

blueprint

for innovation

Sponsored by the state chancellor's office, the *California Community Colleges (CCC) Maker* initiative recently announced the recipients for a two-year grant, and Foothill College/KCI made the cut. The initiative was launched with the goal to drive innovation in education, and ultimately to prepare students for success in STEM/STEAM careers (Science, Technology, Engineering, Art & Math). Kyle Brumbaugh, director of the KCI Professional Learning Network, stated, "By participating in the CCC Maker project and creating a makerspace at Foothill College, we hope to establish new educational pathways to STEAM degrees and certificates, as well as supporting the pathways already in place."

One of the grant objectives is to help non-traditional STEAM students—including underrepresented groups, veterans, and economically disadvantaged learners—enter the local Silicon Valley workforce.

KCI's Makerspace has the potential to become a community hub for makers across San Mateo and Santa Clara counties. The grant supports a part-time Maker-in-Residence position, which is pivotal to launching and maintaining the new space. The first year of the grant will focus on transforming one of the computer labs in the KCI into a makerspace that can accommodate up to 32 students. The old computer lab will give way to a space that includes laser cutters, vinyl cutters, soldering stations,



KCI / Foothill College Awarded Two-Year Maker Grant

3D printers, and microcontrollers. Programs and classes will be launched for local college and high school students, educators, and community members. KCI is already leveraging its connections in the maker community to design the makerspace and work through implementation, and is fortunate to have a number of instructors qualified to conduct these courses.

KCI has developed ten additional courses, which will be taught in the makerspace, including three for-credit course strands in Design Thinking, Computational Thinking/ Computer Science, and 3D Design. In these courses, students will engage in product creation, with an emphasis on design thinking concepts, such as ideation, prototyping, and iteration. These courses will also encourage leadership and soft skills. Another key activity will be providing professional

development opportunities for K-14 educators to learn how to implement maker projects in their own classrooms. Teachers will also have the opportunity to work alongside students to fabricate parts, using a variety of materials—from popsicle sticks and hot glue to more sophisticated tools like 3D printers and programming.

KCI has taken the lead by partnering with various divisions at Foothill College—including Fine Arts & Communication; Physical Science, Engineering & Math; and Business & Social Sciences—which will be important to the overall success of the initiative. In year two the plan calls for building out a more industrial FabLab in another area of campus. Stay tuned for more information on the KCI Makerspace as the transformation occurs. For further details, contact Kyle Brumbaugh at brumbaughkyle@fhda.edu.

New Summer Integrated Engineering Program for Kids is a Hit

The KCI partnered with De Anza College Community Education this summer to offer a robust suite of integrated engineering courses and camps for 6th through 9th grade students. The overall program, Integrated Engineering, was first offered through the De Anza Community Education's Extended Summer Year program that took place June 19 through July 14. The Extended Year sessions were followed by two five-day camps, which were even more intensive and challenging. Students spent their time in creative hands-on activities that focused on the intersection of electronics, engineering and coding.

Students in the program, taught by mechanical engineer turned teacher Ken Hawthorn, built a series of increasingly complex projects that set the foundations for high school and college math, exploring the

intersection of multiple coding languages, electronics, and rapid prototyping. The aim is to tap student creativity so they leave the program with the mindset of, "if the machine I want doesn't exist, then I will build it!" Projects included autonomous machines with a focus on iterative prototyping process, using a variety of power tools, 3D printing and CNC cutters.

During the five-day camp, students designed and built intelligent machines by learning to weave professional engineering and development tools together in order to build complex Internet of Things (IoT) machines. All tools introduced in the program are used in professional engineering environments. During the camp, the students were guided in using tools designed for education as well as more complex tools used in industry. Students experienced a breadth of

activities from iterative design to machine control theory and practice, and they had the opportunity to build their own touchscreen Linux tablet computer. The goal of the camp is for students to learn to see the world of machines as accessible, modifiable, and hackable.

What sets these courses and camps apart from others is the integrated focus. Most student camps focus on a single discipline—for example, coding. During the Integrated Engineering camps, students learned to handle equipment such as power saws, CNC cutters, soldering tools, and 3D printers. They gained experience using hardware like Raspberry Pi, Arduino, and Pulse Width Modulation (PWM) controls. Students were also introduced to coding such as Java and Python.

This highly innovative engineering program is capitalizing on the interest of both students and parents and provides opportunities for students to have access to creative, hands-on experiences that are fun, educational, and challenging. The camp also supports a project-based learning approach to STEM topics, where students work on creative problem solving. The students were thrilled with the experience and one wrote to the instructor, "Thank you so much for dedicating your time to helping and encouraging students like me to explore the vast world of engineering. This camp has been an absolute pleasure and I have learned so much more than I expected in just one week."

For more info on the Integrated Engineering Program, please contact Liane Freeman at freemanliane@fhda.edu.



