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Changing the Face of Education

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A Message From the Manager of Chevron Richmond Refinery

Nigel Hearne

Welcome to the winter edition of *Chevron Richmond Today*, our quarterly news magazine for residents, businesses and other organizations in Richmond and Contra Costa County. In this edition, we address the importance of education – particularly in the areas of science, technology, engineering and mathematics (STEM) education – for the future success of our children, our community and our businesses. I'm sure you will agree that it is more critical today than ever that we have a well-educated workforce to compete in a world economy that is increasingly focused on technological knowledge and capability.

Chevron is a strong supporter of STEM education. In 2010 alone, we invested nearly $1.6 million in STEM initiatives that benefited students in the West Contra Costa Unified School District (WCCUSD).

In this issue, you will read about some of the investments Chevron has made in the WCCUSD and the programs that are being implemented as a result, including the following:

- Learning academies, a promising effort under way at WCCUSD, where high school students follow multiyear career and education pathways that join cross-subject curricula with real-world workplace exposure.
- Richmond High School's new state-of-the-art computer lab, which was created and financed by a public-private cooperative effort between the City of Richmond, WCCUSD, Project Lead The Way and Chevron.
- Biomechs, a long-running after-school program where students design and build robots that they enter in national competitions.
- A progress update on how winners of Chevron's 2010 California Partnership grants have been advancing STEM education efforts locally.

This is my first opportunity to introduce myself to most people in the community as the Richmond Refinery manager. I was born and raised in the United Kingdom, not far from the Pembroke refinery formerly owned by Chevron which is where I began my career more than 20 years ago as a power engineer.

I moved to the U.S. in 2005 to become the operations manager at Chevron's El Segundo Refinery in Southern California. Then, in March 2010, I moved to the Bay Area to head up a new strategic planning group for Chevron's refining, marketing, chemicals and lubricants operation.

I'm sure I join everyone at the refinery and throughout the community in wishing Mike Coyle well in his new position. In his 10 years at the refinery, Mike has been instrumental in involving Chevron in almost all aspects of the community, such as working with local governments on important economic and environmental issues, actively participating on various organizations' boards and securing millions of dollars in Chevron funding for local nonprofits.

Mike and I share the same passion for these kinds of issues, particularly the importance that education plays in strengthening communities. Therefore, I will be following in Mike's footsteps while forging new community inroads of my own. One thing I know I will enjoy most about my new role is being able to meet, work with and develop new friendships with people from across the community. If we haven't met yet, please introduce yourself when you see me out and about in Richmond.

And finally, as we approach the year's end, please accept my best wishes for a happy and safe holiday season and a prosperous and healthy 2012.

On the cover: Chompy extends to its full height and places the last blue lifesaver on the hook at the top of the pole.

Changing the Face of Education

America stands at a crossroads. To remain competitive in a world economy that's increasingly driven by innovation and ingenuity, it's vital that our students enter college or join the workforce solidly grounded in the science, technology, engineering and mathematics (STEM) skills that 21st century jobs require.

But even as the need for solid STEM skills grows, our achievement gap continues to widen. U.S. math and science programs lag behind many of our international peers. According to the California Legislative Analyst's office, California eighth-graders ranked 48th among states in math achievement testing, as measured by the National Assessment of Educational Progress (NAEP). California ranks near the bottom among states in math and science proficiency for middle and high school students.

"Chevron has been a strong supporter in our cause – they've done everything from mentoring our kids to funding projects and scholarships to helping us take our STEM education to the next level," says Wendell Greer, associate superintendent for secondary schools in the West Contra Costa Unified School District (WCCUSD).

One promising education reform effort is now under way at the WCCUSD. The district was awarded $2 million in James Irvine Foundation-funded grants through ConnectEd, a Berkeley-based nonprofit organization. The organization advances practice, policy and research aimed at helping young people prepare for both post-secondary education and careers through the Linked Learning approach. (See "What Is *Linked Learning?*" on page 7.)

