Project Evaluations/Testimonials

TF3: General Public

Contents

2013

Chinese Poetry Astrophotography

Last year, I did a lot of things. I built 3 exhibitions as director of Beijing Planetarium exhibition, wrote 228 programs for the Hello Sky podcast: http://hellosky.cdstm.cn/ and 12 column articles for the Amateur Astronomer, and organized the OAD project.

This experience I had helped expand my horizon in public astronomy. The more people know about astronomy, the happier I feel. It encouraged me to devote myself in popular astronomy in the future.

Dark Skies Outreach to Sub-Saharan Africa

The evaluation of the project was used to answer the following five questions:

1. To what extent were the supporting materials implemented successfully in partnering countries?

2. To what extent were the coordinators trained by NOAO, and the teachers they trained, equipped with the knowledge and skills needed to provide access to quality STEM learning experiences for students, regardless of their geographical location, academic ability and socioeconomic status?

3. What student outcomes were evident as a result of their participation in the project?

4. What was the level of participation of each partner country?

5. What were the challenges and lessons learned from the project?

Data to answer these questions was collected in the form of online and paper surveys, communication between NOAO staff and local coordinators through email and Google Hangout sessions, review of progress reports submitted by coordinators, and analysis of program artifacts including student presentations, work, and videos. Findings to each question are reported below, along with evidence and in-depth descriptions of the program components.

1. **Activities and supporting materials (e.g. kits and Google Hangout sessions) were implemented successfully in almost 60% of partnering countries.**

Supporting evidence was gathered from local coordinators through Google Hangouts and other conversations held between NOAO staff of local coordinators. There were a number of ways in which supporting materials for the Dark Skies Africa program

were implemented successfully in the partnering countries. NOAO supported the successful implementation by providing kit materials and information on how to use them, real-time Google+ Hangout sessions, archived videos of Google+ Hangout sessions, PBWorks pages to organize and provide information, and ongoing support through email and informal conversions, each described below.

Kit Materials

12 kits were delivered to each participating country prior to the initial Google+ Hangout sessions. Each kit contained organized materials for the six different main activities and numerous subsequent activities, as well as helpful resources on further darks skies and energy conversation topics. Overall, each kit cost about $450. Baring a few issues with customs and delivery methods, these kits reached each coordinator with no further issues. NOAO facilitators are confident that the kit contained all materials needed for each activity, and thus was of high quality to the coordinators. Throughout the project, there were very few complaints about the kit material and suggestions on anything to add or remove. The most significant recommendation was to include a solar energy component on the next version of the kit and activities. Furthermore, all important kit materials were explained and demonstrated in the Google+ Hangout sessions, thus clearing up any questions on how kit materials should be used. Overall, the implementation of the kit materials occurred with great success.

Google+ Hangout Sessions

The implementation of the Google+ Hangout sessions, although internet connections made it difficult at times, turned out to be a success as well as a great learning experience. Cross-continent communication is always difficult, especially when also dealing with cultural differences, internet connectivity, and time-zone differences. In order to counteract these issues, the NOAO staff implemented a number of factors into each Google+ Hangout session. The dates and times for each session were selected based on the availability of the local coordinators, which normally led to early-morning, weekend sessions for the NOAO staff. NOAO typically offered two different session times for each of the six session topics to make sessions more available to coordinators. In total, 11 sessions were developed over six months of the project to cover all six topics. Furthermore, the Hangout sessions were downloaded as YouTube videos, so that parties who were not able to make a particular session would be able to watch it later at their convenience. As a result, the 11 YouTube videos were watched over 250 times in total by our team of coordinators, teachers, and students. The Google+ Hangout sessions were detailed and thorough. Anyone who attended the Hangouts, or watched the subsequent

video archives made of the Hangouts, received an in-depth description of the kit materials, activities, and procedures. Being two to three hours, each session was long enough for any and all questions to be answered, and for each participant to have their voice heard and concerns dealt with.

Six main groups attended three or more Google+ Hangout sessions. Since the staff from Algeria diligently watched the recorded videos, we can say that seven out of twelve countries actively participated in the Google+ Hangout session and project as a whole (58%). This is consistent with our goal of the project (3 out of every 5).