MERIT 2017 Challenges Teachers To Promote Student Creativity



On July 5th, 44 teachers from across the Bay Area gathered at the KCI to begin the two-week, intensive MERIT Summer Institute. Over one hundred educators applied for the program, and less than 50% were selected, since MERIT is donor-supported with limited seats. These teachers have made a 10-month commitment to transform their teaching practice and to enhance learning environments for students. During these 10 months they will be challenged to try new technologies and student-centered pedagogical practices.

This year, under the guidance of new MERIT program director, Lisa DeLapo, teachers were challenged to discover their own creativity with the ultimate goal of helping students find their creativity. The theme of the program is student-centric: **What Will Your Students Create?** Teachers experimented with a number of technologies and applications, including Hyperdocs, Flipgrid, and iMovie. If teachers gain confidence in using technology, they are more likely to be comfortable with students using technology. Building teacher confidence is one of the desired outcomes of MERIT, and over 95% of this year's cohort agreed that they could teach relevant

subject matter with appropriate use of instructional technology after completing the first two weeks.

During the Summer Institute, teachers are expected to revise existing lesson plans and projects or create new ones to deploy in the upcoming school year. By the end of the Summer Institute, teachers had to present a “TPaCK Project” that combined the right tools, pedagogical delivery, and content knowledge. One participant commented, “As a teacher-creator, MERIT gave me a great number of tools that I can use to make my presentations and products more professional. I was introduced to valuable assessment and creation tools—such as Screencastify, Green Screen, and storytelling with Google Slides—that are relevant to the creative work my students are interested in.”

Also new for this year, teachers received the training required to pass the Google Educator Level 1 and 2 Certifications. Over 80% of districts in California are adopting the Google Suite for Education. Level 1 certification recognizes educators who have learned the fundamentals of Google tools and validates standard technology implementation skills. Level 2 certification is awarded to teachers who are “super users” and enthusiasts for Google tools, demonstrating advanced technology integration skills.

To sum up the experience of many, one participant wrote, “On July 5th, driving to MERIT and stuck in a traffic jam, I thought, ‘Why am I doing this on my time off?’ That thought immediately disappeared when we started class. I’ve come home each day super excited to continue creating and to share with my family what we are learning. This has been a truly fabulous experience!”

For more information on the MERIT Program, please contact Lisa DeLapo at delapolisa@fhda.edu.

Register Online for KCI Classes

A variety of for-credit online, on-campus, and hybrid classes are offered each quarter. For best course selection register early since classes fill quickly. It's easy! Visit krauseinnovationcenter.org/classes to view and register for FASTtech classes.



KCI Conducts Two Sessions in Modeling, Analysis, Design & Engineering (MADE)



conducted two MADE Science programs—one for teachers coming from throughout the Bay Area, and the second for teachers from the Belmont-Redwood Shores School District. In its second year, KCI is building the MADE instructor bench strength and honing the curriculum. The team now includes some noteworthy Bay Area science and maker educators—including Greg Brown, Rachel Freed, Robert Provonost, Rebecca Girard, and Sabrina McDaniel—all of whom have worked with Kyle Brumbaugh of the KCI to develop and teach the program.

conduct experiments using scientific methods—such as collecting data and improving on the design of individual experiments—they also learn how to build websites, create videos, and design games. These skills will be transferred to students so that when they grasp science concepts, they can share their work through blogs, portfolios, videos and other digitally published media, allowing for authentic, real-world feedback. “Documenting by uploading videos is so important in working with this generation of students, keeping them engaged and ensuring their involvement,” said one participant. “So many resources, my head is full in terms of what we have access to and how to organize it!”

Participants were upbeat about the program—100% agreed that the educational technology tools they learned how to use can help them teach NGSS more effectively, and 90% were confident in their ability to integrate NGSS and technology into their curriculum. “The technology and engineering topics were valuable for me. I feel much more confident in tackling the NGSS lesson plans this coming year,” a participant said. Another commented, “I found it so useful to engage in hands-on science and learn about how to present these activities and ensure that they’re not only fun but also developing key science knowledge and engaging students in the critical thinking process.”

The Next Generation Science Standards (NGSS) are here, and teachers are trying to figure out how these will impact their approach to teaching science. The standards are designed to encourage deeper learning, where students demonstrate their knowledge of science concepts as opposed to memorizing content for multiple-choice tests.

KCI has developed and launched the MADE Science program—a five-day, 30-hour experience—to support teachers with the transition. “MADE” stands for Modeling, Analysis, Design, and Engineering. This summer KCI

The program specializes in training teachers through hands-on science projects that are infused with technology and support NGSS. The two cohorts experimented with fizzy rockets and egg drops that they were able to video and slow down in order to truly analyze the activity and the “why” of the results. As Rachel Freed, instructor and program director said, “What does it mean to do science, to have a scientific understanding of something, to look at it through an engineering perspective? Think instead of studying the concept of earthquakes, designing and studying shake-table buildings to withstand them.” The participants not only

To learn more about the MADE Science Program, contact Kyle Brumbaugh at brumbaughkyle@fhda.edu.

