Full STEAM Ahead

Science, Technology, Engineering, Art, and Math from

nclab
More Than Coding

Coding at the Discovery

by Sarah Gobbs-Hill, Education & Exhibits Director at the Terry Lee Wells Nevada Discovery Museum

Since opening to the public in September 2011, The Discovery has become our region's hub for hands-on learning in science, technology, engineering, art, and math. Through unique, hands-on programs and exhibits, The Discovery creates learning experiences that range from simple curiosity to deep understanding, empowering a community of critical thinkers. We see coding and computer science as an important component of what the museum offers its visitors, especially as industries and career paths continue to diversify in Northern Nevada.

The Discovery has partnered with NCLab to offer computer coding and 3D modeling to 1st through 7th grade students via Camp Discovery, the museum's seasonal camp program. Campers enjoyed learning about the various applications of coding and 3D modeling and developed critical thinking skills in the process.

Another way The Discovery has integrated coding into its programs is with an annual coding challenge. Capitalizing on the popularity and ease of use of the Scratch platform, the museum holds its annual Scratch Code Challenge. Participants are encouraged to create a game, video or presentation using the Scratch platform for the chance to win one of three cash prizes offered for four different age groups. Since the challenge's first year, participation has grown and now includes participants from other states and counties outside the U.S.

On Wednesday, January 11 th , the The Discovery introduced its monthly Tech!Night program, an evening of hands-on exploration of the latest technologies, games, and techniques, hosted in the museum's Spark!Lab Smithsonian. Supported by a generous grant from the Best Buy Foundation, Tech!Night provides The Discovery's young adult visitors with a unique opportunity to learn about cutting-edge gadgets and enjoy activities that included:

- Using a 3D printer to fabricate your very own invention;
- Programming a robot called "Dash";
- Flying a drone through an obstacle course;
- Running BB-8 robot races; and
- Learning about static electricity using a Van de Graaff generator.

The purpose of Tech!Night is to place technology directly in the hands of our young museum visitors so that they may become better equipped with the knowledge and experience that is fundamental to the booming industry of technology. To find out when the next Tech!Night is happening, or to learn more about other programs offered, check out calendar of events on The Discovery's website.

WNC'S Jump Start College Program Leads to Success

by Georgia White, Director of Career and Technical Education (CTE), Western Nevada College, Carson City

Western Nevada College's Jump Start College Program started with 27 enrolled students three years ago, and it has evolved into a highly successful, dynamic program that is providing a variety of higher education benefits to Nevada high school students. Besides the extraordinary opportunity for students to receive up to an associate degree before graduating from high school, the dual-credit program is saving parents a significant amount of money and delivering a high rate of success for their children in the classroom.

"Do you want to graduate from college on a Monday and from your high school that Friday? Jump Start is making that a reality for students across Nevada," said WNC Dean of Students John Kinkella. The growing Jump Start College program now serves 379 total students spanning five Northern Nevada school districts and reaches as far south as the Nevada Virtual Academy in Las Vegas. But students attending public schools aren't the only ones benefiting. Nearly 30 home-school students are also enrolled in the program. High schools screen their students beforehand to determine who qualifies as good candidates for WNC's Jump Start College. A willingness to work hard and a desire to start higher education earlier than most have translated into a high success rate in the classroom.

There is a support system in place so students don't become overwhelmed and abandon their enormous opportunity. An important component of the Jump Start program is the supplemental instruction the students receive. Cohort coaches serve as peer mentors and sit in class with the students, and orchestrate a multi-purpose workshop once a week. Many Nevada school districts have also become immersed in the Career and Technical Education Jump Start program. For the fall 2017 semester, Jump Start students will be able to gain industry-endorsed credentials and certifications in automotive mechanics, manufacturing, construction, business, collision repair and computer information technology at the Carson City campus. Some of these programs are available throughout WNC's service area. Fall 2016 a Jump Start manufacturing program started at Silver Stage High School. This fall, Yerington and Smith Valley High Schools will participate in a construction program on the YHS campus.

While empowering their students to expedite their college education, these generous school districts are saving students' substantial money. If you factor in the higher cost of tuition at state universities, as well as food and lodging (not to mention many other costs), the savings reach well into five figures. This can be the difference sometimes whether a student even pursues a higher education.

