Coding for Differentiation and Enrichment with Gifted Students

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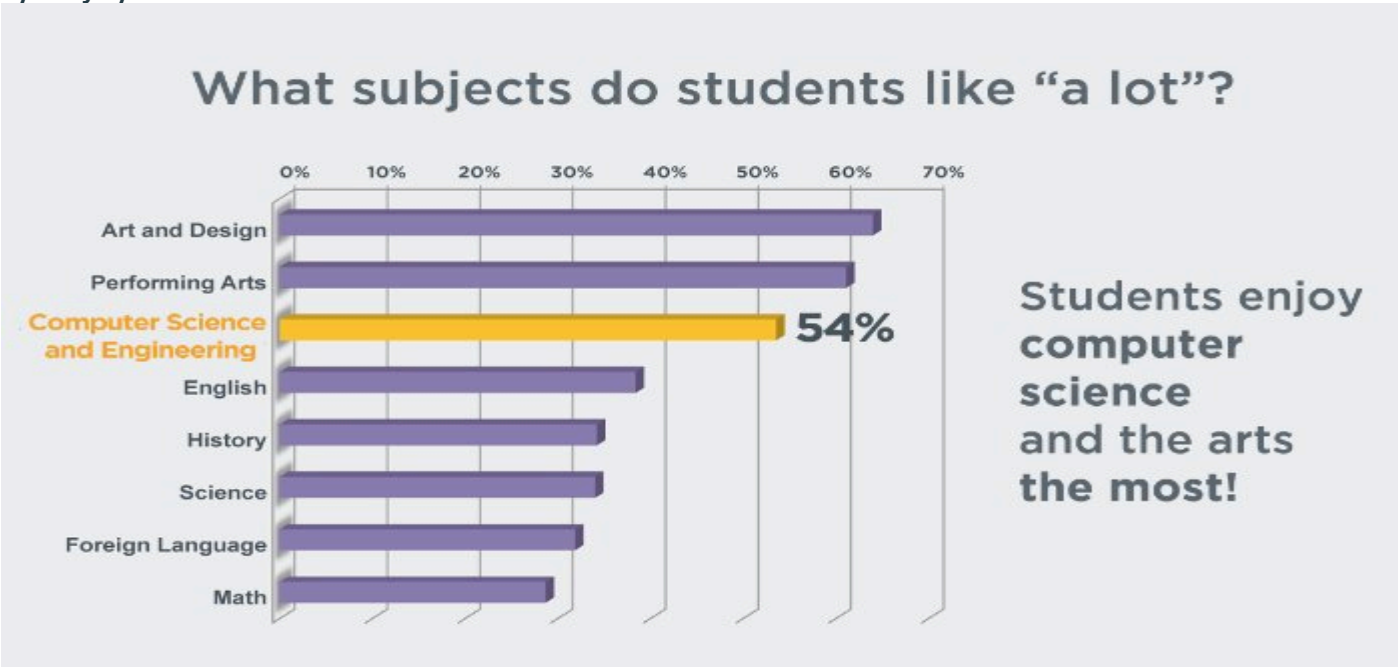
Coding for Differentiation and Enrichment in High School

This session aims to engage educators in a conversation about how they can use computer programming in their classrooms to challenge and inspire gifted students to thrive using logic, creativity, problem solving, critical thinking and innovation. Using coding with students gives teachers a great way provide enrichment and differentiated learning and assessment in the classroom.

What is coding?