PBWorks Page

As a further resource to the coordinators and teachers, a PBWorks resource page was created in order to display all information regarding the Dark Skies Africa project. This page, which can be found at http://darkskiesafrica.pbworks.com/w/page/67151813/Dark%20Skies%20Africa (password entry can be given upon request), has everything a project participant would want, including: program and participant information, Google Hangout links and information for video and session trouble shooting, dark skies and energy conservation links, activity resources and forum location, examples of previous projects, science standards from across the world, and progress made by each coordinator (including email updates from each coordinator). This has been a tremendous resource to all who have used it. During the course of the project, the PBWorks pages evolved and were improved as the program unfolded.

Informal Conversions

Along with 11 Google+ Hangout sessions, email communication was pivotal to the success of the program. With new information arising at a constant rate, emails were sent out to coordinators about once every week or two depending on the program's current schedule. These emails contained pertinent information for the coordinators. Four coordinators were highly active communicators throughout the program, three others were highly active at most times during the program, and five were inactive or used little communication throughout the project.

2. **Coordinators trained by NOAO, and the teachers they trained, were equipped with the knowledge and skills needed to provide access to quality STEM learning experiences for students, regardless of their geographical location, academic ability and socioeconomic status. Overall, members from seven countries were able to perform key activities of the project.**

Supporting evidence was gathered from the analysis of final student projects as well as progress and final reports submitted by local coordinators. The content and delivery of the materials for the Dark Skies Africa program was done in a successful and professional manner. Coordinators and teachers who were active and fully participated in the program were fully prepared with all materials, education, and resources they needed to perform all aspects of the Dark Skies Africa Program.

In total, there were six main activities available in the Dark Skies Africa kit, which included the Light Shielding Demonstration, the Spectra of Lights Activity, the Outdoor Light Audit, the Constellation at Your Fingertips Activity, the Magnitude Reader Activity, and the Turtle Hatching Activity. The goal of the project was to get all coordinators and teachers to implement at least the first three activities with their students. Below is a list of all participating countries and the number of activities that they were able to use with their students, listed with the most active countries first. As can be seen, seven countries met and/or exceeded this goal of implementation.

Country and Coordinator(s)/Teacher(s)	**Number of Activities Implemented**	**List of activities implemented**
Algeria Jamal Mimouni, Gergouri	5	Light Shielding, Spectra of Lights,
Hickem		Outdoor Lighting Audit, Magnitude
		Reader, Constellation at Your Fingertips
Nigeria Bonaventure Okere, Daniel	5	Light Shielding, Spectra of Lights,
Okoh, Ezechi Nwachukwu, Misc.		Outdoor Lighting Audit, Magnitude
Teachers		Reader, Constellation at Your Fingertips
Rwanda Pheneas Nkundabakura,	5	Light Shielding, Spectra of Lights,
Antoine Mahoro)		Outdoor Lighting Audit, Magnitude
		Reader, Constellation at Your Fingertips
Tanzania Noorali Jiwaji, Shaban	5	Light Shielding, Spectra of Lights,
Juma Baya, Jonas Breiling,		Outdoor Lighting Audit, Magnitude

Mwinuka Pasvolo		Reader, Constellation at Your Fingertips
Ghana Jacob and Jane Ashong,	3	Light Shielding, Spectra of Lights,
Sarah Abotsi-Masters, Emmanuel		Outdoor Lighting Audit
Frimpong		
Zambia Prospery Simpemba	3	Light Shielding, Spectra of Lights,
		Outdoor Lighting Audit
South Africa Sivuyile Manxoyi	2	Light Shielding/Spectra of Lights
Ethiopia Solomon Tessema	0	No progress seen
Gabon Patrice Okouma	0	No progress seen
Kenya Paul Baki	0	No progress seen
Namibia Eli Kasai/Rob Johnstone	0	No progress seen
Senegal Maram Kaire	0	No progress seen

Overall, seven countries were able to perform the Light Shielding Demonstration and Spectra of Lights Activity, six were able to perform the Outdoor Lighting Audit, and four were able to perform the Magnitude Reader and Constellation at Your Fingertips Activities. The coordinators who were most active in the Dark Skies Africa program, whether through Google+ Hangouts or actively communicating with NOAO staff, were able to do at least the three main activities, if not more. The point is further shown through the quality of the students' final projects. As described further below, the final projects completed by students in four of the active countries unequivocally revealed that the students understood dark skies and energy conservation and felt comfortable enough with the material to put together excellent presentations.