2017 FAME Program Inspires Math Teachers to Rethink Their Classrooms

Student math proficiency, especially in algebra and geometry, is still proving to be difficult for many schools and districts, and success in algebra is a strong indicator of whether or not a student will attend and complete college. Hence, the KCI has continued to offer and evolve the FAME (Faculty Academy for Mathematics Excellence) program, which is geared toward 6th through 10th grade math teachers. The program goals include improving teacher content knowledge in the pre-algebra, algebra, and geometry topics that are most difficult to teach and learn, as well as training them in technology-enhanced learning activities to motivate, challenge and inspire students.

This is the second year KCI has offered two FAME programs: blended FAME and traditional, face-to-face FAME. FAME is a nine-month commitment regardless of program style—math teachers attend an intensive summer institute along with four follow-up sessions during the school year. For blended FAME, the summer institute is comprised of five in-person days and 30 hours of online work. Traditional FAME meets for 60 hours over two weeks. The KCI has strived to keep the curriculum for the two programs in sync since the two cohorts will meet together for the follow-up sessions. Thanks to the collaborative efforts of program directors Cristina Bustamante and Ed Campos, along with their instructional teams, the program is more creative and relevant than ever.

What separates FAME from other math professional development is the focus on problem solving from different perspectives and collaborative activities that stimulate student engagement. One participant stated, “I learned how to structure group math problems to stimulate thinking and conversation; how to get my students up and moving; how to incorporate some great technology into my teaching; and how to search for great online tools to use in my teaching. I learned how to rethink my entire math curriculum!”

The two FAME cohorts included participants who were brand new to teaching and veterans who have taught for over 30 years. This alone creates a unique environment where teachers can collaborate to support and learn from each other. A new teacher wrote, “I was incredibly nervous since I have no teaching experience. I truly thought I was the weakest link. Soon after we started, I began to feel accepted as a teacher, and my feelings were validated about being in the right spot at the right time.”

Teachers are put in the place of students as they tackle daily math problems and learn new activities, teaching approaches, and skills. One of the biggest hits of the program is the introduction to Spheros, robotic balls that bring

coding to life. Teams of teachers were challenged to run Spheros through a pre-determined course (see picture). The teams enthusiastically used every part of the KCI building during this activity.

The teachers particularly enjoy the environment created for the program, which allows for time to learn, play, and plan. A participant commented, “I valued the instruction—the manner in which we were taught, managed, and encouraged, the availability of materials and the access to the instructors. Our time was valued. The environment created and modeled for us was incredibly helpful.” FAME is made possible by a grant from the Silicon Valley Community Foundation and other family foundations.

For more information on the FAME Program, please contact Gay Krause at krausegay@fhda.edu.



Local Teachers Try Their Hands at Coding & More

While many schools and districts are still trying to figure out how computer science (CS) activities and courses fit within the educational landscape, teachers are seeing the future and showing high interest in and enthusiasm for professional CS learning opportunities. This was certainly the case over the summer when KCI conducted two Computer Science Crash Course for Educators programs in June and July. Funded by Google's CS4HS initiative, an annual Google grant that supports CS professional development for educators, the program was offered on a first-come, first-served basis, and both sessions filled rapidly with 60 teachers coming from across the Bay Area for the 4-day, 24-hour experience.

Aimed at middle school and early high school teachers, the Crash Course included lessons in bloc-based coding, along with non-coding components of CS such as computational thinking, algorithms, computing systems, data, networks, and the impact of computing. The goal is to prepare teachers to integrate computer science into their curriculum (for example, science teachers can add a unit aligned to the Next Generation Science Standards), or prepare them to teach CS as an elective. In this hands-on program teachers learned both content and pedagogy to successfully integrate CS into their curriculum and to reach all students in their classrooms.

By the end of the four days, teachers could code a variety of projects, integrate coding and computational

thinking into their current curriculum, implement basic coding projects in their classrooms, and potentially teach a computer science class. Those interested in teaching computer science were in a better position to take additional CS courses. At the end of the program, 97% of the participants felt more prepared to teach a CS-related lesson. One participant commented, "I came with very limited knowledge of computer science, and I've learned so much! I feel like I've cleared the hurdle of getting started. Now I can't seem to stop, even at 1:00 in the morning!"

The Crash Course is designed and taught by local computer science teachers, with Sheena Vaidyanathan as program director. This experienced team hailed from the Los Altos School District, Gunn High School, Castilleja High School, and The Nueva School. One of the program's strengths is that it is designed and taught by teachers who are active in the classroom, adhering to the KCI philosophy of teachers training teachers. This best practice yielded great results. One participant commented, "Not a wasted moment! The course was very informative and engaging. The mix of listening, small-group discussion, whole-class sharing, and individual, self-paced learning was perfect." When asked if they would recommend the workshop to others, 100% of the teachers responded with a resounding "YES!"

For more information on the CS Program, please contact Liane Freeman at freemanliane@fhda.edu.



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