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The Junior Scientist Outreach Program Handbook: A guide to the preparation, execution, and evaluation of a sustainability-themed informal science education outreach program

Martha Josefina Vargas

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The Junior Scientist Outreach Program Handbook:

A guide to the preparation, execution, and evaluation of a sustainability-themed informal science education outreach program

Martha Josefina (MJ) Vargas
JSOP Director & Research Analyst
2011 & 2012



The Junior Scientist Outreach Program
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The first person I would like to thank is, you, the reader of this book. Thank you for taking the time to learn about this program in its entirety. May you be inspired to take action where you see fit!

There are several people who have now contributed, in one manner another (or several), to the success of this program. Of course, we will all remain grateful for (soon to be Dr.) Stephen Bergin, the original developer of the Junior Scientist Outreach Program, for not only his initial spark for the program, but his continued support. Also very key to JSOP is the Board of Directors - those who have helped to institutionalize this program and will ensure its continued success. Enormous thanks for *everything* involved in this goes to: Christine Chung, Angie Swanson, Alexander Quinones, Erinma Anyankah, Gabriela Chacon, Samana Tasnim, and Amy Adams. Their work is also reflected through the totality of what is included in this work.

Others who have served as strong leadership support and program sponsors are: Shannon McCoy-Hayes, Avelina Martinez, Dr. Diane Marshall, and Dr. Richard Cripps - all of whom are from the Department of Biology - as well as Dr. Teresa Sheldahl from the Department of Education, and Drs. Anna Nogar and Damian Wilson from the Department of Spanish – all part of the University of New Mexico.

Others to thank for the success of JSOP are Amy Tapia and her staff at the Community Involvement Department at Sandia National Laboratories – our largest sponsor. Many thanks also go to Johnny J. Armijo and Linda Sepulveda, from the Westside Community Center of Bernalillo County, for continuously providing the safe space for our programs free-of-charge, and always being accommodating to our program's needs.

It is amazing what we can accomplish when we, as a whole, communicate effectively to align our goals and actively contribute to the betterment of what is around us. For this I thank each and every Volunteer, donor, sponsor, contributor, and/or supporter that JSOP has ever known. Every person that has come in contact with our program has been an integral and necessary part of what has become a beautiful equation - sincere thanks to you all!

FOREWORD: BY STEPHEN BERGIN

When MJ and I began the Junior Scientist Outreach Program, we hoped to create a sustainable opportunity that engaged young students in the sciences. The program we envisioned would provide a meaningful learning experience to a population with limited access to the scientific community, and we hoped the outreach would inspire participants to pursue new learning opportunities and eventually choose science-related careers.

The high quality of this handbook is representative of the passion and persistence with which MJ has led the Junior Scientist Outreach Program. Since the first camp in June 2010, MJ has guided the program to further growth and improved sustainability. Importantly, she has been able to measure the program's positive impact on participants and writes a straightforward guide for how to replicate this success. This handbook is well researched and gives both a local and national context that demonstrates the necessity of outreach initiatives such as this one to provide new opportunities and to close achievement gaps.

Volunteers play a critical role in our efforts to give children the opportunity to appreciate scientific discovery and to develop the self-confidence they need to succeed. The Junior Scientist Outreach Program is the perfect avenue to combine a joy for science with an enthusiasm to share it. For me, The Junior Scientist Outreach Program has been an inspiring journey, and I believe anyone who hopes to work in an informal scientific education setting will benefit from reading this handbook.

Stephen M. Bergin
MD/PhD Candidate, Ohio State University
Founder, Junior Scientist Outreach Program

"We cannot expect the task of science and math education to be the sole responsibility of K through 12 teachers while scientists and graduate students live only in their universities and laboratories. There is no group of people who should feel more responsible for science and math education in this nation than our scientists and scientists-to-be."

-Rita Colwell, National Science Foundation Director

INTRODUCTION

This handbook is intended to provide the history of and methodology for the preparation, execution and evaluation of an informal science education program that is based in a predominantly Hispanic community in Albuquerque, New Mexico. Because this program, known as The Junior Scientist Outreach Program (JSOP), has already positively impacted the lives of hundreds of students and families, the importance and relevance of its continuation will be highlighted and reiterated throughout the instructions and step-by-step procedures defined in the following pages.

What follows is a detailed description of and definitions for Informal Science Education (ISE). As JSOP is an excellent example of this particular type of educational outreach, its history, as well as the history of the area in which it is located, will be offered to give all participants a greater sense of knowledge, ownership, and meaning in the program.

A timeline, to depict what a complete year of program development and delivery looks like, will then be briefly described before delving into the specifics of JSOP's program preparation, execution, and evaluation; all of which will be discussed at length. In these sections lie several tips, tools, and examples on the organization and etiquette needed to help ensure program success. Previous research that has found this program to significantly impact children's views of school and learning will also be addressed. Finally, suggestions for future directions for The Junior Scientist Outreach Program will be offered, followed by information on how to get involved in JSOP. The references section at the end should also be used as suggestions for further reading. Enjoy!

Informal Science Education

Informal science education is a hands-on approach to teaching, learning, and applying the complex theories and concepts of science (Vargas, M.J., Marshall, D.L., & Sheldahl, T., 2012). Traditionally-taught science is usually presented in only an abstract manner, which can often times be difficult for young learners to grasp when they've had little or no previous experience in the subject. A study by Dr. Lisa Ramsey-Gassert of Wright State University says that, "The majority of science taught in a classroom setting tends to be solitary, abstract, and divorced from real-world experiences, with little or no connection with the actual objects or events represented (1997). ISE, on the other hand, is a method of learning that can take place anywhere outside of a classroom, usually using natural or everyday household items as well as some basic scientific equipment, so that the focus is shifted to the learning itself and away from any pressure of grades and the like. Traditional places in which informal science education can take place are museums, parks, community centers, and/or the great outdoors. Science is everywhere and the goal of ISE is to help students come to their own realization this fact.

The recent study by myself, and Drs. Marshall and Sheldahl, from the University of New Mexico Departments of Biology and Education, respectively, documented the effects of JSOP in 2011 in a study entitled "*Sharing science: A case study of the effects of informal science education outreach with elementary students*". This is what we learned about ISE:

Informal science education is helpful in promoting classroom science education because participants engage with science on their own initiative and not as part of a mandated school curriculum (Quigley, Pongsanon, & Akerson, 2011). Participation reaps several benefits: a better understanding of concepts, topics, processes, and thinking in scientific and technical discipline; increased knowledge about career opportunities in these fields; and increased appreciation and understanding of science and mathematics, and their applications (Sladek, 1998). Informal science education also has larger impacts on communities as it inspires and promotes interactive learning. Ramsey-Gassert (1997) noted, "Out-of-school learning more commonly involves the accomplishment of an intellectual or physical task by a group that is interacting using real elements, which allows learning to take on greater meaning." Science knowledge and therefore, informal science education will continue to be of importance to the general public and to future generations. It is increasingly important for the general American population to be scientifically literate so that the United States can remain economically competitive (Ondracek & Leslie-Pelecky, 1999). Therefore, if we want a society that is interested and knowledgeable about the need

for scientific research, the basic principles of the sciences need to be integrated early in the pre- college curriculum (Schaefer & Farber, 2004).

Nationwide in grades K-12, the only subjects currently being evaluated using standardized testing [and therefore, taught] in public elementary schools are Math and Reading (NCLB, 2001). This means that the only way that children who attend public schools receive education in the sciences and arts is if the teacher is creative enough to work these subjects into an already predetermined math or literacy lesson (more about this in “Curriculum planning“ of the Program Preparation section). From personal observations and dozens of hours of research, I can tell you that this is not the case the majority of the time. The effects of this dynamic have begun to be documented, however, several questions remain: Educationally speaking, where does this leave us, and the upcoming generation? How will that affect the ability of the new generation of students to be prepared for an ever-increasing level of technology in the world? What does this mean for the society at large? What is our role in all of this? How will we use what we learn about the natural world around us to help us live in greater accordance with it?

As you review these pages, keep these questions in mind and use them as a starting point when thinking of how we as community members, students, teachers, scientists, and role models can contribute to the improvement and eventual eradication of the educational disparities around us. Think about what you can do in your daily life to contribute to helping make our planet a more sustainable one in which knowledge is freely shared. Keep in mind you have the power to positively impact at least one young student who will soon grow up.

Program History

The Junior Scientist Outreach Program began as a Volunteer outreach project led by Stephen Bergin, an Albuquerque native who graduated from St. Pius X High School and attended Duke University. Through partnerships with Sandia National Laboratories and the Westside Community Center (WSCC) of Bernalillo County, he was able to declare the camp free-of-cost to students in grades 4 and 5 who live in the South Valley of Albuquerque.

Stephen then worked with UNM Biology Undergraduate Advisor, Avelina Martinez, to finish the coordination of the weeklong summer camp that happened for the first time in June of 2010. The Volunteers who served as camp counselors for this project were all recruited from the Biology Undergraduate Society (BUGS) of UNM of which I was the president at the time. It was truly a collaboration of like-minded individuals and all of their enthusiasm that combined to make this program a reality.

The success of the 2010 camp was amazing. There were 14 Volunteers who taught hands-on science (ISE) to 26 fourth and fifth grade students. There

was media coverage as well as much positive feedback from Campers and their families, and also from the Volunteers. Once Stephen and Avelina realized that the program was something we wanted to continue for years to come, I Volunteered to be the next camp Director, while, thankfully, Avelina agreed to help with the coordination again. Stephen supported us by giving the documents he'd used to develop the first curriculum and wishing us well as he was off to pursue an MD/PhD program at Ohio State. Little did I know what I was getting myself into...

Soon after the preparations for JSOP 2011 began, UNM Biology Undergraduate Program Coordinator, Shannon McCoy-Hayes, and myself brainstormed options about how we could research the impacts of JSOP that many had witnessed. We knew it had to be a rigorous academic pursuit, but neither of us had an idea of where to immediately begin. After weeks of networking and getting the word out about the desire to pursue this research, Dr. Diane L. Marshall and Dr. Teresa Sheldahl agreed to mentor and help guide me through the project in which we intended to quantitatively and qualitatively report the effects and impacts of JSOP.

It was an uphill endeavor that required the asking of every one of those questions posed in the Introduction to keep motivated throughout the process of preparing the research. Approval was received from the Human Research Protections Office (HRPO) at UNM, which serves as the Institutional Review Board (IRB), to conduct this study after the submission of a large proposal about the research on JSOP. We had planned to administer surveys to all the Campers both before and after they participated in any JSOP activities to get a breadth of data points to test statistically. To capture depth within the study's findings and highlight components that quantitative data cannot, we wanted to conduct in-class observations and interviews of three of the camp participants and their teachers. I hadn't at the time understood all it would take to make this happen, so I'm very thankful that I had lots of helping hands to guide me through the process.

Being that I was also the Director, it was often challenging differentiating between the camp and research preparation. Many times they went hand-in-hand, and others it was as though I had to do the same things twice. It was quite the balancing act that year. You can imagine my relief and excitement as the time for Volunteer orientation approached. I was eager to meet new people who could help and make all of what had been prepared come true.

Getting to know all of the 28 Volunteers who participated as camp counselors throughout JSOP 2011, which took place the first week in August, was a great experience. Likewise, the program that we delivered to 47 fourth and fifth grade students from the South Valley was exhilarating and everything we'd hoped it would be and more. Again, our camp received media coverage, and excellent feedback from the Campers, their families, and the Volunteers.

In the weeks following JSOP 2011, the buzz going around about the program was quite substantial. In the early Fall of 2011, a local elementary

charter school's after school science program contacted me to ask if JSOP could be expanded to include outreach at their school. Preparations began, but due to small differences in administration, we were unable to proceed. The "problem" was that Volunteers for this project had already been recruited; many were Volunteers that had just been part of the camp. Shannon, Avelina, and I didn't feel comfortable turning away 24 Volunteers, so with renewed funding from Sandia National Laboratories and a new contract with the WSCC, we were able to establish our very own After School Program that was held once per week for the second half of the 2011 Fall semester. Once again, JSOP experienced success as we reached out to several children in grades 3-8 in the South Valley.

To completely see the research through and help ensure the longevity of JSOP, I'd again agreed to direct the program for 2012. After the unexpected, but welcomed, After School Program was over, I knew it was time to seriously consider the future of JSOP for the long term. It was also time to begin the preparations for another upcoming camp. With more help from Avelina in building a framework, a call for previous Volunteers who were interested in being part of JSOP's new leadership, that we wanted to call a "Board of Directors", was sent out.

Quite to my surprise, there were seven dedicated individuals that showed up to the first meeting. It was established by the end of our time together that each person would fill a different Coordinator position while I would continue to Direct until after the end of the next camp. Christine Chung (Communications), Angie Swanson (Finance), Samana Tasnim (Curriculum), Gabriela Chacon (Curriculum), Erinma Anyankah (Community Outreach), Alex Quinones (Volunteers), and Amy Adams (Multimedia) are all the first to ever serve on, what we deemed on the 16th of January 2012, as The Junior Scientist Outreach Program Board of Directors.

Throughout the Spring semester of 2012, we met nearly every two weeks and went through hours upon hours of discussion, usually late at night I might add, about the program we envisioned. We couldn't seem to keep our meetings under 3 hours each! Our work was definitely being recognized because in March of 2012 we were nominated and chosen for the Presidential Luminaria Award, which acknowledges its recipients for "lighting the path to diversity, equity, inclusion, and social justice." We were beginning to see the ripple effects of our work. The implementation of this Board has helped JSOP to remain an autonomous and completely student led and facilitated organization, while retaining our original affiliations with our funding and supporting agencies, Sandia National Laboratories and UNM Biology.

Other events that we participated in by doing similar outreach during this academic year were the Día de los Muertos Marigold Parade in the South Valley, initiated by Angie Swanson, and a conference for girls in grades 5-9, led by Sandia National Laboratories, called Expanding Your Horizons. Both were times for us to actively engage the community for a few hours and reach a

broader audience than which is present in our regular camp. During this time it was also possible for the JSOP Community of individuals to grow closer-knit because we proved to ourselves how it is possible and important to promote and/or provide ISE all year long.

Our newest partnership has been with the Long Term Ecological Research (LTER) of the Sevilleta National Wildlife Refuge. Immediately following our summer camp that took place on July 30-August 3, 2012, where we had 60 participants, significantly increasing our count from the previous year, we took 22 Campers and 12 Volunteers to spend two nights in research huts for a special program at the Sevilleta National Wildlife Refuge. This outreach project served as an extended focus on ecology and hydrology, while giving many inner-city children a chance to explore nature in a setting they may have never otherwise.

JSOP has come a long way. Given its previous success and impact on a historical community in New Mexico, it is important that it continue to gain momentum and outreach to as many children in the South Valley of Albuquerque as possible. Our future directions will be highlighted near the close of this handbook.

JSOP LEADERSHIP

The program is now under the leadership of a Board of Directors that was established on January 16, 2012. The board positions were made from a list of every big component it takes to keep the program running. That list was divided into categories with titles, which new leaders could take. Below is a description of each Board Member position followed by the feedback from the most recent, and in every other case besides the Director, the first person to fill each role. Immediately afterward, our mission and more information on our governance procedures will be offered,

Board of Director Positions:

Director: The role of the Director is to oversee entire coordination of all JSOP programs through all stages of preparation, execution, and evaluation. The Director facilitates group structure; schedules meetings; delegates work to be done; communicates with funding agencies; and ensures overall success of all JSOP programs by remaining in close contact with each board member. It is this person's duty to make final decision calls during program delivery, to address the camp population everyday in the "Science of the Day" introduction, and to take ultimate responsibility for all program endeavors.

MJ Vargas's Feedback: What I have learned from this experience that has been at the forefront of my mind for a little more than two years, is that every action, big and small, is worth it. Its like the old saying by Hunter Thomas: "Anything worth doing, is worth doing right." Every thing I have done day-to-day as Director, no matter how big, small, seemingly insignificant, or boring, has had a direct reflection on the success of the program, whether those actions were meant to influence it or not. I've learned that I cannot lead a life separate from what I do – education is my life; it is in every action and in every breath, if I'm able to realize it often enough. I now know from experience that it is possible to both learn and teach anywhere one may go.

This program has taught me to be humble, to work harder than I ever thought possible, and to be happy with simple things. It has shown me, first-hand, that though I am just one in billions, I am able to make a difference. Yes, being the Director of this program is work, lots of it. Throughout my time in this role, there have been several very tough conversations, many hurdles to overcome, lots of emotional "strings" being pulled, and many friendships gained and others lost. I've learned that at the end of the day, I just have to move on with what the reality is; I've also realized that it is never so bad.

What has been most important in the success of this project since the board was established in January of 2012 is that the core of people who work together to make this happen, do precisely that; As the Board of Directors we've learned to work together through thick and thin. I know it has been my job to be the first to admit when I'm wrong and initiate subsequent brainstorming sessions to overcome what seems may be blocking the next move. It has also been my responsibility to make sure that what we set out to do as a whole gets done in an efficient, easy, and happy way. I am so very thankful for each and every Board Member. Christine, Angie, Amy, Alex, Gaby, Samana, and Erinma – you all have been my teachers. I appreciate you for allowing me to completely be myself.

Of course, it has also been my job to represent JSOP in meetings with funding institutions, during conferences or presentations, and in my university and community. It has also been my duty to establish and maintain a high level of communication within the Board. This can be a tough task at times, and at others, quite easy. My best advice for the person in this position would be to just be comfortable enough with yourself to be able to speak as clearly as possible, and say what you really mean; ask for feedback, then be willing to truly listen to what others say, and adapt where you see fit. Be flexible, and remember that there is *always* a solution to any issue at hand and it may not always be your idea. You'll never know unless you ask... this applies to yourself and others.

I wholeheartedly believe that just as one does not have to be in church to pray, one does not need to be in school to learn. The act of learning is vital to our existence. Through this program, and the rest of my life, it has been, and will be, my goal to spread knowledge where I can

and show others how truly satisfying learning – and living according to an increased level of knowledge and wisdom – can be.

Communications Coordinator: The role of the Communications Coordinator is to send all official communications to program participants' parents, outside agencies, etc, as well as a quarterly newsletter to all volunteers and program participants ("campers"), both past and present. This person works very closely with the Board to complete donation requests, advertise, and keep track of program participant data; this individual works specifically with the Director and Curriculum and Volunteer Coordinators to complete the curriculum (scheduling components) and is also responsible for keeping frequent track of the JSOP email account. All correspondence and record-keeping regarding volunteers is the responsibility of the Volunteer Coordinator.

Christine Chung's Feedback: As a child, I had dreamed of being like the other kids and attending a summer camp of my own. The kind of camp did not really matter – I had too many interests. However, this dream was not realized until the summer of 2011. I became a Volunteer for the Junior Scientist Outreach Program (JSOP), which aimed to teach children the joys of science! Under the leadership of MJ Vargas, a wonderful program that may have disappeared after its first year was reborn with the theme of sustainability. I enjoyed my experience that summer, and I will admit that I even envied the kids who were able to participate. Where was JSOP when I was young? I realized how important this program really is to kids who may not ever have such an enjoyable experience working with the sciences; JSOP helped weaken the walls that may lead people to believe that science is boring and difficult while simultaneously promoting young children to become responsible citizens of our planet!

After a successful extension into an afterschool program, I was delighted to hear that a Board of Directors would be assembled. I wanted to be more involved with the program and help make sure that it would be accessible for at least several more years if not several lifetimes. Originally, I had hoped to be more involved in the curriculum, but fate had it that I was appointed the Communications Coordinator. What does that entail? It is still largely a mystery to me, but I have enjoyed being a part of the JSOP process. As a coordinator, I have been interconnected and involved in little bits of everyone else's jobs. I created our first newsletter, worked with the other coordinators to make and distribute flyers advertising our camp, drafted and distributed donation requests, been the contact for a potential extension program, helped build the background curriculum, and so forth.

Now on the brink of our third annual summer camp, I am excited to see the bright happy faces of our Campers and Volunteers again! The enthusiasm and energy that the Volunteers bring for science to the camp

create the tone and setting for our Campers. The Campers look up to our Volunteers, and science is no longer that big, scary, difficult subject that only the “Einsteins” of our generation can do. MJ’s added component of sustainability helps instill a sense of social responsibility in our Campers at a young age. We have heard reports in the past of how our Campers returned home, full of excitement as they tried to think of ways to recycle, reduce, and reuse. To see all of that and more through JSOP is truly rewarding.

It is not only the Campers and Volunteers who are affected by our program. I have received several personal accounts from parents who swear that JSOP made a difference in their children’s lives. One student became more actively committed to learning and improved his grades. Some parents have even expressed their hopes of JSOP’s continued involvement and existence for when their younger children grow to be within the right age range. JSOP has largely been welcomed into the South Valley community, and children from all over Albuquerque have come to learn from our Volunteers, guest speakers, and from each other.

I hope that JSOP continues to grow and expand to include more Campers from diverse backgrounds to come together and share their love for science and the world. What is science without discussion between people from different backgrounds? I see a great desire from the community for JSOP’s continued existence, and I hope that this program can see several generations. Perhaps our old Campers will become our new, future Volunteers and professional guest speakers someday. I hope that our future Volunteers and coordinators hold JSOP as dear to their hearts as we do today and that our dreams of making science accessible to everyone continues to flourish through the years.

Volunteer & Research Coordinator: Role is to coordinate volunteers in every step of the JSOP process. This position entails recruitment of volunteers and the planning and facilitating of the volunteer orientation. This person keeps track of all volunteer data and all hours worked by both volunteers and Board Members. An important facet of this position is to collect Camper and Volunteer feedback before and after every JSOP event through the use of surveys as well as ensure that the “background curriculum” is properly made, by working with the Curriculum Coordinators and Director, before the summer science camp. The analyzing of the pre- and post-camp data is an important facet to this position as it helps the Board promote JSOP for the upcoming year. Another component to this position is ensuring that the group is “culturally competent” and safety-certified by arranging for trainings through different community or university agencies (ex: Cultural Competency trainings through El Centro de la Raza of UNM, or CPR/First Aid trainings through the American Heart Association).

Alexander Quinones's Feedback: Volunteer Coordinator is a fun, satisfying, position to have in JSOP. It is very important, because without Volunteers the camp would not be possible. There are three main duties, which the VC must complete: recruiting Volunteers, organizing Volunteers according to the needs of the curriculum, and leading Volunteers during the camp.

The recruitment of Volunteers is a very important task. Oftentimes, the best form of recruitment is indirect social interaction. People respond best to informal conversations, and instead of pushing recruitment, the VC should casually describe JSOP in an exciting, enjoyable manner and should mention offhandedly that JSOP is accepting Volunteers, rather than pushing recruitment. Thus, the VC must be comfortable and confident in interacting with others, and must not make the program appear to overly pushy and needy. Other forms of recruitment include flyers, advertising, and list-serve emails, all of which should be handled by the VC, along with maintaining contact with Volunteers who have signed up for the camp.

Organizing the Volunteers requires close interaction with the curriculum coordinators, and it is very difficult for the VC to do his or her job if he or she is not kept in the loop as to the progress of the curriculum. This is important, because the VC must be able to keep track of how many Volunteers are necessary, and what responsibilities they will have. As the camp draws near, the VC must come up with a schedule for Volunteer orientation and a comprehensive sign up sheet for camp activities. Constant communication with the Volunteers is necessary because many Volunteers will have scheduling conflicts and will request special accommodations. It is the VC's prerogative on whether or not to accommodate or release the Volunteer from their duties all together.

Finally, the VC is responsible for coordinating and leading the Volunteers at the camp. He or she must make sure that all Volunteers are where they need to be, and must keep all Volunteers busy and happy so that they can derive the greatest amount of enjoyment out of the camp.

Community Outreach Coordinator: This position entails general promotion of our camp and distribution (but not necessarily assembly) of advertisements. Duties include elementary school presentations, website maintenance, and other media coverage as well as the responsibility of making and distributing promotional items such as t-shirts. With every summer camp we will strive to collect pre- and post-camp data from the elementary and middle school grade participants – this will be the role of the Community Outreach Coordinator. One last task of this Coordinator will be to work with the Communications Coordinator to facilitate registration periods and ensure that daily sign-in and sign-out for all programs are completed.

Erinma Anyankah's Feedback: I started as a Volunteer for JSOP during the Summer 2011 camp and I was immediately impressed with everything MJ had been able to do by herself, so when she announced that she would be needing more help and wanted to create a board, I jumped at the opportunity, that's how I came to be the Community Outreach coordinator. I've been able to talk to different schools and teachers to raise awareness about our program. One of my favorite moments was when we went to present to the kids at a school, seeing how excited they got after we told them that our program was free was rewarding to me. I believe in MJ's vision for JSOP, it has become my vision as well. Being a board member for JSOP has taught me the importance of giving back to the community and has also shown me the amazing things we can achieve if we are passionate about them. I hope that future board members continue with the humble beginnings of JSOP and improve where we have fallen, while still holding on to the idea that we can encourage the study of Science in young students and make science fun as well as educational.

Financial Coordinator: This role is for all financial matters surrounding the program. Duties include the planning for and maintenance of a budget and ledger; arranging reimbursements when needed; working with multiple budgets and donations to ensure adequate amounts of supplies for events; organizing of fundraising events; and writing grant applications. It should be clear that the Financial Coordinator should approve of all purchases and/or reimbursements over \$10 before any action is taken.

Angie Swanson's Feedback: Working for the Junior Scientist Outreach Program has changed my life. I hadn't done much volunteering before the camp, so I wasn't sure what to expect, but I willingly signed up for a bunch of presentations to get the most out of the camp. Monday morning I led the rock cycle presentation, and it was nerve-racking. The kids seemed to know more about the cycle than I did, but it was so fun. We very gracefully crash-coursed through the week long camp, and I was so impressed by the leadership that I wanted to continue with the program. That fall I went on to work for the after school program, and helped to put on a float in the Marigold Parade that is held in the South Valley (at the very community center the camp is at, WSCC) to promote the camp. When the call came around to be a part of the leadership for the following year's camp, I was definitely in.

Being the Financial Coordinator is not one of the toughest jobs on the board, but it is an important one. We have a very little budget with this program (though we do have quite lavish support from Sandia National Labs, covering nearly all the costs for the camp), and we needed to tangibly set up the material budget to keep the costs within reason. JSOP is important and we need to keep it going. Teaching children sustainability and the fun of science is priceless, because they will go out and tell their friends and neighbors about their experience. I'm happy to

be a part of JSOP, and I hope it never stops doing the good things it does for the community.

Curriculum Coordinator (two positions): This role is large enough for two people who are interested in working closely together to design the curricula (forefront and background) for our programs. This is a big task as it includes designing/identifying protocols for hands-on experiments appropriate for students in grades 3-7. Other duties include: the timely organization of activities in a location that is safe and appropriate; building of supply lists that fit our budget; arranging for presenters (usually Sandia National Labs Scientists or UNM science professors); and working with the Director, and Communications and Volunteer Coordinators, to facilitate transition into the event itself. The main focus for this team should be the summer science camp curriculum and the "Digital Presentations" which will be given toward the beginning of each day of the program. Other events' curricula could be comprised of a re-arrangement of previous years' activities.

Gabriela Chacon's Feedback: Our society uses the term "make a difference" very loosely and much too often. What does it mean to make a difference? In my opinion, concerning JSOP, making a difference entailed much more work than was expected, but ironically, I found it to be much more simple than I had previously imagined. Countless hours went into preparing for the camp: meetings, brainstorming sessions, planning, writing, researching, etc. The entire process, however, taught me that it only takes an idea to begin the process of change. It all started with the individual who thought to himself, there is gap in education, and I can do something about it. Through the process of helping to plan this summer camp, I've come to understand that having a true, positive impact is sometimes much too time and energy expensive for most people, which is why few are willing to do it. But most importantly, however, I've learned that *anyone* can do it. It's not easy, by any means, but it's simple. Through this camp, all rooted in an idea that stemmed in a single individual's brain, someone's life will be changed. They will be exposed to science, and I am confident their lives will never be the same. Something will be born within them, and it will continue to expand. Now, this won't happen within every single camper, but rest assured it will happen in at least one of the 100. This will then have a ripple effect. This camper will go on to become a scientist, and they in turn can then cause their own ripple effect. The simplicity of being an agent of change is extraordinary. It all begins with an idea. The chain of events starts with a willing mind. I'm extremely grateful to have taken part in this project, for it will not only have an impact on the Campers and the individuals who helped put it together, but for many others who will in one way or another feel the wave that will continue to ripple for a long time to come.

Samana Tasnim's Feedback: As a curriculum coordinator for the JSOP camp, I gained a lot of unforgettable and outstanding experience from my fellow board members. Although, I never expected myself to be excelled at any particular art, I always wanted to do something different that I knew I haven't done before. In order to fill that gap, JSOP provided me such an opportunity to express my enthusiasm and willingness to serve the community at large. I wanted to not only learn leadership experience via my role in JSOP but also at the same time challenge myself and ask, "Am I capable of doing this and living to this great expectation and responsibility?" Yes, leadership is something I have rarely tried anytime really in the past probably because I was unsure and was not ready to try something new. Yet I knew deep that this rapidly changing world will not wait for anyone, just as time does not wait for anyone to speed up their gear. Similarly I had to decide firmly what I wanted to do with this new position and every single time I had this immense desire, urge to keep up to my board member's expectation and never disappoint them. It was not that I blindly chose this position and showed my interest in the first hand, I rather started out as a Volunteer counselor in the JSOP after school program which was also a starting of small leadership role. I was so enthralled every passing day, with the whole JSOP sustainability themed concept of providing free-of-cost science education to South Valley elementary and middle school kids in New Mexico, that how quickly I got involved in this program is still a mystery!!! Above all, I got huge inspiration from the other selected board members who are very talented individuals, both academically and non-academically in their respective fields, and are very good colleagues and friends of mine.

