Baron J. Richardson
brichardson@mansd.org

Mentis Sciences introduces STEM to Hillside Middle School using the Mentis Sciences Educational Toolkit

I was introduced to the MSET during last summer's UNH TESSA program. I immediately envisioned numerous applications for the device in my science classroom. With the help of Michael Elliott, I was able to bring the device into my classroom and pilot some of the lessons with my students. Michael and I collaborated to adapt the spring-tension lessons so that they would be more suitable for middle school students. In addition, Michael returned for an engineering day with our students where he was a featured presenter. He presented a dynamic impact lesson to each group of students using the MSET device.

Over the past six years I have been working with UNH professors and graduate students to bring structural engineering lessons into my classroom. With a focus on seismic safe building design my students have been designing and building model structures from pasta and glue. Once constructed the students test their buildings for earthquake resistance on a classroom shake table. When I first witnessed the MSET device being used in a three-point deflection test demonstration, I could see possibilities for its use by students to test the structural materials that they might choose for their pasta structures. This would allow them to make informed decisions about their material choices. This spring I was able to introduce the Mentis MSET to 7th grade students. My goal was to determine how practical and effective the MSET would be in a middle school science classroom.

With the help of a Senior Capstone student (Michael Elliott) from UNH Manchester, my students were able to participate in a series of lessons using the MSET device. Over a span of two class periods my students learned about the nature of springs, spring constants, and the mathematics necessary to calculate and predict how springs will function individually, in series, and in parallel. The students made measurements in science class and followed up with discussions of the mathematical formulas and calculations in Mrs. Capistran's math class. The goal was to help our students make better connections between math and science disciplines. The teachers were introduced to the MSET prior to the lessons, and the students were guided through the lessons by their teachers.

Initially we found that the math that was used to analyze the results in each of the experiments was challenging for most of our 7th grade students. Due to the fact that the students were given a very brief introduction to these concepts through these lessons, I believe that with continued instruction and practice, middle school students can make practical use of the MSET for measurement and analysis purposes. This will help them to gain a better grasp of the math concepts as they connect to the science that they are doing. For this to occur, the students will need far more in-depth instruction in the use of the MSET device as well as practice with the math concepts. A continued collaboration between math and science teachers will help to facilitate this process. A limiting factor is the slow speed at which the MSET operates and the large size of my science classes. These factors limit the number of students who have direct experience with the device, due to time constraints. Ideally these devices would be part of a well-equipped STEM lab where stations were set up with multiple MSET devices. In addition, classes with a high teacher to student ratio would be much more effective.

I feel that the MSET is a practical tool for middle school students to use in their analysis of physical science principles. If students are given enough time and instruction with the device and the associated mathematics, there is much to be gained from its use in the middle school science classroom. I plan to continue to work with the MSET and to further develop and refine practical lessons for its use with students in middle school science and math classrooms.

Although, out-of-the-box the MSET is most suitable for a high school physics classroom, I believe that exposing children to this type of analytic equipment will help to further the goal of building student interest in STEM fields.