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STEM key to Nevada's Economic Diversification

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Nevada is changing. Where once as a state we were known mainly for our gaming, tourism, and hospitality industries, we have now added to our portfolio many new and exciting industries such as clean energy, robotics, battery manufacturing, drones, and autonomous vehicles. Nevada's established industries are also changing as technology and entertainment collide. Together, these industries old and new are building the "New Nevada." The common element in the industries of the New Nevada is the requirement for specialized knowledge and skill sets in Science, Technology, Engineering, and Mathematics (STEM).

As Nevada changes, so too does the world around it. Technology affects all aspects of life, and we are connected instantaneously to events around the world. As the world grows more interconnected, its challenges grow in complexity. Change brings opportunities to solve new challenges. Nevada's future depends on its students being prepared to meet a wide variety of challenges both at work and outside of it. Those who have a solid foundation in real-world problem solving and experimentation, the bedrock of a rigorous STEM education, become confident, critical thinkers with the creativity to find solutions to the challenges they face. No matter the career pathway they pursue after high school, all students benefit from the skills learned in STEM.

The recession that started in 2008 hit Nevada harder than most states. Leading up to the recession, Nevada's economy had thrived on the strength of its tourism, gaming, and hospitality industries. These industries fueled a residential and commercial construction boom, particularly in Southern Nevada. As the rest of the nation struggled with a contracting economy during the recession, less discretionary income elsewhere meant fewer visitors to Nevada and less money spent by those that did come. This cratering of the tourism industry spread to other industries across the state, including construction, small businesses, and retail and resulted in the unemployment rate peaking at 13.7% in 2010 . Nevada led the nation in unemployment, bankruptcies and foreclosures.

In 2011, Nevada embarked on an economic development strategy to diversify the economy and catalyze innovation. This unified economic development effort led to efforts in the state to recruit, retain, and expand businesses in targeted industry sectors, and expanded global engagement to facilitate export growth. The success of this ongoing effort is evident in the number of innovative companies that have relocated to or expanded operations in Nevada, including Tesla, Faraday Future, Hyperloop One, Switch, and others. **Continued at** <u>NCLab.com/blog</u>

My Path to STEM with NCLab Isabel Peralta, Freshman at Galena High School



Hi! I am Isabel Peralta, and I'm a young student with an interest in computer science and engineering. I am enrolled in the STEM academy. I hope to work in the field of

Aerospace Engineering, and I have a very strong interest in robotics. I also really like computer programming which will be very useful in both fields.

In the summer of 2014, the year I was going into middle school, I took a computer programming class that included Karel the Robot from NCLab. I really enjoyed it, and this was my first step into realizing how far I could go with computer science and engineering. Later I had the opportunity to become an assistant instructor for NCLab, teaching coding and 3D modeling to younger children. I frequently was an

STEAM and SHINE: Your Project for February

Fractals are proof that math can be visually beautiful! We'll explain what they are, and how you can make your own using NCLab's free Fractal Explorer! SEE PAGE 2

Library 3D Modeling Courses Take Shape

Reno, Nevada-area libraries are seeing early success with 3D modeling classes. Kids are delighted to see a few lines of code transformed by a 3D printer into beautiful sculptures.

SEE PAGE 3

Create you own Computer Game

Have you finished a few sections of the Karel course? Then you are ready to create your first Karel coding game! NCLab's browser-based tools make it easy, fun, and exciting. SEE PAGE 4

assistant instructor in summer, winter and spring break camps with NCLab.

My favorite part about this amazing opportunity was being able to help and encourage younger children to learn these important skills. These skills are useful not only in this day and time, but they are essential knowledge for many careers. I believe that through my teaching experience with NCLab, I was able to truly take in the information I already knew, and learn to be a better leader.

Being a Hispanic girl interested in STEM fields, I strongly encourage girls and women, and people of every background and ethnicity to pursue science and engineering if it's their interest. Although it's considered a difficult field, never lose or miss an opportunity to follow it, because it's a fascinating study, and hard work definitely pays off.

In my free time I play the viola, run, ski, and doodle!

Connect with us: office@nclab.com, (800) 666-2024, or social media — links at <u>NCLab.com</u>.

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Ada Lovelace: The First to Grok Computers?

We think of science and logic on the one hand (left brain), and art and creativity on the other (right brain). But are they really separate? A bright young girl born to English aristocracy in 1815 lived to answer that question, or so it looks through the cloudy lens of history.