As a curriculum coordinator for JSOP program I along with my colleagues had to divide our meeting times, days we work on the curriculum, protocols or other various camp projects we had. I had to not only keep in communication about my progress every now and then, but also I also had to meet with the director and communication coordinator of JSOP throughout the process of camp preparation so that everything runs smoothly. Curriculum for the Sevilleta camp, JSOP camp projects was not made in a day rather needed extreme support of such a strong backbone- 8 wonderful board members. I could have not possibly done it all by myself, because when more than one soldier joins a troop it becomes a much stronger and better entity just as JSOP has now become in present. Leadership is such an art that not only dictates power, individuality, and self-confidence, but motivates your juniors and emerging talents to follow the same direction to strive to do the best and live best. Similarly, my contribution until now has been only the first chapter of this journey to make JSOP shine in the road of success. I believe many students have the dream; capability and talent to stand out from crowd and do something that not only make them proud but also their community and nation. So, my appeal to all those incoming talents, "Choose something that will give you a new look to your personality, a new meaning to your life, something that changes you not for any other

reason but for the betterment of humanity.” Thank you for your time and effort to read this.

Multimedia Coordinator: The role of the Multimedia Coordinator is to keep a photo/video record of our events for promotion purposes. Duties include the processing and posting of pictures and videos, maintenance of the JSOP YouTube page and website, and the creation of designs for promotional materials and advertisements – this entails working closely with the Community Outreach and Communications Coordinators. This coordinator will also be responsible for working with the Curriculum, Communication, and Financial Coordinators to make a menu for all snacks served during JSOP programs and to help locate videos for the “Daily Digital Presentations” which the Curriculum Coordinators will present.

Amy Adams’ Feedback: During my term as the 2012 JSOP Multimedia Coordinator, I found that the position entails much more than photography and filming. Although it is true that the Multimedia Coordinator’s main task is to arrange and enact a schedule of photography and filming for the week of the summer camp, I discovered that there is plenty to do before the camp even starts. The other coordinators needed to accomplish many things during the preparation phase for the camp, so I helped whenever I was needed. For example, I helped the communications coordinator by delivering donation letters and suggesting potential businesses to approach for donations. The others became busy with their roles, so it fell on me to take over tasks that were not assigned to anyone in particular. For example, I composed a snack schedule for the week of the summer camp. Other major issues I needed to address included designing the program’s logo, setting up a YouTube account, and ordering a waterproof video camera with memory cards. I consider my experiences as the JSOP Multimedia Coordinator rewarding because I not only could contribute long-lasting assets to the camp (i.e. the logo and the video camera), I could help my fellow board members when they needed it. I wish all future Multimedia Coordinators the best as they set out to fulfill this role.

Our Mission:

The Junior Scientist Outreach Program (JSOP) is a student-run organization that is dedicated to engaging young students in science for the purpose of both increasing the diversity of science and medical professionals, and bridging educational gaps by providing informal science education programs through creative community building projects focused on sustainability.

The Board of Directors abides by the Bylaws that were established throughout the spring semester of 2012 (see Appendix I). Our Bylaws include our target populations, inner-leadership workings, Volunteer guidelines, JSOP Code of Conduct, and leadership continuation procedures.

Each transition of leadership must include at least one session where the former Board Member trains the incoming Board Member on everything that it takes to effectively complete that job. This includes introductions of the incoming Member, by the outgoing, to any people, businesses, entities, etc., necessary. All materials such as budget ledgers, previous curricula, previous advertisements, pictures, pass codes/passwords, etc., must be passed on. Make sure and exchange contact information and be willing to be reached after your term has ended to ensure the smoothest transition possible.

TARGET POPULATION

Location and Demographics

Since it started in 2010, JSOP has held the summer camp and after school programs at the Bernalillo County Westside Community Center (WSCC) located at: 1250 Isleta Blvd SW, Albuquerque, NM 87105.

The partnership between the WSCC and JSOP has always been simple to manage because both entities are working toward a common goal. Each year we sign an annual contract that shows what we "rent" and why, then it is given to us free-of-charge, so we may pass that on to our participants. The space is provided for the community, by the community.

Peter Block, the recent author of *Community: The Structure of Belonging*, states that, "In communal transformation, leadership is about intention convening, valuing relatedness, and presenting choices. It is not a personality characteristic or a matter of style, and therefore it requires nothing more than what all of us already have" (2008). This statement adequately describes much of the feedback that has been received in past years from Volunteers, as it is a great capture of how JSOP, the WSCC, and Sandia National Laboratories partner to make this happen.

Ours is a good mission for a place that really needs it. As was discussed at the start of the program, the primary goal of JSOP, as developed by Stephen Bergin, was to make science accessible to the public and to care for the community that we live in by connecting an impoverished area of the city to the metropolitan area through a creative approach to teaching and learning science (S. Bergin, personal communication). The most recent demographic information provided by the school district lists that in the South Valley community of Albuquerque in 2010, over 90% of elementary and middle school students were eligible to receive a free or reduced-rate lunch, approximately 35% of students were enrolled in English as a Second Language (ESL) classes,

and less than 49% of students graduated from high school (RDA, 2010). Dr. Ladd, who wrote about education and socioeconomic status trends in the *Journal of Policy Analysis and Management*, says (2012):

Suffice it to say at this point that research documents a variety of symptoms of low socioeconomic status (SES) that are relevant for children's subsequent educational outcomes. These include, for example, poor health, limited access to home environments with rich language and experiences, low birth weight, limited access to high-quality preschool opportunities, less participation in many activities in the summer and after school that middle-class families take for granted, and more movement in and out of schools because of the way the housing market operates for low-income families. Differences in outcomes between high- and low-SES families may also reflect the preferences and behaviors of families and teachers. Compared to low-SES families, for example, middle- and upper-class families are better positioned to work the education system to their advantage by assuring that their children attend the best schools and get the best teachers, and they are more likely to invest in out-of-school activities that improve school outcomes such as tutoring programs, camps, and traveling. The preferences and behaviors of teachers are also a contributing factor in that many teachers with strong credentials tend to be reluctant to teach in schools with large concentrations of disadvantaged students than in schools with more advantaged students (Clotfelter, Ladd, & Vigdor, 2011; Jackson, 2009).

Her insight is a direct reflection of not only how the work done in JSOP is meaningful, but also about how it is very necessary on a large scale. There is hope in changing this disparaging educational dynamic and our approach is through creative community collaboration. "One key perspective is that to create a more positive and connected future for our communities, we must be willing to trade their problems for their possibilities. This trade is what is necessary to create a future for our cities and neighborhoods, organizations, institutions – a future that is distinct from the past. Which is the point" (Block, 2008). By focusing on what we can do about it, then, we, as a team at JSOP, can have a direct impact on the improvement of the communities and educational systems closest to us. Let's look at why this has been a recurring theme for this area.

The South Valley: Our Past is Our Present

Since New Mexico became a territory of the United States of America in the late 19th century, we've, of course, participated in its educational system. There are several different opinions on what exactly has happened, however, there has been much consistency in the notion that the educational system in the U.S. was not designed for anyone other than the average Anglo-Saxon of the time (Duncan-Andrade, 2005; Rubin and Kazanjian, 2011; Bixler-Marquez, 1992). "This sociopolitical context has its origins in government policies predating the infamous Treaty of Guadalupe Hidalgo in 1848, and its legacy continues to linger in Chicano communities in the form of social and economic marginalization" (Duncan-Andrade, 2005). Clearly this is evident.

Things of this nature were happening then, and – whether we realize it or not - we're still experiencing them now. Though there are programs designed to target minority populations and provide special funding to aid in student success at almost every level, most educational reform is cushioned in eloquent language that only makes it seem like Hispanics/Latinos/Chicanos and other people of ethnic origin are only being helped. Duncan-Andrade (2005) states:

What we find on the surface of dominant political rhetoric, such as "No Child Left Behind," is the promise that schooling offers Chicanos a pathway to rewrite society's negative imagery. Sadly, beneath the shiny exterior of this bootstrap theory, lies the reality that "[s]chools have historically kept Mexican Americans 'in their place' as cheap labor by pushing youth out of public schooling at an early age through the tracking system" (Munoz, 1989, p. 21). Given such inconsistencies in political rhetoric, the sociohistorical positioning of Chicanos must become a lens through which students and schools develop critical understandings of past struggles, so as to better reach the promises of equal opportunity.

Though it is past the scope of this context to go in depth on the topic of Mexican-American/Chicano oppression, I will mention the overwhelming similarities in the educational disparities happening in the early 1900's, and those still happening today, only 100 years later. Perhaps if we are keen to what is truly happening around us we can approach this community with a more-informed and optimistic outlook. In 1911, Aurora Lucero published an article entitled "Defensa de Nuestro Idioma" (In Defense of our Language) in *La Voz del Pueblo*, a periodical in Las Vegas, NM. She said:

“Somos ciudadanos americanos, es cierto, y nuestra conducta levanta nuestra lealtad y patriotismo sobre de todo reproche. Necesitamos aprender el idioma de nuestra patria y eso estamos haciendo; pero no necesitamos, con tal motivo, negar nuestro origen, ni nuestra raza, ni nuestra lengua, ni nuestras tradiciones, ni nuestra Historia, ni nuestro pasado ancestral, porque no nos avergonzamos de ellos ni jamás nos avergonzaremos; lo contrario, nos enorgullecen.”

This relatively translates to: “We are American citizens, it's true, our behavior and our loyalty and patriotism rises above all reproach. We need to learn the language of our country (English), and this is what we've been doing. But we do not need, for any reason, to deny our origin, our race, or our language, nor our traditions, our history, or our ancestral past, because we are not ashamed of who they were nor will we ever be ashamed; on the contrary, we are proud.” It is fortunate that there has been, and always will be, educated *nuevomexicanos* who are willing to stand up for what is right. Though this passage refers to the equality between English and Spanish education in New Mexico of the time, what we are currently experiencing is something similar, but rather than language being the only thing at stake, current educational trends are threatening several disciplines, of which science is included.

One recent current example of a similar trend is the Arizona House Bill 2281 which was based on the fact that, “public school pupils should be taught to treat and value each other as individuals and not be taught to resent or hate other races or classes of people” (AZHB 2281, 2010). It sounds very noble and fair, however a closer look will show that, “any courses or classes that... promote the overthrow of the US government, promote resentment toward a race or class of people, are designed primarily for pupils of a particular ethnic group, [or] advocate ethnic solidarity instead of the treatment of pupils as individuals...are prohibited” (AZHB 2281, 2010). This has led to the banning of several books by Chicano/Hispanic/Latino writers (Pablo Freire, Sandra Cisneros, Rudolfo Anaya, and many more) and the entire study of Mexican-American Studies based on the premise that they violate what the bill proposes. There are several activists now standing up against this; they claim it is a violation of our first amendment (Steiner, 2012).

A new age of understanding must come soon. Rubin and Kazanjian (2011), state that:

“If there is to be any change in this modern age of [educational structure], there must be a revolution of varying degrees in this country. The reforms must be radical, by targeting the roots, rather than just treating symptoms and not the causes of our educational ills. From revolution, we may tap into the greatest resource of all - the individual person (Rogers, 1980). There must be a focus, not on exploitation, but of enrichment and understanding of all persons engaged in a learning experience. However, authorities are uneasy when learning takes place without standardization and structure (Postman & Weingartner, 1969). This type of thinking must be challenged as teachers realize how political teaching is in actuality (Moll & Arnot-Hopffer, 2005) and how much power teachers can have as agents of positive change (Hill, 2002, 2009). According to Moll and Arnot-Hopffer (2005), “schools are not fixed or immutable entities, they are built environments, socially produced and recreated through the actions of human beings.”

This is why programs such as JSOP that seek to raise the quality of education and inspire young people of ethnic origin, but really of *any origin*, to get educated are so important. We are not only teaching science, we're helping to empower people that, as a whole, continue to be oppressed for several factors, most of which are historical - and they may not even know it. It is our duty as educators from diverse backgrounds to not only contribute to the academic success of the upcoming generation, but also to perform acts of social justice along the way where our goals can simultaneously be met. As Pablo Freire, author of *Pedagogy of the Oppressed*, states: “The revolution is made neither by the leaders for the people, nor by the people for the leaders, but both acting together in unshakable solidarity” (1970). We are those leaders and what we're doing through the Junior Scientist Outreach Program is directly addressing a need in our community that is older than the buildings in which we teach.

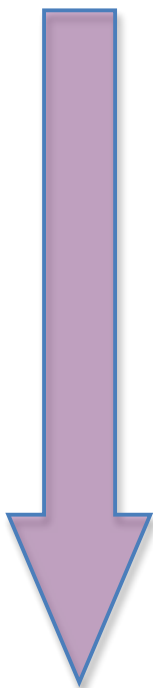
Note about the Leadership Population

It is true that as a team we have a unique, but very necessary, role to fill. As the preparation for JSOP initiatives continues throughout the year, it is important that we remember what we're doing and why. Coordinating can be tough, and keeping the mission and humble beginnings of the program in mind, a new sense of meaning and excitement can be felt as encouragement for the next step in the process. In decision making it is good to think, “Which people, organizations, or businesses would be most likely to have an interest in aligning with our goals, for not only educational or scientific purposes?” and then make whatever effort to express the JSOP mission that targets the South Valley.

For example, though there will be no discrimination against any participants in any way (we're working for the opposite, remember?), when appropriate, it may be good to encourage Hispanics/Latinos/Chicanos or any other Spanish speakers to participate in Volunteering, presenting, or helping to lead the program in any other way. This is mentioned because, Duncan-Andrade (2005) writes: "As the Hispanic population grows, the number of Hispanics available to teach them declines. A large Hispanic student population with few or no Hispanic teachers is generally recognized as a negative condition (Valencia & Aburto, in press). [sic] Whatever the cause, it should be apparent that significant improvement in Chicano school experiences will be more difficult without a significant increase of Chicanos as teachers and administrators. (Pearl, 1991)." Like any other group or population of people anywhere else in the world, it is inspiring for young people who ascribe to that same group to be shown role models who would identify similarly.

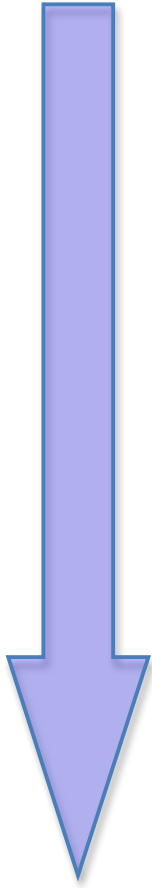
TIMELINE: A QUICK GUIDE TO AN ENTIRE YEAR OF JSOP

This section is intended to provide an overview of what a complete year of the Junior Scientist Outreach Program development looks like. The year will be broken down into months, where specific tasks for each will be focused on. It will be arranged from September through August to adequately reflect the Board Members' term. There will always be a reference to what section and page number you should refer to for more information. *Please note that this is intended to only be a framework, not a comprehensive list of everything that should be done in the JSOP process.* The specifics of Program Preparation, Execution, and Evaluation will be discussed at length immediately following.



September:

- New JSOP Board of Directors takes effect of September 1st
 - o Refer to Bylaws in Appendix I, as well as pages 11-19.
 - o A recommended first order of business is to set goals for the entire term. This may include:
 - Funding plans (See page 44).
 - Academic plans for all anticipated JSOP programs for the year (See page 35).
 - Other community outreach projects (a couple are mentioned here - also see page 58).
- Fall After School Program
 - o See Program Preparation Section: pages 29-45.
 - Recruit Volunteers for Fall After School Program (See page 32).



- Send letters to previous campers' parents (See Appendix IV for example).
- Confirm with WSCC and SNL (See page 42).
- Curriculum should be set (See page 35).
- Newsletter made and sent out to all participants (See example in Appendix IV).
- Donation letters sent out to surrounding businesses for materials and/or food for the Fall After School Program (See example in Appendix IV).

October:

- Fall After School Program Begins:
 - o See Program Execution Section: Pages 46-54).
 - o Must have registration a few days beforehand. (See pages 29-31).
 - o Also need to hold a brief Volunteer Orientation. (See pages 32-34).
 - o Program runs weekly for 8 weeks.
- Fundraising via Bake Sales or other similar event (See pages 44 and 45).
- Día de los Muertos (DDL M) Marigold Preparation completed in this month.

November:

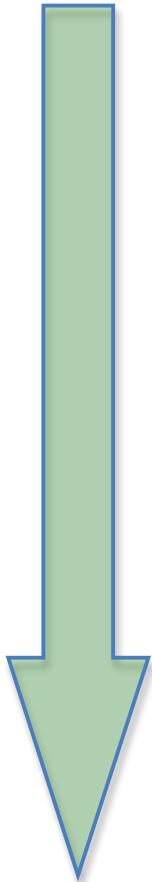
- DDL M parade at the beginning of the month.
- Newsletter written and sent out (See Appendix IV for example).

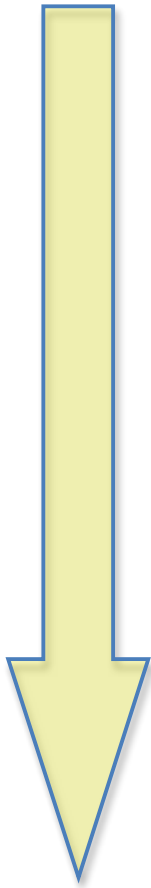
December:

- Trainings for the Board of Directors:
 - o See Volunteer Coordinator Description on page 14.
 - o Please note funding guidelines about this.
 - o This can also be completed in November, if time permits.
- Plan for EYH in January (more on this in that month):
 - o Contact Sandia National Labs (See page 42).
 - o Decide who is presenting, then prepare experiments.

January:

- Expanding Your Horizons (EYH) Conference for girls in grades 5-9
 - o Sponsored by Sandia National Labs.
 - o Like our "give back".
 - o Materials should be purchased beforehand.
- Fundraising of some sort (See pages 44 and 45).
 - o Grant deadlines vary, check into those
 - o Maybe a Bake Sale could be great during back-to-school week.
- Newsletter written and sent out late in this month or in early February (Example in Appendix IV).





February:

- Contact elementary schools in the South Valley to give presentations to advertise the Spring After School Program and Summer Science Camp. (See pages 29-31).
- Spring After School Program
 - o See Program Preparation Section: pages 29-45.
 - o Recruit Volunteers for Spring After School Program
 - o The Board might want to further advertise for this program at this time
 - o Confirm with WSCC and SNL
 - o Curriculum should be set

March:

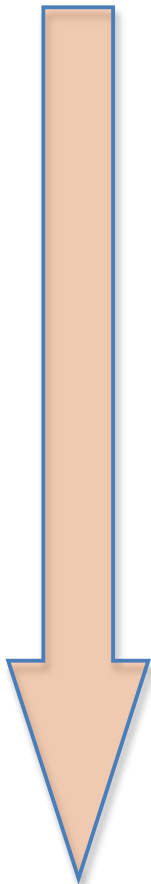
- Spring After School Program Begins:
 - o See Program Execution Section: Pages 46-54).
 - o Must have registration a few days beforehand. (See pages 29-31).
 - o Also need to hold a brief Volunteer Orientation (See pages 32-34).
 - o Program runs weekly for 8 weeks.
- Curriculum Preparation for the Summer Science Camp starts (Read over pages 35-41 and 49-51 in detail).
- Volunteer recruitment for Summer Science Camp begins (See pages 32-34).

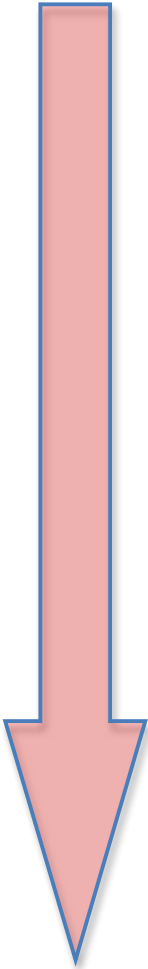
April:

- Presenters for Summer Science Camp secured.
- Protocol writing starts. (See Appendix III for examples).
- By the end of this month, communications with Sandia National Labs should have been well under way (See pages 42-44).
- Fundraising using Bake Sales or other similar event (See pages 44 and 45).
- Newsletter should be sent out. (See example in Appendix IV).

May:

- Letters announcing plans for the Summer Science Camp should be sent out to previous campers' parents (See example in Appendix IV).
- Donation letters sent out for summer science camp (Example in Appendix IV).



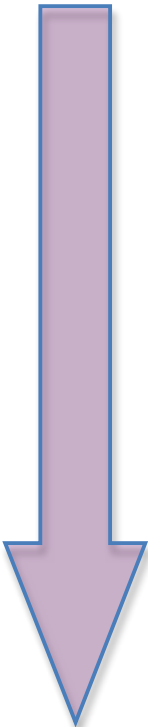


June:

- Continue advertising camp in the community.
- Communicate with Volunteers.
- Both curricula and all protocols should be completed.

July:

- For Summer Science Camp:
 - o Make sure entire Program Execution and Program Evaluation sections have been reviewed (pg 46-57).
 - o Registration should take place a few days beforehand. Clear with WSCC.
 - o Volunteer Orientation should happen the weekend before the program begins.
 - o Supply lists should be completed.
 - o Shopping for materials/ Coordinate with Sandia National Labs.
 - o Follow up with presenters.
 - o Begins in last week of July.
 - o Ensure that both pre- and post-surveys given out.
- Continue advertising throughout the month to potential campers in the South Valley community.



August:

- All surveys collected during the Summer Science Camp should be analyzed as soon as possible (See pgs 54-58).
- Videos posted from camp can be posted to our YouTube channel.
- Website should be updated
- Board term end - vacant positions are filled.
 - o See Bylaws in Appendix I
- Ensure reimbursements from camp are processed as soon as possible

Ongoing:

- Recycle bin pick-up from the WSCC.
- Board meetings to make it all happen.
- Communication with one another and the JSOP Community.

PROGRAM PREPARATION

Participants: Campers

The number of participants, who we refer to as “Campers”, in JSOP has continued to grow each year since 2010. In that year there were a total of 26 participants, while in the second, there was a total of 47. In 2012 we were happy to provide informal science education to 60 individuals.

Numbers are only part of our endeavor; it is important that we focus on recruiting our intended population. A good place to recruit our Campers is from their schools. Please note that when recruiting in any means (i.e. distributing flyers, or giving presentations) in any school, it is very important to contact the school administration beforehand to obtain the proper permission. Failure to do so could reflect negatively on the person organizing the school visit, and most importantly, on JSOP itself. This is usually the Community Outreach Coordinator's duty. More about advertising will be addressed in the “Publicity” portion of this section.

When giving school presentations it is important to have a group of presenters, usually a few people from the Board and *experienced* Volunteers, rather than just a solo, or even a pair. Its best to only give the presentation to students in grades 3 through 6 – those who could potentially attend the next upcoming camp. The presentation might be to all classes of these grades all at once, or it could be given to several smaller groups throughout the day; that will be determined by the school administration and the presenters' schedules, but make sure to ask. Also, be sure find out the number of total students you'll be presenting to. It's important to send each one with a small flyer that includes the following:

JSOP full name and logo, program dates/times/location, registration date/time/location, what grade levels are accepted, number of positions available, the sustainability theme of JSOP, highlights of curriculum for each day, and sponsor logos. An example from JSOP 2012 is provided on the next page.

Junior Scientist Camp 2012

@ The Westside Community Center, 1250 Isleta Blvd SW, ABQ, 87105



The Junior Scientist Camp is a **free-of-charge** program that partners **100 South Valley 4th and 5th** graders with UNM and high school students to learn about the world of science through a week of hands-on experiments.

CAMP DATES:
Monday, July 30th – Friday, August 3rd **TIME: 7:45AM -12PM**
@ the Westside Community Center

CAMP REGISTRATION DATES: WE WILL ACCEPT 100 CAMPERS
Thursday, July 26th & Friday, July 27th **TIME: 4PM – 7PM**
@ the Westside Community Center

Free!! For South Valley 4th and 5th graders ¡Gratis!

Curriculum	Monday	Tuesday	Wednesday	Thursday	Friday
Theme	Biology and Genetics	Geology	Biochemistry	Sustainability	Astronomy
Activity	DNA and Heredity	Understanding the physical earth.	Primary macromolecules in living organisms.	Solar and wind energy	Solar system and the stars
Curriculo	Lunes	Martes	Miércoles	Jueves	Viernes
Enfoque	Biología / Genética	Geología	Bioquímica	Sostenibilidad	Astronomía
Actividades	AND y Herencia	Comprensión de la tierra física.	Macromoléculas primarias en los organismos vivos.	Las energías solar y eólica	Sistema solar y las estrellas

For more information visit us at: www.juniorscientist.org

Questions? Email us at: jsop.unm@gmail.com

Thanks to our partners: Sandia National Laboratories, UNM Biology Department, Biology Undergraduate Society, Osuna Nursery, Westside Community Center, and Albuquerque Bernalillo County Water Utility Authority.



For students by students

Flyer by: Erinma Anyankah and Avelina Martinez

Other good places for advertising are the Westside Community Center and surrounding grocery stores, community bulletin boards, and parks. The same flyer is acceptable for use in all of these locations. *Again, it is imperative that proper permission is obtained before placing flyers in any location, whenever applicable.*

Registration takes place the Thursday and Friday before the weeklong camp begins. It is traditionally held at the WSCC from 4-7pm so as to catch parents as they are getting off work. Registration can take place whenever the Board of Directors deems appropriate for any other JSOP outreach events. The WSCC provides registration forms, as it is their property, and ultimately, their liability. This form can be found in Appendix II; it is what should be used for all programs.

In 2012, however, we've received permission to accept registration forms electronically, only to ease the organization of participants' information. *There are several stipulations with this that must be adhered to:*

- The application should only be online, on Google Docs or similar program, for the length of the registration period and taken down *immediately* after registration has ended on the second day. This form is NOT to be linked to the website to avoid outside registration.
- ONLY forms that are filled out at the WSCC or other registration site, *while parents/legal guardians are in person* may be considered as

valid. This is a way of reserving a spot for each child that is registered during this period. Remember this is on first come, first serve basis.


- JSOP waivers of liability and risk and JSOP Photo Releases (See Appendix II) MUST be signed at the same time that the parent/legal guardian registers his/her child(ren). These are only to be hard copies kept by the Community Outreach Coordinator throughout the duration of the camp – these forms are later given to the Communications Coordinator for storage. During this time the camper who is registering should be taking the Pre-Camp Survey (See Appendix V) and go to “Camper/Participant Surveying” in the Program Evaluation Section for more information).
- Registration is not complete until each participant's information is printed out and signed by the parent/legal guardian on the first day of the program before it begins.
- Anything that is outside of these guidelines WILL NOT be accepted. Anyone that participates in JSOP must have been properly registered in this way, with the exception of proper late registration (see below).
- All of these rules/regulations should be made clear on the website
- The Community Outreach Coordinator should retain these forms on file, and make them available for quick reference, for the duration of the program. See the “Handling Mishaps” section under “Curriculum Delivery” in “Program Execution” for more information.

To make camper registration a fun and easy event it is important that there are several board members and Volunteers there to assist. *The Director must be present at all times* to answer questions and facilitate the process. As stated above, pre-camp surveys must be given to Campers at this time - see “Camper/Participant Surveying” in the Program Evaluation section below to review the guidelines for survey administration. These are to be given to the Volunteer/Research Coordinator for eventual compilation and comparison with the post-camp survey.

Late registration may only be done on Monday morning (or the first day of the program) before 8:00am (or before the program begins). In this case, all documentation would be on paper and no other confirmation past the parent's/legal guardian's signature would be necessary. All of the same paperwork (registration form, liability waiver, pre-survey) must be completed. This is to be done with the Communication's Coordinator and/or Community Outreach Coordinator.

Participants: Volunteers

Volunteers are typically UNM undergraduates or graduates, or High School Seniors (usually from Albuquerque Academy or St. Pius X High School who are completing their community service requirements). Recruitment can be done in several ways. What is most important is that it is made clear to all prospects which population they will be working with – a sense of biculturalism and a sensitivity to and/or skill in the Spanish language is preferred. Since it is a sustainability-themed science program, it is best to first recruit from the Biology, and other science, Departments, and then from UNM at large, because all majors are encouraged to apply. Things that have been done in the past for recruitment are Bio 200-Level class presentations (keep it to 5 minutes or less and make sure to clear it with the professor first), emails over Department listserves, presentations at student organization meetings (usually ~10 minutes), Daily Lobo advertisements (made from collaboration between the Communications and Multimedia Coordinators), and flyers put up all around campus. Here is an example of the Volunteer recruitment flyer from 2012:



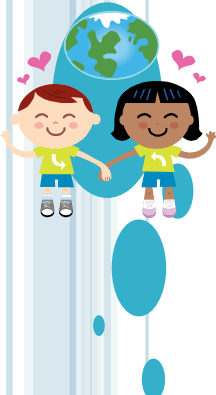
Join us!



Junior Scientist Outreach Program

The Junior Scientist Outreach Program (JSOP), established in the summer of 2010, will be hosting its 3rd annual summer camp from **July 30-August 3**. We are proud and excited to announce that applications for volunteer positions are now being accepted on a **rolling-deadline** basis for:

- Outreach events, e.g. 2-night program at the Sevilleta Long-Term Ecological Research Center!!
- Fundraising events!
- **30 Camp counselor positions** for our 3rd annual summer camp from July 30-August 3, 2012.




Being a JSOP volunteer means that you will not only have a fabulous addition to your CV or resume, but you will also be a voice for creative community outreach focused on enabling science education and sustainability. **Apply online** at our website (www.juniorscientist.org)!

We look forward to working with you to achieve higher standards in informal science education!

All **disciplines** of study are encouraged to apply!

jsop.unm@gmail.com | www.juniorscientist.org



Flyer by: Christine Chung

It is the responsibility of the Volunteer Coordinator to lead (but not do!) all recruitment efforts, and to keep an ongoing record of the application and selection processes. Volunteer registration forms are available online and can be open for months before JSOP begins, with a closing date/deadline of about a month before the program starts.

