



## Welcome to the iSTEM Project!

### What is iSTEM?

iSTEM is a science education program funded by the National Science Foundation that combines an in-school mentoring program with informal science activities and projects and field adventures for Pascua Yaqui and Hispanic youth. The goal of the project is to:

*Increase interest, engagement and excitement about doing and learning about science and connect science to real world issues experienced by students.*

The University of Arizona - Southwest Institute for Research on Women (UA-SIROW) provides grant oversight and is leading the development of the science activities curriculum and science related field trips.

The mentoring component of the program is led by StrengthBuilding Partners (SBP), a Tucson based non-profit which has worked with the Pascua Yaqui Tribe for over 10 years. Mentors receive training and are matched with Pascua Yaqui students attending Lawrence Elementary and Valencia Middle School in Tucson. A Partnership Team comprised of project staff, school officials, tribal members and leaders, and parents and family members of students provides guidance and input in all areas of the program. The iSTEM program philosophy contends that:

- It important to work with students in their home communities and to involve their family and friends,
- The more closely science activities relate to the everyday lives of youth, the more engaged they will be in science,
- Educational opportunities for science exist most everywhere, mentors and other adults can help youth make the connections and ignite the spark of curiosity,
- The UA and the Tucson community have an abundant array of science education resources and activities available to K-12 students and families. It is important to connect students to the science opportunities in their communities and neighborhoods!

The program activities and materials provided to mentors by the iSTEM team are intended to give you hands-on tools to develop a relationship that gives you and your mentee an opportunity to explore the natural world together. You can use these materials as jumping off points and see where they take you! You do not need to be anchored to the activities or the “instructions”

rather use them to help create a relationship that allows your mentee and you to explore, question, and share your thoughts and experience with each other about the world around you.

Mentors deliver a very important message. Science is cool and fun!!! As positive role models, you can demonstrate to your mentee that you value education, that science is relevant and important to them as a student, a future scientist, and most importantly, as an engaged citizen in their community and the world and. Knowing, doing, engaging with your iSTEM mentee can impact their future – their commitment to education and career development as well as their overall wellbeing and the wellbeing of their family and community. Conveying confidence and interest and excitement about science is at the core of the mentor-mentee relationship.

**Remember: Mentors do not need to be trained scientists to be effective mentors for students. In fact, many iSTEM mentors do not have a background in “formal science” . The key is excitement, interest in science and the world around you and a desire to communicate that excitement to youth!**

## What’s My Role as iSTEM Mentor

As an iSTEM mentor your role is to support, encourage, and guide. Ideally, you become a co-investigator, a “partner in discovery” with your mentee, which means that you work together to examine things that interests both of you.

In the iSTEM project, the science activities provide the context for developing relationships, but it is the relationship, the rapport and the support that you provide, that is the real focus of your work. As you begin to think about facilitating science experiences with your mentees, it’s helpful to keep in mind your role as an iSTEM Mentor.

- You are there as a [guide, a supporter, a good listener](#) – an adult who is interested in your mentee’s life. You will need to be consistent, caring, and enthusiastic. It is very important to be reliable, too, always showing up on time.
- You are a [role model](#) for children who may not have many examples in their lives of people who see education or science as a means to a better life. Your enthusiasm for the things you discover together sends a message that learning, and science in particular, can be rewarding, useful and fun. Interaction with you may help your mentee begin to think more concretely about their dreams and ambitions for the future, such as getting a college degree.
- You are a [co-investigator and explorer](#), not a teacher. Your role isn’t to transmit knowledge; it is to explore interesting topics with your mentee. You will also need to model the behaviors that you want to encourage, such as observing, asking questions, using the science supplies, and taking notes in your science journal. Realize that it takes practice to know when to intervene and guide the activity and when to hold back to allow for productive exploration and investigation. Be prepared to lead by example, to listen, and to follow where the mentee’s curiosity takes you.



Science related goals of iSTEM are to:

- Stimulate and nourish the curiosity youth about the scientific aspects of their natural and man-made surroundings,
- Build a sense of confidence and pride in the scientific and natural knowledges that they bring to the world as a result of their experiences in the world,
- Expose students to new ideas about work and educational possibilities including in the science areas,
- Build a sense of connection to the UA and other educational and scientific experiences and opportunities around Tucson,
- Develop their skills and interests in observation, problem-solving, analytical thinking and oral, written, and artistic expression,
- Nurture a connection between students own cultural and everyday experiences and knowledge and science.

## Partners in Exploration

Your relationship with your mentee will develop around the science activities you do together. The goal of iSTEM is to increase interest, engagement, experiences, knowledge and self-efficacy (self-esteem) in science. You as their mentor, will work along-side them – observing, wondering, and asking questions. Most likely your mentee will look to you to provide the initial spark and will periodically need your encouragement and guidance to help them focus. Your goal is to offer necessary support and structure without taking over the activity or the mentees' learning.

All of the activities listed below represent aspects of scientific inquiry. These include:

- asking questions
- making observations
- coming up with plans for answering your questions
- recording data and questions
- analyzing evidence
- reflecting on findings and coming to conclusions

## Asking Questions

By asking questions of your mentee you can encourage further investigation and thinking.

Ideas for Questions:

- What do you think will happen? (As you conduct an experiment)
- Does this ever happen to you in your life?
- What kinds of projects do you think (insert type of scientist) scientist works on?
- What are some useful ways this kind of science or information could be used to make the community of New Pascua better? What about the park, the roads, houses, lights, etc.
- Do you have stories from your family or Yaqui stories that explain (insert science topic or phenomenon).



