

## **Connecting Students to the 21st Century: 2021-2022 Science, Technology, Engineering, and Mathematics (STEM) Report**

### **Background:**

The Livermore Valley Joint Unified School District (LVJUSD) is dedicated to preparing all students for success in the 21st Century. LVJUSD is a leader in bringing rigorous Science, Technology, Engineering, and Mathematics (STEM) education to our students. We are devoted to offering project-based learning opportunities to prepare them for college and careers. These learning opportunities integrate 21st Century skills into the classroom, providing communication, collaboration, critical thinking, and creativity (4Cs) skills identified as essential by the Partnership for 21st Century Framework. LVJUSD has expanded the 4Cs to include Character development.

Our District has the unique benefit of being in proximity to two national laboratories as partners: Lawrence Livermore National Laboratory and Sandia National Laboratories. Both of these renowned facilities offer our students and staff access to a wide variety of STEM experiences. In addition, our District enjoys wonderful relationships with other STEM-rich businesses in our community to develop STEM-related Work Based Learning opportunities for our students.

### **Status:**

For more than a decade, LVJUSD has made offering an excellent STEM program a high priority. Our STEM program provides students with exposure to project-based learning STEM activities beginning as early as transitional kindergarten (TK) and continues through high school.

### **Project Lead the Way (PLTW)**

Over the past several years, our District has been committed to growing the Project Lead the Way (PLTW) program to the extent that we now offer the full breadth of PLTW programs at the elementary, middle, and high school levels at nearly all school sites. PLTW is a non-profit organization that is a nationally recognized provider of a standards-aligned STEM curriculum for use in K-12 education. The PLTW curriculum is currently offered at both comprehensive high schools and all middle schools, including both K-8 sites.

### **Science Odyssey**

In February 2022, over 350 students in grades 1-12 participated in the 22nd annual Science Odyssey. All elementary schools were represented and most of the engineering projects came from the Livermore High Green Engineering Academy.

We were so impressed with our young scientists and engineers. Our students shared their curiosity and passion for science! They explored real world phenomena, asked thoughtful questions, generated hypotheses, created well-organized experiments and designed innovative engineering projects. Some of our young scientists entered their projects for awards and participated in an interview with judges. We were excited to see our students confidently present their project and demonstrate their critical thinking skills during these interviews. We are also grateful for generous community support. Our students received special awards recognizing excellence in behavioral science, robotics, water/environment and innovation.

### **Fun with Science Fridays**

This year the Lawrence Livermore National Laboratory (LLNL) has introduced a new opportunity for our 5th grade students at each of the elementary schools - 'Fun with Science Fridays'. Historically, our fifth grade

classes have visited LLNL for field trips to the LLNL Discovery Center. However, due to COVID-related health regulations, these field trips have not been possible. LLNL still wanted to provide an opportunity for our 5th grade students and this was the impetus behind 'Fun with Science Fridays.'

At Fun with Science Fridays (FWSF), one of the scientists from LLNL teaches all of the fifth grade students at one of our elementary schools via Zoom. The lesson focuses on Color Theory and the National Ignition Facility (NIF), which is the incredibly powerful laser at the Lab. Each student receives a mini flashlight and colorful gel cards to investigate light and color. Currently, three schools have experienced this wonderful learning opportunity; 5th graders at each of the remaining 8 schools are scheduled for the lesson in April and May. We are very grateful for the LLNL's scientists delivering this inspiring science lesson and providing the materials so our fifth grade students have the opportunity to continue to explore after school and share their learning with family members.

### **Girls Who Code**

Girls Who Code has a mission to close the gender gap in technology and to change the image of what a programmer looks like and does. This is a mentor-driven extracurricular programming opportunity offered through a partnership with the Lawrence Livermore National Laboratory (LLNL). We are fortunate to have most middle schools and both comprehensive High Schools participate in the GWC program. Despite COVID-19, our teacher advisors and mentors from LLNL found a way to continue to provide this program in a virtual format. This year, we had over 140 students participating and over 20 mentors from LLNL.