Before the application is made available, however, it is necessary for the Board to discuss the target population number of Campers, so as to adequately prepare for the proper number of Volunteers. In 2012, for example, we are expecting 100 Campers, at most, so we are looking to have up to 40 Volunteers, not including Board Members. This means that we advertise for 30 positions and expect to get about 40 or 50 applications. It is almost guaranteed that at least 30% of those people will not be able to attend, for one reason or another, so we're left with close to our target.

What is most important in this process is to know what the absolute minimum of Volunteers can be; this is based on the JSOP "team" structure:

JSOP Team Structure:

If we'll be serving 100 children, we can safely say that we can split them into 12 teams, 8 of 8 and 4 of 9. Each team will have two group leaders that will stay with their team the entire week and progress through each session or activity. This means we'll need 24 group leaders. Take a look at the curriculum you are planning and then determine how many other people you'll need available to present experiments, help in the process, clean, set up/take down, prepare food, etc. For this number of Campers, we estimate between 12 and 16 other Volunteers (who we call "assistants"), plus board members (8), which gives a total of 20-24 other people available. This is a grand total of 36-40 Volunteers that will be needed, not including the Board of Directors. See "JSOP Volunteer Roles" in this section for more information.

The number of applications that come in will determine whether or not the application process is competitive. If many more than the target number are received, then a group interview process can take place to determine the level of ease with which each person can be part of a team. Otherwise, if the number of received applications is close to the target number, it is safe to accept all of them with the understanding that there may still be a few that drop before the program begins.

All Volunteers that have been accepted must attend the Volunteer Orientation, which is held the Saturday before the first day of camp in the afternoon. This is typically a three-hour event where time is spent getting to know one another, talking about JSOP Volunteer Code of Conduct (See Bylaws in Appendix I), learning about the camp, and having a Q&A. Notification emails of

acceptance, of confirmation of participation, and of Volunteer Orientation notification should be sent out as necessary. Its essential to keep Volunteers informed. A Volunteer Orientation agenda might look like this:

Sample Volunteer Orientation Agenda:

2:00-2:10: Greet Volunteers, hand out forms for their review and signature
Start about 10 minutes "late" to give everyone time to arrive

2:10-2:30: Give a talk on JSOP: our mission and goals, what we do, where, and why, and talk about JSOP Code of Conduct (see bylaws in Appendix I). Led by the Director and Communications Coordinator. During this time, the paperwork is collected and organized by the Volunteer Coordinator and other Board Members.

2:30-2:45: "Ice Breaker" game where everyone get to know one another. There are several variations on these games, whichever you choose, just make sure its appropriate. Led by the Volunteer Coordinator.

2:45-4:00 or 4:15: Talk in depth about Volunteer roles (below) and talk through each portion of the curriculum (forefront and background). Virtually walk Volunteers through all days in the camp and let them know how each one fits in. Have protocols and videos available to show/watch. Led by the Director and Curriculum Coordinators.

4:00 or 4:15-4:30 or 4:45: Sign Volunteers up for roles (see descriptions below). Make sure each portion of every day is accounted for Volunteer-wise. Led by the Volunteer Coordinator.

4:30 or 4:45-5:00: Answer questions and wrap up. Led by entire Board.

JSOP Volunteer Roles:

Team Leader: There must be two team leaders per group. These individuals progress through the entire camp (i.e. must be able to attend each day of the program in its entirety) with their group as they facilitate learning in all experiments (but don't do them, themselves) and act as the Campers' "go-to" person for questions or concerns. A Team Leader is expected to be able to manage a group of no more than 10 (and with one other Team Leader) for at least four hours at a time while being responsive, kind, compassionate, and motivating to the Campers. A Team leader is not able to be an "Assistant" and vice/versa.

Assistant: There are several activities throughout each day that Assistants can sign up for. Each person is expected to sign up at least once per day. Options for sign up include, but are not limited to, experiment leader(s), experiment set up/take down, snack preparation, and general clean up.

When an Assistant is not currently signed up (i.e. their activity has already, or has not yet, passed) he/she is expected to help others in whatever task is immediately at hand. There could be several Assistants signed up for the same thing (i.e. five Assistants will be needed for the Gingerbread Cookie Genetics experiment).

Curriculum Preparation

The curriculum is the most work-intensive part of the program preparation because several factors such as the sustainability theme, timing, space, budget, and the number of people, need to be taken into strong consideration throughout the process. The main focus of curriculum preparation should be for the summer science camp; this should be started at least six months before the program is to begin. Other curricula for outreach programs such as the After School Program can be taken from previous activities used and re-arranged and altered, if necessary. Before taking a look at preparation specifics, let's first take a look at why JSOP, as a model of Informal Science Education (ISE), and the sustainability theme that is used, do indeed fill educational gaps. The curriculum is at the heart of this.

As previously stated, ISE is a hands-on method of science education that takes place outside of a classroom (Vargas, et al, 2012, Quigley, et al, 2011, & Sladek, 1998). Because interest in science needs to be culminated from an early age, it is appropriate and important to engage students in STEM subjects since elementary (Kelly, 2000). Unfortunately, however, science education has become a lesser priority, or in some cases obsolete, in public elementary schools. Due to the No Child Left Behind Act (NCLB) - which was passed by the 107th U.S. Congress in 2001 and signed by former U.S. President George W. Bush in January 2002 - teachers are now being required to teach according to what will be on the test and are not given adequate resources to allow students to 'get their hands dirty' during science lessons (Schaefer & Farber, 2004), if they have time for one at all. Schools are mandated, nonetheless, to meet or exceed adequate yearly progress (AYP) in reading and math, both of which are measured only via standardized tests (Trolan & Fouts, 2011).

"Increasingly, classrooms are places in which teachers and students act out the script given to them by someone else, while neither teachers nor students ask the questions that matter, and learning is equated with passing a test" (Hursh, 2008 as cited by Rubin and Kazanjian, 2011). Since science is a subject that is not a focus of these tests, it is being left by the wayside. This method of learning does not help current or recent elementary students "acquire knowledge and become more independent and critical human beings; it only sets them up to become the next generation of unquestioning capitalist workers" (Bauman, 2010; Giroux, 2009a; Hill, 2005, 2006; Leonardo, 2004; Lugg, 2007 as cited by Rubin and Kazanjian, 2011). To begin to counteract

these effects of this nationwide public law, bystep the time-lapse in policy change, Informal Science Education can step in and fill educational gaps in a way that encourages students to want to learn.

JSOP, as an excellent model for informal science education, utilizes a curriculum where sciences, such as (but not limited to) biology, geology, ecology, astrology, physics, chemistry, and biochemistry, are presented in a manner in which real-world connections can be made. The questions of “How does this science apply to my life?” or “Why should I care about this subject?” are immediately addressed through creative and visually stimulating videos and discussion, then always followed up with a hands-on experience where children can *apply* the content and theory of science, which is often of abstract nature and tough for non-critical thinkers to understand.

The sustainability theme, which encompasses all of these sciences by relating them to the greater health of the planet and our need to know about it (i.e. Geology can be taught through a sustainability lens by making the connection between learning about the mechanics and structure of the planet in order to live in greater accordance with the natural habitat we occupy), is something that we’ve found to help inspire students to continue to be interested in learning about science (Vargas, et al, 2012). Because it applies to real-life situations (i.e. physics and engineering are used to develop tools such as solar panels, which help us use less fossil fuels and reduce the amount of pollution in the air - something that we breathe everyday, living in a highly populated area) it is easy for students to see the environmental need and their role in helping make our world more sustainable, starting with their own community. Furthermore, sustainability education, not only incorporates content in the sciences, it also includes math, reading, and critical thinking. It is true that “if educational leaders, teachers and parents are to support environmental [and sustainability] education, they have to be shown that it fosters measurable student learning in the [NCLB] tested content areas,” [math and reading] (Gruenewald & Manteaw, 2007).

To adequately ensure that JSOP is indeed filling educational gaps in science, each activity that is chosen should clearly demonstrate a link to one or more of the Content of Science Standards from The New Mexico Public Education Department (NMSDE, 2003). See Appendix III for a complete list of the standards for Fourth and Fifth Grade in New Mexico. These standards were written in 2003 and revised in 2008 (NMSDE, 2003). There is, however, an upcoming transition, almost nationwide, where new standards called “New Mexico Common Core State Standards (NMCCSS) will be phased in and in place by 2015 (NMPED, 2012). Please visit www.newmexicocommoncore.org for more information.

Below is an example of the curriculum for one complete day of the JSOP summer camp. Each day should be modeled in a very similar way, with the theme, times, activities, presenters and location clearly visible. Specifics of each portion of the curriculum will be discussed immediately following.

Sample Curriculum for JSOP Summer Camp:

Monday	(Date: 7/30) (Time: 8-12)		
Theme: Biology	Activities	Presenters	Location
7	Set Up	All JSOP Staff	
7:30	Set Up	All JSOP Staff	
7:45	Check In	Community Outreach Coordinator and one other "assistant"	Outside main entrance
8:00-8:20	Welcome & "Science of the Day" (during this time all children should be eating snack = strawberries and bananas with graham crackers)	Director	Game Room
8:20-8:45	Digital Presentation -Videos for basics of genetics and Punnet squares and DNA Extraction	Curriculum Coordinators and Director	Game Room
8:45-9:00	Break for bathroom and washing hands while we walk to the tent	Everyone	Transition outside
9:00-9:45	Strawberry DNA Extraction (Everyone is sitting in teams, following along)	Two "Assistants"	Tent
9:45-10:05	SNACK BREAK (Carrots with ranch and pretzels)	Presentation led by Multimedia Coordinator	Playground
10:10-10:45	Presentation on Biology and Hydrology	Angie Swanson: Upcoming biologist guest speaker	Gym or game room
10:45-11:30	Gingerbread Cookie Genetics (in stations)	Five assistants (one main presenter + 4 helpers)	Game Room
11:30-11:40	Clean up (bathroom break) and go to the tent	Everyone	Transition outside
11:40-12:00	Debrief	Director	Tent
12:00	Check out	Community Outreach Coordinator and one other Volunteer	Outside main entrance
12:30	Volunteer Meeting (go over what happened this day and what to expect for the next)	Director, Communications and Volunteer Coordinators	JSOP Staff Room

Curriculum Specifics:

Science of the Day: This expression is used to refer to the introduction of the scientific topic (usually one discipline; in this case, Biology) that is used throughout the day. This is the time in which sustainability is linked to the overarching topic and the experiments that will take place. The Director leads this. This is a time where lots of questions should be asked to encourage student participation and to get the enthusiasm for the day's activities started. On the first day of camp, the overall theme of sustainability can be talked about more extensively and the main experiments of each day can be mentioned to encourage continued participation throughout the week.

Digital Presentation: This time can be equated to what an interactive classroom science lesson might look like in an ideal situation. The goal of this period is to introduce the specific topics of the science that will be covered throughout the day. This is led by the Curriculum Coordinators. For example, if the day is focused on biology and we'll be teaching mainly about genetics, key vocabulary words and key concepts about DNA, heredity, and the discipline of genetics should be introduced here. Educational videos (usually from YouTube.com) and interactive presentations (made in Microsoft Powerpoint or online at Prezi.com) are also used to engage students.

This time is where NM Educational Standards in science should be directly addressed, but not necessarily talked about in the presentation (see Appendix III). Again, using our biology day as an example, you will see that the second Content of Science Standard where "Students will understand the properties, structures, and processes of living things and the interdependence of living things and their environments," we can specifically target the first strand of the second component in this standard where children will learn how to "understand how traits are passed from one generation to the next and how species evolve (4th grade)," and also "understand that heredity is the process by which traits are passed from one generation to another (5th grade)" (NMSDE, 2003).

Experiments/Protocols: The experiments that are chosen (by the Curriculum Coordinators) should clearly reflect the "Science of the Day." Each time a new experiment is begun, the focus should first be taken to this science and how it relates to sustainability so that the connection is continually made in the students' minds. For the Biology day where our main focus will be on genetics, a sub-discipline of biology, we've chosen to use the Strawberry DNA Extraction and Gingerbread Cookie Genetics experiments (see protocols in Appendix III). When planning experiments it is important to take budget into consideration and use simple household

or food items whenever possible to keep spending to a minimum – when 100 Campers are performing each experiment, the cost adds up quickly.

A written protocol should be available for each experiment where the supply list and units (i.e. materials listed for one person, listed per pair, per team, etc), are clearly labeled. Again, this is the duty of the Curriculum Coordinators. It is completely acceptable to look online or use previous protocols (all available in Appendix III), but please make sure to use proper citations! These protocols are to be handed out during Volunteer Orientation where “assistants” can sign up to lead each activity. They should also be displayed in the JSOP Staff Room at the WSCC so anyone can refer to it throughout the week. These protocols are used to make the master supply list and background curriculum (more on these topics later in this section).

In the curriculum itself, it is important to list who will be responsible for setup and takedown of each experiment and also who will be the main presenter. Make sure that the methods of transitioning between portions of the experiment, and/or between experiments, are made crystal clear. There is usually a highlighted portion below each day where this information can be kept.

Healthy Snacks: Snacks are given twice per day, once in the early morning during check-in and the “Science of the Day,” and again during a snack break. At the latter time, the specifics of that snack should be discussed with the Campers to positively influence their eating habits and educate them about what they are eating. In 2012 the Multimedia Coordinator was responsible for this because in specific, Amy Adams, who currently holds this title, has participated in the Food Shed Field School and has learned about the sustainability of food production. While the children are eating their snack she will talk about the importance of eating locally and lower on the food chain whenever possible, as both of these are more sustainable (i.e. less fossil fuels used to transport food and better for the local economy), and better for our health (i.e. less bioaccumulation of toxins, pesticides, hormones, etc.).

Supplies: Again, the materials used for experiments should be as commonplace of items as possible so as to reduce cost. Other items that should be added to a master supply list are food for all snacks, and incidentals that will be used throughout the week such as labels, permanent markers, baby wipes, sunscreen, paper towels, paper plates and bowls, plastic ware, etc. This master supply list should be made with a column that lists how much of each will be needed per person/group/team (when applicable) and another that lists how much will be needed for the *entire camp*. It is important to think about the quantities in which each item is sold and convert it to such units so as to

make the shopping that takes place with the Sandia National Laboratories representative as seamless as possible. For example, if each person needs 2mL of rubbing alcohol for his/her Strawberry DNA extraction, 200mL might not be a good unit to list in the master supply list. Instead this value could be converted to 2 Liters or approximately 68 oz (remember to *always* round up).

Guest Presenters: If possible, at least one guest presenter should be brought in per day of the summer science camp. This is not necessarily true for other JSOP outreach programs. These people are typically scientists from Sandia National Laboratories, a science department at UNM, or undergraduates/graduates from UNM who have primary research they work on and can present. These people strongly help to inspire our Campers and bring even more credibility to our program. Some of our presenters include: Solar Cell Engineer from SNL, Dr. Jose Luis Cruz Campa; Geologist from SNL, Dr. Nedra Bonal; and Microbiologist and Professor of Biology at UNM, Dr. Diana Northup. In JSOP 2012, we were also very lucky to have our Financial Coordinator, Angie Swanson, present her research on how frogs in Alaska freeze; she talked about what it was like to work in a lab and thus served as great inspiration to all the participants.

When asking these professionals to present, it is very important to tell them about our mission and how they can help. It is also a good practice to allow them to choose their own time slot (after the "Science of the Day" and digital presentation) and then build the rest of the curriculum for the day around what their schedule will permit. It will be the responsibility of the Director to follow up with these individuals about a week in advance of the program.

Background Curriculum: In order to make the curriculum a success, it is necessary to make a detailed, scheduled, list of everything that will need to happen before, during or after each activity. This we refer to as the "Background Curriculum" because no one other than the "Assistants" and Board Members need to be concerned about this portion of the program. A sample of the background curriculum for the Biology day is below. This must be shown to Volunteers during their orientation and be placed in the JSOP Staff Room at the WSCC along with the (regular) curriculum and protocols. For work-intensive projects, Volunteers and/or Board Members may do some of the preparation duties the night before.

Volunteer Meetings: These will be addressed in the "Volunteer and Camper Dynamic" portion of Program Execution section.

Sample Background Curriculum for JSOP Summer Camp:

Monday	(Date: 7/30) (Program Time: 8-12)		
Theme: Biology	Background Activities	Presenters	Location
7:00	Arrive at Community Center	Presenters and Board	
7:30	Set Up Projector; Prepare for Videos; Name tags + Snacks/ ALSO Late Registration	Everyone/Erinma and MJ	Game Room/ Outside main entrance
7:45	Check In (Campers find their team leaders in the Game Room)	Community Outreach Coordinator and one other "assistant"	Outside main entrance
8:30-8:50	Set up DNA extraction materials: divide materials for groups	Four assistants	Tent
8:45-9:00	Bathroom and washing hands break while we walk to the tent	Need supervisors in the hall/bathrooms	Transition outside
9:00-9:45	Make-up Volunteer Orientation	Director and Volunteers who missed orientation	JSOP Staff Room
9:45-10:05	SNACK BREAK (set up projector)	Multimedia Coordinator	Playground
9:45-10:00	Greet guest presenter and prepare for presentation	Biology Guest Speaker	Gym
10:00-10:45	Set up for gingerbread cookie genetic stations	Five assistants (one main presenter + 4 helpers)	Game Room
11:30-11:40	Clean up and go to the tent	All other assistants	Transition outside
11:40-12:00	Debrief	Director	Tent
12:00	Check out	Community Outreach Coordinator and one other "assistant"	Outside the side entrance
12:30	Volunteer Meeting (go over what happened this day and what to expect for the next)	Director and Communications and Volunteer Coordinators	JSOP Staff Room

Community Partnership and Providers

To be able to make this entire program successful, there must be early, frequent, and professional communication with community partners and donors who contribute space, materials, time, or funds to JSOP. Below is a contact list of the main JSOP providers. Specifics about communication with each entity will be covered in the next paragraph.

Bernalillo County Westside Community Center (WSCC)

1250 Isleta Blvd SW

Albuquerque, NM 87105

Manager: Johnny J. Armijo

jarmijo@bernco.gov

(505)-314-0179

Recreation Coordinator: Linda Sepulveda

lsepulveda@bernco.gov

(505) 314-0178

Sandia National Laboratories (SNL), Community Involvement

P.O. Box 5800

Albuquerque, NM 87165

Manager: Amy Tapia

astapia@sandia.gov

(505) 284-5207

Specialist: Vicki Northington

venorth@sandia.gov

(505) 284-5204

UNM Department of Biology

MSC03 2020

1 University of New Mexico

Albuquerque, NM 87131

Department Chair: Richard Cripps

rcripps@unm.edu

Advisor/JSOP Contact: Shannon McCoy-Hayes

shannon@unm.edu

The Director will have already been in contact with each of these providers. She/he is who will speak for the entire Board at meetings held with each of these entities, unless it has previously been decided that the Board, or more than just the Director, will be attending. This is why a high, efficient level of communication between and throughout the Board is imperative. Inner success translates to outer success.

Westside Community Center (WSCC):

As previously discussed in the "Target Population" section, the WSCC is where the summer camp and after school program are held. Because the space has been generously provided free-of-charge, it is important to always thank the manager and staff at the WSCC and to *ask and not assume* what the stipulations for each subsequent year will be. Typically, this will take the form of a

yearly contract and facility use agreement. It has also been our practice to ask what JSOP can contribute to the WSCC. In the past this has been in including their traditional after school program participants in our after school program, contributing goods such as toilet paper, paper towels, soap, etc. (as we definitely make a dent in their overhead cost, with 140+ people there for a week), and offering other presentations at their center for the community throughout the year, free-of-charge. Most recently, we've started a mini recycling service for the community center to inspire change in the local community. There will usually be a contact person such as the Recreation Coordinator, Linda Sepulveda that we've worked with for the last three years, who will speak on behalf of WSCC. It is best practice, however, to always check with the community center manager. All space planning for all programs is therefore done only between the Director and this WSCC contact – each person is then responsible for adequately relaying the message to the rest of their respective groups.

Sandia National Laboratories (SNL):

To contact SNL it is customary for the Director to first email. Contacting the manager directly is appropriate when dealing with new or large budget questions. The other contact will be the Specialist who works in the same department, currently Vicki Northington, who will work with the Director and Financial Coordinator on purchases, reimbursements, and science equipment checkout. Keeping in communication with both people by copying them on all correspondence is a great practice to keep. SNL is JSOP's largest sponsor and provides most materials and food that is supplied for all programs. When planning any event it is imperative, again, to kindly ask and not assume (ever!) what SNL is willing to do for JSOP. More specifics about the budget will be addressed shortly.

University of New Mexico, Department of Biology

The Department of Biology has had a long, dynamic relationship with JSOP. There are several things that it provides for JSOP: annual funding, mailbox hosting, advising, and meeting space. There is a 5-year Memorandum of Understanding that has been signed by both parties in August of 2012, which begins in 2013 and lasts through 2017. Both the Director and Financial Coordinator should have written record of this. Mailbox hosting is in the Department's main office and meeting space is coordinated through the advisement office. The structure between the UNM Biology advisors and JSOP should be made available in writing to each individual from both entities. This is to ensure an increasingly comprehensive approach to understanding what each person in his/her respective role is responsible for contributing, or vice versa. This should be reviewed/renewed, and revised if necessary, on a yearly basis at the beginning of the fall semester to ensure the agreements are still attainable, appropriate, and realistic for both parties. Just like in all other

interactions with agencies, it is important to always represent JSOP in the highest regard possible and to ask and never assume what the University or any of its affiliates are willing to contribute.

After each successful program it is good practice to send small gifts and thank you cards to each of the funding institutions or partners. Including pictures will allow them to see exactly which individuals' lives they helped impact and show first-hand what their money went toward. Should there ever again be a momentous event, such as the Presidential Luminaria Awards ceremony, it is appropriate to invite at least one representative from each entity. Our success can be seen as their success, too!

Finance and Budget

The budget is something that will fluctuate each year. It is based mainly on the number of participants that are expected to attend and the experiments that are chosen (more about this in the "Curriculum" section in Program Preparation). This is to be the main task for the Financial Coordinator, and the Director should work closely with this person to remain informed and communicate with funding agencies. Big budget items are food (small, healthy snacks for all Volunteers/Campers, 2x/day, and food for the Volunteer orientation), experiment materials (budget should be strongly considered in the planning) and advertising (flyers, newspaper ads, etc). Other things that need to be accounted for are board expenses (gas to out-of-town outreach = \$0.30/mile; business cards; postage; printing/copying, etc) and miscellaneous camp expenses (t-shirts, prizes, etc).

The best way to tackle the budget is to first send cordial letters asking for donations to any and all (local) businesses that can be thought of to supply food and/or materials for the camp. This is the job of the Communication's Coordinator. A sample donation letter is included in Appendix IV. Make sure that there is at least a 6-weeks time lapse between when the letter is submitted and when the materials are needed. If more than three weeks time has lapsed after the letter was submitted, it is best to call and find out what the status on the request may be. Once materials have been promised or received, those items can be crossed off the budget of expenses. After the program has come to an end, make sure to send a thank you card and tell the business how their contribution was used! Pictures are great to add as well.

From there, the supply list for all materials that will be necessary for the camp, including any donations to the WSCC or miscellaneous items, can be made and organized into various budgets from different funding agencies (SNL, UNM Biology, etc.). The master supply list should also be divided into various shopping lists organized by store. Board expenses should be taken from a

fundraised budget (more on fundraising shortly). Items such as t-shirts or food for the Volunteer orientation, or large one-time expenses such as a video camera bought in 2012, should be taken from the UNM Biology Department Budget. Materials and food for the camp have traditionally been in the SNL budget. Again, each year's budget will be unique so it is of utmost importance that the Financial Coordinator and the Director work together to manage communication with sponsors and donors. A completed budget that lists a grand total cost figure for the entire program, total cost per budget, and transaction totals and dates should be available for review each October for the summer science camp, and within a month's time from the end of any other outreach programs.

Fundraising can be through any means appropriate for raising both money and awareness for our program. Examples of past fundraisers include, bake sales at various locations on the UNM campus, "Dining for Dough" at Flying Star – a well-known local restaurant, and raffle ticket drawings. All earnings can be kept as cash with the Financial Coordinator or Director along with a dual-signature log for accountability.

Small grant applications such as the Youth Service America (YSA) Grant (www.ysa.org/grants) may also be completed to raise funds. For large grants from the NSF, NIH, or any other state or federal agency, however, it will be required to apply through a UNM Department, or to first obtain a 501(c)3 non-profit status through the Internal Revenue Service (IRS) to apply independently. Therefore, grant writing is something that can be part of JSOP's future (see Bylaws in Appendix I).

Publicity

Keeping past, present, and prospective Volunteers and Campers informed throughout the year is important to the program's overall success. Of course, advertising for upcoming events is essential (see the "Campers" and "Volunteers" sections at the beginning of Program Preparation), however, semi-frequent contact with the growing JSOP community translates to an ongoing momentum for our outreach. Other means of broad communication to use to promote JSOP include: letters mailed to parents about our progress and upcoming events, newsletters (see example in Appendix IV), radio shows, and newspaper advertisements, just to name a few.

Every time official communications are sent out, it is important to use the same letterhead, our logo (see the cover page of this book), and provide the information in both English and Spanish, either on the same document or separately. The JSOP logo should also appear on newsletters, the website, and promotional materials such as monogrammed t-shirts and water bottles. Uniformity and continuity in design helps others recognize JSOP and not confuse

it with something new or something else. Remember to also include sponsor logos on promotional items or letters, when appropriate.

The JSOP summer programs in 2010 and 2011 both received media coverage. Articles have appeared in the Albuquerque Journal both years, and in UNM Today and the Daily Lobo in 2011. The Director should be responsible for handling media requests, and should be very attentive and articulate to what is said during interviews. Providing journalists with written information is also a good practice so as to minimize the chance of words being misconstrued. It is acceptable to contact media providers in advance and ask for coverage of the program. If this is the case, make sure to follow up with your contact several times.

PROGRAM EXECUTION

The process of delivering the programs that have been cultivated in hours upon hours of meetings and discussions can be tricky. What is most important during this crucial and moving time is communication and compassion, for both oneself, and also fellow Volunteers and Board Members.

In this "Program Execution" section you will find the detailed guidelines for facilitating day-to-day program dynamic, curriculum delivery, daily documentation, and handling mishaps. These are, for the most part, specific to the summer science program; however, many of the general components apply to all JSOP programs, and can be modified to meet the current project needs.

Overall Dynamic

There are three overall goals in the execution of all JSOP programs: (1) maintaining a high level of safety and health; (2) delivering a high-quality curriculum that teaches the theories and concepts of science using hands-on experiments and interactive discussions; and (3) utilizing a sustainability theme to give students a sense of meaning in their pursuit of knowledge of science. To accomplish these overall goals, there are several nuances and minute details that need to be continually paid attention to. *A very high level of communication and efficiency is needed to ensure overall program success.* This should begin within the Board of Directors and transpire through Volunteers by first being initiated during Volunteer Orientation and then continuing throughout the duration of the camp. Likewise, it is imperative that Volunteers and Board Members communicate effectively with parents of participants and WSCC staff. In the box below, the following components, which are part of the daily program dynamic, will be discussed at length: Daily sign in/out, late registration, group arrangements, assistants, and daily volunteer meetings.

Daily Sign In/Out: This typically takes place outside the community center, between the main and side doors. The Community Outreach Coordinator and one or two other Volunteers (who remain the same throughout the week) should be responsible for being at the Community Center (or location of event) at least 30 minutes prior to when the program is set to begin (usually 7:30 am for the summer science camp).

There should be a daily sign in/out sheet made by the Community Outreach Coordinator that lists each registered participant in alphabetical order by last name. Parent's names and phone numbers should be listed beside each camper's name along with two blank lines: one for sign in, and another for sign out. For the first day of the program, this document should also list a series of check boxes that let us know all required documentation from registration is received (see the "Participants: Campers" section in "Program Preparation"). This daily document should be several pages long, have moderate sized font, and be printed single-sided so it can be laid out across a table where multiple parents are able to use it at once.

Late Registration: Late registration should only take place on Monday morning, or the first day of the program, during the check in period. Both the camper, and his/her parent or legal guardian should sign the same documents that are required for registration during this time. Please refer to the "Participants: Campers" section in "Program Preparation" for more information on this topic.

Team Arrangements: Please see the "JSOP Team Structure" box in the "Participants: Campers" section of "Program Preparation" for more information on how to split Campers into groups. Each day for the "Science of the Day," (described in the box under "Curriculum Preparation") Campers should be seated in groups while they eat a morning snack, have an interactive discussion about the scientific topic of the day, and watch videos to inspire their learning of the subject.

Teams stay together throughout the entire week. Team Leaders progress through the entire curriculum, with those who are in their team, while supervising and helping to maintain order. Each team should have a team name. Examples from JSOP 2012 are "The Blue and Green Cats and Koalas Ruling the World," "The Einstein Meatballs," "The Pink Kittens," and "Generation Green," just to name a few.

Occasionally teams will also group together to do experiments together, rather than remaining in one large group that comprises the entire camp, to do one experiment. Try to be as even as possible, individual camper count-wise, when dividing teams into larger groups. Projects and experiments that are very hands-on and detailed, or those that require lots of interaction and discussion,

are best handled in this manner. Examples from previous years include: Pizza Box Solar Oven Assembly, the Layers of the Earth Activity, and the Protein Folding Experiment (See Appendix III for all protocols).

Assistants: In order for the curriculum to be delivered as seamlessly as possible, there are several preparation steps that need to be taken. Assistants, or those who are not Team Leaders (see “Participants: Volunteers” section in “Program Preparation”), along with the Board of Directors, are responsible for ensuring that what is listed in the background curriculum gets accomplished. Please see “Background Curriculum” in the box in the “Curriculum Preparation” section of “Program Preparation” for more information on the specifics of what this should include. This topic will also be discussed in “Daily Volunteer Meetings,” below.