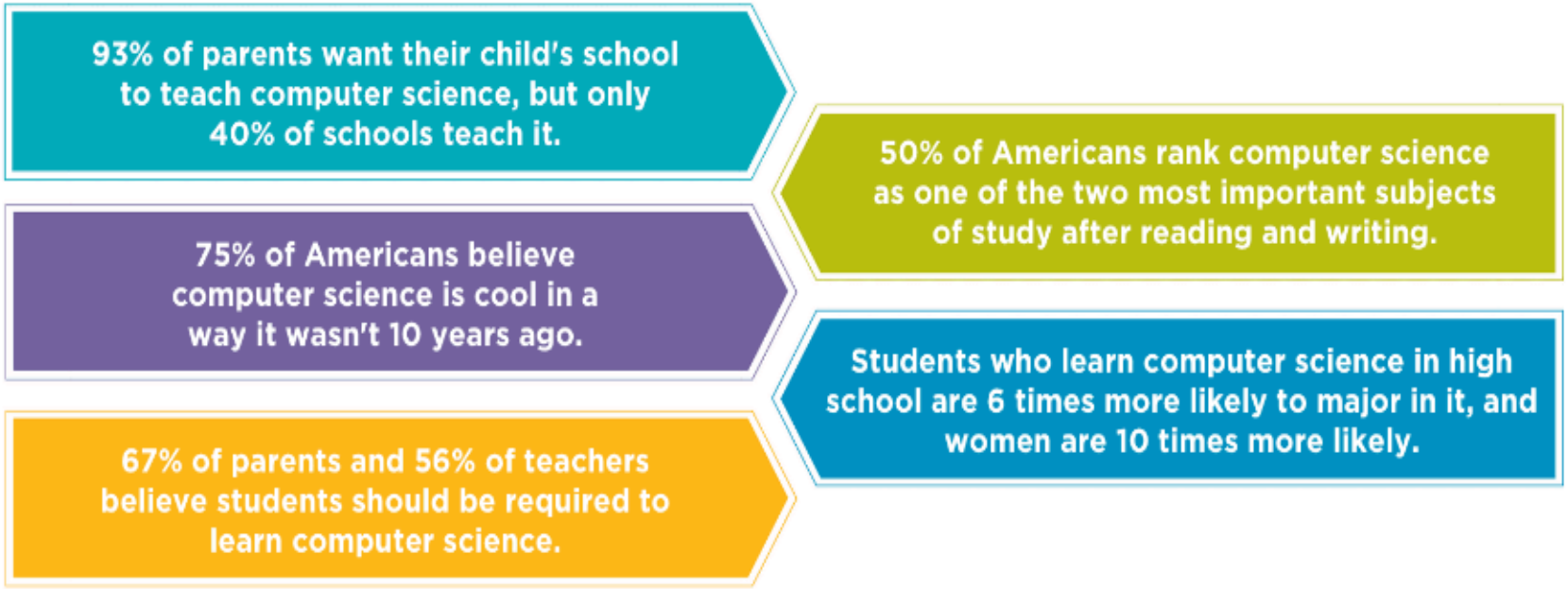
Why should students code?

They enjoy it!!!



LInkedin.com

Why should students code?



Code.org

Why should students code?

- **Coding drives innovation**
- **Coding allows kids to be creative**
- **Coding builds confidence**
- **Coding is best learned early** (similar to learning a second language).
- **Coding translates to success in other areas** (such as math, science, language arts)

www.tynker.com

Why should Gifted Students Code?

- **Need to be challenged**
- **Cure for boredom**
- **Makers not just consumers**
- **Need choice & personalization/ Individualized learning**
- **Students choose learning preferences**
- **Desire NOVEL experiences**

Student Engagement- Student as Learner

(Not teacher driven)

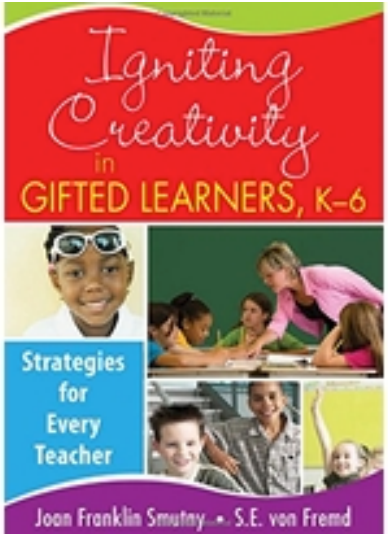
Gifted students

- think outside the box.
- are up for a challenge
- love to showcase creativity and be different

Point them in the right direction and then get out of their way

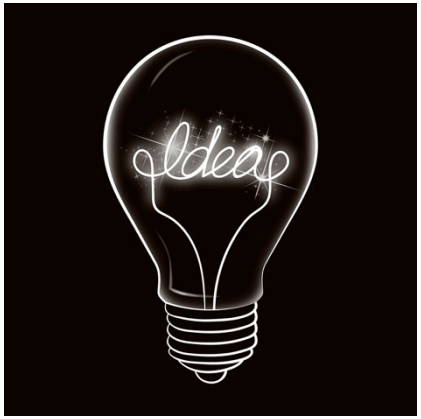
Very high level of student engagement

Creativity



- **Allow students to develop their “sense of wonder” (Rachel Carson)**
- **Develop curiosity and discovery**
- **Revive unused talents and interests**
- **Students become more engaged and alive in their learning**
- **Allow students to move into the “unknown”**
- **Increased creativity depends on the learning environment that allows the development**