"One immediate benefit we gleaned from Linked Learning was being able to more clearly define and develop industry-specific career and education pathways for our students – what we call College and Career academies – and to more effectively target resources toward expanding them," says Greer.

With 21 learning academies in various stages of development at high schools and middle schools, Greer explains, "Two have already attained full Linked Learning certification, including the Law and Multimedia academies at Richmond High School, and another three should be certified later this year. Our goal is for all 21 academies to be fully certified in the next four years." (To learn about how academies work, read "Industry Experts Guide Learning Academies" on page 6.)

The learning academies promote teamwork, and students benefit from real-world workplace exposure through internships, job shadowing and other interactions with established companies.

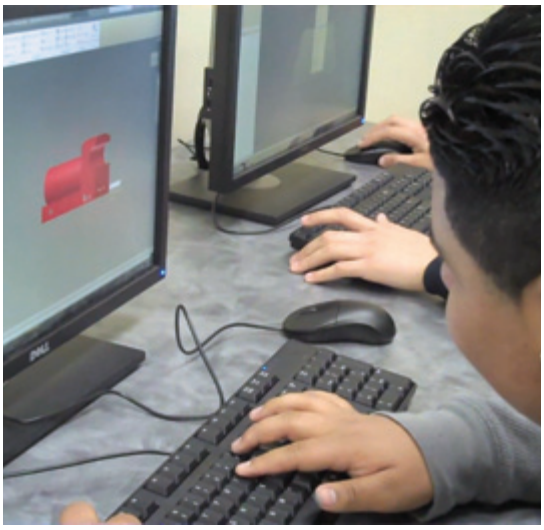
"What's been most exciting about following the Linked Learning approach is the level of confidence it has built in our students," adds Greer. "Kids who previously felt disengaged from school are now competing academically in regional competitions – not with fear or trepidation, but with the expectation of winning."

Chevron Invests in Local STEM Programs

"Out of the $10 million Chevron spent promoting STEM education in California last year, nearly $1.6 million was either contributed directly to the WCCUSD or funding made to other organizations whose STEM programs were implemented in WCCUSD schools," says Nigel Hearne, Richmond Refinery general manager.

The following is a partial list of organizations that Chevron provided funding for:

- ACCLAIM (Alameda County Collaborative for Learning and Instruction in Mathematics) Mathematics Achievement Academies
- ACE (Architecture, Construction and Engineering) Mentor Program
- Alameda County Office of Education
- American Chemical Society Project SEED
- Bay Area Rescue Mission Back to School Program
- Bay Area Science Festival
- Contra Costa College Foundation
- Coronado Neighborhood Council Scholarships
- DonorsChoose.org
- Exploratorium Teacher Development Program
- Fuel Your School
- Gooden College Connection
- Individual College Scholarships
- Junior Achievement of the Bay Area Inc.
- MESA (Mathematics Engineering Science Achievement) Schools Program
- NACME (National Action Council for Minorities in Engineering)
- Peres Elementary 6th Grade Annual Picnic
- Project Lead The Way
- Biomechs team, Richmond High School Robotics Program
- Teach For America
- The Ed Fund After School Programs
- The Ed Fund College Scholarship Program
- WCCUSD Annual Academy Awards
- WCCUSD Career Exploration Program
- WCCUSD JFK High School Welding Program
- WCCUSD Parents as Partners Leadership Conference



Engineering Academy Gives Students Real-World Education

One West Contra Costa Unified School District (WCCUSD) learning academy that has been gathering steam is the Engineering Academy. Originally launched two years ago at Richmond High School, it has recently been introduced at Pinole Valley High School and Helms Middle School.

The academy uses Project Lead The Way (PTLW) curriculum and teacher training, which were supported through Chevron funding.

> 'The project was a great success,' says Garcia. 'It created a strong sense of community between the students and teachers.'

Aurelio Garcia, a six-year Richmond High School math teacher, underwent intensive training last year to become qualified to teach "Introduction to Engineering Design," the PLTW course that forms the foundation for the Engineering Academy. "Now, in addition to teaching geometry classes, I also lead the Engineering Academy team, which includes seven additional instructors from the English, history and science departments," says Garcia. "Altogether, about 200 sophomore, junior and senior students are enrolled in the program."