Daily Volunteer Meetings: These meetings, which typically take place twice per day for the summer science camp in the “Teen Room” at the WSCC, are crucial to overall program success. In the Teen Room (or a place deemed the JSOP Staff Room) there should be: the two curricula, all protocols for experiments or activities chosen, and a list of Volunteer assignments, all clearly displayed to encourage viewing by all Volunteers and Board Members. There should not be any Campers allowed in this area. Though all of this information is displayed, it is important to reiterate its content several times throughout the week – never assume that someone knows exactly what to do without clearly asking them, first.

In the early morning meeting, only Assistants and Board Members (i.e. all those who are not Team Leaders) will be able to attend; Team Leaders should be with their Campers as they arrive in another predetermined location. This short meeting (5-7 minutes) should be used to address big things happening for the day: transitions, experiment prep, presenters, etc. The early afternoon meeting, which happens as soon as all Campers are picked up, is to inform everyone, as a whole, what will happen the following day and should cover feedback from the day that just ended (both negative and positive – I like to end on that note). These meetings are led by the Director and Volunteer Coordinator. When meeting for a program other than the summer science camp, it will be at the discretion of these two individuals when and where they’d like to address the above stated topics (Also see “Daily Planning” in box under the “Curriculum Delivery” section below).

These meetings are at the heart of communication – something that has been discussed in several areas of this book because it is *that* important. It is imperative that details and nuances about the curriculum are made clear, but even more crucial is the understanding that things don’t always go to plan. The team working to facilitate the curriculum should be ready to adapt whenever necessary according to decisions that should ultimately be made by the Director; otherwise, it’s as though the “captain of the ship” thinks one thing will be happening, when in reality that is not so. When appropriate, it is the role of

the Volunteer Coordinator to relay messages or decisions made by the Director and/or to communicate when something is not going to plan to

It is also the Director's job to take ultimate responsibility for overall communication. This should be simple to do once the program has arrived because this is something that should have been cultivated throughout the planning process with the Board. One last note is that it is crucial to the continuation of JSOP to mention Leadership continuation at the last Volunteer meeting (see Bylaws in Appendix I for stipulations on Leadership Transitions). This typically happens on the second to the last day of the program's ending because the last day is too hectic to be able to hold a meeting. This portion of the meeting should be used to encourage and thank each and every Volunteer. By doing this you help them see what an important component they were. Remind them that their ripple effects will be greater than they may even ever have the capacity to know.

Curriculum Delivery

This is the area that takes the most preparation, but is over almost too quickly. Having an exciting curriculum for each day is what will keep our Campers and Volunteers coming back. Talking about science content is important and lots of times can be facilitated with appropriate videos from YouTube, however, it is the real-world connection, in my opinion, that moves and inspires children to want to learn more about the world around them (not just science!) – whether it is in school, or not. Helping people of all ages to see how their actions now will make up their world later is quite easily done through a sustainability lens. Also talking about what it takes to become a scientist that works on the current topic being discussed (i.e. a Biologist, Chemist, Engineer, etc) is also motivating; it shows children a large benefit that is possible later in life, which can be made possible through serious academic pursuit now.

Below are the following specifics of curriculum delivery discussed in detail: Transitions, Presenters, Experiments/Activities, Behind-the-Scenes, and Daily Planning.

Transitions: Also refer to “Experiments/Protocols” in the box under “Curriculum Preparation” to find more information on how decisions for how transition times will take place and be facilitated. If there is anything that should be ready for the transition itself (i.e. baby wipes should be handed out during a particular transition after a semi-messy experiment), or for what comes immediately after the transition (i.e. everyone will be going to another location to eat snack), please make sure that all possible details are in the background curriculum. Also talk about transitions with specific individuals who will facilitate these

preparations either early in the morning or the day before. It is also a good practice to discuss transitions during the daily Volunteer meetings to ensure everyone is aligned with what needs to happen the next day.

Presenters: The Director should have been in contact with each presenter at least a week before the program is to begin. It is the Director's responsibility to communicate any needs that the presenter may have for the day of his/her presentation (i.e. projector needs to be set up, materials need to be passed out/collected several times) with the rest of the group and especially the Volunteer Coordinator. It may be wise to have 1-2 Assistants dedicated to helping this person throughout the duration of their time at the program. It is appropriate to give each of the presenters a water bottle, t-shirt, or other JSOP promotional item as a gift. Following up with a "thank you" email and/or card with pictures is a great practice. Also see "Guest Presenters" in the box under "Curriculum Preparation" for more information.

Experiments/Activities: Before the start of the program, all materials should have been purchased and/or donated. Of course, refrigerated items should go in the kitchen of the WSCC (make sure it is labeled!); all others should go in the "Teen Room" or other JSOP Staff location where no other personnel are allowed. Make sure that all Volunteers are aware of where materials are kept and ask them to make every effort to not waste them – we are, after all, talking about sustainability.

It is very helpful to everyone involved when the Volunteers who are presenting any given activity are practiced in what each protocol calls for. Understanding the experiment in theory is not the same as using a hands-on approach to learning what needs to be done (also just like we teach). This could save time and stress during the delivery of the activity because there may be an otherwise unforeseen hiccup that could have been prevented. It is the Volunteer Coordinators job to make sure that this is the case with each of the Volunteer presenters. Again, asking and not assuming, is a great practice to keep. Last but not least, despite all the precautions and preparations, just remember to have fun and be ready for improvisation when time calls for it!

Behind-the-Scenes: Refer to the "Background Curriculum" section in the box under "Curriculum Preparation" for more an example and more information on this topic. This is also discussed under "Assistants" and "Daily Volunteer Meetings" in the box under the "Program Dynamic" section above.

Daily Planning: Each day after the program, there will be many things to prepare for the upcoming days. There will most likely be items that need to be picked up from businesses that have donated to our camp, promotional items such as t-shirts, materials for the closing ceremony, etc. These tasks can be delegated throughout the week. This is something that can be addressed in the

Daily Volunteer Meetings (see the box under “Program Dynamic,” the section above”).

Friday, or the last day of the program is something that should be discussed throughout the week, or duration of the program. There are typically lots of things that need to be accomplished in a very short amount of time, so it is important to divide and conquer. By splitting Volunteers up into groups (number needed may vary depending on the current situations) large tasks such as material pack up, and returning of things to SNL, clean up, camper dismissal, and other transitions can all be accomplished with the least amount of stress possible. Whew.

The closing ceremony is also on Friday, just before this chaotic moment happens. Avoid extra stress of the day by having materials ready to hand out to campers by organizing projects and prizes into teams; this can be done a day or two in advance so that it is easy to just add to the piles, if necessary. Other things such as camper certificates, cake, a picture slideshow, and set up of the area itself should be well thought out and planned for a few days in advance. During JSOP 2011 and 2012, a tree has been planted as our combined effort towards sustainability. This has been how the closing ceremony starts, so details surrounding the efficient delivery of this event should also be planned out and well thought through days in advance.

Documentation

Because JSOP is such a dynamic and fast-paced program, obtaining the proper documentation is fundamental to the increased success of the program for years to come. Its almost like proof that it actually happened! The program always seems to be over so quickly! Or its like, Shannon says, “if you ain’t got pictures you ain’t got anything!” I would definitely agree...

Pictures and video should be taken by the Multimedia Coordinator and one other Volunteer/photographer. For JSOP 2011 and 2012, we’ve been very lucky to have an amazing photographer volunteer to document the entire camp process. Jobette (“Joey”) Chour has been an amazing asset to the program as she has produced increasingly high-quality photos for our use to represent the camp. Whenever using any of her photos, or others by another photographer in the future two things are important: (1) obtaining photo releases (See Appendix II) signed by all participants including Campers and Volunteers, and (2) properly citing the photographer for all use of photos in any advertisements, publicity, and/or on the JSOP website. Below are some examples of Joey’s photography from 2012:



Campers building Volcanoes during Geology Day



Everyone helped to plant a tree during our closing ceremony – our contribution to sustainability in the local community



Daily "Animal Walks" – transitions inside from snack time



Group Picture from JSOP 2012

For JSOP 2012, we were also very lucky to be able to not only have our very own Multimedia Coordinator, Amy Adams, film most experiments for later posting on our YouTube page (view link on our website: www.juniorscientist.org), we were so fortunate as to be able to purchase our very own video camera with funds raised throughout the Spring semester of 2012. Combined, the multitude of photos and video that has been collected over the last three years will soon become a library of memories that we can use to not only promote our program, but also to gain insight into where our program has been so that it can be made clear to all where it is going.

Other things that serve as a great means of feedback and documentation of the program itself are “Mid-Week Reflections” and the pre- and post-camp surveys. Mid-Week Reflections are simple; basically, everyone gets a sheet of paper and writes down two sentences minimum about what they like about the camp and why. These are given out on Wednesday of the program, or at about mid-way through the program. The Community Outreach Coordinator will eventually gather these for compilation and placement on the website. These also serve as a very informal way of feedback – it is a great gauge as to what is working and what is not. Please see the “Camper/Participant Surveying” section in “Program Evaluation” for more information on pre- and post-camp surveys.

Handling Mishaps

During the Volunteer Orientation and the first day of the program we let all participants know that Team Leaders are the first people that should be spoken with when anything goes wrong – illness, bickering, or discomfort of any sort.

In the three years that JSOP has existed there have never been any serious illnesses, and very few minor ones such as stomachaches and headaches. These are dealt with on a case-by-case basis, but for the most part, we provide non-medicinal remedies known to help cure the problem (i.e. Gatorade/Electrolyte drink for stomachaches, or a cold cloth on the forehead for headaches) before any other action is taken. If after a while the child doesn't feel better, a call is made to the parents/legal guardians to let them know the situation and ask them what they would like us to do. During the regular summer science camp, we have never had to administer medication, however, if that is ever required, the person giving the medication **MUST** receive verbal permission from the parent/legal guardian before proceeding. This should also be documented and retained for our records. The registration forms we collect prior to any program list a brief section for medical information (See Appendix II); these forms should be kept on file and available for quick reference by the Community Outreach Coordinator through the duration of the program. The medical section particularly should be paid close attention to in order to avoid illness due to allergic reaction, etc.

More common problems are small bickering and bad attitudes. These are most always handled by the Team Leaders. When the situation is too intense or too repetitive from the Team Leader's perspective he/she is to contact the Volunteer Coordinator, Communications Coordinator, and/or Director to facilitate a one-on-one mentoring session with the individual(s) participating in the mishap. If it continues, a call to the child's parents can happen if the JSOP Staff attending to the issue feels it is necessary.

PROGRAM EVALUATION

For the sake of keeping an ongoing record of JSOP's progress, the methods for pre- and post-camp surveying for Campers and Volunteers will be described. All efforts to ensure surveying of participants (both Campers and Volunteers) should be made each year. Please note that only data that has been pre-approved by the Human Research and Protections Office (HRPO) of UNM via the Institutional Review Board (IRB) process can be considered as valid for publication. Surveys/Data that have not been approved through HRPO may only be used for internal purposes and can only be published in JSOP promotion materials with the written consent of those being surveyed. Information on how to obtain information on receiving consent can be found by contacting:

Human Research and Protections Office (HRPO) of UNM
MSC08 4560
1 University of New Mexico
Albuquerque, NM 87131-0001

Phone: (505) 272.1129

Email: HRPO@salud.unm.edu

Office located at BSMB (B71) in the UNM School of Medicine (M-F, 8-5)

*Please note that faculty support will be *required* for an HRPO application.

Camper/Participant Surveying

Surveys for young participants should ideally be done with paper and pen/pencil. This is because several other factors about the child's academic level and progress can be more easily inferred (i.e. spelling, penmanship, grammar, etc) through visual analysis of what is written. Pre-camp surveys should be administered during the registration period only after a letter of informed consent (whether approved by HRPO or not) is signed by the parents/legal guardians of the participant. This will be before the child has participated in any JSOP activities or interacted with any JSOP staff or Volunteers. This part is crucial to obtaining accurate results. Please note that should data collection be pre-approved, letters of assent should also be signed by the Campers. Samples of letters of informed consent and assent (that were approved by HRPO for JSOP 2011) and pre- and post- camp surveys for our elementary and middle school students are included in Appendix V.

Post-camp surveys, which will have already been approved through the informed consent letter signed during pre-camp survey administration, should be given on the last day of JSOP activities, before any of the closing events. This is a good time because Campers will get a chance to reflect on their experience in the program before being given rewards during the closing events (i.e. t-shirts, completion certificates, freebies, cake, etc). Again, this will allow for a more accurate representation of feedback for the actual teaching and learning of science that has gone on.

The student surveys should include a mix of multiple choice, Likert scale, and open-ended questions in something close to a 4:5:1 ratio. Likert scale questions, which ask students to agree or disagree to a statement on a scale of 1-5 or similar, have been proven as a preferred method for testing and surveying children (Laerhoven, van der Zaag-Loonon, & Derkx, 2004.) Over the years, new questions can be developed, asked, and then analyzed according to the changing interests of JSOP's leadership and Volunteer team.

Volunteer Surveying

The same basic procedures apply for surveying Volunteers. The Volunteers should sign a letter of written informed consent (again, whether approved by HRPO or not) before the survey is administered during the orientation period that has traditionally taken place on the Saturday before JSOP activities begin. This can be done at the same time as other important documents are being signed (See “Volunteer Orientation” under “Program Preparation” section). Similarly, the post-survey should be given after all participation has taken place; this should be after all closing activities have ended on the last day of JSOP.

This data, whether for publishable research or not, will most likely not be used in the same manner as that from camper surveys might, therefore, paper and pen/pencil are not necessarily a requirement for Volunteer surveying. Electronic surveys designed using Survey Monkey, a form made on Google Docs, or some other similar website may be used. The ratios and types of questions chosen (i.e. multiple choice, Likert scale, and open-ended) should be varied according to the detail and amount of data the Board wishes to obtain. An example of questions asked in previous Volunteer surveys is also included in Appendix V.

Previous Research

The data collected from pre- and post-camp surveys for JSOP 2011 was combined with several in-class observations of Campers in the Fall semester of 2011 to yield a mixed-methods evaluation of the program which helped us and others gain a deeper understanding of the effects and impacts of informal science education. The study conducted by myself and Drs. Marshall and Sheldahl, from the Departments of Biology and Education, respectively, was entitled, *Sharing Science: A Case Study of the Effects of Informal Science Education* (2012). There were three major findings.

First of these was that JSOP increased student interest in pursuing a career in science. “This was clearly demonstrated in our analyses of the open-ended question that read, ‘What do you want to be when you grow up?,’ [when we observed] a 41% increase in the number of students wanting to become scientists or engineers” (Vargas, et al, 2012). This was one of our original hypotheses; it was supported by triangulation of two other correlating data points from case studies.

Another hypothesis we had was that “JSOP would increase students’ interest and performance in the classroom in science and related subjects; [this was not supported, however,] because an area required for testing the validity of this claim was not available” (Vargas, et al, 2012). Throughout the duration of the case studies - where a total of five students were interviewed, three of which were also observed in their public classrooms – there was absolutely no science being taught. It didn’t matter that the duration and/or time of the observations

fluctuated; there simply was no science education that took place for the term of this study. More than anything else, we saw this as a red flag for the educational system and began to have a more profound understanding of the need for programs like JSOP.

The last marked finding that was discussed in this study was that “in nearly all data sets [we repeatedly found trends] that the participants’ motivation for their career ambitions and/or activities related to school [stemmed] from their desire for the general enjoyment of what they’ll do” (Vargas, et al, 2012). Several of the responses from surveys as well as the data from interviews and observations supported that motivation for future goals is based in fun! “It is also interesting to note that all students would recommend informal science education programs to their friends or family members because they consider it to be fun” (Vargas, et al, 2012). I can’t help but wonder, what would the world be like if everyone talked about school that way?

A final note about JSOP from *Sharing Science* (Vargas, et al, 2012):

The greater importance of JSOP and other informal science educational programs, then, is primarily focused on the need for accessibility to science education at a young age due to the lack of exposure to this subject area, as demonstrated by this study. It is also based in the need to connect marginalized populations to mainstream knowledge and give students from these communities a voice in their desire to pursue professional careers. The sustainability theme that is used to make the science taught relevant to the current generation allows students to develop their own tools for follow-up activities and demonstrates the importance of the material to the student population.

Below is a schematic for a method that was proposed for the continued inclusion of the Junior Scientist Outreach Program into institutionalized settings such as the University of New Mexico and Sandia National Laboratories. It shows how individuals interested in science at any stage in their career can contribute to this ever-growing body of knowledge and the betterment of the societal, educational, and environmental conditions around us. Please refer to the source for more information (citation included in reference list).

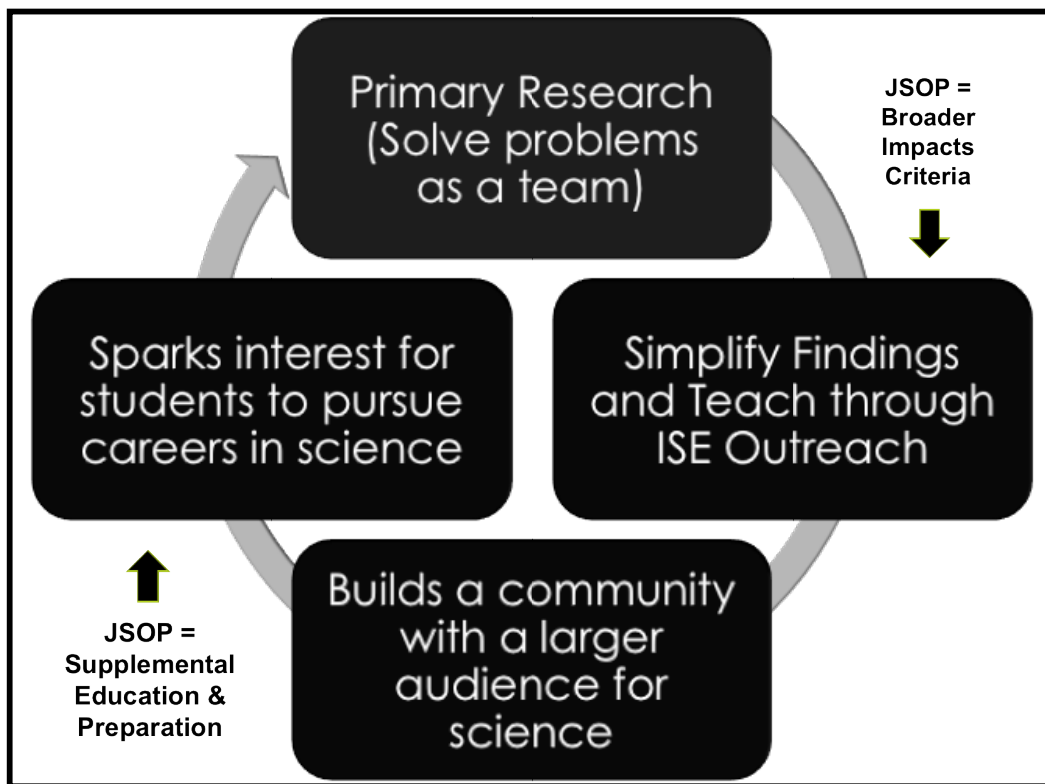


Figure source: Vargas, et al, 2012

THE JUNIOR SCIENTIST OUTREACH PROGRAM: 2012 AND BEYOND

"The future belongs to those who believe in the beauty of their dreams."

-Eleanor Roosevelt

Future Directions

In this section you will find the ideas that have been brought to my attention from several different Board Members and Volunteers – all of whom have expressed a passion for Informal Science Education and who have found even just a bit of meaning and inspiration through this program. Thank you to each and every one of you – you know who you are – it is my honor to share these here.

It is apparent, from Board meetings, that the idea to make the After School Program at the WSCC year-round is a strong goal of ours. It has been decided that the Board will strive to provide an 8-week program that meets once per week, each semester. This will equal a total of 17 weeks of outreach from JSOP in one academic year!

There have also been several questions from various Volunteers and JSOP Alumni about installing satellite programs at other universities. It is my hope that this handbook will benefit many, many JSOP participants to come – both far and near. Should this idea become reality it will be great to see the Board of Directors at UNM working to establish “branches” on our JSOP tree; we will all be connected to the same roots and work to give one another a strong foundation.

As mentioned a couple of times throughout these pages, JSOP is now entering a 5-year plan that will see the program through 2017. Certain financial agreements and our Bylaws that were enacted at the close of JSOP 2012 will help to ensure the longevity of this grassroots program and help it gain momentum and positive impact in the surrounding community. When we get to this point at least half of the original Board of Directors will convene with the current Board to help establish even more future goals for our beloved program.

How YOU can get involved

If you have read this all the way through, or even glanced at it a few times, I hope you have shown yourself how you are able to make a difference by investing in the educational wellbeing of the upcoming generation. Below are the ways in which you get involved or learn more about the current developments of the Junior Scientist Outreach Program:

- ★ Find out how you can volunteer year-round
- ★ See feedback from previous years' programs
- ★ Donate to the Junior Scientist Outreach Program Fund!
 - ➔ Email us: jsop.unm@gmail.com
 - ➔ Check out our website: www.juniorscientist.org
 - ➔ Visit our YouTube channel: “JuniorScientistUNM”



CONCLUDING REMARKS

Helping to bring the general enjoyment of learning and critical thinking to a diverse population of soon-to-be adults is a major tenet of this program. As is clear through the diverse topics addressed herein, one can see the large span of impacts that JSOP has on a community, many young individuals, and educational gaps surrounding them both. As time grows and changes, so will this program. It is my hope that this work is carried on with a sense of dignity and hope that continues to spark and ever-growing interest in the sciences, academic success, and most importantly, our planet and its overall health - we are all part of that equation.

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APPENDICES

Appendix I: Leadership Documents

Bylaws (9 pages)



BYLAWS OF THE JUNIOR SCIENTIST OUTREACH PROGRAM (JSOP)

Originated: August 11, 2012

Article I. Purpose

Section 1 – Mission

The Junior Scientist Outreach Program (JSOP) is a student-run organization that is dedicated to engaging elementary and middle school students in science for the purpose of both increasing the diversity of science, engineering, and health professionals, and bridging educational gaps by providing informal science education programs through creative community-building projects focused on sustainability.

Section 2 – Target Population, Participants, and Location

- A. For all outreach programs, including the summer science camp, JSOP will seek to recruit and serve minority populations and those of low socioeconomic status.
 - a. Applicants that do not meet these criteria will not be excluded or denied participation in any JSOP programs.
- B. The annual summer science program shall be held in the South Valley of Albuquerque, New Mexico at the Westside Community Center of Bernalillo County, for as long as their administration sees fit.
 - a. All other outreach programs may take place anywhere appropriate for elementary and middle school students, with the understanding that recruitment and outreach is still to be aimed at serving the above stated target populations.
 - b. This will be at the discretion of the current Board of Directors.
- C. The participants that the Junior Scientist Outreach Program may serve must fit the following criteria:
 - a. The child must be entering or leaving a grade level between 3 and 7.
 - b. The child must be properly registered according to the requirements stated in the Junior Scientist Outreach Program Handbook (see the “Participants: Campers” section in Program Preparation).
 - c. Exceptions may be made at the discretion of the current Board of Directors.
- D. Those individuals who cannot participate are:
 - a. Those that are unregistered.
 - b. Parents, guardians, family members, etc.
 - i. With the exception of 30 minutes after the program has commenced and 30 minutes prior to dismissal.
 - ii. Also with the exception of special ceremonies or events to which all family and community members are welcome to attend.

Article II. Board of Directors

Section 1 - Composition

- A. The “Coordinators” of the Program shall be designated the *JSOP Board of Directors* (hereafter referred to as the “Board”) and shall be composed of the following members:
 - a. Director
 - b. Communications Coordinator
 - c. Financial Coordinator
 - d. Community Outreach Coordinator
 - e. Volunteer Coordinator
 - f. Two (2) Curriculum Coordinators
 - g. Multimedia Coordinator
- B. Each member of the JSOP Board of Directors must have first been a volunteer for one or more JSOP outreach events, have a strong interest in science education, and have a knowing of and/or sensitivity to the Spanish language and/or culture.
- C. Additionally, each Board Member should possess the following, all of which should be clearly outlined at the commencement of each term:

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- a. An adequate sense of leadership.
- b. An ability to manage one's own schedule and work load, as well as an understanding of the nature of the time commitment that any given position of the Board requires.
- c. A strong personal commitment to the overall goals and mission of the program as outlined in the Junior Scientist Outreach Program Handbook.

Section 2 – Powers of the Board of Directors

The Board shall have a general power to administer any and all programs, projects, and matters pertaining to or concerning the Junior Scientist Outreach Program.

- A. The Board shall have the power to create such volunteer positions and activity committees as it deems necessary to carry out the business of the Program. Such volunteer persons and activity leaders shall be appointed by the Director or Volunteer Coordinator from the active volunteer cohort, subject to the approval of the Board.
 - a. These appointed volunteers will not be considered Board members, but instead are subject to its oversight.
 - b. Appointed volunteers do not have voting privileges on the Board. Such positions may only be officially designated by an amendment to the Junior Scientist Outreach Program Bylaws.
- B. Any decision of the Board shall be made at a duly called meeting at which 6 of 8 Board Members are present.
- C. Board approval is defined as an affirmative simple majority vote by the Board of Directors.
 - a. Due to the fact that there are 8 Board Members, should a tie in the vote arise, it will be the duty of the Director to make the ultimate decision.
 - b. Additionally, Board Members are the only individuals who will hold voting power. Any other individuals from any other partnering agencies, institutions, etc, may not cast votes but may serve in an advisory role only.

Section 3 – Board Term

The term, which each given board member will serve, shall be defined as the calendar year from September 1st through August 31st.

Section 4 – Responsibilities of Officers

- A. Director: The role of the Director is to oversee entire coordination of all JSOP programs through all stages of preparation, execution, and evaluation. The Director facilitates group structure; schedules meetings; delegates work to be done; communicates with funding agencies; and ensures overall success of all JSOP programs by remaining in close contact with each board member. It is this person's duty to make final decision calls during program delivery, to address the camp population everyday in the "Science of the Day" introduction, and to take ultimate responsibility for all program endeavors.
- B. Communications Coordinator: The role of the Communications Coordinator is to send all official communications to program participants' parents, outside agencies, etc, as well as a quarterly newsletter to all volunteers and program participants ("campers"), both past and present. This person works very closely with the Board to complete donation requests, advertise, and keep track of program participant data; this individual works specifically with the Director and Curriculum and Volunteer Coordinators to complete the curriculum (scheduling components) and is also responsible for keeping frequent track of the JSOP email account. All correspondence and record-keeping regarding volunteers is the responsibility of the Volunteer Coordinator.
- C. Financial Coordinator: This role is for all financial matters surrounding the program. Duties include the planning for and maintenance of a budget and ledger; arranging reimbursements when needed; working with multiple budgets and donations to ensure adequate amounts of supplies for events; organizing of fundraising events; and writing grant applications. It should be clear that the Financial Coordinator should approve of all purchases and/or reimbursements over \$10 *before* any action is taken.
- D. Community Outreach Coordinator: This position entails general promotion of our camp and distribution (but not necessarily assembly) of advertisements. Duties include elementary school presentations, website maintenance, and other media coverage as well as the responsibility of

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making and distributing promotional items such as t-shirts. With every summer camp we will strive to collect pre- and post-camp data from the elementary and middle school grade participants – this will be the role of the Community Outreach Coordinator. One last task of this Coordinator will be to work with the Communications Coordinator to facilitate registration periods and ensure that daily sign-in and sign-out for all programs are completed.

- E. Volunteer & Research Coordinator: Role is to coordinate volunteers in every step of the JSOP process. This position entails recruitment of volunteers and the planning and facilitating of the volunteer orientation. This person keeps track of all volunteer data and all hours worked by both volunteers and Board Members. An important facet of this position is to collect Camper and Volunteer feedback before and after every JSOP event through the use of surveys as well as ensure that the “background curriculum” is properly made, by working with the Curriculum Coordinators and Director, before the summer science camp. The analyzing of the pre- and post-camp data is an important facet to this position as it helps the Board promote JSOP for the upcoming year. Another component to this position is ensuring that the group is “culturally competent” and safety-certified by arranging for trainings through different community or university agencies (ex: Cultural Competency trainings through El Centro de la Raza of UNM, or CPR/First Aid trainings through the American Heart Association).
- F. Curriculum Coordinators: This role is large enough for two people who are interested in working closely together to design the curricula (forefront and background) for our programs. This is a big task as it includes designing/identifying protocols for hands-on experiments appropriate for students in grades 3-7. Other duties include: the timely organization of activities in a location that is safe and appropriate; building of supply lists that fit our budget; arranging for presenters (usually Sandia National Labs Scientists or UNM science professors); and working with the Director, and Communications and Volunteer Coordinators, to facilitate transition into the event itself. The main focus for this team should be the summer science camp curriculum and the “Digital Presentations” which will be given toward the beginning of each day of the program. Other events’ curricula could be comprised of a re-arrangement of previous years’ activities.
- G. Multimedia Coordinator: The role of the Multimedia Coordinator is to keep a photo/video record of our events for promotion purposes. Duties include the processing and posting of pictures and videos, maintenance of the JSOP YouTube page and website, and the creation of designs for promotional materials and advertisements – this entails working closely with the Community Outreach and Communications Coordinators. This coordinator will also be responsible for working with the Curriculum, Communication, and Financial Coordinators to make a menu for all snacks served during JSOP programs and to help locate videos for the “Daily Digital Presentations” which the Curriculum Coordinators will present.