- If you could invent anything what would it do?
- What kinds of issues or problems do you think this kind of science could fix
- What do you know about (insert type of science or topic)?
- What would you like to know about (insert type of science or topic)?
- At every opportunity, discuss what scientists do, what skills they use, and different jobs that scientists and those interested in science have.

## Funds of Knowledge: Respecting Indigenous & Cultural Knowledge

The iSTEM project has as a guiding frame work a “Funds of Knowledge” perspective. Funds of Knowledge refers to the accumulated and culturally developed knowledge that all groups and individuals have (and that is often overlooked or undervalued) that allow people to live day-to-day in their environments.

Within this project we emphasize that Pascua Yaqui culture is rich with knowledge and science that is useful for explaining and predicting natural phenomenon. Without it, the culture wouldn't have survived for thousands of years. Honoring and connecting western science with Native American and Hispanic culture and the everyday experiences of the students of families and community is important. There are several opportunities within the activities for the units for students to share what they know and to take home a question or ask an elder or family member about their knowledges related to the science topics you will be working on with your mentee.

“Indigenous knowledge systems are regionally and tribally specific, and dependent upon thousands of years of observing and passing on knowledge of the particularities of the land itself, the animals, and other life forms that dwell there. Thus, traditional Indigenous knowledge or native science is “place-based,” and “hold the memories, observations, stories, understandings, insights and practices for how to follow the natural laws of place.” (from: “Original Instructions: Indigenous Teachings for a Sustainable Future”, 2008, by M.K. Nelson)

*Remember: “Science has been and can be defined many different ways depending on who is doing the defining. But one thing that is certain is that “science” is culturally relative. In other words, what is considered science is dependent on the culture/worldview/paradigm of the definer.” Leroy Little Bear, J.D., Ph.D. Foreword to Native Science, Natural Laws of Interdependence*

## Working with the Activities

(See the next page for a list of units, activities and field trips for the 2013-2014 school year.)

Every 6 weeks there will be a new iSTEM unit or theme introduced. During the unit or shortly after there will be a field trip adventure related to the unit. For example the first topic is Solar Energy & Robotics. When you arrive at the school for your first session you will be provided a packet, or we can email you a packet. This packet will contain



- 1) Introduction to the area of science the unit is related to. This contains information you can read over with your mentee, give to the mentee to read, or use as ways to have discussions about the area of science, employment, education and how the topic relates to Southern Arizona.
- 2) Activities 1-3 or 1-4. Each Activity has a direction list, and set of instructions and some background information. Some activities also include a “Take it Home” activity for the student to try at home which you should encourage them to complete. There are also opportunities within the activities for journaling, drawing, graphing or storytelling. Each mentee will receive a science journal to keep. We hope that you will encourage them to write or draw in their science journals.
- 3) A packet of materials and supplies you will need in order to complete the activity.

- If these activities make take more than a week/session that’s okay!
- Don’t let the activity instructions be the boss of you!! If you want to try something different, go ahead. This is about discovery and adventure, have fun and experiment!
- There will be iSTEM staff at the schools to help you with the activities. So please ask for help if you need it.
- And please talk with your mentee about the real world and cultural connections these science activities have. Make it Real!
- Most importantly: HAVE FUN!!!!

## UA iSTEM Contacts:

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## PROJECTED UNITS & FIELD TRIPS FOR iSTEM 2013/2014

### **Unit 1: Solar Energy & Robotics (August/September)**

Activity 1: Predicting Temperature

Activity 2: Build a Pizza Box Solar Oven

Activity 3: Experimenting with UV Beads: Solar Energy & Chemical Reactions

Activity 4 Computer Programming (Preparation for Solar Robot Field Trip)

**Field Trip:** University of Arizona, College of Engineering. Work with engineers on building solar powered robots.

### **Unit 2: Mapping and GIS (Sept/October)**

Activity 1: Map your school

Activity 2: Scavenger Hunt/Intro to GIS

Activity 3: Google maps!

**Field Trip:** Tour of UA Facilities and Departments that use GIS and Mapping in Applied Fields (Health, Weather/Monsoons, NOAA, Geology/Archeology)

### **Unit 3: Soil Science (November/December)**

Activity 1 Experimenting with Soil Texturing

Activity 2: Making Edible Soil, Yum!

Activity 3: Making Soil/Sand Paintings

**Field Trip:** Soil Lab @ UA (Soil Testing, etc.)

### **Unit 4: Water & Watershed Management (January/February)**

Activity 1: Making a Model of a Landscape and Waterflow.

Activity 2: Map Pascua Area Watershed (Mapping)

Activity 3: Make a Model of the Effects of Water Erosion on Soil/Landscape

Activity 4: Identifying Locations around School and Create a Rain Garden.

**Field Trip:** Wastewater Plant (Pima County)

### **Unit 5: Ecology (March/April)**

Activity 1: Identifying Patterns in Plant Distribution (Mapping Plant Distribution in School Area)

Activity 2: Identification and Analyzing Plant Distribution

Activity 3: Make A 3-D Model (Clay) Of Mt Lemmon from a Topographic Map

Activity 4: Life Zones of Catalina Mountains: Go Fish Game!

**Field Trip:** UA Science Center, Mt. Lemmon