



Teacher In-Service Program Support to Phoenix Schools by IEEE Retirees

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The "IEEE Retirees Group For TISP" has been very busy this past month. Two of them, John Purchase and Arnold Brenner, put on the "Working With Watermills" lesson at Sacaton Middle School in the Gila River Indian Community. They gave lessons to three classes of 7th graders, teaching them how potential and kinetic energy and the mechanical advantage of simple machines dictate how watermills work. The students also designed and built water wheels which were tested in a in a jig with a water jet supply and a weight of steel washers to lift. The record was 39 washers, or 624 gms, for the wheel built by two girls (photos below). The weight of water in one bucket on their wheel was 50 gms, giving an MA of 12.5 (the theoretical MA was 16 but they lost some in friction between the wheel axle and the test stand supports). That really brought home to them what mechanical advantage meant; as one said, wide eyed, when she felt the weight of the washers compared with the weight of the water: "Cool!"

We also signed up three new schools:

- **Phoenix Collegiate Academy** (a charter school) for two 6th grade classes doing "Sail Away"
- **Tempe Connolly Middle School** for five 7th grade classes doing "Here Comes The Sun" (this is a new lesson plan for us)
- **Tempe Fees Middle School** for ten 6th grade classes doing "Working With Watermills."

We have assembled three new teams of volunteers to work with these three schools. We have also been approached by Tempe Aguilar Elementary School for lessons with several classes and we are currently talking to them about their needs.

And we still already have Sacaton Middle School next quarter with three 7th grade classes doing "Here Comes The Sun" and then the following quarter three 8th grade classes doing "All About Electric Motors."

So we are now very, very keen to find more volunteers to join us in this extremely rewarding and most important activity, working with students to get them interested in science! Please contact John Purchase, jpurchase@cox.net, if you would like to join us!

Here are some pictures from the Sacaton visit to stimulate your interest:



John Purchase Teaching Potential Energy, Kinetic Energy, Simple Machines, and Mechanical Advantage As Applied To Watermills



Arnold Brenner And One Of The Students Exploring The Concept Of Mechanical Advantage As Applied To Their Water Wheel Designs



Designing And Building— This Design Maximized The Mechanical Advantage And Worked Well Until The Tape Holding The Cups Came Off In The Water Stream!



One Of Our Budding Engineers From Our Previous Lesson, "Sail Away," Building An Elegant Paddle Design (The Science Teacher, JoEllen Kinnamon, Is Sitting Behind; She Is An Avid Supporter Of What We Are Doing For Her Students)



Arnold Brenner And John Purchase Helping Run Various Designs In Test



Our Other Budding Engineer (On The Left) From "Sail Away" With A Good Design — The Red Cup On A String Carries The Steel Washers (Seen On The Table Surface)



The Proud Record Holders With Their Wheel — It Lifted 39 Washers (624 gms!). Unfortunately We Didn't Get A Picture Of It Running



A Large Paddle Design — It Would Have Worked Better If We Had Had A Stronger Water Jet From The Fountain Pump We Were Using!



A Long Paddle Design In Construction — The Students Quickly Grasped The Concept Of Mechanical Advantage Once They Had Run An Initial Test



Many Students Initially Went For A Design Using Spoons As Paddles Until They Saw The Performance Advantage Colleagues Using Small Cups Had Over Them



Another Good Design With Increased Mechanical Advantage In Test

The TISP program is an effort sponsored and promoted by the IEEE national office but run at the local chapter level. As a subset of TISP, talented retirees in the IEEE Phoenix section are being organized by John Purchase to help on this noble cause. Any retiree interested in joining the effort should please email John Purchase at: jpurchase@cox.net. Plus any non-retiree interested in helping the Chapter's TISP effort should get in touch with Mike Poggie at: Mike.Poggie@ieee.org.