Garcia and his fellow instructors meet regularly to integrate their course content around common engineering themes, culminating in student group projects that are presented and evaluated each semester. For example, last year's sophomore cross-curriculum project was called "Project Ship Shape."

"The challenge was to build a foil boat taking into consideration four different design constraints assigned by the teaching team," Garcia explains. "Students studied the science behind building their boat, such as designing the proper hull shape and calculating how much mass it could hold. The interdisciplinary learning came in when they studied the history behind boat building and learned how to write and deliver their presentations. One of the highlights was a study trip we took to examine Navy submarines and ships at Fisherman's Wharf.

"The project was a great success," says Garcia. "It created a strong sense of community between the students and teachers. Plus, by learning and applying engineering concepts to real-world problems, it felt like our students were better able to connect with us. Now, the same students are enrolled in the junior-level curriculum and have those same high expectations."

Each grade level requires that students take a specific technical engineering class as well as core and elective academic classes outlined by the PLTW curriculum. Major group projects for juniors involve building a bridge and learning how catapults and ballistics work. Seniors will redesign a section of the school that needs improvement, doing everything from drawing design plans to building a scale model. Top contenders will be eligible to present their proposals to the school board for consideration.

Garcia notes that several Engineering Academy students who initially weren't particularly interested in engineering are now considering it as a possible profession. "Plus, we've built some real buzz around the academy with other students," he adds.

"Bottom line, Chevron's willingness to champion the PLTW curriculum as well as provide initial funding to incorporate it into WCCUSD's Engineering Academy has already had a huge impact on the quality of STEM education available to local school children," says Dr. Duane Crum, PLTW California State Leader.

New Computer Lab Boosts Engineering Academy Capabilities

You can't teach 21st century science and technology on 20th century computers. That's why the City of Richmond, the West Contra Costa Unified School District (WCCUSD) and Chevron banded together to fund and install a $60,000 computer lab at Richmond High School.

"Today's students need the right tools to compete in an economy that's increasingly driven by technical jobs," says Nigel Hearne, Richmond Refinery general manager. "The 'right tool' when developing engineering classes for middle and high school students is the science, technology, engineering and mathematics (STEM) curriculum developed by the nonprofit organization, Project Lead The Way (PLTW)."

According to Dr. Duane Crum, PLTW California State Leader, the courses use project- and problem-based learning that teaches students how to apply what they are learning to real-life situations. Academy students are provided opportunities to:

- Understand the scientific process, engineering problem solving and the application of technology.
- Understand how technological systems work with other systems.
- Apply mathematics knowledge and skills to solve problems.
- Communicate effectively through reading, writing, listening and speaking.
- Work effectively with others.

"PLTW requires a strong commitment from teachers as well," says Crum. "They must go through an intensive two-week training 'boot camp' where they experience first-hand the same difficult projects their students will be assigned in class."

As Dr. Bruce Harter, WCCUSD superintendent notes, "The bottom line is that this computer lab is a great example of how the public and private sectors can work and cooperate with each other to have a huge impact on people's lives. It will feed a real hunger among many of our students for advanced classes and training, ultimately strengthening their ability to compete in the workforce after graduation."

Catching the Engineering Bug Early

In a bid to get kids interested in science and engineering at a younger age, WCCUSD this year expanded the Engineering Academy to Helms Middle School.

Helms math teacher Jacqueline Huerta, who has an engineering degree, was enlisted to teach the PLTW engineering curriculum. Another Helms teacher, Richard Volberg, teaches an after-school engineering class for seventh graders.

"About 165 students are enrolled in this year's pilot program," says Huerta. "They're being introduced to basic engineering and technology concepts, the design process, robotics, and engineering and the environment. They will be learning to use Autodesk Inventor®, which is the same professional 3-D design software used to make *Avatar*."