Famous Cloud Outages

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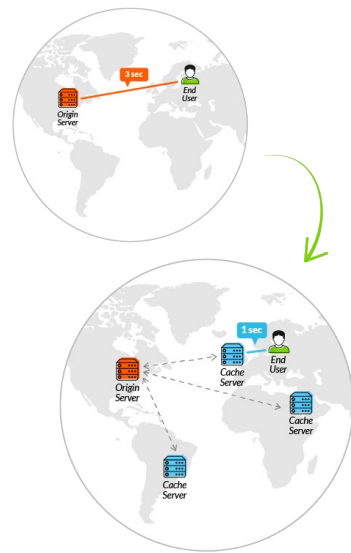
Celebrating National Library Week in Nevada

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Famous Cloud Outages

In the era of cloud computing, increasingly many software service platforms rely on other cloud services to work properly. In a recent blog post titled Today's Two-Hour CDN Outage we described why NCLab's response was slowed down for approximately two hours on April 5. The reason was an outage of a Content Delivery Network (CDN) that NCLab uses to deliver contents efficiently all over the world.

It turns out that large outages can happen as a result of small human errors. Let's look at some of the more famous ones:

The Great Amazon S3 Outage of 2017

February 28, 2017: The Amazon Simple Storage Service (S3) went down, affecting thousands of companies including Bitbucket, Github, Kickstarter, LonelyPlanet, MailChimp, Pinterest, Slack, U.S. Securities and Exchange Commission (SEC). Here is Amazon's description of the event: An authorized S3 team member using an established playbook executed a command which was intended to remove a small number of servers for one of the S3 subsystems that is used by the S3 billing process. Unfortunately, one of the inputs to the command was entered incorrectly and a larger set of servers was removed than intended. The servers that were inadvertently removed supported two other S3 subsystems. One of these subsystems, the index subsystem, manages the metadata and location information of all S3 objects in the region. This subsystem is necessary to serve all GET, LIST, PUT, and DELETE requests. The second subsystem, the placement subsystem, manages allocation of new storage and requires the index subsystem to be functioning properly to correctly operate. The placement subsystem is used during PUT requests to allocate storage for new objects. Removing a significant portion of the capacity caused each of these systems to require a full restart.

Google Search Engine Outage Affected Europe

March 17, 2017: A Google Search Engine outage that happened around 5:41 a.m. EDT in parts of Europe spread to Washington, Boston and Detroit. The countries most affected were Netherlands, Denmark and parts of Germany. Apparently the outage was caused by an experimental flag "Experimental Quic" that was introduced to Google Chrome browser.

Costly 20-Hour Outage at Salesforce

May 10, 2016: An all-day outage occurred as a result of a server bug in the North America region. Salesforce customers were not able to access the cloud software for hours, and it caused the company to lose a chunk of customer data as a result of it. According to financial services firm D.A. Davidson, "Depending on Salesforce's response and affected customers' service level agreements, we estimate this outage could impact current quarter revenue guidance by ~$20 million."

Samsung Worldwide Outage

April 2014: Massive fire in a Samsung SDS data center in South Korea disrupts mobile access to data stored in the cloud globally, as well as credit card services and other Samsung Smart devices' cloud-dependent features.

*A fire takes out a Samsung data center. Source: comworld.co.kr.*

# NCLab Coding Camp, Susanville, April 1-2, 2017

NCLab's popular Coding and 3D Modeling Camps Are Back! The latest NCLab Coding Camp took place April 1st and 2nd at the Richmond School in Susanville, California. Approximately 30 students participated. Seven students came all the way from Big Valley, driving two hours each way to attend the camp. That's dedication! During the two-day camp, students created games with Karel, drew designs with Turtle Tina and built models with 3D Modeling.