### **Courses**

One of our Board priorities continues to be a focus on improving our students' mathematical abilities. In elementary schools, teachers in kindergarten through 2nd grade continue to be trained in Counting Collections as part of our Early Learning Math Initiative supported by a grant from Alameda County Office of Education. The focus of the program is to develop early on in learning a comfort and abstract understanding around numeric literacy. In addition, students in grades 1 – 5 engage in mathematical discourse daily and deliberately to help students talk their way through math problem solving. Math coaches offer demonstration lessons and professional development on the use of mathematical discourse and the inquiry model within the primary classrooms. Our goal is that students continue to increase their confidence level in math as they go through elementary and middle school to the extent that they continue to take math courses beyond the minimum required to graduate from LVJUSD. To that extent, our District continues to explore course offerings that will engage students beyond the traditional courses of algebra and geometry.

Our District will continue to explore additional application-based approaches to all Math levels, specifically third-year options. For example, this year, two new courses are being proposed for School Board approval, including Data Science and Geometry with Computing and Robotics; both are existing classes within the A-G portal. In addition, we continue to collaborate with Las Positas College (LPC) and Tri-Valley Regional Occupational Program (TVROP) to articulate high school courses.

### **Work Based Learning**

Our commitment to STEM and expanding learning opportunities supports our District's mission to ensure all students graduate with the skills needed to contribute and thrive. Building strong TK-12 STEM programs allows students to graduate well-prepared for college and careers. Working with partners, including business and industry, students are exposed to a range of work-based learning opportunities throughout the grade levels. Fortunately, through a Strong Workforce Program grant obtained by our Tri-Valley

Education Collaborative, our District has access to a person whose sole responsibility will be to work with our Career Technical Education (CTE) staff on enhancing and further developing work-based learning opportunities for students. The best way to engage students and connect the curriculum to relevant learning is through exposure to actual work environments that will allow them to see science, technology, engineering, and math in action. Our District has been fortunate to have several students participate in internships and externships in related STEM fields. In addition, CTE teachers have been able to provide virtual guest speakers, field trips, and job shadowing opportunities.

### **Next Steps:**

As stated, we are fortunate to live in a community that values STEM education and to have many well-established partnerships within our community that afford unique learning experiences. Moving forward, we need to continue to connect our curriculum in the classroom with “real-world” opportunities that actively engage all students. Now that we are able to place them again, our goal is to increase the number of students who participate in internships and externships within local STEM businesses. Our District also continues to strive to offer the most up-to-date, Next Generation Science Standards (NGSS)-aligned TK-12 science curriculum. This school year, our elementary science specialists and teachers on the Science Adoption Committee have deepened their understanding of NGSS, the CA Framework for Science as well as the implementation of NGSS-aligned Pilot Curriculums. In 2021, we adopted Discovery Education as our Middle School Science Curriculum. We need to ensure that our elementary and middle schools have access to the current instructional materials that will best support their learning so that they are prepared upon entering high school to excel in the area of science, with the hope of continuing into a STEM-related career.

In support of mathematics, our District has provided all students in K-8 and our special education students in K-12 with access to Dreambox, a research-based online supplemental support program that assists students in deepening their grade level knowledge and skills. In addition, we continue to focus on increasing the amount of math discourse that our students engage in daily during math instruction. This year, we were also able to extend our Counting Collections program through to 3rd grade as a result of continued support from an Alameda County Office of Education grant focused on the Early Learning Mathematics Instruction initiative.

Our secondary schools continue to align vertically and horizontally through collaboration, pacing, and common assessments. Our schools partner with The Silicon Valley Math Initiative (SVMI) which is a comprehensive effort to improve mathematics instruction and student learning. SVMI provides professional development, among other trainings, which is based on high performance expectations, examining student work, and improved math instruction. The Initiative includes a formative and summative performance assessment system, pedagogical content coaching, and leadership training and networks. Our District also hosts an Algebra Task Force whose mission is to support the development of mathematical reasoning and problem solving skills to improve student learning and understanding of Algebraic concepts.