Dr. Duane Crum, California State Leader for PLTW, cites a strong reason to introduce engineering courses at the middle school level. "A much higher percentage of girls are likely to enroll in middle school – maybe 50 percent of the class will be girls," he explains. "Those girls are then much more likely to continue on in the high school Engineering Academy and pursue careers in engineering."

Huerta, who herself attended Helms and Richmond High as a teen, agrees. "I chose the engineering field on my own, but it would have been great to have had this sort of program available when I was in middle school," she says. "Even though we're just starting out, I can already see a new level of excitement among my students. They can hardly wait for our lab equipment to arrive so they can start building their projects."

Robots Are Science Fact, Not Science Fiction

It's one thing to watch robots on the big screen. It's quite another to build them yourself. For the past 11 years, students in the Richmond High School after-school robotics program, called "Biomechs," have been learning how to design, program and build their own robots from scratch and enter them in national competitions.

Luciano Del Rio, who was a Biomech student himself before going on to earn a degree in cinema production at San Francisco State University, now volunteers as the program coordinator. "Back then, there was a noticeable lack of science, technology, engineering and mathematics (STEM)-related education available to us," says Del Rio. "So it's a real testament to the robotics program that so many participants have gone on to careers in science and engineering."

Chevron Richmond is an integral part of sponsoring the robotics team. "They fund our core operations, including paying for materials to build the robots, which can cost $5,000 or more," notes Del Rio. "Chevron also covers the costs for our team to participate in regional competitions, and their engineers have volunteered their expertise many times over the years."

The program runs throughout the school year. "In the fall, we do research and training, and then we have six weeks to design, program and build a robot from scratch," he explains. "We usually enter the regional competition in Davis, but last year, thanks to Chevron, we were able to compete in Utah as well. It was the first time some of those kids had ever experienced snow."

To learn more about the Richmond High School Robotics Program, visit www.team841.com.

Industry Experts Guide Learning Academies

Each Learning Academy is overseen by an advisory committee comprised of experts who work in related industries. For example, Chevron process engineer Shanying Lee chairs Richmond High School's Engineering Partnership Advisory Committee alongside representatives from other local engineering organizations such as the East Bay Municipal Utility District; the University of California, Berkeley; the Richmond Chamber of Commerce; and SunPower.

"Our role is to help shape the engineering curriculum to meet current industry standards, to advise and assist academy teachers, and to promote engineering as a career possibility to students," says Lee. "We are working closely with the teachers to create new and innovative programs that will attract even more students to the academy."

As part of its commitment to science, technology, engineering and mathematics (STEM) education, Chevron provides several popular classroom and workplace programs for engineering students. For example, last summer, David Alvarez, a Richmond High School senior and Engineering Academy member since his sophomore year, was chosen for an internship at the Chevron Richmond Technology Center (RTC), where, among other tasks, he measured densities and viscosities of crude oils processed by the Chevron Richmond Refinery.

"While I was in class, I thought I would never get to do this in the real world," says Alvarez. "But once I saw what they do at Chevron, I could see the purpose of the things I was learning. They're using the same equipment at the Chevron RTC that we use in class. It made me more excited about engineering because I already have experience, so I know what it'll be like when I graduate from college."

Other students get first-hand experience through the refinery's annual job-shadow day. "About 40 students from the Engineering Academy take a guided tour of the refinery and are then matched up with Chevron volunteers who walk them through a typical day's activities, answering questions and discussing the students' goals and ambitions," notes Lee. "We also have about 15 Chevron employees who participate in a mentoring program with students in the Richmond High School Engineering Academy. Others give classroom presentations, tutor and attend student events like science festivals."

What Is *Linked Learning*?

In 2006, ConnectEd: The California Center for College and Career, a Berkeley-based nonprofit, was founded by the James Irvine Foundation to better prepare middle and high school students to enter college, attain a trade credential or embark on a career using the Linked Learning approach to education.

According to ConnectEd Vice President Brad Stam, "Under Linked Learning, students choose a particular industry pathway to follow (for example, finance and business, health and science, or engineering). These pathways integrate rigorous academic instruction with a demanding technical curriculum designed for that career field. They also include many field-based learning opportunities such as internships and job shadowing with people in the chosen career category."