On Saturday, we had an unexpected treat! Cliff Motherall was flying his glider in the field below the school, and took a few minutes to show us how his RC glider worked. Cliff can remotely control the rudder, ailerons and flaps to steer, bank, climb and descend, and he can also receive data back from the glider about factors such as altitude and temperature. The glider and controller use open source software such as OpenTX. It was fun to see programming in action!
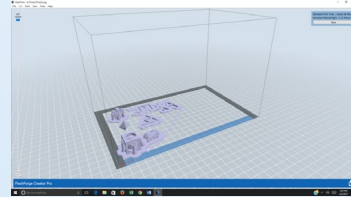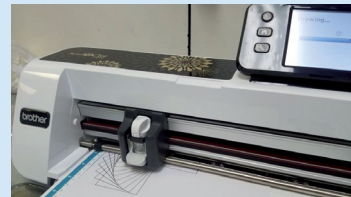

Once we had some Tina designs and 3D models, it was time to print. We used a Brother Scan N Cut to draw or cut Tina designs, and Flashforge 3D printers to build the models. In this screenshot, you can see several STL files loaded into the 3D printer. They can be printed in the same batch, which saves time. We scaled the models down to about 2 cm each to save time and print as many as we could during the camp.
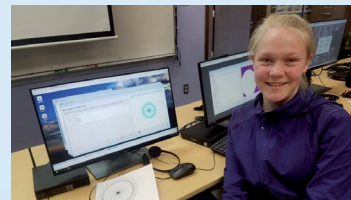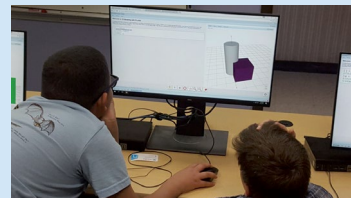

Here, a student used an SVG file to print out her Turtle nested loop drawing. The Scan N Cut plots the lines with a pen the same way that the Turtle draws them on the computer screen. The inner loop draws a square by repeating a line and turning 90 degrees 4 times, then the outer loop turns Tina 10 degrees to a new starting position, drawing 36 squares in all. Did you notice the relationship? 90 x 4 = 360 degrees, and 10 x 36 = 360 degrees. It's all about dividing up a circle!

Here is a detail of the Scan N Cut plotter working:

Turtle designs can be both printed on a 3D printer, or cut out of basswood using a laser cutter!

Students get acquainted with manipulating shapes in 3D space:

As in any NCLab camp, the atmosphere is sparking with creative communication:

Many thanks to the Lassen County Office of Education, to James Giles for facilitating the camp and helping the students use the new 3D printers, and to Principal Vicky Leitaker for providing access to the beautiful new computer lab at the Richmond School.

Celebrating National Library Week in Nevada

April 9th through 15th was the National Library Week. The NCLab Team loves libraries. They are the only institution in the U.S. where anybody can visit, get help, and learn, no matter his or her age or social status. If you think that schools do this, think again. Some libraries don't even wait for you to come – they come to you!

Carson City Library Bookmobile.

NCLab is proud to be an integral part of the Nevada library system, providing patrons with easy to access and easy to learn game-based courses in critical 21st century job skills including computational thinking, computer programming and 3D modeling. NCLab was part of a celebration that took place in Carson City on Wednesday April 12. Here are a few photos. The first one shows Jen and Sheila manning the NCLab exhibit. The exhibit included 3D prints and laser-cut designs made by students, textbooks, flyers, stickers, several issues of Full STEAM Ahead, and Chromebooks with live demos of the Karel, Turtle, and 3D modeling courses.

"This picture shows the NCLab team. From left to right: Jen (sooner or later, you'll talk to her on the phone), Sheila (prepares educational materials, and trains and supports teachers), Vas (marketing and sales guru) and Pavel (the guy to blame for making your course too difficult).

We were so excited about meeting many librarians and having great conversations with them!

NR21 Digital Summits - April 2017

Digital classrooms, 1:1, student-centered learning, a rich array of apps, extensions, tools, and of course, NCLab … it's time to reflect on Year One of Nevada Ready 21. This year, Nevada Department of Education program put CTL Chromebooks in the hands of 20,000 Nevada students and their teachers, along with great software and training opportunities.

At the April 2017 Digital Summits in Elko, Carson City, and Henderson, NR21 educators converged to share their experiences and learn something new. Just another Professional Development Day? Not quite: the air hummed with "aha" moments and the sense of being part of a breakthrough in education. In the 1:1 classroom, every student in a classroom is connected, not just during computer lab time, but all the time. 1:1 means self-paced learning, work in progress saved to the cloud, and many opportunities to collaborate. Teachers see what their students are doing in real time - formative assessment at its best. This has always been a key feature in NCLab courses.