Section 5 – Succession of Board Members

- A. In the event that the Director is unable to complete a term of office, an Acting Director shall be appointed by simple nomination and majority vote of the Board.
- B. In the event that any other Board Member is unable or unwilling to complete a term of office, the Board shall appoint a replacement to serve the remainder of the term. This individual shall meet the initial requirements for admittance into the Board (see Article II, Section 1)

Section 6 – Impeachment and Removal of Members of the Board

- A. In the event that a Board Member is charged with not fulfilling his or her duties as stipulated in these Bylaws, he/she may be dismissed from the JSOP Board of Directors according to the following stipulations:
 - a. All Board Members must be present in a meeting while the presenter of the formal grievance states his or her case against the said Board Member in a formal manner.
 - b. The Board Member in question will then be given a chance to defend his/her position and/or resign from the Board.
 - c. Should the Board Member choose to not resign, it will be held to a simple majority vote of the 7 remaining Board Members, as to whether or not the individual in question should continue to be part of the JSOP Board of Directors.

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- B. It should be noted that discussions of possible impeachment should not take place outside of a convened JSOP Board Meeting.

Article III. Transitions in Leadership

- A. Should any existing Board Member continue to serve for the upcoming term, he/she will be given the opportunity to choose, from the vacant positions, which Coordinator Role they would like to fill.
 - a. An existing Board Member may hold his/her or position for as many terms as he/she is willing and able
- B. To fill vacant roles, a call that states the Board's needs, position requirements, and the duration of the term, should be made to previous volunteers. A date for elections should be set and communicated to all potential new Board Members (see Article II, Section I for requirements).
 - a. Any past volunteer has the ability to either self-nominate, or to be nominated by another Board Member or Volunteer. In the case of the latter, he/she must accept his or her nomination.
 - b. At the elections meeting, where all Board Members and potential new Board Members are present, each prospective Board Member should present the following:
 - i. Which role he/she would be interested in filling
 - ii. A brief summary on their qualifications, and motivation for wanting to be an integral part of the JSOP process
 - c. After all cases have been presented, all prospective Board Members will be asked to leave the meeting while the existing Board has a debrief and voting session. Voting guidelines are as follows:
 - i. The Board Members of the current term – defined as the individuals who will be continuing to serve for the upcoming term – shall all be present to vote
 - ii. In the event of a tie, the Director shall have the final call on who is admitted into the Board
 - iii. An affirmative vote shall be defined as a simple majority of the Board Members of the current term.
 - 1. In the event that there are 2 or less continuing Board Members, the entire outgoing Board shall be invited to aid in the decision making process.
 - 2. Those who want a say in the matter must be present during the elections meeting.
 - d. It will be the responsibility of the Director to inform each individual of the Board's decision via email.

Article IV. Volunteers

- A. Volunteers should be recruited and accepted according to the outlined guidelines in the Junior Scientist Outreach Program Handbook (See the "Participants: Volunteers" Section of "Program Preparation").
- B. Code of Conduct
 - a. To be required by all JSOP participants – including both Board Members and Volunteers
 - b. The Code is as follows:
 - i. JSOP Board Members and Volunteers should strive to benefit the campers, their families, and the communities in which they serve, while taking care to do no harm in any manner. Each should honor and faithfully fulfill the JSOP mission while striving to generate enjoyment for all program participants.
 - ii. All JSOP participants should be respectful and sensitive to the opinions and cultures of others in all settings, including but not limited to meetings, orientations, outreach events, and so forth. The diversity of all participants should be embraced.

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- iii. Any and all conflicts of interest should be resolved in a responsible manner that avoids and/or minimizes harm. These should be prevented by strictly keeping JSOP business separate from any other.
- iv. JSOP Board Members and Volunteers strive to contribute their time and efforts to JSOP for little or no compensation or personal advantage. Each Board Member shall present himself/herself in a timely and professional manner. Each shall behave in a manner that befits a highly educated and professional person.
- v. The JSOP Board should establish relationships of mutual trust and respect with those with whom they work. Board Members especially should uphold professional standards of conduct and accept appropriate responsibility for their actions and behavior, as well as seek to manage conflicts of interest that could lead to exploitation or harm.
- vi. Each Board Meeting or otherwise should be scheduled with start and end times. Board Members should strive to stay true to these time limitations.
- vii. JSOP Board Members should seek to promote accurate, up-to-date, and truthful scientific information in the program.
- viii. In no way should any Board Member steal, cheat, or engage in any fraudulent activity. Board members should strive to keep any and all promises and avoid unwise and/or unclear commitments.
- ix. During camper registration and other recruitment efforts, JSOP Board Members should reflect a positive and friendly image of JSOP with any and all potential campers and their families, community members, funding organizations, and other people who may come in contact with the program. They are to uphold their professionalism in all interactions with the community.
- x. During volunteer orientations, JSOP Board Members should facilitate a positive and safe atmosphere for volunteers to learn about the program, sign up for roles, and meet their other fellow volunteers.
- xi. Board Members should strive to minimize costs yet maximize the experience of all participants, including Volunteers and Campers, in all JSOP events.
 - 1. Money will be spent wisely.
 - 2. All purchases over \$10 shall be reported to the Financial Coordinator before it is completed.
 - 3. JSOP should avoid a state of debt and any disrespecting of sponsors or donors.
 - 4. Timely reimbursement shall be guaranteed for all purchases made on behalf of the program.
- xii. Board Members should exercise fairness, equality, and justice with all persons who wish to access and benefit from the contributions of JSOP events. JSOP Board Members should exercise reasonable judgment and take precautions to ensure that their potential biases, the boundaries of their competence, and the limitations of their expertise do not lead to or condone unjust practices.
- xiii. All JSOP Staff (Board of Directors and Volunteers) should respect the dignity and worth of all people, and the rights of individuals to privacy, confidentiality, and self-determination. They should also be aware of and respect cultural, individual, and role differences, without prejudice against any of the following including but not limited to age, gender, gender identity, race, ethnicity, culture, national origin, religion, sexual orientation, disability, language, socioeconomic status, and so forth.
- xiv. Any indiscretions committed by any JSOP Board Member or Volunteer during a JSOP event shall be evaluated by the current Board of Directors and dealt with in a confidential, ethical, and professional manner, resorting to the use of the legal system, if and when necessary.
- xv. JSOP Board Members and Volunteers planning to participate in outreach events should be made aware of the nature of the populations and areas in which JSOP events take place, and undertake any measures to ensure their sensitivity to our program goals.

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- xvi. Confrontations of any kind should be dealt with in an ethical, confidential, and professional manner. There should be no form abuse involved, including verbal, sexual, physical, etc., and such interactions should be dealt with in a calm manner. All JSOP participants should be able to report concerns without fear of retaliation.
- xvii. In the case of a medical emergency, contact in order: the Director, the Community Outreach Coordinator (to access any files), and the parents/legal guardians, when a participant is under 18 years of age. Medical services should only be contacted with the permission of all three above stated individuals. In the case that the parents/legal guardians do not permit contacting medical services, (when the injured/ill is under 18), a decision should be made by the Board of Directors if the given case seems severe.
- xviii. All JSOP Board Members and Volunteers must undertake ongoing efforts to develop and maintain their competence.
- xix. JSOP Board Members shall refrain from initiating an activity when they know or should know that there is a substantial likelihood that their personal problems will prevent them from performing their work-related activities in a competent manner. In such cases, adequate and appropriate measures should be taken, such as obtaining professional consultation or assistance, and determine whether to limit, suspend, or terminate their JSOP-related duties.
 - 1. A positive example should be set at all times, especially when in front of children.
 - 2. The public display of affection and colorful language should be avoided in all cases that would deter the professionalism of the program.
- xx. All JSOP members must take reasonable steps to avoid harm to campers, families, community members, other follow volunteers, and so forth in order to minimize harm where it is foreseeable and unavoidable. No exploitation will be tolerated.
- xxi. In the event of an unforeseen circumstance such as illness, death, unavailability, relocation or retirement, all JSOP Board Members or Volunteers should make reasonable efforts to plan for facilitating JSOP events so that plans proceed in an uninterrupted manner.
- xxii. Any and all information collected from campers, families, and volunteers shall not be used for personal or commercial purposes nor exploited for personal profit or gain.
 - 1. All information gathered shall be confidential and all measures should be taken to ensure the privacy of said persons.
 - 2. The JSOP Board of Directors may disclose confidential information with the appropriate consent of the individual and/or the parents or another legally authorized person or guardian (when a participant is under 18 years of age) unless prohibited by law.
 - 3. However, Board Members and JSOP Volunteers do not disclose in their writings, talks or other public media, confidential, personally identifiable information concerning their campers or parents, volunteers, research participants, etc. unless:
 - a. Reasonable steps are taken to disguise the person or organization
 - b. The person or organization has consented in writing
 - c. There is legal authorization for doing so. This must also be in writing.
- xxiii. Before recording the voices or images of individuals to whom they provide services, JSOP Board members obtain proper written permission from all such persons and/or their legal representatives.
- xxiv. Public statements, including but not limited to, paid or unpaid advertising, endorsements, grant applications, license applications, other credentialing applications, brochures, printed matter, personal resumes or curricula vitae, or comments for use in media such as print or electronic transmission, statements in

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legal proceedings, lectures or public oral presentations and public materials shall not be made to be false, deceptive or fraudulent concerning their research, practice or other work activities or those of persons or organizations with which they are affiliated.

1. No false, deceptive or fraudulent statements concerning (1) their training, experience or competence; (2) their academic degrees; (3) their credentials; (4) their institutional or association affiliations; (5) their services; (6) the scientific basis for results or degree of success of their services; (7) their fees; or (8) their publications or research findings.
- xxv. Any public statements that promote JSOP activities and/or events must be created or placed with professional responsibility. It is the duty of the Board of Directors to ensure that all proper permission for advertising has been approved before any action is taken.
- xxvi. Any public comments via print, Internet or other electronic transmissions should have necessary precautions that ensure statements:
1. Are based on their professional knowledge, training or experience in accord with appropriate literature and practice
 2. Are otherwise consistent with the JSOP Code of Conduct and Mission
 3. Do not compromise the integrity of the program, participants, affiliates, Board Members, or volunteers.
- xxvii. Any in-person interactions and recruitments done on behalf of JSOP should be necessarily cautious and sensitive to the time, culture, beliefs, values, etc. of the individuals with whom one is interacting.
- xxviii. JSOP Board members create, and to the extent the records are under their control, maintain, disseminate, store, retain and dispose of records and data relating to their professional and scientific work.
1. This is to ensure to (1) facilitate provision of services later by their or others, (2) allow for replication of research design and analyses, (3) meet institutional requirements, (4) ensure accuracy of budgeting, and (5) ensure compliance with the law.
 2. If confidential information concerning participants is entered into databases or systems of records available to persons whose access has not been consented to by the recipient, the Board members must use coding or other techniques to avoid the inclusion of personal identifiers.
 3. Plans must be made in advance to facilitate the appropriate transfer and to protect the confidentiality of records and data in the event that Board members withdraw from their positions.
- xxix. All funding and budgeting should be maintained with reasonable steps to ensure the accuracy.
- xxx. Board Members responsible for the education and training programs must take reasonable steps to ensure that the programs are designed to provide the appropriate knowledge and proper experiences, and to meet the requirements set by the New Mexico Educational Standards. A current and accurate description of the program content, training goals and objectives, benefits, etc. must be met and readily available in writing to interested parties. Teachings should be accurate to the best of one's abilities, though modifications of course content and such may be altered when necessary or desirable.
- xxxi. Board Members do not require participants or volunteers to disclose personal information in JSOP-related activities, either orally or in writing. This includes, but is not limited to: Information regarding sexual history, history of abuse and neglect, psychological treatment, and relationships with parents, peers and spouses or significant others except if:
1. The information is necessary to evaluate or obtain assistance for those whose personal problems could reasonably be judged to be preventing

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them from performing their activities in a competent manner or posing a threat to the students or others.

- a. In this case, the need for this information must be presented to the individual from which it is requested in the form of a certified letter.
- xxxii. No weapons, concealed or otherwise, or any tools that may be used as weapons, will be allowed at any JSOP event. In the event that a participant is found to be armed, he/she will be immediately dismissed from the program.
- xxxiii. JSOP Board members are expected to attend at least 90% of Board meetings in order to coordinate effectively with other members and be up-to-date with their information. Any early dismissals, late arrivals, or absences must first be cleared with the Director.
- xxxiv. JSOP Board Members must establish a timely and specific process for collecting, analyzing, and presenting feedback from all participants (both Campers and Volunteers) regarding its events.
- xxxv. JSOP Board Members must receive informed consent, via a signed letter approved by the University of New Mexico Human Research Protections Office, to conduct any and all research with intent of forming a study.
 1. Deceptive practices in research are unacceptable.
 2. Board Members and Volunteers do not deceive prospective campers about research.
 3. No form of collecting data shall cause physical pain or severe emotional distress.
- xxxvi. During JSOP events all Volunteers and Board Members are expected to attend the Daily Volunteer Debrief Meetings to ensure that they are adequately prepared for their responsibilities. Board Members should be prepared to give these debriefs and should be readily present and available for any questions concerning such activities.
- xxxvii. JSOP Board Members and Volunteers will not present portions of another's work or data as their own. For each time any figures (pictures or otherwise), clauses, writing of any sort, and/or video, etc are used, a proper citation must be included.

Article V. Bylaws

Section 1 – Amendments

- A. Any Board Member can may present proposed amendments to the current Board of Directors.
- B. The current Board of Directors shall be in a unanimous vote in order for an amendment to be proposed to the Founding Board of Directors
 - a. The Founding Board of Directors shall be defined as the following individuals:
 - i. MJ Vargas – Director (mjvargas15@gmail.com)
 - ii. Christine Chung – Communications Coordinator (cchung08@gmail.com)
 - iii. Angie Swanson – Finance Coordinator (angelica.swanson88@gmail.com)
 - iv. Alexander Quinones – Volunteer Coordinator (quinones.alexander01@gmail.com)
 - v. Erinma Anyankah – Community Outreach (eanyankah@gmail.com)
 - vi. Gabriela Chacon – Curriculum Coordinator (gabmmsocket@gmail.com)
 - vii. Amy Adams – Multimedia Coordinator (amyeadams17@gmail.com)
- C. At least four of the above stated individuals must be present (in person, or via video conference) and unanimously agree to the proposed amendment before it is ratified.

Section 2 – Scheduled Evaluation of 2017

- A. After the JSOP summer science camp of 2017, during the month of August, the existing Board Members shall convene with a minimum of four Founding Board Members to reevaluate the Junior Scientist Outreach Program Bylaws and financial structure.

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- B. At this point a 5-year Financial Memorandum of Understanding with the University of New Mexico Department of Biology will have dissolved. Thus, at this point the general structure of the Junior Scientist Outreach Program shall be reevaluated to promote the further longevity of the program.

Section 3 – Autonomy of the Executive Board

- A. The Junior Scientist Outreach Program (JSOP) Board of Directors is to be declared a self-governed student organization.
- B. It is to be understood that the program is sponsored by Sandia National Laboratories and the University of New Mexico, Department of Biology, along with other community or student organizations, however, JSOP is to remain an autonomous organization.
- C. Stipulations on this actuality include the understanding of the prohibition of arranging a charter through the Associated Students of the University of New Mexico (ASUNM), or any other analogous organization.

Appendix II: Registration and Orientation Documents

Westside Community Center Registration Form (3 pages)

Program Location: **WEST SIDE COMMUNITY CENTER**

<p style="text-align: center;">PROGRAM(S) REGISTERING FOR: Please Check all that Apply</p> <p><input type="checkbox"/> Before School <input type="checkbox"/> After School</p> <p><input type="checkbox"/> Summer Regular <input type="checkbox"/> Junior Science Camp</p> <p><input type="checkbox"/> Summer Extended <input type="checkbox"/> Other (specify)</p>	<p style="text-align: center;">(Please Print) FATHER/GUARDIAN Authorized to pick-up child/children <input type="checkbox"/> yes <input type="checkbox"/> no</p> <p>Name: _____ Employer: _____</p> <p>Home Address: _____ Business Phone: _____ Email: _____</p> <p>City/State: _____ Zip: _____ Home Phone: _____ Cell: _____</p>
<p style="text-align: center;">(Please Print) FIRST CHILD</p> <p>Name: _____</p> <p>School: _____ Grade: _____ Age: _____</p> <p>Birth Date: _____ <input type="checkbox"/> Male <input type="checkbox"/> Female</p> <p>Will your child be <input type="checkbox"/> picked up <i>or</i> <input type="checkbox"/> walk home</p> <p>Does the child have a health condition(s) that our staff needs to be aware of? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, fill out medical information</p> <p>Does the child have a disability that requires accommodation? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, please identify:</p>	<p style="text-align: center;">(Please Print) MOTHER/GUARDIAN Authorized to pick-up child/children <input type="checkbox"/> yes <input type="checkbox"/> no</p> <p>Name: _____ Employer: _____</p> <p>Home Address: _____ Business Phone: _____ Email: _____</p> <p>City/State: _____ Zip: _____ Home Phone: _____ Cell: _____</p> <p style="text-align: center;">(Please Print) MEDICAL INFORMATION</p> <p>Child's Name: _____</p> <p>Child has the following condition(s): _____</p> <p>Current medication and time taken, special diet, allergies, treatment : _____</p> <p>Other Information: _____</p>
<p style="text-align: center;">(Please Print) SECOND CHILD</p> <p>Name: _____</p> <p>School: _____ Grade: _____ Age: _____</p> <p>Birth Date: _____ <input type="checkbox"/> Male <input type="checkbox"/> Female</p> <p>Will your child be <input type="checkbox"/> picked up <i>or</i> <input type="checkbox"/> walk home</p> <p>Does the child have a health condition(s) that our staff needs to be aware of? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, fill out medical information</p> <p>Does the child have a disability that requires accommodation? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, please identify:</p>	<p style="text-align: center;">(Please Print) THIRD CHILD</p> <p>Name: _____</p> <p>School: _____ Grade: _____ Age: _____</p> <p>Birthdate: _____ <input type="checkbox"/> Male <input type="checkbox"/> Female</p> <p>Does the child have a health condition(s) that our staff needs to be aware of? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, fill out medical information</p> <p>Does the child have a disability that requires accommodation? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, please identify:</p>
<p style="text-align: center;">(Please Print) EMERGENCY CONTACT</p> <p>Name: _____</p> <p>Relationship: _____</p> <p>Home Phone: _____ Work Phone: _____</p> <p>Cell Phone: _____ Pager: _____ Hospital: _____ Doctor: _____</p> <p>Insurance Company: _____</p>	<p>Describe any behaviors that might be affected or caused by the above: _____</p> <p>Child's limitations: _____</p> <p><i>If there are any changes in a child's health status during the year, parents must notify BCPR immediately.</i></p>

BCPR CUSTODIAL CARE INFORMATION

My Child/Children are under the custodial care of: (Check one) Both Parents Mother only Father only Other

I authorize the following people (other than the people listed on the front) to pick up my Child/Children. PLEASE NOTE: ALL authorized individuals must be at least 15 years old to sign out a program participant. Identification is required.

1.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone
2.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone
3.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone
4.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone
5.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone
6.	_____	_____	_____	_____
	Name	Relationship	Home Phone	Work Phone

Please list any persons who might attempt to pick up your Child/Children but are not authorized to do so: *Supporting documentation is required.*

1.	_____	_____
	Name	Relationship
2.	_____	_____
	Name	Relationship
3.	_____	_____
	Name	Relationship
4.	_____	_____
	Name	Relationship

****If there are any changes to these arrangements you must notify the community center immediately.**

Please Sign: _____ Date: _____

ADDITIONAL INFORMATION

PLEASE READ & SIGN

I will **not** hold Bernalillo County Parks & Recreation Department or its staff, including directors, managers, agents, representatives, or employee's responsible for any injuries and liabilities that may occur while participating in any activities held at the site, on field-trips or special events. I will not hold Bernalillo County responsible for any injuries, which may be sustained during *travel* between the site and an activity or other location. I further state that my child/children is capable and **can** participate in **all** BCPR activities.

Parent's Signature _____ Date _____

*****PARENTS MUST RETURN THIS PAGE WITH THE NECESSARY SIGNATURES*****

If participants do not follow the **Code of Conduct** and **Behavior Correction** is needed, staff will follow these advancing **Behavior Correction** steps. It should be clear that by not responding to staff, a participant could go from Level I to IV very quickly.

Level I

Verbal Warning

The specific inappropriate behavior is pointed out and the participant is given an explanation **why** this behavior is inappropriate. They will be asked to correct it. A verbal warning is given not to repeat the behavior. (If the behavior is **severe** enough, dependent on staff judgement, an Incident Report will be used and placed in the participant's file).

Level II

Removal from Group

After repeated verbal warning have been given with **no change** in the behavior, the participant is **removed from the group** in a "time out" fashion for 5-15 minutes. After this time out period, the participant is asked whether he/she wishes to rejoin the group and **change their behavior**. If yes, participant rejoins the group. If no, a **supervisor** is called. Level II Code of Conduct violation and above **automatically** results in the behavior being **documented** using an **Incident Report**. It is placed in the participant's file. Parent's will be called and informed of the situation.

Level III

Conference

Verbal warnings and removal from the group have proven **unsuccessful**. At this level, parents will be called in for an **immediate conference**. This may include one or all of the Center's Administrative Team, participant and possibly the staff person on shift when the incident occurred. An **Action Plan** will be developed **at that time**. It will include the following:

1. specific behavior that needs to be corrected
2. how this will be accomplished
3. time frame in which specified behavior must be changed

All notes/documentation from this meeting, with signatures, will be placed in the participant's file.

Level IV

Suspension or Termination

After the above steps have been attempted, **with no change in behavior**, the Manager will suspend the participant for 1-30 days **or terminate their involvement at the center**. The Director or Assistant Directors for Bernalillo County Parks and Recreation may review this action. **Prior** to the participants **returning** to the center, a **parent-participant-staff** conference will be scheduled and a **revised** action plan will be established.

Please note: In cases of behavior being **more severe or criminal in nature**, the participant may well skip other levels and be suspended or terminated from participation of some or all activities at BCPR facilities.

I parent/guardian of _____ have carefully read, understand and will provide support to BCPR so that my child/children participating at the center complies with the **Code of Conduct** and understands the **Behavior Correction Levels**.

*****Parent Signature** _____ **Date** _____

*****Participant Signature** _____ **Date** _____

Waiver of Liability for Campers

Junior Scientist Outreach Program

Department of Biology, University of New Mexico



WAIVER OF LIABILITY AND ASSUMPTION OF RISK

I, _____ (name of parent), am voluntarily allowing my child, _____ (name of child) to participate in the **Event Name** with the Junior Scientist Outreach Program. I recognize and assume the risks of my child's participation in **describe characteristics of the event**. On behalf of myself, my family, heirs, representatives, executors, administrators and all other persons making any claim by reason of relationship to me, I hereby release The Junior Scientist Outreach Program, University of New Mexico, Sandia National Laboratories, and any of their affiliates, subdivisions, officers, directors, employees, advisors, agents and/or representatives from any claims, damages, costs including attorneys' fees, or other liabilities resulting from personal injury, property damage, or other losses of any kind in any way connected with my child's participation in this event. I have carefully reviewed this form in its entirety and by signing below agree to its terms with full understanding of its meaning and effect. Intending to be legally bound, I am signing this Waiver of Liability and Assumption of Risk in consideration of my child's participation in this event.

Signature: _____ **Date:** _____

JSOP Photo Release for all Participants



PHOTO RELEASE FORM

Permission to Use Photographs and/or Videos

Event: _____

Location: _____

I grant to the Junior Scientist Outreach Program (JSOP) and its photographers, Jobette Chour and Amy Adams, the right to take photographs of me and/or my family in connection with the above-identified event. I authorize JSOP, its assigns and transferees to copyright, use, and publish the same in print and/or electronically.

I agree that JSOP and its photographers, Jobette Chour and Amy Adams, may use such media of me, with or without my name, and for any lawful purpose, including for example, such purposes as publicity, illustration, advertising, educational promotion, and web content.

By signing below you certify that you have read, understand and agree to the statements above:

Participant Signature: _____

Printed Name: _____

Address: _____

Date: _____

Parent or Guardian (if under age 18):

Signature: _____

Printed Name: _____

Waiver of Liability for Volunteers from Bernalillo County



Volunteer Liability Waiver

I, _____, am hereby offering to serve as a volunteer for the County of Bernalillo with the Parks & Recreation Department.

In consideration for allowing my participation in any Bernalillo County program, I hereby release, waive and discharge the County of Bernalillo, its elected officials, employees and agents and representatives all liability, loss, damages, claims or demands on account of any injury that I may receive whether caused by the negligence of the County of Bernalillo, its employees, agents or any other entity or person, regardless of whether liability is sole, joint or several. I further agree not to sue the County of Bernalillo, its elected officials, employees, agents or as a result of any such injury which results from participation in any program of the County. I understand and agree that to the extent that any injury that I may receive is covered by worker's compensation insurance that the remedies available under the Worker's Compensation Act are my sole and exclusive remedies and I waive and release any right that I may have to seek additional or alternative relief.

I have read this release and understand all its terms. I execute it voluntarily and with full knowledge of its significance and legal consequences. I execute this release on the date indicated below.

Parent/Guardian Signature (if under 18) _____ Date _____

Participant's Signature _____ Date _____

Volunteer Name (print) _____

Phone Number _____

E-mail _____

Revision: 09-16-2008
Approved by Legal & HR

Appendix III: Documents for the Curriculum

NM State Educational Standards for 4th and 5th Grade Science From The New Mexico State Department of Education (NMSDE, 2003): Also available online at www.mystandards.org

Content of Science Standard 1

Students will understand the structure and properties of matter, the characteristics of energy and the interactions between matter and energy. Students will:

1. Recognize that matter has different forms and properties;

4th Grade

- i. Know that changes to matter may be chemical or physical, and when two or more substances are combined, a new substance may be formed with properties that are different from those of the original substances (e.g., white glue and borax, cornstarch and water, vinegar and baking soda);
- ii. Know that materials are made up of small particles (atoms and molecules) that are too small to see with the naked eye;
- iii. Know that the mass of the same amount of material remains constant whether it is together, in parts or in a different state;

1. Know the forms and properties of matter and how matter interacts;

5th Grade

- i. Describe properties (e.g., relative volume, ability to flow) of the three states of matter;
- ii. Describe how matter changes from one phase to another (e.g., condensation, evaporation);
- iii. Know that matter is made up of particles (atoms) that can combine to form molecules and that these particles are too small to see with the naked eye;
- iv. Know that the periodic table is a chart of the pure elements that make up all matter;
- v. Describe the relative location and motion of the particles (atoms and molecules) in each state of matter;
- vi. Explain the relationship between temperature and the motion of particles in each state of matter;

2. Know that energy is needed to get things done and that energy has different forms;

4th Grade

- i. Identify the characteristics of several different forms of energy and describe how energy can be converted from one form to another (e.g., light to heat, motion to heat, electricity to heat, light or motion);
- ii. Recognize that energy can be stored in many ways (e.g., potential energy in gravity or springs, chemical energy in batteries);
- iii. Describe how some waves move through materials (e.g., water, sound) and how others can move through a vacuum (e.g., x-ray, television, radio);
- iv. Demonstrate how electricity flows through a simple circuit (e.g., by constructing one);

2. Explain the physical processes involved in the transfer, change and conservation of energy;

5th Grade

- i. Know that heat is transferred from hotter to cooler materials or regions until both reach the same temperature;
- ii. Know that heat is often produced as a by-product when one form of energy is converted to another form (e.g., when machines or organisms convert stored energy into motion);
- iii. Know that there are different forms of energy;
- iv. Describe how energy can be stored and converted to a different form of energy (e.g., springs, gravity) and know that machines and living things convert stored energy to motion and heat;

3. Identify forces and describe the motion of objects;

4th Grade

- i. Know that energy can be carried from one place to another by waves (e.g., water waves, sound waves), by electric currents and by moving objects;
- ii. Describe the motion of an object by measuring its change of position over a period of time;
- iii. Describe how gravity exerts more force on objects with greater mass (e.g., it takes more force to hold up a heavy object than a lighter one);
- iv. Describe how some forces act on contact and other forces act at a distance (e.g., a person pushing a rock versus gravity acting on a rock).

3. Describe and explain forces that produce motion in objects;

5th Grade

- i. Understand how the rate of change of position is the velocity of an object in motion;
- ii. Recognize that acceleration is the change in velocity with time;
- iii. Identify forces in nature (e.g., gravity, magnetism, electricity, friction);
- iv. understand that, when a force (e.g., gravity, friction) acts on an object, the object speeds up, slows down or goes in a different direction;
- v. identify simple machines and describe how they give advantage to users (e.g., levers, pulleys, wheels and axles, inclined planes, screws, wedges);

Content of Science Standard 2

Students will understand the properties, structures and processes of living things and the interdependence of living things and their environments. Students will:

1. Know that living things have diverse forms, structures, functions and habitats;

4th Grade

- i. Explain that different living organisms have distinctive structures and body systems that serve specific functions (e.g., walking, flying, swimming);
- ii. Know that humans and other living things have senses to help them detect stimuli, and that sensations (e.g., hunger) and stimuli (e.g., changes in the environment) influence the behavior of organisms;
- iii. Describe how roots are associated with the intake of water and soil nutrients, and how green leaves are associated with making food from sunlight (photosynthesis);
- iv. Describe the components of and relationships among organisms in a food chain (e.g., plants are the primary source of energy for living systems);
- v. Describe how all living things are made up of smaller units that are called cells;

1. Explain the diverse structures and functions of living things and the complex relationships between

living things and their environments;

5th Grade

- i. Identify the components of habitats and ecosystems (producers, consumers, decomposers, predators);
- ii. Understand how food webs depict relationships between different organisms;
- iii. Know that changes in the environment can have different effects on different organisms (e.g., some organisms move, some survive, some reproduce, some die);
- iv. Describe how human activity impacts the environment;

2. Know that living things have similarities and differences, and that living things change over time;

4th Grade

- i. Know that, in any particular environment, some kinds of plants and animals survive well, some survive less well and others cannot survive at all;
- ii. Know that a change in physical structure or behavior can improve an organism's chance of survival (e.g., a chameleon changes color, a turtle pulls its head into its shell, a plant bends toward the light);
- iii. Describe how some living organisms have developed characteristics from generation to generation to improve chances of survival (e.g., spines on cacti, long beaks on hummingbirds, good eyesight on hawks);

2. Understand how traits are passed from one generation to the next and how species evolve;

5th Grade

- i. Know that plants and animals have life cycles that include birth, growth and development, reproduction and death, and that these cycles differ for different organisms;
- ii. Identify characteristics of an organism that are inherited from its parents (e.g., eye color in humans, flower color in plants) and other characteristics that are learned or result from interactions with the environment;
- iii. Understand that heredity is the process by which traits are passed from one generation to another;

3. Know the parts of the human body and their functions;

4th Grade

- i. Know that the human body has many parts that interact to function as systems (e.g., skeletal, muscular) and describe the parts and their specific functions in selected systems (e.g., the nose, lungs and diaphragm in the respiratory system);
- ii. Recognize that the human body is organized from cells, to tissues, to organs, to systems, to the organism.