Ada Lovelace was the only "legitimate" child of George Lord Byron, a famous Romantic poet, womanizer, and moral scalawag. Her mother

Ada in 1832, age 17 artist unknown

Annabella left Byron a month after Ada was born. To counteract the unwholesome creativity she saw latent in Ada's genes, she made her study math, logic, and French.

As with most parental demands, results were mixed. True, Ada became an accomplished mathematician. She also developed a love of literature, music, her father's poetry, and that most illogical of all passions, gambling.

By 17, Ada befriended Charles Babbage, who had just invented the first mechanical calculator, the "Difference Engine." Babbage went on to dream up an "Analytical Engine," capable not only of arithmetic, but of solving complex mathematical problems. It took Ada's creative imagination, though, to see its true potential.

In one of her notes on Babbage's invention, Ada charted out punch cards for generating Bernoulli Numbers. Some see this as the first computer program. Others, perhaps out of sexism, claim Babbage would certainly have written similar routines himself, if only to test his invention's logic.

Another of Ada's notes suggested the iterative loop, a cornerstone of modern programming. Perhaps her most astounding realization, though, was that the Engine could process not only numbers, but any logical system based on symbols, be they letters or even musical notes. Babbage disagreed, but history has proven him wrong.

Ada lost much of her family money betting on horses, and died at 36 of uterine cancer. Her intellectual contributions languished until 1953, when her notes were republished and widely understood for the first time as a far-sighted description of modern computers and software.

The Department of Defense named a real-time computer language for Ada in 1980. Several computing prizes bear her name. And today, Oct. 15 is celebrated throughout the Western world as Ada Lovelace Day.

If Ada's life has any meaning, it must be that it takes both science and art together, logic and intuition, mathematics and metaphysics – and both men and women – to drive human understanding and intellectual progress forward.

STEAM and SHINE: Your Project for January

Create Beautiful Fractal Art

Fractals are proof that math can be visually beautiful. What are they exactly? A definition on Wikipedia states, "A fractal is a mathematical set that exhibits a repeating pattern displayed at every scale."

The best way to explain it is showing one of the oldest and simplest fractals - the Sierpinski triangle. This fractal is created using an infinite process starting A from an equilateral triangle. The triangle is split into four A parts by connecting edge midpoints with straight AAAA lines. Then the middle part is removed. This leaves 🖄 three smaller equilateral triangles. Applying the 🚵 🚵 same step to each of them, one obtains 🔬 ሕ nine even smaller triangles. Since the \Lambda process is infinite, one sees the same repeating pattern no matter how far \, 🏠 you zoom into it.



More attractive examples of fractals are the Mandelbrot and Julia sets. The Julia set offers greater flexibility and more variations.



Mandelbrot

All the images below are examples of Julia sets created with the help of NCLab's Fractal Explorer app, using different parameter values.





"The Dragon"

"Eye See You"



"Sea Breeze"

"Lizard"

Both Mandlebrot and Julia fractals can be explored using the Fractal Explorer app in NCLab's Creative Suite - Math section. The Fractal Explorer allows students to zoom to infinite depths, discovering that identical shapes indeed repeat themselves on smaller and smaller scales.

If you are interested in learning some of the math behind fractals, check out the <u>Fractal Explorer Tutorial</u>. If you create a pretty design, we will be happy to add your art into the Fractal Art Gallery: <u>NCLab.com/fractal-art-gallery</u>

3D Modeling Courses Take Shape

By Kevin Fredericks, Washoe County Libraries

Computing is powerful. In today's world, products can be designed, prototyped, tested, and manufactured without a single drop of ink on paper. If you have ever enjoyed a Pixar film like Finding Nemo or Toy Story, you have experienced the level of artistry that is possible with computers. When the power of computing is combined with the power of human expression, our world can be transformed in beautiful ways. So, when I was considering how to design new coding courses for the Washoe County Libraries, I decided that 3D modeling would be a great fit. Having students program their own 3D objects would instill a creative joy while being a springboard for those interested in design-oriented careers. I felt I had found a suitable course for the Washoe Libraries which would be creative, relevant, and challenging. Perfect!



NCLab includes a 3D Modeling course based on PlaSM, a popular open-source modeling program that uses the fundamentals of Python, a quickly-growing, and very useful programming

language. Students using the self-paced "gamified" courses in NCLab are getting an excellent introduction for the programming challenges of the future while having a lot of fun. I highly recommend the NCLab courses for educators looking to combine the joy of creativity with the math comprehension and logical thinking that naturally arises from computing. NCLab runs from an Internet browser, so it is very easy to set up in a classroom setting.