And it's fun. When students are engaged, learning happens. Many thanks to CTL for the Digital Summit events, to the Department of Education for the Nevada Ready 21 program, and to everyone involved - teachers, coaches, professional development instructors, administrators, vendors - for three inspiring Summits. On to Year Two!

Teachers from Elko, Battle Mountain, and Ely took a different approach to their Digital Summit. Under Blanca Duarte's guidance, they created their own sessions to share expertise and solve problems.

Sheila Bunch and Josh Billings strike a pose at the Carson City Summit. Josh uses NCLab courses as part of the STEM curriculum at Carson Middle School. STEM is about problem solving: Josh's class is using technology to examine the impact of this winter's record snowfall and what will happen when the snowpack melts.

From left to right: Amy Al-Khalisi (CTL), Sheila Bunch (NCLab), Clifton Roozeboom (Pocketlab), and Wayne Lawson (Bob Miller MS). As always, great discussions about future plans!
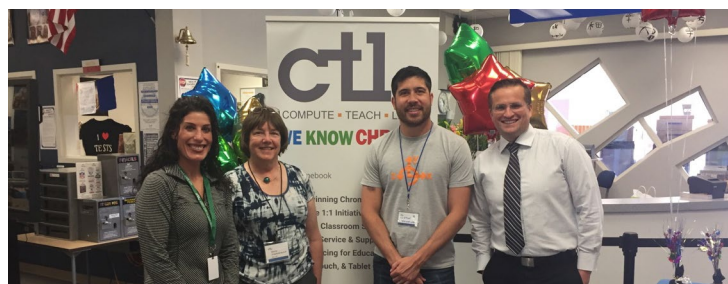
Soft, Hard and Applied Skills Taught by NCLab

Soft skills such as perseverance, problem solving and coping with failure are increasingly important to employers. The table below provides a concise overview of the soft, hard and applied skills taught by NCLab in the context of computer programming and 3D modeling. Click to download the PDF file:

SUCCESS = SOFT SKILLS + HARD SKILLS + APPLIED SKILLS

NCLab provides learners with carefully sequenced, game-based courses, a Creative Suite of application tools, and project-based curriculum that can be used in schools, libraries, clubs, and trainings.

Soft Skills: interpersonal and character skills	Hard Skills: area-specific, measurable skills	Applied Skills: skills required for specific jobs and careers
Communication Questioning and responding; understanding directions; presenting results.	**Vocabulary and Writing Skills** Instructions, model descriptions, game narratives, commands, keywords, spelling, and syntax; commenting within programs.	**Technical Documentation** Writing technical specifications, communicating the why's and how's effectively; training.
Collaboration Collaborative problem-solving and project-based learning; shared sandbox and game environments.	**Collaborative Coding and Modeling** Splitting complex programs and 3D models into simpler tasks, solving them, then combining the results.	**Teams in the Workplace** Solve real world problems as a team, by writing programs and building 3D models.
Problem-Solving Perseverance, efficiency, planning, breaking complex tasks into simpler tasks, using design cycles, understanding the value of failure.	**Using Appropriate Tools** Solving problems using Python and other programming languages; using Constructive Solid Geometry (CSG) to build 3D models.	**Solve Real World Problems** Write programs and create 3D models for specific applications such as games, databases, complex calculations, prototyping, machining, and robotics.
Adaptability Ability to adapt existing solutions to new situations; flexible thinking.	**Adjusting Programs and 3D Models** Modifying existing computer programs and 3D models in response to new conditions.	**Responding to Change** Products, computer programs, supply and demand, design specifications and other factors constantly change.
Critical Thinking and Observation Use common sense and feedback to evaluate and improve results.	**Logical and Spatial Reasoning** Using logic to write efficient programs; using spatial reasoning to build and manipulate 3D models.	**Advanced Applications** Advanced Computer Aided Design (CAD), programming languages, and computational tools.
Creativity and Innovation Looking for novel solutions and designs. Thinking outside of the box.	**Performance Tasks** Writing code and building 3D models for one's own projects.	**Innovating in the Workplace** Inventing and advancing new technology.
Awareness of Cause and Effect Understanding the consequences of one's actions.	**Understanding Constraints** Understanding computational complexity, software and hardware limitations, impact of human error.	**Social and Environmental Impact** Assessing costs, availability of resources, short and long term impacts.