3. Understand the structure of organisms and the function of cells in living systems;

5th Grade

- i. Understand that all living organisms are composed of cells from one to many trillions, and that cells are usually only visible through a microscope;
- ii. Know that some organisms are made of a collection of similar cells that cooperate (e.g., algae) while other organisms are made of cells that are different in appearance and function (e.g., corn, birds);

- iii. Describe the relationships among cells, tissues, organs, organ systems, whole organisms and ecosystems;

Content of Science Standard 3

Students will understand the structure of earth, the solar system and the universe, the interconnections among them and the processes and interactions of earth's systems. Students will:

1. Know the structure of the solar system and the objects in the universe;

4th Grade

- i. Understand that the number of stars visible through a telescope is much greater than the number visible to the naked eye;
- ii. Know that there are various types of telescopes that use different forms of light to observe distant objects in the sky;
- iii. Know that the pattern of stars (e.g., constellations) stays the same although they appear to move across the sky nightly, due to earth's rotation;

1. Describe how the concepts of energy, matter and force can be used to explain the observed behavior of the solar system, the universe and their structures;

5th Grade

- i. Know that many objects in the universe are huge and are separated from one another by vast distances (e.g., many stars are larger than the sun, but so distant that they look like points of light);
- ii. Understand that earth is part of a larger solar system, which is part of an even larger galaxy (milky way), which is one of many galaxies;
- iii. Know that there have been manned and unmanned journeys to space and to the moon;

2. Know the structure and formation of earth and its atmosphere and the processes that shape them;

4th Grade

- i. Know that the properties of rocks and minerals reflect the processes that shaped them (e.g., igneous, metamorphic and sedimentary rocks);
- ii. Describe how weather patterns generally move from west to east in the United States;
- iii. Know that local weather information describes patterns of change over a period of time (e.g., temperature, precipitation symbols, cloud conditions, wind speed/direction).

2. Describe the structure of earth and its atmosphere, and explain how energy, matter and forces shape earth's systems;

5th Grade

- i. Understand that water and air relate to earth's processes, including: how the water cycle relates to weather, and how clouds are made of tiny droplets of water, like fog or steam;
- ii. Know that air is a substance that surrounds earth (atmosphere), takes up space and moves, and that temperature fluctuations and other factors produce wind currents;
- iii. Know that most of earth's surface is covered by water, that most of that water is salt water in oceans, and that fresh water is found in rivers, lakes, underground sources and glaciers;
- iv. Recognize that the seasons are caused by earth's motion around the sun and the tilt of earth's axis of rotation;

Science and Society Standard 1

Students will understand how scientific discoveries, inventions, practices and knowledge influence and are influenced by individuals and societies. Students will:

1. Describe how science influences decisions made by individuals and societies;

4th Grade

- i. Know that science has identified substances called pollutants that get into the environment and can be harmful to living things;
- ii. Know that, through science and technology, a wide variety of materials not appearing in nature have become available (e.g., steel, plastic, nylon, fiber optics);
- iii. Know that science has created ways to store and retrieve information (e.g., paper and ink, printing press, computers, CD-ROMs) but that these are not perfect (e.g., faulty programming, defective hardware);
- iv. Know that both men and women of all races and social backgrounds choose science as a career.

5th Grade

- i. Describe the contributions of science to understanding local or current issues (e.g., watershed and community decisions regarding water use);
- ii. Describe how various technologies have affected the lives of individuals (e.g., transportation, entertainment, health);

Scientific Thinking and Practice Standard 1

Students will understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting and validating in order to think critically. Students will:

1. Use scientific methods to observe, collect, record, analyze, predict, interpret and determine reasonableness of data;

4th Grade

- i. Use instruments to perform investigations (e.g., timers, balances) and communicate findings;
- ii. Differentiate observation from interpretation and understand that a scientific explanation comes in part from what is observed and in part from how the observation is interpreted;
- iii. Conduct multiple trials to test a prediction, draw logical conclusions and construct and interpret graphs from measurements;
- iv. Collect data in an investigation using multiple techniques, including control groups, and analyze those data to determine what other investigations could be conducted to validate findings;

5th Grade

- i. Plan and conduct investigations, including: formulating testable questions, making systematic observations, developing logical conclusions and communicating findings;
- ii. Use appropriate technologies (e.g., calculators, computers, balances, spring scales, microscopes, etc.) to perform scientific tests and to collect and display data;
- iii. Use graphic representations (e.g., charts, graphs, tables, labeled diagrams) to present data and produce explanations for investigations;
- iv. Describe how credible scientific investigations use reproducible elements including single variables, controls and appropriate sample sizes to produce valid scientific results;
- v. Communicate the steps and results of a scientific investigation;

2. Use scientific thinking and knowledge and communicate findings;

4th Grade

- i. Communicate ideas and present findings about scientific investigations that are open to critique from others;
- ii. Describe how scientific investigations may differ from one another (e.g., observations of nature, measurements of things changing over time);
- iii. Understand how data are used to explain how a simple system functions (e.g., a thermometer to measure heat loss as water cools);

2. Understand the processes of scientific investigation and how scientific inquiry results in scientific knowledge;

5th Grade

- i. Understand that different kinds of investigations are used to answer different kinds of questions (e.g., observations, data collection, controlled experiments);
- ii. Understand that scientific conclusions are subject to peer and public review;

3. Use mathematical skills and vocabulary to analyze data, describe patterns and relationships and communicate findings;

4th Grade

- i. Conduct multiple trials using simple mathematical techniques to make and test predictions;
- ii. Use mathematical equations to formulate and justify predictions based on cause-and-effect relationships;
- iii. Identify simple mathematical relationships in a scientific investigation (e.g., the relationship of the density of materials that will or will not float in water to the density of water).

3. Use mathematical ideas, tools and techniques to understand scientific knowledge;

5th Grade

- i. Use appropriate units to make precise and varied measurements;
- ii. Use mathematical skills to analyze data;
- iii. Make predictions based on analyses of data, observations and explanations;
- iv. Understand the attributes to be measured in a scientific investigation and describe the units, systems and processes for making the measurement;

Protocols for all previously used Experiments (Next 32 pages)



Solar System Mobile

By: Gabriela Chacon

Supply List: (for 100 campers)

100 round pieces of cardboard about 1 ft across
Construction paper for 8 different planets and a sun for 100 kids
100 scissors
Tape (around 50 rolls)
String (about 1200 ft.)
100 markers or pens or pencils

Protocol:

- Find the center of the large cardboard circle by drawing a line from top to bottom and a line from right to left. Where these two lines meet is the center of the circle. This will be the position of the Sun.
- Using a compass, draw the orbits of the 9 planets (draw circles around the center of the piece of cardboard).
- The first 4 planets orbit relatively close to the Sun, then there is a gap (this is where the asteroids orbit). Then the last 5 planets orbit very far from the Sun.
- Using the sharp point of scissors punch a series of holes in the cardboard. First punch a hole in the center (this is where the Sun will hang). Then punch one hole somewhere on each circle (orbit); a planet will hang from each hole.
- Cut circles from construction paper to represent the Sun and each of the planets. Since the range in size of the Sun and the planets is far too large to represent accurately, just make the Sun the biggest. Make Jupiter, Saturn, Uranus, and Neptune a bit smaller than the Sun. Make the remainder of the planets much smaller. Saturn has beautiful rings.
- Write the name of each planet on its back.
- Tape a length of string to each planet (and the Sun)
- Lace the other end of each string through the correct hole in the large cardboard circle (Mercury goes in the inner orbit, Venus goes in the second orbit, Earth goes in the third, etc.). Tape the end of the string to the top side of the cardboard
- After all the planets (and the Sun) are attached, adjust the length of the strings so that the planets (and Sun) all lie in a plane
- To hang your model, tie three pieces of string to the top of the cardboard - then tie these three together. Tie them to a longer string (from which you'll hang your model).

References:

Enchanted Learning. 2001. Solar System Model. Web. 17 April 2012
<<http://www.enchantedlearning.com/crafts/astronomy/solarsystemmodel/>>

DNA Isolation from Strawberries

Developed by Diane Sweeney

http://www.caseciw.org/first_light_case/horn/strawberries/strawbdnproc.html

Teacher Background

This is a simple, effective protocol for spooling DNA. Ripe strawberries are an excellent source for extracting DNA because they are easy to pulverize and contain enzymes called pectinases and cellulases that help to break down cell walls. And most important, strawberries have eight copies of each chromosome (they are octoploid), so there is a lot of DNA to isolate.

The purpose of each ingredient in the procedure is as follows:

Shampoo or dishwasher soap helps to dissolve the cell membrane, which is a lipid bilayer.

Sodium chloride helps to remove proteins that are bound to the DNA. It also helps to keep the proteins dissolved in the aqueous layer so they don't precipitate in the alcohol along with the DNA.

Ethanol or isopropyl alcohol causes the DNA to precipitate. When DNA comes out of solution it tends to clump together, which makes it visible. The long strands of DNA will wrap around the stirrer or transfer pipet when it is swirled at the interface between the two layers.

Notes on Materials and Recipes

- Use Ziploc™ freezer bags rather than sandwich bags, as they are thicker.
- Fresh or frozen strawberries can be used. Be sure to thaw the frozen berries at room temperature. Bananas or kiwi fruit can also be used but yield less DNA.
- Use non-iodized table salt or laboratory-grade sodium chloride.
- 95% ethanol or 91 or 100% isopropyl alcohol can be used to precipitate the DNA. Isopropyl alcohol can be purchased from a pharmacy. Whichever you use, make sure it is ice cold by placing in an ice-water bath or in the freezer.

DNA Extraction Buffer

- 100 ml (3/8 cup) shampoo (without conditioner) or 50 ml dishwasher detergent
- 15 grams sodium chloride (2 teaspoons)
- water to 1 liter

DNA Isolation from Strawberries

Student Directions

Materials per student group

- 1-3 strawberries (about the volume of a golf ball). Frozen strawberries should be thawed at room temperature.
- 10 ml DNA Extraction Buffer (soapy salty water)
- about 20 ml ice cold 91% or 100% isopropyl alcohol
- 1 Ziploc™ bag
- 1 clear test tube
- 1 funnel lined with a moistened paper towel
- 1 coffee stirrer or transfer pipet

Directions

1. Remove the green sepals from the strawberries.
2. Place strawberries into a Ziploc™ bag and seal shut.
3. Squish for a few minutes to completely squash the fruit.
4. Add 10 ml DNA Extraction Buffer (soapy salty water) and squish for a few more minutes. Try not to make a lot of soap bubbles.
5. Filter through a moistened paper towel set in a funnel, and collect the liquid in a clear tube. *Do not* squeeze the paper towel. Collect about 3 ml liquid.
6. Add 2 volumes ice cold isopropyl alcohol to the strawberry liquid in the tube. Pour the isopropyl alcohol carefully down the side of the tube so that it forms a separate layer on top of the strawberry liquid.
7. Watch for about a minute. What do you see? You should see a white fluffy cloud at the interface between the two liquids. That's DNA!
8. Spin and stir the coffee stirrer or transfer pipet in the tangle of DNA, wrapping the DNA around the stirrer.
9. Pull out the stirrer and transfer the DNA to a piece of saran wrap or clean tube. The fibers are thousands and millions of DNA strands.
10. To view in a microscope, put the glob on a clean slide and gently tease/stretch apart using 2 toothpicks or dissecting pins. The fibers will be easier to see in the teased-apart area.
11. Rinse your funnel. Put the Ziploc™ bag and paper towel in the garbage.



Gingerbread Genetics Protocol

By: Gabriela Chacon and MJ Vargas

Adopted from the Junior Scientist Outreach Program 2010, Director: Stephen Bergin

Materials:

8 colors of frosting (one or two tubes of each color is sufficient for *many* children)
Gingerbread-shaped cookie for every child

Procedure:

- There will be four stations, one for each body part
- Stations:
 1. Eyes: blue/green icing
 2. Hair: yellow/black icing
 3. Buttons: purple/orange icing
 4. Mouth: red/pink icing
- 3 groups will go to the eyes station, 3 to the hair one, etc. (3 groups to each of the 4 stations for a total of 12 groups of 8 or 9 children each)
- Each group will remain in each station for approximately 8 minutes and then rotate.
- In each station, counselor will show children how to determine what color they decorate their gingerbread man with using recessive and dominant principles
 - Eyes: blue=dominant, green recessive
 - Hair: black=dominant, yellow recessive
 - Buttons: purple=dominant, orange recessive
 - Mouth: red=dominant, pink=recessive
 - Heads=dominant; tails= recessive
- Which color?
 - Flip each coin twice for each camper
 - If you get two tails, that is recessive, so choose the recessive color
 - If you get one of each, it is a heterozygote, but the phenotype will still be dominant. Choose the according dominant color
 - If both are heads, choose the dominant color

- Rotation will be in the following order: eyes to hair, hair to buttons, buttons to mouth and mouth to eyes
- This means the stations will have to be placed in that order so that transitions are easily done

Gingerbread Genetics Punnett Square

Eyes	Hair
Buttons	Mouth

AA = Homozygous Dominant
Aa = Heterozygous
aa = Homozygous Recessive

HEADS = Dominant
TAILS = Recessive

Eyes:
Blue = Dominant
Green = Recessive

Hair:
Black = Dominant
Yellow = Recessive

Buttons:
Purple = Dominant
Orange = Recessive

Mouth:
Red = Dominant
Pink = Recessive

Lesson: Wind Energy

Assembled by Matt Solomon

Purpose: To provide a general understanding of wind energy and mechanics as well as its roll in sustainability to provide a renewable and clean energy source. Describe the general structure of a wind turbine and the different ways it can be used. Emphasize again why this important in the big picture of protecting the planet. Diagram the different parts of a wind turbine and the importance of each. Define and describe fossil fuels and why they are not the best option for energy production. What are some careers in the field of wind energy and what are the educational steps required to obtain a career in this field.

Lecture: 5 mins

Fossil fuels are fuels formed by natural processes such as anaerobic decomposition of buried dead organisms. These take millions of years to make and they are being depleted much faster than being made. (Q1) Not only are they very limited but they also are bad for the environment and are known to cause 90% of the greenhouse gas emissions (Q2). Contributes to global warming; (Q3) They also produce nitrous and sulfur oxides which are a cause for acid rain which affects both natural and industrialized environments.

Years of production left in the ground with the current proved reserves

- Coal: 148 years
- Oil: 43 years
- Natural gas: 61 years

Wind is a renewable energy source because the energy produced is provided by a natural resource and there are limitless amounts of wind. Airflow can be used to run wind turbines. (?4)

Questions to motivate response and critical thinking

#1. What are some of the most common fossil fuels?

A: Coal, petroleum and natural gasses

#2. Name a couple of the greenhouse gasses.

A: Methane, CO₂, ozone

#3. How is the earth like a greenhouse?

A: Earth's atmosphere does the same thing as the greenhouse. Gases in the atmosphere such as carbon dioxide do what the roof of a greenhouse does. During the day, the Sun shines through the atmosphere. Earth's surface warms up in the sunlight. At night, Earth's surface cools, releasing the heat back into the air. But some of the heat is trapped by the greenhouse gases in the atmosphere.

#4. Where would be the best location for a wind farm?

A: coastal areas, at the tops of rounded hills, open plains and gaps in mountains - places where the wind is strong and reliable. Some are offshore.

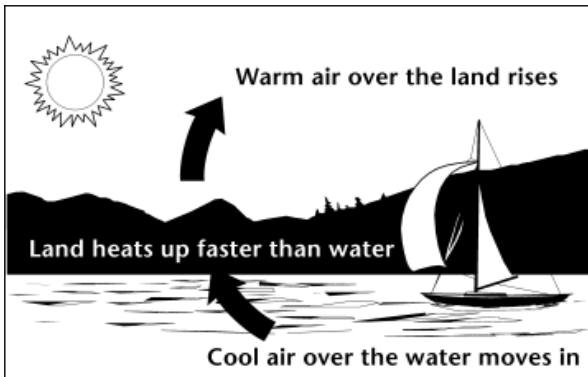
Cup Copters: 15 mins

Materials:

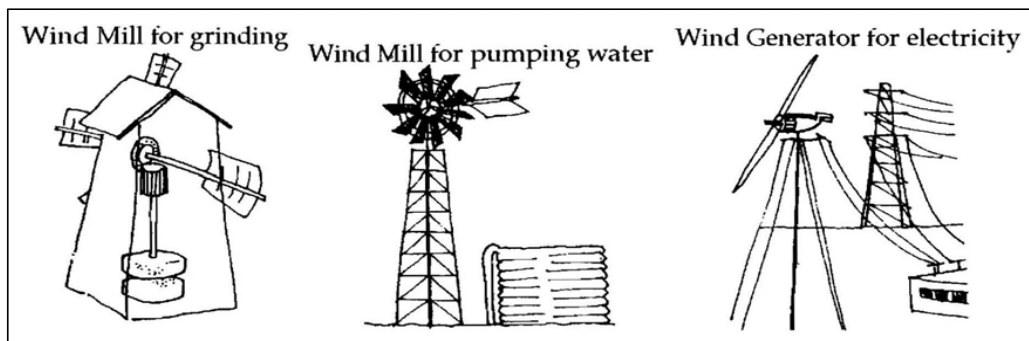
- Fan
- Wind concentrator
- Bathroom cups
- Scissors (normal and ones with ridges)
- Wire screen
- Tape
- Windmill cut out for wind demonstration
- Pencil
- Nail
- Yardstick

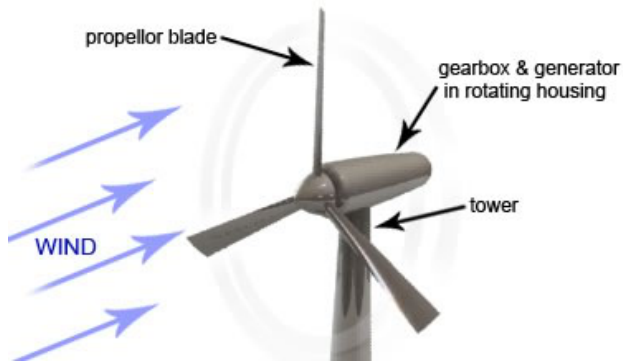
Procedure:

1. Define the difference between drag, lift and weight
2. Show an example of the paper cutout windmill in the fan
3. Pass around the different pictures of most innovative wind turbines
4. Pass out the materials and allow the kids to get creative with making different designs that they think will create the best cup copter
5. At the end of the day have a cup copter contest to determine the highest-flying cup copter
Prizes will be given to the highest flying copter and the most unique and creative design.

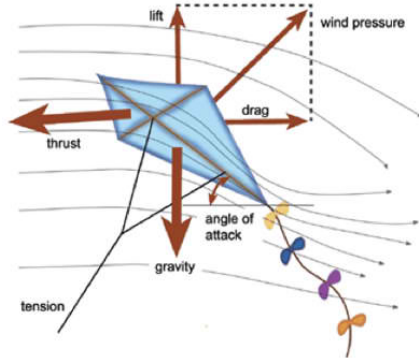


Below: The wind blows the propellor round, which turns a generator to produce electricity





Lift is the upward force that pushes a kite into the air. Lift is generated by differences in air pressure, which are created by air in motion over the body of the kite. Kites are shaped and angled so that the air moving over the top moves faster than the air moving over the bottom.



Drag is the backward force that acts opposite to the direction of motion. Drag is caused by the difference in air pressure between the front and back of the kite and the friction of the air moving over the surface of the kite.

Weight is the downward force generated by the gravitational attraction of the Earth on the kite. The force of weight pulls the kite toward the center of the Earth.

Since the speed of the air above the kite is greater than the speed of air below, the pressure above is less than the pressure below and the kite is pushed into the air

Dry Ice Comet Demonstration

Comets are composed of frozen water and gases, dust and rock, and a variety of organic materials. Heating from our Sun vaporizes frozen gases and water on the surface of comets. Solar wind sweeps the dust and gas of the coma into trailing tails. Because the solar wind always flows outward from our Sun's surface, the tails always point away from our Sun no matter what direction the comet is moving in its orbit. This means that the tails can be in front of the comet as the comet moves away from our Sun on its return to the outer part of its orbit.

Comet tails increase in length as the comet gets closer to the Sun.

This activity will introduce children to the structure of comets and the interactions between comets and our Sun. This demonstration provides a visual model of comets, particularly illustrating how the length and direction of a comet's tail varies in relationship to the comet's location relative to our Sun. It also helps the children gain a better understanding of the composition of comets.

This demonstration uses dry ice and should be conducted by an adult facilitator. Adult supervision is required at all times!

What You Need:

- ☞ 5 pounds of dry ice
- ☞ Mallet
- ☞ Eye protection
- ☞ Thick work gloves or insulated rubber gloves
- ☞ Plastic bowl - large
- ☞ Paper grocery bag
- ☞ 13 gallon garbage bag
- ☞ Pie pan or flat tray
- ☞ 1 liter (34 ounces) of water
- ☞ 1 cup of soil
- ☞ Dash of ammonia
- ☞ Dash of alcohol
- ☞ Dash of dark corn syrup
- ☞ Hairdryer with a low or cool setting
- ☞ Strong flashlight

What to Do to Create Dry Ice Comet:

Caution: Do Not Touch Dry Ice Without Protective Gloves

- ☞ Put on safety glasses and gloves. Ask the children to maintain a safe distance while still being able to see the demonstration.
- ☞ Put the dry ice into the paper grocery bag and crush it to a fine-grained consistency using the mallet. (The finer the texture, the better.)
- ☞ Line the large plastic bowl with the plastic garbage bag.
- ☞ Pour the following liquid ingredients into the garbage bag: half of the water, ammonia (warn the children about the strong smell!), alcohol, and the corn syrup. Next, add the soil.
- ☞ **Explain that each of the materials mixed into the model represents the actual components of comets – different types of ices, rock and dust, ammonia, organics - in somewhat realistic amounts.**



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http://www.lpi.usra.edu/education/space_days

What to Do to Create Dry Ice Comet (cont'd):

- ☞ Carefully add in half of the crushed dry ice and mix well with other ingredients by kneading the outside of the garbage bag.
- ☞ **The dry ice will create a cool, cloudy vapor that is safe to touch. This vapor cloud represents the outgassing of the comet that forms the coma and gas tail as a comet approaches our Sun.**
- ☞ Add in the rest of the dry ice and mix well by kneading the outside of the garbage bag.
- ☞ Add in the rest of the water. It may be necessary to add a bit more water if the comet ball does not stick together.
- ☞ The water/dry ice slush will start to thicken as the dry ice freezes the water.
- ☞ Close the garbage bag around the comet and shape it into a ball.
- ☞ Carefully remove the comet ball and place it in the pie pan or tray.

What to do for the Demonstration:

- ☞ Holding the flashlight and hairdryer "Sun" (on low or cool setting) next to each other, point them toward the comet model from about 18 inches away. Turn out the lights to create a more dramatic visual effect. Move the hairdryer closer and farther from the dry ice ball.
- ☞ **The flashlight represents our Sun and the hairdryer represents the solar wind.**
- ☞ **Potential Misconception Alert: Make sure the children understand that our Sun does not "blow" a wind, but that the solar wind is instead a stream of particles, constantly coming from our Sun, that exert a very small pressure on matter.**
- ☞ Ask a few children to hold the flashlight/hairdryer "Sun." Holding the comet with gloves, walk in an ellipse around the "Sun." Comets trace long elliptical orbits around our Sun. The children will need to keep the hairdryer and flashlight aimed at the dry ice throughout your orbit, but they should stay in the same spot. Make sure to walk far enough away so there is no effect from the blow drier. Far from the Sun, comets do not have tails.
- ☞ Ask the children to focus on the changing orientation of the comet's tail relative to the Sun throughout the orbit. No matter where the comet is, the tail always points away from the Sun – so sometimes the tail "follows" the comet, and sometimes it is ahead of the comet! Prompt the children to notice how the tail is longer when the comet is close to the Sun and that it gets shorter and shorter as the comet moves away from the Sun.



Paper Comet Protocol

By: Gabriela Chacon

Materials:

Paper Comet worksheet for each participant

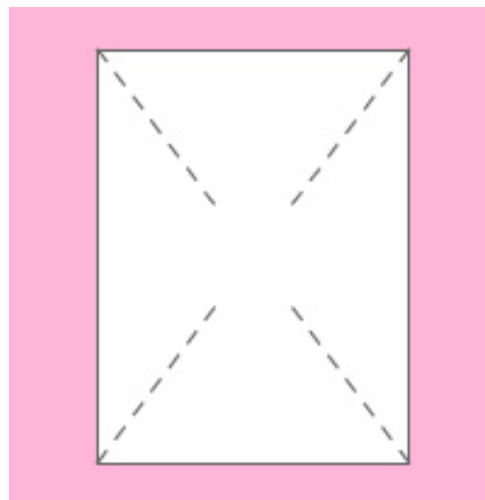
Scissors

Straw

Hairdryer

Method:

- Cut slits in the paper from each corner leaving a space in the middle (like the drawing).
- Lay the strips across the paper over the slits to make an "X."
- Put a piece of tape across the "X" to hold the strips on to the paper.
- Crumple the paper into a comet shape. Make sure that your strips stay on the outside.
- Use the scissors to poke a hole through the comet.
- Push the straw into the hole.
- Hold the comet by the straw.
- Use a hairdryer to show how the Sun's energy makes parts of the comet blow off to a tail. (Let the adult plug the dryer into the socket.)



Optional:

- Here is something you can do with a friend. He or she can be the Sun. Walk around the Sun holding the comet. The Sun's energy should blow on your comet as you walk.
- See how the tail moves as you get closer to the Sun.

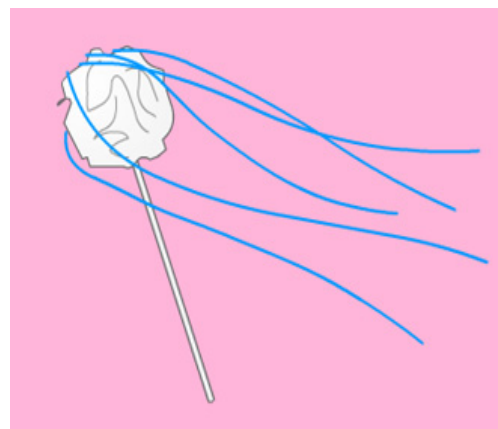


Photo credits: www.nasa.com

Sourced from:

National Aeronautics and Space Administration. 2009. "Paper Comet Model."

<<http://www.nasa.gov/audience/forstudents/k-4/playandlearn/paper-comet.htm>>

Gum Removal Experiment Protocol

Modified and Revised by: Samana Tasnim and Amy Adams.



Introduction: Students remove gum from provided pieces of hair in their small groups while rotating through stations (~ 8 min at each station). Volunteer presenters assigned for this experiment need to determine how the small groups will progress through each station.

*****The number of reagents tested in this experiment is arbitrary, as long as the test includes at least one hydrophobic reagent and one hydrophilic reagent. We chose to test six reagents plus a control (the control is simply an attempt to remove gum from hair without the aid of any reagents), which is why this protocol calls for 7 pieces of hair and 7 pieces of gum per group.

Total number of big Groups= 12 divided among small groups as follows:-

- 8 groups of 8 kids.
- 4 groups of 9 kids.

Experiment Goals: Determine which reagent is best for removing gum from hair and why. The volunteer leading this experiment should know how a hydrophobic substance reacts to a hydrophilic substance vs. how it reacts to another hydrophobic substance. This concept will explain why some reagents work better than others, and it should be explained to the campers in a way that is easy to follow after the experiment is over.

Materials needed per group:

- 1 weft of real or fake hair cut into 7 pieces. (total=214 pieces of hair needed)
***NOTE: The pieces of hair should be a minimum of 1 inch long, but longer hair is easier to work with. Pieces of hair 2-3 inches long have worked well for this experiment before. Each piece of hair should be as thick as necessary to stick to a piece of gum, usually about $\frac{1}{4}$ - $\frac{1}{2}$ of a millimeter.
- 1 stick of gum divided into 7 segments (to be chewed and placed in hair).
- Butter and Mayonnaise
***NOTE: There will be one plastic knife for butter, and one plastic knife for mayo. Each group should receive only one knife full of butter, and one knife full of mayo. Volunteers handling the butter and mayo should monitor this in order to ensure that there is enough to go around.
- $\frac{1}{2}$ of a small paper cup of tap water
- $\frac{1}{2}$ of a small paper cup of soapy water
- 1 teaspoon of olive oil
- 1 teaspoon of canola oil
- 1 Paper towel. (total=3 rolls)

Gum Removal Experiment Protocol

Modified and Revised by: Samana Tasnim and Amy Adams.

