

Imagine living in a town where the nearest Wal-Mart is sixty miles away, the nearest higher educational facility has no physics program to speak of, and the school district is deep in debt. I have just described my hometown—Alpine, Texas—but this description fits most of the towns in rural West Texas. The schools are small, and the teachers are spread thin, often covering subjects (such as physics and chemistry) for which they have only basic understanding. Students in these schools are simply not exposed to the broad realm encompassed by the sciences. There is not a shortage of intelligence in these locations; in fact the number of Gifted and Talented students exceeds the state average. However the percentages of economically disadvantaged students and students in the ethnic minority also exceed the state average. It is important for these students to have the same opportunity to be exposed to the sciences that students in larger, richer, more urban schools receive. West Texas rural schools provide a perfect opportunity to interest **students in future physics-related careers**

In May of 2006, the Angelo State University Peer Pressure Team took a week-long road trip to rural West Texas hoping spreading an interest in science to grade-school children, with a focus on the under-represented demographic. The goal was to provide excitement and enhance attitudes about science in general with a focus on encouragement

Timing was key; we took the trip the week after finals, which was before public schools went on summer vacation. We traveled to Sterling City, Garden City, Greenwood, Rankin, Balmorhea, Marfa, and Alpine, Texas (with a round trip mileage of 647 miles. The audiences ranged from late elementary school to high school, though most of the shows were performed for middle school students. They were our target group because their minds are still malleable. They do not yet know which direction they want to pursue educationally, so they are open to new and different ideas and looking for reinforcement in old ones.

The show started out with a “bang” as nine ASU physics students simultaneously popped balloons to get the audience’s attention. Since we were the “Peer Pressure” team, so the first part of the show focused on pressure. We used Magdeburg Hemispheres, balloons, and a vacuum chamber to demonstrate the presence of air pressure. We showed that a “big strong ASU football player” could not stab a straw through a raw potato, but even a girl could stab the straw all the way through by covering the top opening of the straw with her thumb, creating a column of air strong enough to penetrate the potato. We used steam and temperature change to crush cans, again demonstrating air pressure. Using a ketchup packet in a two-liter bottle of water, we demonstrated the relation between density and pressure. The narrator would claim to have “supernatural brain power” and with this power would command the ketchup packet to sink or rise in the bottle of water. When the narrator raised or lowered his or her hand (appearing to be under great strain), the person holding the bottle would discretely squeeze or release the bottle, making the ketchup packet sink or rise, respectively. The students were then asked to try to control the packet with their combined mental powers. It was funny to see them strain and raise or lower their hands, but more importantly it was exciting because it meant they were interested and engaged.

One demonstration involved using a leaf blower to float a large, light rubber ball over the crowd. The purpose was to show the effects of moving air and areas of low pressure, which was further demonstrated with a pinwheel positioned above and below the ball. Using a fog machine and a home made “air cannon,” we blew smoke rings over

and into the crowd, demonstrating air motion and vortices. This was a real crowd pleaser as students tried to touch the rings as they flew towards them.

Another focus of the show heat, or lack thereof. We brought liquid nitrogen with us and froze balloons to demonstrate the change in volume with relation to temperature. We also froze racquetballs and, with much caution, would shatter them on the floor or table. Students were amazed at this demonstration. They asked many questions about this one. The grand finale of the show was a model of a grain elevator explosion. The purpose of this demo was to end the show with a "bang," too. Refracting lenses (in the form of colored cardboard glasses) and liquid nitrogen-frozen marshmallows were then distributed to the students, and if time allowed, team members gave students rides on homemade hovercraft (though this was not made available to the high school students). This was the chance teachers and students had to ask questions. Most of the time it was the teachers who had the most questions. They were very excited about utilizing some of our demonstrations in the classroom. We also received feedback from administrators, several times receiving an invitation to return. The students really seemed responsive to situations that were counter-intuitive, and they always seemed interested in the explanation. They were most responsive to the demos that required student volunteers and audience participation, and they were naturally fond of the loudest and brightest demonstrations. Most of our demos fell into one of these categories.

Everywhere we went we were met with enthusiasm and gratitude. We received thank-you cards from the students in Marfa, and teachers asked if we would be back the next year. When I returned home for the summer, many of the high school students with whom I used to attend school complimented our show and admitted that physics was interesting. The general feedback seemed to affirm that the ASU Peer Pressure Team had indeed demonstrated the excitement and significance of physics.

Students looking “cool” in their refraction lenses



The audience chose the longest-winded boy and girl in the group to try to blow a ping-pong ball out of a funnel for a low-pressure demo.



The strongest kids in the class could not pull apart what a vacuum had joined together.