

### Summer Institute

This year we invited teachers down to Sonoma State for the Teacher Institute on June 14-18. Our main goal for the training was to leverage each teacher's classroom experience and pedagogical expertise to both evaluate and improve the Learning by Making curriculum. With a critical eye towards overall scope and pacing, the teachers took a thorough inventory of the lesson plans. They focused on measuring alignment with the Next Generation Science Standards and Common Core Math Standards and with identifying core concepts. These intense lesson plan studies led to the creation of concrete and measurable learning objectives, conceptually balanced unit outlines, suggested pacing guides, and draft lesson plans for the first third of the curriculum. In addition, the teachers participated in team building, effective communication, computational thinking, and scientific argumentation activities. While the primary goal was to revamp the curriculum, we also succeeded in strengthening the community of the Learning by Making program.



Back row: Carolyn Peruta, Laura Herman, Lindsey McLean, Patty Halpin, Jeff McLean, Warren Wiscombe, Allison Baldwin, Kevin John, Kandi Golightly, Susan Wandling, Andru Luvisi, Theresa House, Jim Snyder. Front row: Amanda Samana, Susana Ramirez, Kim Jenderseck, Lynn Cominsky, Ann Marie Bauer, Howard Cole, Amanda Derby.

### Rosie's Girls Career Day in Richmond, CA

Learning by Making joined with NASA to sponsor a "girls who code" interactive table as part of the annual Career Day sponsored by Rosie the Riveter National Historic Park, the Richmond YMCA and Rosie's Girls summer camp. Drs. Lynn Cominsky and Carolyn Peruta brought 6 of the LbyM HP Stream 11

computers to the event, and taught the girls how to do simple programming tasks using Turtle Logo. Career Day is the culminating experience for these

6<sup>th</sup> – 8<sup>th</sup> grade girls who have spent six

"I never knew how cool coding was until I actually got to try it out for myself and see the different shapes and patterns [TuxtleLogo] codes can make.". SSU student and

Karen Delgado, Ukiah HS Class of 2016 MESA member



weeks learning about non-traditional careers for women. They were very excited to drive the turtle around the screen and within just a few minutes were able to draw interesting patterns!

Thank you to the Fluke Corporation for contributing another 10 digital multi-meters for use in the classrooms! It's wonderful to be able to use professional equipment to train the LbyM students!

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## **STEM Class Tours Silicon Valley**

On May 25<sup>th</sup>, students enrolled in Ukiah High's STEM Learning by Making class got to visit the longest building in the world when they took a field trip to Silicon Valley. The nearly 2-mile-long building, known as SLAC National Accelerator Laboratory, contains tunnels where protons are slung at the speed of light. Teacher Patty Halpin coordinated the trip that sent 52 students from her STEM class, MESA, Gaming Club, and Computer Science Classes, on a bus which was underwritten by Doug Clarke, retired physicist and consultant to the i3 Learning by Making project. Touring SLAC gave students a glimpse of the research conducted by 3,400 scientists from around the world. They watched 3-D images of nebulas, and black holes forming and expanding. Patty observed "The 3-D models were such a hit. Students were reaching their hands out to touch stars! Lots of laughter and oohs and aahs in the 3-D room!"

After a short ride from Stanford to Santa Clara, the students arrived at the Intel museum. Here they learned about semiconductor technology, which they found to be so relevant to their work in the STEM class. The students built a Lego structure, and then wrote instructions for another group to build that structure, hopefully



with similar results. They then toured the museum, viewing displays that showed the history of computers and the evolution of computer language. A hungry stop at In-N-Out Burger on the three-hour ride home made the trip complete. Patty shared: "It was a long day, but so worth it. Not only did we learn some cool things about the work of astrophysics scientists and uses of computer technology, it turned out to be a fun bonding time for the students."

## What Will the Research Say?

As a development project, i3 Learning by Making has been working with WestEd, an independent evaluator. They continue to review the curriculum and its implementation, and beginning this year will be measuring the impact based on assessments conducted with LbyM students and comparison group students. They will be focusing on the following research questions in 2016-17:

# Bill Sterling, a member

of the LbyM Community Advisory in Group, has visited the Anderson Valley High STEM classroom numerous times, and observes: "The enthusiasm among the students themselves is palpable. They help one another coding their computers to initiate and monitor the experiments." He adds: "They are intensely engaged with the work, with the

equipment and with each other. But the thrust of the class is truly learning by making, learning by doing, learning by learning what one can figure out for oneself. Respect for and appreciation of the benefits of collegiality are apparent." While this i3 study is focused on measuring the impact of STEM

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Learning by Making on math and science achievement and college readiness, we are aware of other potential outcomes. Collaborative learning leads to success! The Global Development Research Center identifies 44 benefits of collaborative learning. At the top of the list is "development of higher level thinking skills."

• What is the overall level of fidelity of implementation?

 Does Learning by Making have an effect on mathematics and science performances of 9<sup>th</sup> to 12<sup>th</sup> grade students compared to mathematics and science performances of 9<sup>th</sup> to 12<sup>th</sup> grade students in the businessas-usual condition?

> Does Learning by Making increase high school students' interests in STEM and STEM careers?

Learning by Making: STEM Success for Mendocino County, an "Investing In Innovation" (i3) program, is funded by the U.S. Department of Education.

To join our LbM group page, send email to <u>lynnc@universe.sonoma.edu</u>. Sonoma State University \* 1801 E. Cotati Avenue \* Rohnert Park, CA 94928 \* (707) 664-3122