- 1-2 paper bowls or cups (to catch the oil when it is poured over the hair)
- 5 Combs per camper group.
- 3 Pencils per camper group.
- 1 Worksheet per camper group, to record the time it takes to remove gum completely out of hair for each treatment.
- 1 timer per group
- Control (no treatment)
- Scissors are optional, it would be good to have some on hand in case more pieces of hair need to be cut for any reason

Procedure:

- Before the experiment begins, the hair must be acquired. Fake hair can be purchased at places such as Sally Beauty Supply, or real hair can be collected from salons. This step will vary depending on the hair source, but the goal is to have 7 pieces of hair 1-3 inches long for each group. The pieces of hair can be cut and distributed in advance by volunteers, or each group can be provided a weft of hair to cut into pieces themselves.
- Chew up a piece of bubble gum and place it firmly on a piece of hair. Repeat for each piece of hair allotted to the group.
- Let the gum sit in the hair for about 30 minutes before attempting to remove it. This will ensure that the gum is completely dry and hardened.
***NOTE: If the gum is not dry enough, it may be too easy to remove. This will skew results.
- Get timer and materials needed for each station.
- Once the gum is dry, try to separate the gum from the hair. Gently comb the reagent (butter, mayo, oil, water, etc.) through the hair to help remove the gum. Continue to work the reagent in and comb the hair until the gum is completely removed.
- As one group member tries to remove the gum from the hair, another group member should time how long the removal process takes. The time it takes to remove the gum should be recorded in a data table similar to the one provided in this protocol.
- Repeat the previous two steps for each piece of hair until all of the reagents have been tested. Make sure every group member has a role!
- Remember to remove the gum from ALL of the hair!
- At the end of the experiment we will compare results in order to determine which reagent was best at removing gum from hair.

Gum Removal Experiment Protocol

Modified and Revised by: Samana Tasnim and Amy Adams.

References:

eHow.com 1999. "Science Fair Project on What Gets Bubble Gum Out of Hair." Web. 20 July 2012. <http://www.ehow.com/info_8694907_science-bubble-gum-out-hair.html>

Brainstretch. 2006. "Intermolecular Forces." Web 20 July 2012

<<http://www.brainstretch.net/introChem/makingMolecules/intermolecular/intermolecular.htm>>

Datasheet for Gum Removal Experiment

Treatments	Time taken (seconds) to remove hair completely
Canola oil	
Olive oil	
Mayonnaise	
Plain Butter	
Plain Water	
Soapy Water	
Control (No reagent)	

Protein Folding experiment Protocol

Revised by: Samana Tasnim



Introduction:

In this Protein Folding experiment, (everyone will be sitting in groups, following along, and each student does individually). Volunteer presenters will be in charge and to be conducted in tent. Prediscussion about importance of proteins and structures is helpful. Each student should be making primary structures and secondary structure of proteins using the pipe cleaners where each beads will represent aminoacids.

Objective: How are the various structures of proteins determined and how are they related to the function of the cell?

Materials per student:

- 6 pipe cleaners (each child needs 4 long and 2 cut pipe cleaners).
 - Short pipe cleaners (~4 cm) to represent hydrogen bonds.

- 20 beads of different colors.

Photo from:

<http://www.cherokee.k12.ga.us/Pages/Welcome.aspx>

Method:

- Each student should get 6 pipe cleaners and enough beads to cover in each pipe cleaner, leaving a slight space between each bead to represent the “peptide” bond between each amino acid. No more than twenty different beads should be used since there are only 20 amino acids. Students may align the beads in any pattern they wish. This model represents the “primary structure” of a protein.
- For the “Secondary structure” have students fold two of the primary chains in a zigzag pattern to represent “pleated sheet” structures. Attach these pleated sheets together using short pipe cleaners to represent the hydrogen bonds between amino acids on the parallel strands.

References:

Cherokee County School District. 2008. “Pipe Cleaner Proteins.” Web. 20 July 2012.<<http://www.cherokee.k12.ga.us/departments/curriculum/science/Doc/Pipe%20Cleaner%20Proteins.pdf>>



Stargazer Protocol

Compiled by: Gabriela Chacon

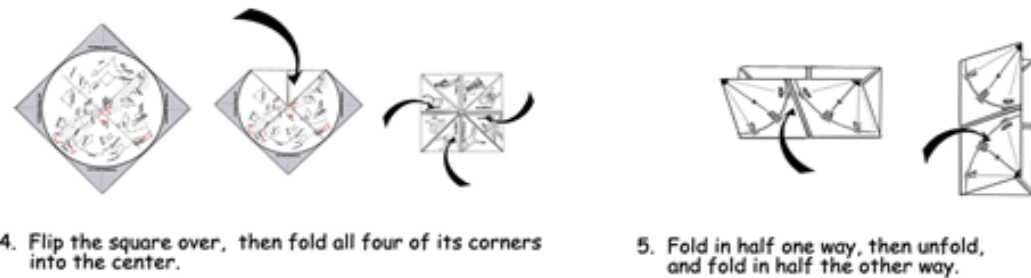
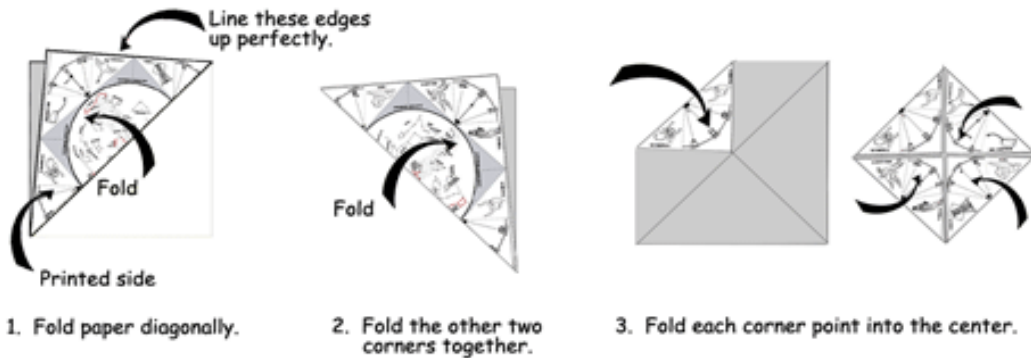
Materials:

Stargazer worksheet for every participant

Go to: <http://spaceplace.nasa.gov/starfinder/> for the finder of the month

Method:

1. First, color or decorate the Star Finder, if you like. Then cut it out on the solid lines.
2. Fold it like this:



3. Stick your thumbs and first two fingers into the four pockets on the bottom of the Star Finder.
4. Ask another person to choose one of the top four squares. Then, depending on the number on the square she chose, open and close the Star Finder that many times (open up and down, close, open side to side, close, etc.). For example, if she chose number 6, open and close the Star Finder 6 times.





5. Then, ask the person to look inside the Star Finder and pick one of the four visible constellations. This time, open and close the Star Finder once for each letter to spell out his choice. For example, if he chose "Lyra," you would open and close the Star Finder 4 times, once for each letter: L - Y - R - A.
6. Ask the player again to pick one of the four constellations visible. Open the panel to see the name of a constellation (highlighted in red) she will try to find in the sky for this month.

For some of the months, not every part of the Star Finder may show a highlighted constellation for you to find. In this case, just try to find the constellation that is nearest to the part of the sky you picked. Or, just find any constellation!

References:

National Aeronautics and Space Administration (NASA). 2011. "Make a Star Finder."
Stargazer <<http://spaceplace.nasa.gov/starfinder/>>

Christine Chung
Fall 2011
Environmental Education Activity



Quick Frozen Critters

Objectives: Students will gain an understanding of predator-prey relationships and their physical and behavioral adaptations for their survival.

Audience: Grades K-12, college, adult

Materials: Brightly colored ribbons (two colors), String or Hula Hoop, food tokens (cardboard or poker chips)

Standards: SCIENCE

Strand II: Content of Science

(Life Science): describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism);

Introduction: Students will simulate predator-prey relationships in this freeze-tag game by exhibiting physical and behavioral adaptations, including the physiological response of prey that “freeze” when a predator is close. Different rounds can be used to demonstrate other aspects that impact their populations and the essential nature of adaptations for survival.

Activity:

1. Select a predator-prey pair (e.g. coyotes and cottontails, foxes and squirrels, cougars and deer, hawks and ground squirrels, etc.).
2. Separate and clearly mark the students into “predator” (e.g. bright pink ribbon around upper arm) and “prey” (e.g. bright green ribbon around upper arm), with one predator for every four to six prey.
3. Designate one end of the playing field as “home” and the other end as their “food source”.
4. Four to five strings or Hula Hoops should be placed randomly between the “home” and “food source” to represent “cover” for the prey. *Only one prey can stay in a “cover” at one time.*
5. Place three food tokens for each prey at the “food source” area.
6. Use a whistle or other signal to start each round. At the beginning of each round, prey will begin at their “home” shelter. Their goal is to move from the “home” to the “food source” to attain food tokens, one per each trip, and bring it back to their “home”. Each prey must collect all three tokens to survive. If they spot a predator, they may use a variety of appropriate prey behaviors, such as warning other prey that a predator is nearby. Prey can prevent being caught by either running for “cover” (with at least one food within the “cover” area) or “freezing” if any predator is within five feet. If frozen, prey may blink but cannot otherwise move nor talk.
7. Predators may start anywhere, except the “cover” or “home” areas. Predators must each capture two prey per round in order to survive, leading captured prey to the sidelines (Note: Establish ground rules for student behavior; e.g., no full tackles!). Prey may be captured by “tagging” or unwrapping the colored ribbon around their upper arm. If the latter, predators may hold onto their captured preys’ ribbons to count how many they have captured.
8. Limit each round to five to seven minutes. Remind prey that they may be frozen as long as they wish (no “guarding” from predators), but if they do not have enough food by the end of each round, they will have died from starvation.

Possible Extensions -

- Round 1: Normal, as described above
- Round 2: Captured prey become predators, and predators without enough food become prey in proceeding rounds
- Round 3: Take away some hiding places/temporary shelter
- Round 4: Take away ability to “hide” by freezing
- Round 5: Reduce the amount of food tokens.
- Round 6: Prey run at the same time, like fish moving in a school. Are prey more susceptible to predation in a group or individually?
- Round 7: Assign different locomotive forms of movement for each animal; e.g., one can only walk versus one who can only hop, etc.

9. Possible Discussion:

- a. Which ways of escaping capture were easier? Most effective?
- b. How did predators capture prey? Which ways worked best?
- c. What did predators do in response to prey who “froze”?
- d. How did you change your strategies to better survive?
- e. In what ways are adaptations important to both predator and prey?
- f. How is this game similar to real predator-prey survival?
- g. What have you learned about predator-prey relationships?
- h. How do predator-prey relationships serve as natural limiting factors affecting wildlife?
- i. How does changing the number of predators in the real world change the survival situation for prey? How does it change the survival situation for predators?
 - i. What happened when the predator population increased?
 - ii. Decreased?
 - iii. What would happen to the predator population eventually if they kept eating all the prey, not allowing them to reproduce?
- j. How does changing the number of prey in the real world change the survival situation for predators? How does it change the survival situation for prey?
- k. Can you think of real circumstances in which a temporary shelter or hiding place may disappear or be eliminated?
- l. What are some other adaptations used by prey or predators that were not covered in this game?

Conclusion: Through simulating predator-prey relationships and their various adaptations for survival, students should be able to get a basic idea of the importance in adaptations and limiting factors which affect populations.

References:

“Quick Frozen Critters” in Project WILD: K-12 Activity Guide. The Council for Environmental Education, 1992.



DATA SHEET: QUICK FROZEN CRITTERS

Student Name _____ Date _____

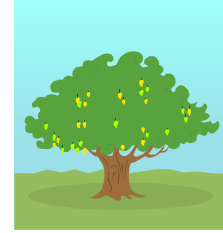
	Round 1	Round 2	Round 3	Round 4
# of Prey at Start				
# of Prey at End				
# of Predators at Start				
# of Predators at End				
# "Covers"				
Could Prey Freeze?				
Other Conditions in the Round				

	Round 5	Round 6	Round 7	Round 8
# of Prey at Start				
# of Prey at End				
# of Predators at Start				
# of Predators at End				
# "Covers"				
Could Prey Freeze?				
Other Conditions in the Round				



FIRE!!!

By: Christine Chung
Summer 2012



Objectives: Students will gain an understanding of the continuous, rapid, and highly transmittable effects of fire.

Materials: 4 Rope/String or Hula Hoops (Anything to make borders for trees)
4 Signs or more, one per tree/vegetation species
(optional) Bandanas or vests to identify the “flames”

Introduction: Students will simulate the effects of fire amongst different species of vegetation and its indiscriminatory results in this fast-paced tag game. Different rounds and variations can be used to demonstrate different aspects of this phenomenon to show the dangers of forest fires.

Activity:

1. Set the outer boundaries. It should be large enough to have four distinct corners or however many corners you need to express each vegetation or tree species.
2. Designate each corner as a species (e.g. Cottonwood, Russian Olive, Siberian Olive, Saltcedar). You can put up signs at each corner with the species name and/or a picture of the species; the back sides of the signs may include information about the plant species (optional). Indicate small boundaries for these species with enough space to hold 1/4 of the players comfortably (or a fraction of however many corners you have).
3. Designate one player to be the “flame”.
4. Separate the rest of the players evenly between the different tree species. Make sure they familiarize themselves with their own species name as well as others. These locations are stationary.
5. One moderator will yell two species names. Players who are standing within the “safe zones” of the species whose names were called will run and switch places, while staying within the outer boundaries. The “flame” will try to tag as many runners as possible, and any tagged players become “flames”. Upon landing at the “safe zones”, those players now represent the species that is indicated on the signs. New “flames” now can help tag.
6. Repeat until at least 3/4 of the species are now “flames” or until the point is made. A round may be between 5-8 minutes.

Possible Extensions/Variations –

Round 1: Normal, as described above

Round 2: Include another “flame” so that there are two in total. They may run separately to tag trees.

Round 3: The “flames” link arms to demonstrate the continuous nature of a fire and tag as a team. This should get easier as the fire gets bigger and “flames” move less to affect more trees.
 Round 4: Incorporate one extra player as “water”. Start with 2 “flames”. “Flames” can continue to chase the tree species. “Water” may chase and tag the “flames” but must start from outside the boundaries and only when the trees are running.

- a.) When “water” tags a “flame”, the “flame” can become a tree.
- b.) When “water” tags a “flame”, the “flame” may only walk (briskly) for 1 minute.

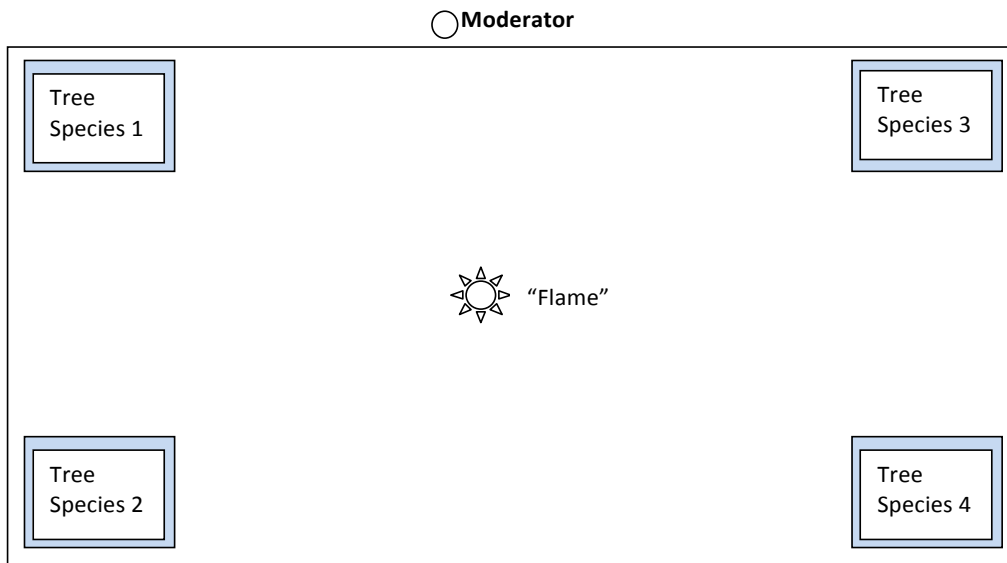
Round 5: Wet conditions – “Flames” may only walk, separately. “Trees” may still run.

Round 6: Dry conditions – “Trees” may only walk. “Flames” may run and connect.

7. Possible Questions for Discussion:

- a. What could cause a forest fire? Are there any forest fires that have recently affected our region or state?
- b. How would you stop a forest fire?
- c. Was fire stronger alone or with others? Linked or unlinked?
- d. How much did water help?
- e. What would happen if we added wind?
- f. What about earth?
- g. Would wetter or drier condition be more favorable? What is New Mexico’s climate, and how would that affect our state? Why would you prefer wetter conditions to drier conditions?
- h. What else would fire affect besides vegetation?
- i. Is fire all bad? What are some good effects that fire may have on land?

Conclusion: Through simulating the behavior and effects of “flames”, students should understand the delicate nature of our ecosystem and fauna.



“Food Web” Protocol

By: Samana Tasnim



Materials needed (as total and per group):

Total 7 groups divided as follows:-

- 6 groups of 3 kids.
- 1 group of 4 kids.
- 1 ball of string (approx. 5 meters) per group to make the chain. (total=5 balls of yarn)
- 1 Notecard or index cards per each student per group, with names of plants and animals written. (Total=22+index cards)
- 1 Pin per each student per group, for attachment to the student collar or dress. (total= 22 safety pins)

5.11 Food webbing



Concept

Plants and animals are linked through a series of food chains to form a web of interactions.

Context

After study of a particular ecosystem, or a small habitat within it, participants are familiar with some of the plants and animals and can try to find out what they feed on. Taking on the roles of each of these important components, each is linked into food chains and then into a complex web. The final model can simulate the effects of changes on the ecosystem and how these might affect the plants and animals living there.

Equipment

Long ball of string - short lengths of string (approx 5 metres) - cards with names and pictures of animals and plants within one ecosystem or habitat (attach to pins or string so that they can be put onto the participants)

Playing it

Participants will understand the idea of interactions between animals and plants much better if they first have the opportunity to study an ecosystem, or more realistically, a habitat within it. For example, after an individual tree study, they will know the names of some of the plants living on and under the tree and some of the minibeasts and other creatures living on or visiting the tree. They may have some idea already of their relative abundance (eg. very common aphids on the leaves, but less common spiders and only a few birds visiting). Although it is possible to study what each animal is eating and its feeding structure to give further clues, this is complex and not really necessary.

1. Select cards of animals or plants which have been seen (ideally have a different one for each student, although some of the common plants and animals could be represented twice).

2. Participants write on each card a letter to represent what they are feeding on - their role. This information will need to be provided (perhaps as a simple list of all the animals and plants) so that the participants can then select what they need. Suggest the following letters:

P = green plant (gaining energy from the sun)

H = herbivore (feeding on the plants)

D = detritivore (feeding on dead and decaying material). To simplify, these could be incorporated with the herbivores.

C = carnivore (feeding on other animals)

TC = top carnivore (feeding on other animals including other carnivores)

3. Form the group into teams so that each participant has an animal or plant card with a different letter. Ask them to think about which order they should be arranged in. Give each a short length of string and ask them to illustrate the food chain. Two might be joined to one other so that it isn't always a straight chain (eg. a green plant might link to

both herbivore and detritivore and these two might each link to a carnivore).

4. Now attempt to link everyone together using a longer piece of string or rope. This can become quite complex, so work through one trophic level at a time (eg. start with all the plants and link them to the herbivores). The result is a complex web of string with all the participants representing the animals and plants, connected into the system by more than one thread.

5. Finish by looking for the 'missing link' - the ultimate source of energy: the sun needs to be linked into the web. Note that it is not too important to be exactly biologically correct in making the links at this stage, and although it is important that the participants should suggest them wherever possible and where there is some logic in the link suggested. Even scientists may not know any better and it is not intended to be an exact model of the ecosystem, just a simulation. The emphasis is on the general idea of linking chains to form a web, the importance of all living creatures in the ecosystem and the complex interactions that exist between members.

Adapting it

Once the web has been designed, some of the relationships can be investigated. Ask the participants to hold the string tight. Now suggest some major changes and see the result. (Tell them they should fall down immediately if they feel a tug on the rope).

☞ what would happen if there was a giant volcanic explosion, blotting out the sun?

☞ what will happen if herbicide kills all the small plants?

☞ what will happen if all the woody plants are felled or the top carnivores are hunted to extinction?

References:

United Nations Educational, Scientific and Cultural Organization (UNESCO) 2005. "Food webbing." *Environmental Education Activities Study Guide for Primary Schools*.
<<http://unesdoc.unesco.org/images/0009/000963/096345eo.pdf>>

Recycling Relay



Supply List

Cardboard, aluminum, paper and plastic bins (one of each)

108 pieces of aluminum

108 pieces of paper

108 pieces of cardboard

108 pieces of plastic

Protocol

- Students will line up in their respective group in a straight line
 - 12 groups (4 groups will have 9 campers and 8 groups will have 8 campers)
- In a line in front of the line of campers, place 9 pieces of each type (for a total of 36 pieces of trash) per line
- Each camper will have to pick up a piece of each kind (for a total of 4 pieces)
- The first camper runs, picks one of each kind as fast as possible, puts it in the according bin, and runs back to the line
- The next camper cannot go until the previous one is back and slaps her/his hand
- The lines with 8 campers, a single chosen camper will go twice, so that each line has 9 turns
- Each line will have 9 turns, each will pick up 4 pieces for a total of 36 pieces
- First line to clean up their entire line wins

Original idea by: Aarti Atreya, Junior Scientist Outreach Program Counselor 2011



Hydrology Activity Protocol

By Gabriela Chacon

Supply List

- Large signs for each of the 7 stations (can draw pictures as well!)
 - Cloud, glacier, ocean, stream, groundwater, animal, plant
- Have in station the corresponding cut out that indicates where to go depending on rolling of die
- 22 pencils
- 7 dice
- 22 water cycle score cards (below)

Method:

- Ask students if they have heard of the water cycle
- Divide campers into pairs
- Ask pairs to write down words that describe the water cycle (can share with everyone after)
- Share with students data of water distribution (pg. provided)
- Make drawing of water cycle on board to show. Can Q's like:
 - If every living thing needs so much water, why isn't it used up?
 - Where does the water go when a puddle dries up?
 - Why don't oceans and lakes dry up like puddles?
 - Where does rain come from?
 - Do you think water always follows the same path as shown in the water cycle?
- Divide students up into seven equal groups, and have each group begin at one of the stations.
- Have students roll the die and read statement at their station corresponding to the number on the die.
- On water cycle score card, have them write their current station, what happens to them, and their destination.
- Call out cycle to indicate to students that they should go to the next station as directed on paper.
- Repeat previous step about 10 times or until most students have cycled through the cloud station a couple of times.
- Have students write a brief story from a water molecule's point of view that describes the journey they took through the water molecule
- On board, write the names of the seven stations. Start with cloud and ask students to share all the different ways they go to cloud. On board, represent responses by drawing arrow to cloud. Repeat with the other stations.
- Discuss the following:
 - Even though individual molecules took different path, was anything similar about the journey they took?
 - In the game, which station seemed to be visited by the most water molecules, regardless of their particular journey? What can we infer from this?
 - The water cycle is usually shown like the diagram previously drawn like this (point to diagram already drawn). Do you think it's a useful way to show the cycle, even if the sketch doesn't include all the path water might take?
 - What makes water move through the cycle? (Sun, gravity, physical properties of water). What would happen if the sun's energy were blocked from Earth?
 - How is the water cycle important to plants and animals? (It moves water to them; it makes water available at different times)

Sourced from:

Project WET Foundation and Council for Environmental Education. 1995. *The Incredible Journey. Project WET Curriculum and Activity Guide*. 155-62.

Water Cycle Score Card		
Station Stop	What Happens	Destination
Ex: Cloud	Fall as Rain	Ocean
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____
7.	_____	_____
8.	_____	_____
9.	_____	_____
10.	_____	_____



“I’m a Water Molecule” Scavenger Hunt

By: Gabriela Chacon and MJ Vargas

Supply List (for 22 people)

- 9 Large piece of paper labeled with each of the 9 possible water locations
- 22 Pencils or markers
- 22 bracelets
- 22 Water Journey Maps (below)
- 22 yellow beads and container of beads of 9 other different colors (one color per station)
- 9 cubes, each labeled according to water cycle table
- 9 water cycle tables (one for each station)





Protocol

- Tell students they are water molecules moving through the water cycle
- Categorize the places water can move through into nine stations: clouds, plants, animals, rivers, oceans, lakes, ground water, soil, and glaciers.
- Write these names on large pieces of paper and put them around room.
- Leave a container of beads of a single color at each station
- Give each student a bracelet with a single yellow bead threaded through
- Explain that the yellow bead is meant to represent the Sun, since energy from the Sun helps drive the water cycle
- Give each student a water journey map and pencil
 - This is used to record the journey through the water cycle
 - Tell students to draw arrows to each station they move to
 - They should also record anytime they stay at a station
- Divide students among the nine stations
- Have students identify the different places water can go from their station in the water cycle.
 - Discuss the condition that causes the water to move. Water movement is dependent on energy from the Sun, electromagnetic energy and gravity. Sometimes water will not go anywhere.
- After students have written their lists, have each group share their work.
 - Check the water cycle table for an explanation of water movement from each station
- Have students discuss the form in which water moves from one location to another.
 - Note that most water movement occurs when its liquid, but water movement to clouds is in the form of water vapor.
- Have students line up behind the cube at their station.
 - Students roll cube and go to the location indicated by label facing up
 - If roll stay, take bead and move to back of line
 - When students arrive at next station, they get in line
 - When reach front of the line, they roll the cube and move to next station (or to back of line of same station)
- Students keep track of their movements by taking one bead from station and placing it on their string and nothing movement on the water journey map



Sourced from:

Project Learning Tree (PLT). 2004. Activity 44: Water Wonders. *PreK-8 Activity Guide*. 179-185.

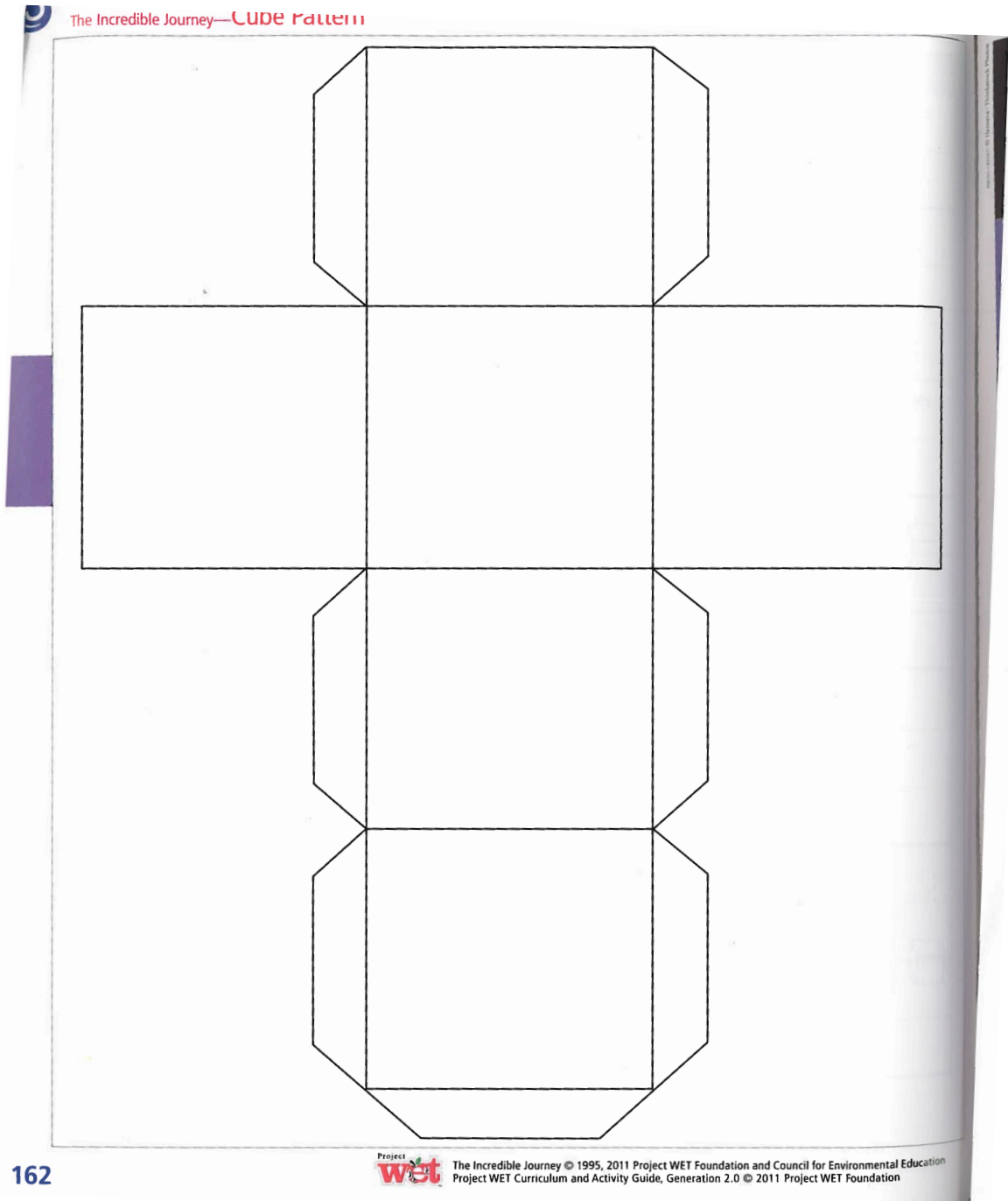
Water Cycle Tables:

STATION	CUBE SIDE LABELS	EXPLANATION
Soil 	one side <i>plant</i>	Water is absorbed by plant roots.
	one side <i>river</i>	The soil is saturated, so water runs off into a river.
	one side <i>ground water</i>	Water is pulled by gravity; it filters into the soil.
	two sides <i>clouds</i>	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	one side <i>stay</i>	Water remains on the surface (perhaps in a puddle or adhering to a soil particle).
Plant 	four sides <i>clouds</i>	Water leaves the plant through the process of transpiration.
	two sides <i>stay</i>	Water is used by the plant and stays in the cells.
River 	one side <i>lake</i>	Water flows into a lake.
	one side <i>ground water</i>	Water is pulled by gravity; it filters into the soil.
	one side <i>ocean</i>	Water flows into the ocean.
	one side <i>animal</i>	An animal drinks water.
	one side <i>clouds</i>	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	one side <i>stay</i>	Water remains in the current of the river.
Clouds 	one side <i>soil</i>	Water condenses and falls on soil.
	one side <i>glacier</i>	Water condenses and falls as snow onto a glacier.
	one side <i>lake</i>	Water condenses and falls into a lake.
	two sides <i>ocean</i>	Water condenses and falls into the ocean.
	one side <i>stay</i>	Water remains as a water droplet clinging to a dust particle.