As to be expected, there were some growing pains during the earliest parts of the program, as coordinators and teachers attempted to learn new materials from the Google+ Hangouts and utilize the kit materials. There were a few misconceptions seen in two of the progress and final reports. One of these misconceptions was related to the use of two devices, the SQM and Lux meter, in the Outdoor Lighting Audit. Students are seen incorrectly using the devices in photographs sent from two of the teachers. This has led to a revision of how to improve teaching this information in the future by the NOAO staff.

3. **There were substantial student outcomes, including increases in target knowledge, and engagement as a result of their participation in the project. Additionally, active students created excellent project outputs demonstrating their increased knowledge and engagements.**

Supporting evidence was gathered from surveys of students and analysis of final student projects. The main goal of the Dark Skies Africa project was to educate the students on the topics of dark skies and energy conversation, as well as get them interested in science. Below we describe how the final projects students submitted from the different countries demonstrate how well our goals were met.

Student Surveys

Student surveys were made available to all partnering countries. Surveys were collected from students in Ghana, Tanzania and Zambia. Although students have a variety of knowledge about light pollution and energy conservation before the program, they showed an increase in their knowledge and beliefs after engaging in the program activities. Students increased in their awareness of light pollution issues, consequences of light pollution, and ways they could address light pollution. Students did not report taking any actions at their homes to address light pollution. Despite this, they did indicate that this project was the first time they had been made aware of such issues and that they would consider changes in the future. Overall, students reported that they enjoyed engaging in the activities and making their projects. Although surveys were not returned from many of the sites, these preliminary student results show positive outcomes for the project and demonstrate that this type of project has value to these communities.

Progress and Final Reports

Algeria: Algeria submitted a substantial number of final project resources, including a Microsoft Excel graph, two poster projects, six Microsoft PowerPoint projects, and five video presentations. Each additional resource demonstrated that the Dark Skies Africa materials were taught to the students with efficiency and dedication. Analysis of the student projects supports the claim that all important information provided by NOAO staff during the Google Hangout sessions were delivered to the students, especially topics discussed during the three main activities. The student projects included information about light pollution in general and energy conservation, including light pollution hazards and solutions to light pollution, as derived from the Light Shielding Demonstration and Spectra of Lights Activity. Furthermore, an emphasis was put on the Outdoor Lighting Audit, as there were five different sets of audits preformed, all of which included full calculations. Some of these audits also included graphs which required the use of the Lux meter and SQM.

This demonstrates that students were able to correctly use the tools given to them in the kit as well as understand how the tools worked in real world situations. Additionally, video presentations were submitted of students' final projects. The content of the videos showed that the students learned all major informative aspects of the three main activities. Their comfort level in presenting the material showed how well they had mastered the dark skies and energy conservation materials.

Nigeria: Nigeria provided four graphs prepared by their students. These graphs showed that the students were able to utilize the Lux meter and SQM, use them in real-world situations, and understand the significance of their readings. These graphs were part of the Outdoor Light Audit and thus support the claim, along with information from Nigeria's progress reports, that the students have a good understanding of the information provided in the activities and how light fixtures affect light pollution.

Tanzania: Tanzania provided two videos, each of which showed students performing a number of activities and results from their Dark Skies Africa education. The students shown were from the Filbert Bayi Secondary School, and were being assisted by one of coordinator Noorali Jiwaji's main teachers: Jonas Breling. The two videos showed a number of students doing a full light pollution presentation for an audience. In both videos, a single student gave a poster presentation that included general information about light pollution and its harmful effects on all life factors, examples of proper and improper shielding techniques, as well as an overview of an Outdoor lighting Audit (with full calculations) they completed themselves. While it was unclear what the students were saying at some times during the videos, their presentations were full of useful information from all three main activities, especially from the Light Shieling Demonstration and the Outdoor Lighting Audit. The audience was then led to a dark room where other students led a full Light Shielding Demonstration. While the demonstration contained flaws in the delivery of the information, it is clear that the students understood the concept of light shielding and how it pertains to the prevention of light pollution.

