meanwhile the fantastic school Principal (and Fulbright alumni) had set me up to visit several other schools in Bangalore, which would all prove to be memorable but also short term learning experiences.

While in Delhi I befriended someone from an NGO (Manzil). One contact led to another and in Bangalore I connected with another NGO (ReapBenefit) whose work on local environmental problem solving seemed like a great fit for some of my student projects. I also connected with and began actively collaborating with a Maker Space in Bangalore (WorkBench Projects). I triangulated the school I was visiting, the NGO and the MakerSpace together, to see if we could get some sparks flying somehow. As in Delhi, it was obviously going to be a longer term project than I had anticipated. Connecting organizations in India through my common interest was a fulfilling accomplishment however.

Finally a breakthrough occurred in Bangalore, primarily thanks to Fulbright teacher Marina Basu, who was working at the time at the Valley School. Marina had been struggling to gain access for me to her school. While we were eventually successful at visiting Valley and my presentations there went very well, this challenge led to a new opportunity. Networking with a parent from the school, a series of workshops was organized on consecutive weekends at the parents residence. This gave me a chance to work directly and at length with students, even helping shoot videos at the end to introduce themselves to my students.

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My project gained momentum and participation is continuing now still. I knew after working with the students for several hours that they were going to need their parents support, and yet the parents hadn't heard or observed my presentations. I spontaneously addressed them in the living room before they dispersed, and the frank and clear answers I gave to their concerns seemed to win them over. Later I would reflect that going directly to parents might be the most efficient way to gain cooperation for implementing this or any project.

My project was interrupted for the Fulbright conference in Kolkata, which was an unforgettable and powerfully enriching experience for me personally and professionally. I was able to present the status and momentum of my project and receive support from Fulbright scholars of many different programs. Afterwards I was eager to get back to Bangalore where I had felt so welcome. Unfortunately the week I returned was the core exam week for all schools and I was hard pressed to find open schools.

Despite these disappointments, I still had great hope for my trip to Mumbai for an extended stay at the elite international school, the American School of Bombay (ASB). This is a school with ample technology that had expressed interest in both versions of my project. Orienting me to the school was their Maker specialist who would become a lasting friend and collaborator. But when it came time to visit, despite the preparations that had made in advance and timing my visit around their school calendar, something was off. It's a fantastic school and I was able to visit for three days and observed some very good instruction and had great rapport with the teachers. The school even has its own Research and Development branch to implement innovations and publishes books on the topic. To me it seemed like the perfect fit, but there was

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no interest in either of my projects and I wasn't even introduced to the students whose classes I observed.

That was a strange contrast to my reception at other schools. Perhaps because I was not charging any fees, perhaps because the teachers were already saturated with work, perhaps even some institutional elitism, for whatever reason I couldn't make quick headway so I decided to move on. There were other schools I visited in Mumbai and then backtracked to Delhi to close out the grant period, revisiting the schools I had started out at.

My new approach was more direct, assertive, even a bit demanding. I would return to the school only to meet parents and present my project to them directly to enlist their participation. Surprisingly, the Heritage School did invite me to return. The presentation I made to parents was a rousing success and I collected many more email addresses on my next to last day in India.

### **Relevance and application**

The final product of my inquiry project is still a work in progress to me. While in India at times it felt like I was not making progress at all, but then I remembered the wise counsel from the orientation, specifically "cultural exchange first, inquiry project second." By that metric, every day was a great success and I'm proud of how I met the challenges of living and adapting in India.

I've been back in the classroom now for four weeks and have hardly had time to reflect on the enormity of my experiences. My original plan was to share student collaborations at a school maker faire, but I postponed that event when I realized that I wouldn't be ready so quickly. Over the summer the Indian school system continues so I intend to cultivate relationships I initiated and continue to push the project along as intended.

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The project I submitted consists of a series of annotated powerpoint presentations that go into detail on the project and my activities in India, complemented by a Teacher's Guide that should prove useful to any teacher who wants to implement a similar project in the future. I'll be presenting my Fulbright project at my school site, and at a high profile district wide event next month.

Some learning takeaways that apply to my current practice are that teaching is and will become even more so an intensely collaborative enterprise. It is not wise to embark on a major project without widespread support, understanding and buy in. In my case I usually ask forgiveness not permission, and I've never had to apologize for my curricular choices. But now that our school and most schools are shifting to a different style of science curriculum, the solo approach is exposed and outdated. I learned this as I visited schools in India with varying degrees of resources but consistent amount of teamwork. Teachers sat together, ate together, worked together, planned together, more than I have at home. No sooner did I get home than the pressure to become a school leader was presented and I accepted the challenge. However I am now looking to develop a new skill set to work effectively with adults, navigate through institutional bureaucracy, and keep my vision intact. My experiences in India were great training for this. The tension between my sense of urgency and the need to be patient to meet the (adult) learners exactly where they are will may be the greatest challenge I'll face in my career. Before this Fulbright experience, I had never considered the possibility of becoming an instructional coach, departmental curriculum planner or collaboration leader.

Obstacles can be hurdled, but going around them is easier. Frustration builds starts when there's no movement at all. Like a bicycle with gears to more easily ascend a steeper slope, I need to modify to keep moving so that others can follow. And sometimes walk the bike up the hills.

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Progress is being made but so much more can be done with cooperation and effort of others working in unison, that the work required to build the team is simply worth whatever the cost of investment.

Access to technology is still a major obstacle across in India while in Los Angeles there is greater access to technology but confusion on how to use it effectively. While I've been studying and reflecting on this topic for years and continue to do so, working in India has given me more experiences working with no technology and still finding ways to be effective. That said, there are so many new methods of interacting and creating content that technology can help leverage, it is imperative that we give every student the opportunity to use the latest resources being developed.

The strategy of "School Maker Faire" as the reimagined science fair is something I intend to help popularize in years to come. International collaboration is actually a necessity when it comes to global environmental and health concerns and our students are eager to engage in these activities now. I will be forever grateful for the Fulbright DAT program that has helped propel me forward in this vision.