STATION	CUBE SIDE LABELS	EXPLANATION
Ocean 	two sides <i>clouds</i>	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	four sides <i>stay</i>	Water remains in the ocean.
Lake 	one side <i>ground water</i>	Water is pulled by gravity; it filters into the soil.
	one side <i>animal</i>	An animal drinks water.
	one side <i>river</i>	Water flows into a river.
	one side <i>clouds</i>	Heat energy is added to the water, so the water evaporates and goes to the clouds.
	two sides <i>stay</i>	Water remains within the lake or estuary.
Animal 	two sides <i>soil</i>	Water is excreted through feces and urine.
	three sides <i>clouds</i>	Water is respired or evaporated from the body.
	one side <i>stay</i>	Water is incorporated into the body.
Ground Water 	one side <i>river</i>	Water filters into a river.
	two sides <i>lake</i>	Water filters into a lake.
	three sides <i>stay</i>	Water stays underground.
Glacier 	one side <i>ground water</i>	Ice melts and water filters into the ground.
	one side <i>clouds</i>	Ice evaporates and water goes to the clouds (sublimation).
	one side <i>river</i>	Ice melts and water flows into a river.
	three sides <i>stay</i>	Ice stays frozen in the glacier.

Water Cubes:



Water Journey Map:

The water journey map is a circular path on a globe. It features several labeled elements, each with a small white cube icon next to it:

- Clouds:** An illustration of white clouds in a blue sky.
- Lake:** An illustration of a lake with a sailboat and a city skyline in the background.
- Animal:** An illustration of a brown bear's head.
- Ground water:** An illustration of a cross-section of the earth showing water underground.
- Soil:** An illustration of a cross-section of the earth showing different soil layers.
- River:** An illustration of a river flowing through a mountainous landscape.
- Plant:** An illustration of green leaves on a stem.
- Ocean:** An illustration of a blue ocean with white waves.
- Glacier:** An illustration of a large, blue and white glacier.

Volcano Experiment Protocol

Revised by: - Samana Tasnim



Introduction:

Volcano Activity will be led by volunteer presenters. Those who are presenting will make a giant volcano to demonstrate, while participants follow along and pair up to build their own volcano.

Materials needed

-12 volcanoes per large group of 3 teams (1 volcano for every 2 participants).

- 6 cups of flour (for premixed dough)*per group. (total=300 cups)
- 2 cups salt per group. (total= 100 cups)
- 4 tbsp cooking oil per group. (total= 200tbsp)
- 2 cups of luke warm water per volcano.
- 1 Large bowl per group. (total=50)
- 1 plastic bottle per group. (total=50)
- 1 baking pan per group. (total= 50)
- 1 or 2 drops red food coloring for each volcano. (total= 4 multipacks)
- 6 drops liquid detergent for each kid expt. (total= 1 bottle)
- 2 tbsp baking soda per volcano. (total= 100tbsp)
- 3 tbsp vinegar in separate cup. (total= 150 tbsps)
- 1 Dixie cup per group. (total= 50 cups)

Procedure:

1. Mix 6 cups of flour, 2 dixie cups of salt, 4 tablespoons of cooking oil and 2 cups of water in a large bowl. Then, mix the ingredients together with your hands until the mixture is firm.
2. Stand the bottle in the center of the pan.
3. Mold the salt dough around the bottle in a cone shape (like a volcano) but leave the bottle top uncovered.
4. Fill the bottle almost to the top with warm water.
5. Add a few drops of food coloring and squeeze 6 drops of detergent into the bottle.
6. Add 2 tablespoons of baking soda.
7. Slowly pour vinegar into the bottle.
8. Your volcano will fizz and spurt red lava! Why? Mixing baking soda and vinegar makes a chemical reaction

Reference:

Kidspot. 2005. "Volcano Experiment." Web. 20 July 2012
<<http://www.kidspot.com.au/kids-activities-and-games/Science%20experiments+10/volcano-experiment+10984.htm>>



Layers of the Earth Activity Protocol

By: MJ Vargas

Objective:

This activity is intended to teach the different layers of the earth through a creative art project.

Materials (for a group of 22):

22 sheets of poster board

11 tubes of Liquid glue

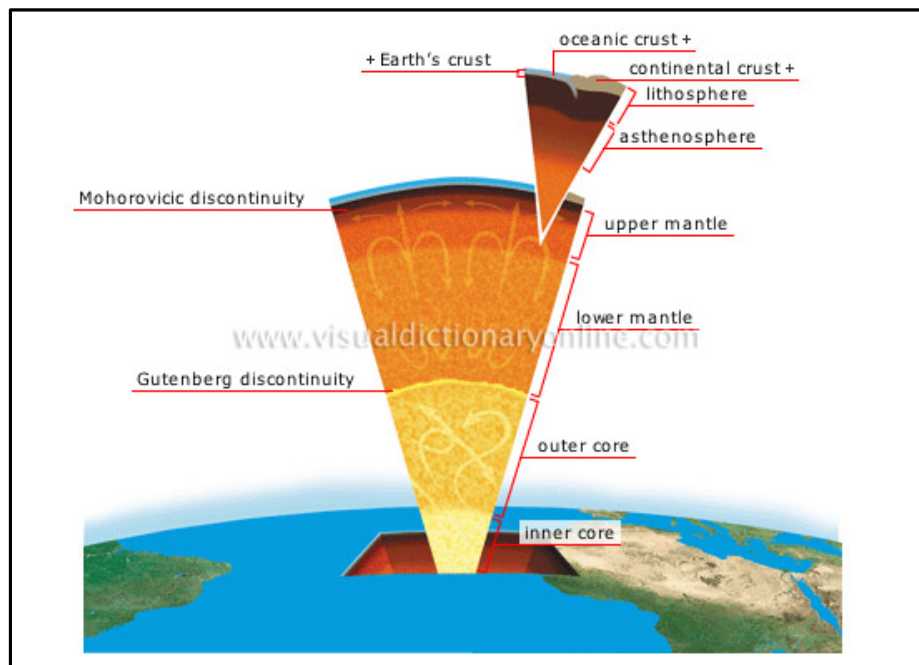
About 2 or 3 cups of each of the following materials to represent a layer of the earth
(note these can be changed very easily, these are just suggestions).

Layer of the Earth (deepest to most upper)	Decorative Material
Inner core (solid metal)	Kidney beans
Outer core (molten metal)	Navy beans
Lower Mantle	Orzo Pasta
Upper Mantle	Elbow Macaroni
Asthenosphere	Black-Eyed Peas
Moho (Mohorovicic discontinuity)	Black Beans
Lithosphere	Quinoa
Continental & Oceanic crust	Green and Blue sprinkles, respectively

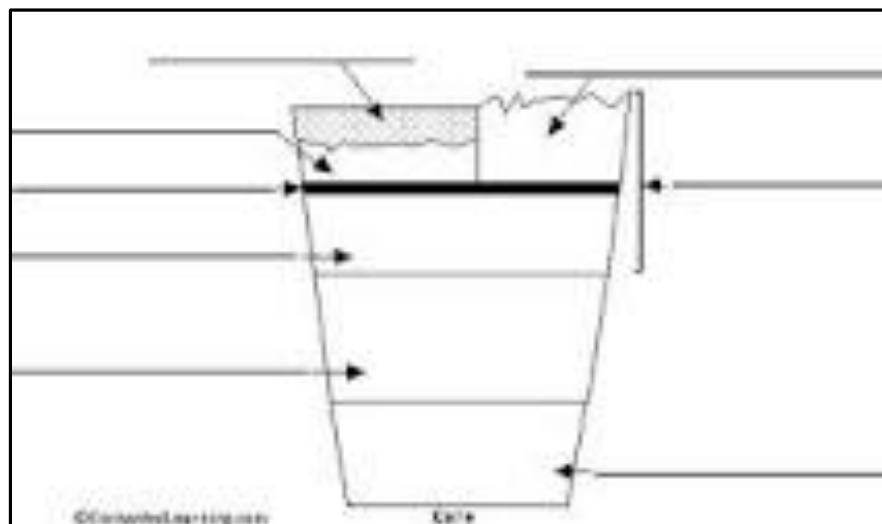
Procedure:

- Each child gets a large piece of poster board and the worksheet on page 4 of this document.
- A discussion is initiated by showing videos and pictures of the different layers of the earth.
 - Example of video: www.youtube.com/watch?v=ukqe_6L9V54
 - Examples of pictures below
- Discuss and go over the definition and function of each of the layers of the earth:
 - Use this interactive website that has all the definitions!
 - http://www.harcourtschool.com/activity/science_up_close/606/deploy/interface.html
 - Have children fill out the worksheet during this time.
- With markers, they draw and label the outline of the inner earth on the poster board. This can be explained through the use of videos and/or pictures like those shown below.
- For each layer, students can glue the respective materials on and create their work of art.
- While going through this procedure you can talk about the following:
 - What is this diagram analogous to, in other words, what does this shape of the inner earth remind you of?
 - Use this to observe the congruency in nature

Layers of the Earth Activity Protocol
By: MJ Vargas

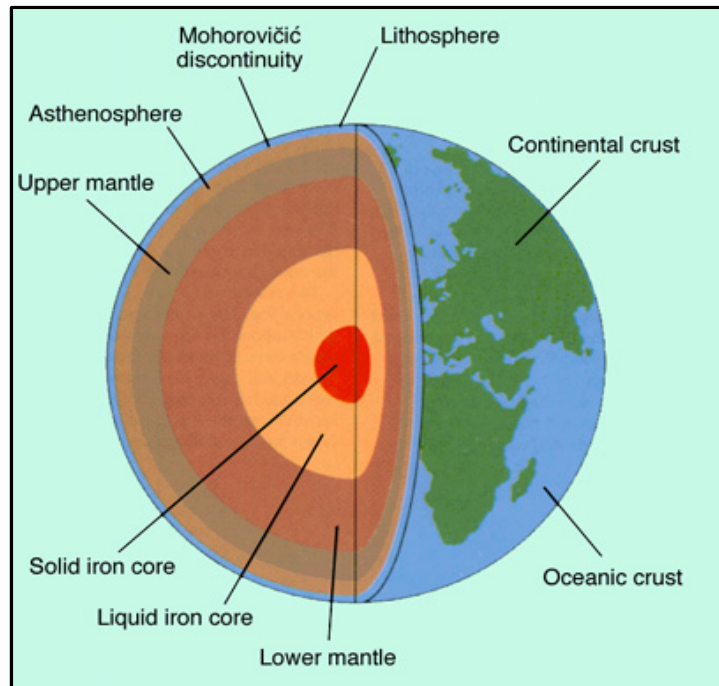


From visual.merrimam-webster.com

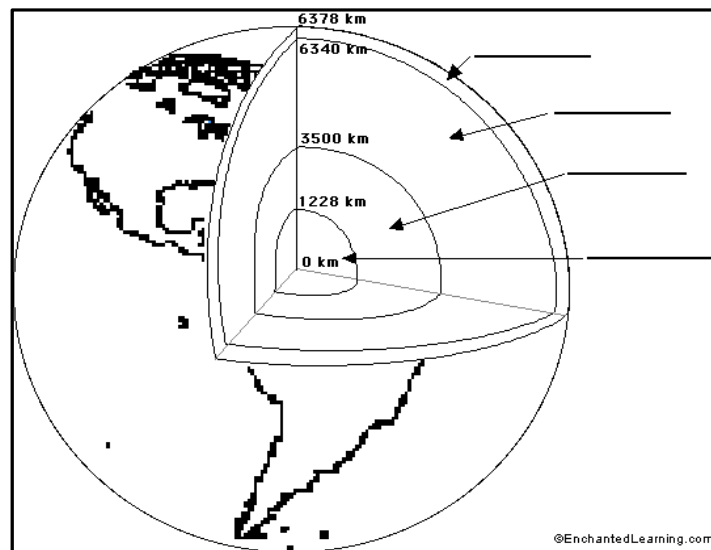


Example #1 of structure children can draw.
From enchantedlearning.com

Layers of the Earth Activity Protocol
By: MJ Vargas



From glossary.oilfield.slb.com



©EnchantedLearning.com

Example #2 of structure children can draw.
From enchantedlearning.com

Worksheet
From TeacherLingo.com

THE LAYERS OF THE EARTH	
WORDS AND PICTURES	DEFINITIONS
LITHOSPHERE	
ASTHENOSPHERE	
MESOSPHERE	
OUTER CORE	
INNER CORE	

Appendix IV: Documents for Communication

Sample Donation Letter

**The Junior Scientist Outreach Program
Albuquerque, New Mexico**



Dear _____,

I am writing on behalf of the Junior Scientist Outreach Program (JSOP), a non-profit organization supported by Sandia National Laboratories and the UNM Biology Undergraduate Society that strives to bring informal science education to the 4th to 6th graders of the underrepresented communities in the South Valley of Albuquerque. We are heading into our third year of offering a **free** week-long summer camp to our students, hoping to spark an interest in science and its related fields at an early age. During our camp, we offer hands-on scientific activities to our students to explore science in everyday life, and this year we are continuing our theme of sustainability to emphasize the importance of science and everyday contributions to supporting a healthier environment. Each day, we participate in team-building activities and activities focused on improving our knowledge of sustainability and how we may adjust our actions towards supporting sustainability. Last year, we had a successful summer camp with 23 UNM and high school student volunteers, along with representatives from Sandia National Laboratories and the Water Utility Authority of Bernalillo County, who taught 47 fourth- and fifth-grade students about various scientific topics. This year we are hoping to build upon our success with 75 to 100 campers and 40 volunteers with several presentations from local scientists.

We are doubling our participants and are seeking additional support from businesses with a reputation for being positively committed to our community. _____, we need your help in reaching our goals. Your donation will go directly to the participants of our camp to make their week-long experience amazing. We are seeking _____. We would be very appreciative of a donation from your business.

Your generous donation will be publicly acknowledged at our event through announcements and official camp t-shirts. You will also receive recognition through our sponsor's (UNM BUGS) website. We feel that your business will benefit from the community goodwill generated by your kind donation to the Junior Scientist Outreach Program.

To learn more about our student organization and the Junior Scientist Outreach Program, please contact Christine Chung, Communications Coordinator at jsop.unm@gmail.com.

Thank you for your consideration of our request, and we look forward to hearing from you.

Sincerely,

MJ Vargas, JSOP Director
Christine Chung, JSOP Communications Coordinator

phone: 505.463.7764 | email: jsop.unm@gmail.com

Example of an Informational Letter to Parents

Junior Scientist Outreach Program

Department of Biology, University of New Mexico



October 12, 2011

Dear Parent,

Hello, my name is MJ Vargas. I am contacting you because your child attended the 2011 Junior Scientist Outreach Program (JSOP) at the Westside Community Center (WSCC) in early August. I'd like to share a couple of other new opportunities with you that your child is eligible to participate in.

First: The outreach that UNM students have done with **JSOP will be continuing through an After School Program that will be taking place at the WSCC on the following dates (all Wednesdays): Oct 19, Nov 2, 16, 30, and Dec 7.** Children who have already participated in JSOP activities will have priority during registration that will be held from 5-7 pm on Monday and Tuesday, October 17 and 18, at the WSCC. All registration will be on a first come, first serve, basis so please make sure to sign your child up!

Second: On November 6, we will be entering a float into the **Día de Los Muertos Marigold Parade** to advertise the JSOP summer camp for 2012. **Students who participated in the 2011 summer camp are eligible to be in the parade.** All that is necessary for your child's participation is that you show up at 2:30pm at the Bernalillo Sheriff's Sub Station on Centro Familiar and Isleta (where parade starts) November 6th, to sign a waiver for their participation. The parade starts at 4pm and line up is at 3pm so we need to have all our participants ready to go by then.

To be in the parade it will also be necessary for your child to be wearing their JSOP Camp T-Shirt, come with their face painted like a DDLM sugar skull, and be dressed appropriately for the weather (i.e. hats, gloves, long sleeves/sweaters under their camp t-shirt). The parade will end at the WSCC where there will be music, art, and food vendors. Please note that you will need to sign your child in and out with JSOP staff.

The two above opportunities are separate. **Your child does not need to participate in one to do the other.** If there are any questions, comments, or concerns, I'd be more than happy to address them. Please email me or call me at (505) 506-4340 so that I can be of assistance.

Thank you!

Martha Jo Vargas
Junior Scientist Outreach Program Director
Research and Undergraduate Opportunities Programs
Department of Biology MSC03 2020
1 University of New Mexico
Albuquerque, NM 87131
mrthj5@unm.edu

Example of Newsletter (written by Communication's Coordinator, Christine Chung)



Junior Scientist Outreach Program Newsletter

May 14, 2012



[From Summer 2011]

[DEAR LOVING COMMUNITY MEMBERS]

Welcome back to a new year with the Junior Scientist Outreach Program (JSOP)! We are excited to inform you of several changes to the program, beginning with the introduction of a new quarterly newsletter!

The Junior Scientist Outreach Program is now heading into its third summer camp with a new Board of Directors. We are planning to double the number of campers this year and are hoping to increase our funding so we may continue to bring informal science education to the South Valley community of Albuquerque.

We have released a new website (www.juniorscientist.org) and we will be adding pictures and videos of our experiments. An exciting, new curriculum is being finalized for our summer 2012 camp. We also have a new convenient contact (jsop.unm@gmail.com) where our entire Board of Directors may be reached. Please feel free to e-mail us if you or someone you know would like to be added to our mailing list.

JSOP is also looking to expand our partnership to more members of the community so that we truly have a community presence. Please contact us if you may be able to contribute in any way.

[RECENT EVENTS]

We recently took on a new endeavor to extend our summer curriculum into the Fall semester. Our **Afterschool Program** was again hosted successfully by the Westside Community Center (WSSC) on a biweekly basis with both our new and tried-and-true experiments!

JSOP members also participated in the **Expanding Your Horizons** event at the University of New Mexico on January 28th. We had a bubble gum experiment and a strawberry DNA experiment for the young girls (5th to 9th grade) of Albuquerque!

[A FUN ACTIVITY – NATURE RUBBING]

Nature rubbing is a great way for children to use their artistic side to interact with nature! Our Junior Scientists may also use this activity to make a field journal to explore the nature in our very own backyard!

Materials: Non-toxic crayons, paper or a notebook, a hard surface, and a little piece of nature.

Instructions: Place the item (a leaf or a flower work great!) under a piece of paper and on top of a hard, smooth surface, rub the crayon over the top of the paper. The crayon may or may not be rubbed on its side, depending on your preference. The image of the item should come through! You may find a field guide and try to write identifying traits about the item if you are keeping a field journal or add some artistic finishing touches to show off to your friends! I show my nature rubbings off to my puppy!



[UPCOMING EVENTS]

Volunteer Orientation! We will be holding our volunteer orientation on Saturday, July 28, 2012 at 1 pm. Once notified of your acceptance, please RSVP to our email address, jsop.unm@gmail.com. Deadline for volunteer applications is **before** midnight on June 30, 2012.

Summer 2012 Dates! Write us into your calendars for July 30 to August 3.

EXTRA Summer Extension! This year, we have partnered with the Sevilleta Long-Term Ecological Research (LTER) Center to take a few lucky campers with us on a 2-night excursion, from August 3 to August 5!

[OUR THANKS]

We would like to thank our partners at the Westside Community Center (WSSC), Biology Undergraduate Society (BUGS), Biology Advising at the University of New Mexico, Sandia National Laboratories, Expanding Your Horizons (EYH), Osuna Nursery Home, the Albuquerque Bernalillo County Water Utility Authority, and all of our community partners for their hard work and faith in our program. Without you, none of our work would be possible, and it is your belief and dedication that truly inspire us to continue on our mission to bring informal science education to our community.

We would also like to thank our campers and students from the WSSC Afterschool Program for being the best junior scientists ever! You are truly the bright light of our future, and we are always honored and enthusiastic to have you as our fellow partners in learning! You guys will truly do great things to make this world a better place!

Last, but not least, we would like to thank all of our past, present, and future volunteers for their hard work and dedication to our program and to the children of New Mexico. You are our role models and who many of our campers will aspire to become. Forming friendships with each other and with our campers is truly a rewarding experience, and we are always thankful that you put your time, energy, fun, excitement, love of life and the sciences, and commitment to positively interact with our campers and parents.

Thank you to everyone, and we hope that you will be joining us for another exciting summer of the Junior Scientist Outreach Program!



Photography by Jobette Chour



[Volcano Experiment – Summer 2011]

Please feel free to inform us of any suggestions, comments, or feedback to improve our program by e-mailing jsop.unm@gmail.com. We would love to hear from you! Thank you to everyone!

With Love,
The Junior Scientist Outreach Program



www.juniorscientist.org

c/o JSOP
Department of Biology
MSC03 2020
1 University of New Mexico
Albuquerque, NM 87131



Appendix V: Research Documents

Participant Pre-Camp Survey



Junior Scientist Outreach Program (JSOP) Pre-Camp Survey for Campers

Campers and Parents: We are interested in the extent to which the child enrolling for the Junior Scientist Outreach Program is engaged/interested in science. Please fill out the following few questions to help us provide the best educational experience possible. Responses will be kept confidential.

Name _____ Age _____ Gender _____

Please circle/fill in the appropriate responses to the following questions.

1. What grade did you complete prior to registering for the camp?

3rd 4th 5th

2. Please describe the type of school you currently attend.

Public Private School Home School

3. What is your main motivation for participating in the 2011 Junior Scientist Outreach Program?

4. Have you participated in any other science outreach programs such as the Junior Scientist Outreach Program?

YES NO

If yes, please describe:

Please circle the appropriate responses to indicate how strongly you agree or disagree with the following statements.

5. I really want to go to college someday.

Strongly Agree Agree Neutral Disagree Strongly Disagree
1 2 3 4 5

Comments:

6. I want to have a career in science someday.

Strongly Agree Agree Neutral Disagree Strongly Disagree
1 2 3 4 5

Comments:

JSOP Pre-Camp Survey for Campers Continued:

7. School is fun and important.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

8. I want to challenge myself to get good grades in school.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

9. I need to go to school to be successful.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

Please write 1-2 sentences to answer the following questions.

10. What do you want to be when you grow up?

Why? _____

Participant Post-Camp Survey



Junior Scientist Outreach Program (JSOP) Post-Camp Survey for Campers

Campers and Parents: We are interested in the extent to which the Junior Scientist Outreach Program engaged/interested the enrolled child in science. Please fill out the following questions to help us to continue to provide the best educational experience possible. Responses will be kept confidential.

Name _____ Age _____ Gender _____

Please circle the appropriate responses to the following questions.

1. What grade did you complete prior to registering for the camp?

3rd 4th 5th

2. Please tell us what kind of school you attend and how your JSOP experience was alike or different from what you experience in your classroom.

Public	Compare with JSOP:
Private School	_____
Home School	_____

3. Which was your favorite event during the Junior Scientist Outreach Program?

Solar Oven Baking
Presentations from Sandia Labs or UNM Biology Scientists
Which one?
Volcano Making
Strawberry DNA Extractions
Other (Please Describe in Detail):

Why?

4. Would you recommend the Junior Scientist Outreach Program to your friends?

YES NO

Why?

Please circle the appropriate responses to indicate how strongly you agree or disagree with the following statements.

5. I really want to go to college someday.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Comments:

JSOP Post-Camp Survey for Campers Continued:

6. I want to have a career in science someday.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
---------------------	------------	--------------	---------------	------------------------

Comments:

7. School is fun and important.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
---------------------	------------	--------------	---------------	------------------------

Comments:

8. I want to challenge myself to get good grades in school.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
---------------------	------------	--------------	---------------	------------------------

Comments:

9. I need to go to school to be successful.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
---------------------	------------	--------------	---------------	------------------------

Comments:

Please write 1-2 sentences to answer the following question.

10. What do you want to be when you grow up?

Why? _____

Example of Parental Consent Form for Surveys used in Research

University of New Mexico Health Sciences Center
Parental Consent to Participate in Student Research
SHARING SCIENCE: A STUDY ON THE EFFECTS OF INFORMAL SCIENCE EDUCATION OUTREACH WITH
ELEMENTARY STUDENTS

Dr. Diane Marshall, Ph.D, from the Department of Biology, is conducting a research study. The purpose of the study is to assess the impacts of informal science education. Your child is being asked to participate in this study because he/she will be attending the Junior Scientist Outreach Program, which is a type of informal science education.

Both your and your child's permission are needed in order to participate in the study. If you agree and your child Volunteers to participate in this study, the following things will happen: he/she will be asked to fill out pre- camp and post- camp surveys. The survey should take about 5-10 minutes to complete. No names or identifying information are on the survey. The survey includes questions such as, "What do you want to be when you grow up?" Your child can refuse to answer any of the questions at any time. There are no known risks in this study, but some individuals may experience discomfort when answering questions. All data will be kept for one year in a locked file in Dr. Marshall's office and then destroyed.

Participation in the study is voluntary. This study provides a chance for future programs like the Junior Scientist Outreach Program to be implemented. You have the right to choose not to participate or to withdraw participation at any time.

If you are interested in further participating in this study, or would simply like to find out more, please sign below and provide a phone number so that a researcher can contact you. If you prefer, you may also call Dr. Marshall's research assistant, MJ Vargas at (505) 506-4340 during the weekday hours of 8am to 5pm. If you are not interested, please sign and check the appropriate line below so we will know that you have been contacted and are not interested in participating.

If you have questions regarding your legal rights as a research subject, you may call the UNMHSC Human Research Review Committee at (505) 272-1129.

Thank you in advance for your help with this project.

Sincerely,
Martha Jo Vargas,
Undergraduate Researcher & JSOP Camp Coordinator

I am interested in further participating in this study. Phone number for contact: _____

I agree to allow my child to participate in this research study.

I am not interested in allowing my child to participate at this time.

Parent name _____ Parent Signature _____ Date _____

Minor Child's name _____ Minor's Signature _____ Date _____

Example of Child's Assent Form for Surveys used in Research

UNIVERSITY OF NEW MEXICO HEALTH SCIENCES CENTER

ASSENT TO PARTICIPATE IN RESEARCH (Ages 7-11)

**SHARING SCIENCE: A STUDY ON THE EFFECTS OF INFORMAL SCIENCE EDUCATION OUTREACH
WITH ELEMENTARY STUDENTS**

You are being asked to join a study to help us find out how informal science education programs benefit children. The Junior Scientist Outreach Camp is an example of informal science education.

For this study you will be asked to fill out surveys before and after you attend the Junior Science Outreach Program.

The duration of this study is 5 days. You will be given a pre-survey before you start any camp activities and a post-survey when you are all done. Each survey will last 5-10 minutes.

We would like you to talk with your parents about this before you decide whether or not to be in this study. We will also ask your parents if they want you to be in this study.

If you have any questions at any time, please Dr. Diane Marshall at (505) 277-1168 or MJ Vargas at (505) 506-4340.

You do not have to be in this study. If you do decide to be in the study, you can change your mind at any time. The camp counselors will not care if you change your mind or if you don't want to join this study.

Signing this form means you have decided to join this study. You and your parents will be given a copy of this form.

Print Your Name: _____

Sign Your Name: _____ Date: _____

Volunteer Post-Camp Survey



Junior Scientist Outreach Program (JSOP) Post-Camp Survey for Volunteers

Camp Counselors/Volunteers: We are interested in the extent to which the Junior Scientist Outreach Program has changed your thoughts on science education. Please fill out the following questions to help us to continue to provide the best educational experience possible. Responses will be kept confidential.

Name _____ Age _____

Please circle all the appropriate responses to the following questions.

1. What level of education did you complete prior to volunteering for JSOP?

HS Senior College: Freshman Sophomore Junior Senior

2. During JSOP, what was you're role? (Circle all that apply)

Group Leader
Assistant
Presenter

3. Have you previously participated in any other science outreach programs such as the Junior Scientist Outreach Program?

YES NO

If yes, please give the name & date of the program and tell us a little about your experience: _____

Please circle the appropriate responses to indicate how strongly you agree or disagree with the following statements.

4. During JSOP I felt empowered as a leader.

Strongly Agree Agree Neutral Disagree Strongly Disagree
1 2 3 4 5

Comments:

5. I was given proper information regarding my involvement as a volunteer before the camp.

Strongly Agree Agree Neutral Disagree Strongly Disagree
1 2 3 4 5

Comments:

JSOP Post-Camp Survey for Campers Volunteers:

6. The sustainability theme of the camp made it easier to relate science to real-life events.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

7. As a group of volunteers, we accomplished our goal of “Sharing Science”

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

8. I would recommend JSOP as a volunteer opportunity to my friends and peers.

Strongly Agree 1	Agree 2	Neutral 3	Disagree 4	Strongly Disagree 5
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Comments:

Please write 1-2 sentences to answer the following question.

9. What were the most and least successful activities of this week’s curriculum?

Why? _____

10. Please provide feedback on your experience in the JSOP volunteer orientation.

11. Please provide feedback on coordination and leadership of the camp.