Zambia: Zambia provided a video showing Gerlad Mwitwa, one of coordinator Prospery Simpemba's main teachers, and his students evaluating a light bulb and its fixture using educational and physical tools from this project. Most of the conversation in the video was prompted by questions from Mwitwa, and thus allowed the viewer to really see whether or not the students knew the information well. As seen in the video, students were able to identify a poor lighting fixture based on its relative level of light pollution, observe the number of bugs being attracted to the light (a topic covered in our Google+

Hangout sessions) and their flight pattern, and use a lux meter in order to evaluate the quality of the light fixture, even though the lux meter was not used properly. The short video demonstrated that the students in Zambia were taught materials from each of the three main activities and were able to utilize the materials in a real world situation.

Overall, the deliverable goals were attained. As seen from the students' comfort level during presentations and the in-depth content of their projects, they were not only been taught the information but also have retained the most important topics of dark skies education.

5) **There was a spectrum of participation in the project by active partner countries. Some were incredibly active, despite barriers, and some did not engage in the project at all. Those who did participate were highly successful.**

Supporting evidence was gathered from documentation of coordinator participation and progress reports. Within the Dark Skies Africa project, there were a range of different types of participation in which coordinators, teachers, and students were able to partake. Below are descriptions of the two main forms of participation: attendance/viewing the Google+ Hangout sessions and actively communicating via email.

Google+ Hangout Participation: Each Google+ Hangout sessions had a particular topic based on where we were with the project, with six different topics overall. Depending on the availability of the coordinators, multiple sessions were conducted by NOAO staff for the same topic. While the plan was only for coordinators and subsequent teachers to attend six topical sessions over the course of the project, eleven sessions were conducted overall to accommodate as many people as possible. The following table lists the number of Google Hangout sessions attended by members of each participating country. The names included with each country represent the coordinator(s) for that country, as well as any of teachers who might have attended a particular session together (or attempted to).

Participating Coordinator and Teachers	Number of Google Hangout Sessions Attended
Algeria Jamal Mimouni, Gergouri Hickem)	0
Ethiopia Solomon Tessema	0
Gabon Patrice Okouma	4
Ghana Jacob and Jane Ashong, Sarah Abotsi-Masters, Emmanuel Frimpong	4
Kenya Paul Baki	1
Namibia Eli Kasai, Rob Johnstone	1
Nigeria Bonaventure Okere, Daniel Okoh, Ezechi Nwachukwu, Misc. Teachers	4
Rwanda Pheneas Nkundabakura, Antoine Mahoro	5
Senegal Maram Kaire	0
South Africa Sivuyile Manxoyi	1
Tanzania: Noorali Jiwaji, Shaban Juma Baya, Jonas Breiling, Mwinuka Pasvolo	6
Zambia Prospery Simpemba	3

The Google+ Hangout sessions were also downloaded to YouTube for follow-up viewing. Overall, the videos had a viewership of 257 times. Although it is unknown who watched the videos, the large number of subsequent views suggests that information shared by NOAO staff during the online sessions was getting out to the intended audience, most likely the participating coordinators and teachers.

Internet connectivity was a major issue throughout the length of this project. A number of coordinators and teachers (e.g. Mimouni and Hickem) were not able to connect even with technical support from NOAO special projects assistant, Daniel Tellez. Some of the coordinators who were not able to connect through Google Hangouts were still able to use the materials and educate their students. Sivuyile Manxoyi, who only attended the first session and did not communicate actively throughout the project, went through the activities with his students and teachers, and even used the light shielding demonstration to win “Third Best Exhibit” at Sasol Techno X, a science festival in Sasollburg.