Stam cites two key differences from the traditional high school model. "First, students are grouped together in 'cohorts' of fellow students following the same career pathway (or academy), all taking the same classes and working on common projects together," he explains. "Second, under Linked Learning, teachers from different academic areas (math, English, history, science) work together with technical area instructors to link plans and projects around the same common themes."

Numerous studies reveal that students using Linked Learning:

- Have higher grade point averages.
- Pass high school exit exams at higher rates.
- Are more likely to meet college entrance requirements.
- Earn higher incomes after graduation.

"The Linked Learning approach can be particularly successful, and when done well, engages and motivates all students," adds Stam. "It also brings to their attention the rigor of workplace standards since students are interacting with adults in real work situations."

2010 Chevron Grant Winners Report Progress on Educational Programs

Chevron believes that our company cannot be successful without a healthy, competitive and economically stable California. "That's why in 2009, we created our California Partnership initiative to invest and deepen our contribution and efforts with nonprofit organizations that focus on economic development, education and job training in underserved communities," says Matt Lonner, Chevron's manager of Global Partnerships and Programs.

"In fact," as Richmond Refinery general manager Nigel Hearne notes, "In 2010 Chevron invested $1 million in California Partnership grants to seven local organizations, including three that provide science, engineering, technology and mathematics (STEM) educational outreach programs for middle and high school students in the West Contra Costa County Unified School District (WCCSD)."

Below is a list of updates for the three STEM programs that have been implemented:

Alameda County Office of Education (ACOE) used its grant to hire and train two full-time middle school mathematics coaches for the West Contra Costa Unified School District. These coaches now provide individualized, in-classroom mathematics coaching to students throughout the district.

Gooden College Connection has admitted 46 low-income freshmen with demonstrated academic success at Kennedy and Richmond high schools to its program, which provides after-school academic tutoring in STEM subjects as well as individual mentoring and certified pre-college counseling.

MESA Schools Program/CSU East Bay hired and trained nine advisors to help expand their renowned academic enrichment program at 10 WCCUSD schools. The program prepares disadvantaged students to excel in math and science so they can later graduate from college and pursue STEM-based careers.

Toy Program Spreads Joy to Disadvantaged Children

Nearly a quarter of a century ago, Richmond firefighter Rod Woods began organizing a small local toy drive that over the years has grown into the annual Richmond/El Cerrito Firefighters Toy Program.

"Each year, sponsors like Chevron, along with thousands of individual donors, volunteer their time, energy and money to the cause," says Woods. "We now distribute thousands of new, unwrapped toys to disadvantaged children ages 12 and under in around 2,250 western Contra Costa County families."

Woods notes that the East Bay YMCA graciously provides a large facility where the toys are distributed. "They also help broaden our exposure to needy families by distributing applications at their network of satellite programs throughout the county," he adds. "Although this year's registration is closed, you can register for next year's toy drive at YMCA facilities in early September 2012."

Woods relies on 200-plus volunteers from local high schools, churches and other organizations to sort through thousands of applications and match children with appropriate gifts that are handed out at the annual giveaway event.

Chevron Richmond employees are among the program's biggest boosters. "Last year, more than 50 Chevron volunteers did everything from assembling bicycles to filling gift bags to driving the trucks used to pick up and purchase toys," says Mark Ayers, chief of Emergency Services at the Chevron Richmond Refinery. "It's one of the more gratifying ways we're able to give back to the community."

To learn more about the Richmond/El Cerrito Firefighters Toy Program or to donate, visit www.firefighterstoyprogram.org or call (510) 307-8031.

Financial contributions and donations of new and unwrapped toys may be dropped off at any fire station in El Cerrito, Kensington and Richmond.

Resources, Links and Feedback

To learn more about Chevron in Richmond, please visit www.chevronrichmond.com.

To share any comments or concerns you may have, please send an email to info@richmondrefinery.com, call 510-242-2000 or send correspondence to:

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