Cultivating Citizen Scientists with seismic monitoring in Texas and New England using an affordable seismograph TX-ESP TEXAS EDUCATIONAL SEISMIC PROJECT

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Educational Seismology Programs

Texas Educational Seismic Project (TXESP), together with the Boston College Educational Seismological Project (BCESP), share a mission to take real world events and turn them into "Teachable Moments". In pursuit of our mission, both TXESP and BCESP use seismology as an exciting medium for inviting students into the world of scientific monitoring; we are highly motivated to promote inquiry-based learning through investigation of earthquakes recorded by seismographs in classrooms. It is truly fascinating that it is possible to record earthquakes that occur across the globe and are recorded in Texas and New England using a new, simple seismograph - the "Raspberry Shake". Historically, real-time earthquake monitoring and analysis required very high cost, and research-quality instruments. However, very recently the Raspberry Shake seismograph revolutionized citizen science capabilities. The question we ask is "Can the Raspberry Shake seismograph provide high quality data comparable to educational and research-quality seismographs?" Affordability and flexibility expands opportunities for all students - giving them research experiences investigating what is recorded on their classroom seismograph and promoting a valuable positive step in the direction of inquiry-based science education and college readiness.

Seismic Instrumentation

RIGHT: Ward's vertical educational seismograph uses oil as a damping mechanism.

BELOW: Raspberry Shake seismographs are available in a number of configurations: 1-C, 3-C, Strong Motion, Infrasound



Raspberr



LEFT: Historical (and still operating) World-Wide Standardized Seismograph Network seismographs at Boston College's Weston Observatory in Weston, MA. Weston Observatory also operates modern researchquality seismographs as part of its New England Seismic Network (NESN Broadband).



Testing Technology and Seismology Concepts



ESPs Grow New Citizen Scientists

Through TX/BC ESP's educational partnerships, we make a difference in the lives of citizens and students of all ages and in differing socioeconomic circumstances by engaging them in hands-on learning opportunities and teaching science as it is actually practiced.

Overseen by our science-education and monitoring team, students study, record, and interpret natural geologic phenomena through visual experiences and hands-on activities, explore and test student-led inquiries, and ultimately develop critical peer-to-peer communication skills. The science of seismology forms an excellent foundation for this endeavor because: (1) it is an interdisciplinary science that requires integration of many STEM concepts, and (2) it teaches how the natural environment impacts our everyday lives (see BELOW).



LEFT: Exploring how earthquakes are located enables students to transcend passive learning and move towards active learning.

Examples of Wave Interpretation, **Propagation and Attenuation**







...and experimenting with wave attenuation

Collaboration Across the Nation

Raspberry Shake offers a simple "plug-and-play" affordable seismograph which offers great flexibility for users. Affordability and flexibility expands opportunities for low to median income students - giving them research experiences investigating what is recorded on their classroom seismograph and promoting a valuable positive step in the direction of inquiry-based science education and college readiness. With one classroom Raspberry Shake seismograph, all students at a school may benefit from multiple, large monitors (computer screens) across a campus. Required viewing software is available for <u>free</u> online, and any user can begin "watching the ground move" immediately once the software is installed.



Poster SPET P3

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