Email Communication: Each Google+ Hangout session were approximately two 3--hour periods every month. To further support coordinators, a constant stream of emails was the main means of communication between the NOAO staff and the participating countries throughout the project. However, while an email by NOAO staff was sent to all participating personnel approximately once every two weeks for the span of the project, there was a range of emails returned by coordinators in partnering countries. Below is a list of coordinators and/or teachers and how well they communicated with NOAO throughout the project.

Highly Active with Communication Throughout: Noorali Jiwaji (Tanzania), Sarah Abotsi-Masters (Ghana), Bonaventure Okere (Nigeria), Pheneas Nkundabakura (Rwanda), Prospery Simpemba (Zambia)

Highly Active At Times: Jamal Mimouni (Algeria), Patrice Okouma (Gabon), Jacob and Jane Ashong (Ghana)

Little to No Communication Throughout: Paul Baki (Kenya), Rob Johnstone (Namibia), Sivuyile Manoxyi (South Africa), Solomon Tessema (Ethiopia), Maram Kaire (Senegal)

While the parameters of this list might seem vague, the communication from project participants followed a specific pattern. There were certain participants who actively communicated throughout the project, those who only communicated for a specific period of time, and those who we had little to no communication at all.

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1. Use pre-recorded videos of activities and use Google hangout time to answer questions.
2. Provide multiple ways for coordinators to get information online.
3. Use short applications to ensure that coordinators are interested and committed to the project.
4. Use a variety of techniques to gather data to measure success of the project including online surveys, paper surveys, and analysis of artifacts submitted by coordinators from each country.
5. Be aware of issues with customs when mailing kits out to different countries so ensure efficient delivery of materials.

Bringing Astronomy to Remote Areas in Vietnam

We found that there will be more impacts if there are some professional astronomers who could join us and talk to the audience about their own experiences. I think IAU-OAD can send out a recommendation to professional astronomers who travel to other countries contact with local clubs and give talks.

2014

Accessible Citizen Science

One area where it is relatively easy to see if the work is having an effect is translation. Google Analytics reports where a user's web session comes from, and what language their browser is set to use.

On Galaxy Zoo, English (en-us) has steadily held at 65-70% of website sessions since 2012. In 2014 that changed to be 60-65% of all website traffic, with greater fluctuation overall. In early 2015 there are signs that the number is dropping further, with English only accounting for 51% of session in the week Jan 11-17th 2015.

On other astronomy projects the story is better. Up to early 2014 the Milky Way Project saw English-language users in 65% of sessions. In April 2014 that had dropped to 55% and in January 2015 it was 40%. In the first two months of 2015, Dutch has reached 8% of all MWP sessions, with Russian, German, Spanish, Polish, and French all consistently exceeding 1% of weekly sessions.

Asteroid Zoo began as an English only project and had English session rates of 60% at launch. Volunteers added Polish, Russian, and Spanish translations in the first few weeks and English sessions dropped to 50% and have stayed there since. A similar story is seen on Disk Detective, which launched with English session rates at 64%, but this has dropped to 45-50% since volunteers have added several different languages - 14 in total.

The effect of the PEEK 'Retinas' prototype site is harder to measure. It did not launch to the public as intended, but it will do at a later date, and in a larger way. The best way to measure its impact will be to see if it reconnects with people in the region, and if it causes them to consider online citizen science as a tool for their own work or community. That project is being built on the Zooniverse's new 'Panoptes' infrastructure, which will benefit from the work done in this grant. Panoptes will allow anyone to create and run their own Zooniverse-style citizen science project. If the Retinas project has the intended effect, we would hope to see a project or two originating in Kenya and the other PEEK areas.

2015

Astronomy on Camel Cart

Specially, the programmes were very helpful for the schools children of **5th, 6th, 7th** and 8th grades for solving academic related queries related to Astronomy. Manthan's Outreach Programmes have had a good impact on the teachers, students and their parents offering to be inspirers and be visitors in the consecutive years also.

Sign Language Universal Dictionary

So at the end of the first year, we can conclude that the program is well advanced in terms of gathering a maximum of information and contact the relevant persons in order to include the maximum of terms and to homogenize them when e.g. for a designed object, several different signs can exist, most of them linked to the historic and semantic tradition of its own language.