After an enthusiastic phone conversation with John Crockett of the Sierra View Library, we had booked a prospective date for a course, and to my delight, he was also ready to buy a 3D printer, so the students could print their models at the libraries! The Washoe Libraries understand



their role in providing excellent resources to our communities. Having a 3D printer on site was a pipe dream I had scribbled on the edge of my notes, but the addition 3D printer propelled the course from being a fun class to being a wondrous place of learning. For these students, the computer is now a tool that blends seamlessly with the real world. As they saw a few lines of code become a beautiful sculpture, smiles burst on to their faces and I could see that they were excited for the next challenge.

NCLab has joined the ALA

Read about some of the reasons why: goo.gl/CB9pyN

Awards, Opportunities Roll in

HOMESCHOOL.COM

We are thrilled to announce that Homeschool.com included NCLab among the top 100 educational websites for home-schoolers. According to Homeschool.com, "NCLab provides a comprehensive curriculum in essential 21st-century STEM job skills – computational thinking, computer



programming, and 3D modeling. Learn rigorously, but with the fun of a computer game. All courses are 100% self-paced and self-graded. For ages 10+."

EDUCENTS.COM

TOP 101 Educational Websites of 2017

Educents is an online marketplace for education supplies. It claims to have over half a million customers. It named NCLab among seven science/technology sites on its annual list of the Top 101 Educational Websites: "NCLab's award-winning curriculum uses the power of games to teach computer programming and 3D modeling to 6th-12th graders. In the fundamental Karel Coding course, students learn computational thinking and all key programming concepts by writing programs for a robot to solve mazes. The intermediate Turtle Tina course introduces Python while drawing objects such as pendants and exporting them for 3D printing. The advanced Python programming course teaches how to use Python to solve realistic computer programming tasks. The 3D modeling course teaches geometry and spatial reasoning, and allows students to create their own 3D models and print them."

VENTURE SUMMIT WEST



NCLab was selected as one of about 50 "top innovators" to take part in Venture Summit West. The event aims to match growth-potential start-ups with venture capital investors. According to organizers, the two-day conference will feature "A select group of more than 50 top innovators from the technology, life sciences, clean-tech and ed-tech sectors." Participants will "present their breakthrough investment opportunities to an exclusive audience of venture capitalists, private investors, investment bankers, corporate investors, and strategic partners." Wish us luck!

NCLab is not an affiliate program of the University of Nevada, Reno.

CREATIVE SUITE APP OF THE MONTH Create your own Karel Game

Have you finished a few sections of the Karel course? Then you are ready to create your first Karel coding game! This is an exciting break from logic and problem solving into imagination and creativity. Moreover, this is lots of fun. Your Karel games can be saved in your NCLab user account and shared with others online, so that your friends can play them.

"OK, so where do I start?" Well, every good game begins with a good story. You need to say where Karel is, what is happening there, and what exactly his task is. This part is surprisingly important. When you neglect it, your game most likely will not be very good. While thinking about your story, it can help you to browse the various themes that are available in the Designer mode. To get there, open the Creative Suite and launch the Karel the Robot app in the Programming section. You should see this:



The app opens in Programming mode but it has three other modes – Manual, Designer and Games. In the upper left menu switch to Designer. Your left panel will change to:



Article continued here: NCLab.com/blog

Everybody is a Genius. But If You Judge a Fish by Its Ability to Climb a Tree, It Will Live Its Whole Life Believing that It is Stupid. — Albert Einstein

KAREL GAME OF THE MONTH POWER by Kevin McAvoy

Karel goes on a hike. Then it gets dark. He finds a cemetery! Write a program for the robot to find his way home. Get the coins and diamonds. Don't get water. If you do, you will have to start over again!



The code template at right should help you get started. Just complete the code to solve to help Karel solve the maze.

Kevin's game and many others are available in the Karel Gallery, <u>NCLab.com/karel-gallery</u>



3D MODEL OF THE MONTH Silver Legacy by Dhruv Rohatgi

The Silver Legacy is a hotel-casino in downtown Reno. The photo below was contributed to the wikimedia commons by Wikih101.

Dhruv attends the Davidson Academy, a public school for profoundly gifted students. The Academy is located on the campus of the University of Nevada, Reno.

This 3D model, including its source code, is available in the 3D Gallery: NCLab.com/3d-gallery





Have your students created awesome games or 3D models? Let us know at <u>office@nclab.com</u>!