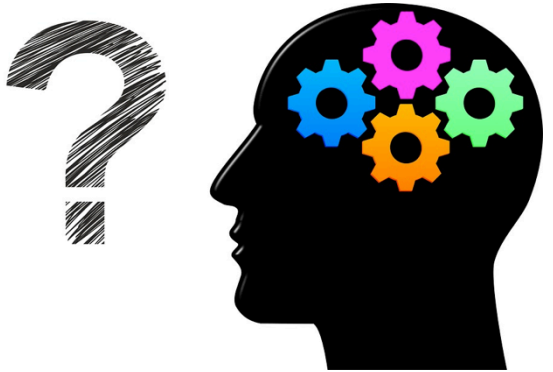
Benefits of Creativity



- **Value to emotional well being and intellectual growth**
- **Personal connections with content areas**
- **Originality and individuality**
- **Discovery**
- **Greater exploration of interdisciplinary connections and sources**
- **Higher-level thinking and depth of learning**
- **Artistry and depth of feeling**

Igniting Creativity in GIfted Learners, K-6 pg. 8-9

Higher-level thinking



Stimulates higher-level thinking in a wide range of way

- **Analysis of problems**
- **Awareness of new questions**
- **Flexible thinking across disciplines**
- **Sensitivity to pattern, color, gesture, nuance**
- **Heightened sensory awareness**
- **Discovery of connections**
- **Probing new mysterie**

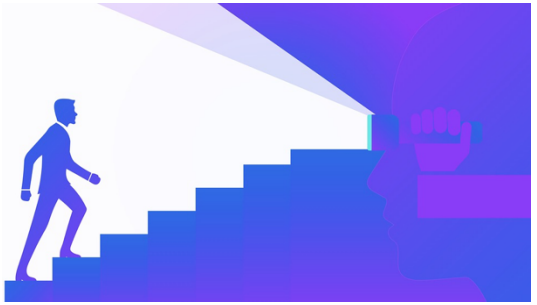
Igniting Creativity in GIfted Learners, K-6 pg. 7

Practical Suggestions

- **Recognize that few teachers have expertise**
- **Collaborate with other content teachers**
- **Creativity should provide ways to expand and enhance your curriculum.**
- **Offer more open-ended and complex ideas/problems.**
- **Offer multiple ways to demonstrate learning and understanding**
- **Broaden understanding of the different forms of creativity (math students invent own formulas and solutions)**
- **Break students from old patterns**
- **Use inquiry based approaches**

Igniting Creativity in GIfted Learners, K-6 pg. 19-20

Practical Suggestions



- **Maintain a focus**
- **Create established routines, learning stations and organized plans**
- **Begin with a thought of the week**
- **Use curriculum as a guide**
- **Teach students to make friends with mistakes**
- **Understand importance of self-selected projects**
- **Differentiate, stay ahead of the pace**
- **Use open-ended questions, and thinking**

Igniting Creativity in GIfted Learners, K-6 pg. 21-26

National Association for Gifted Children (NAGC) Gifted Programming Standards

Standard 3: Curriculum Planning and Instruction

3.2. *Talent Development*. Students with gifts and talents become more competent in multiple talent areas and across dimensions of learning.	3.2.1. Educators design curricula in cognitive, affective, aesthetic, social, and leadership domains that are challenging and effective for students with gifts and talents.
	3.2.2. Educators use metacognitive models to meet the needs of students with gifts and talents.
3.3. *Talent Development*. Students with gifts and talents develop their abilities in their domain of talent and/or area of interest.	3.3.1. Educators select, adapt, and use a repertoire of instructional strategies and materials that differentiate for students with gifts and talents and that respond to diversity.
	3.3.2. Educators use school and community resources that support differentiation.
	3.3.3. Educators provide opportunities for students with gifts and talents to explore, develop, or research their areas of interest and/or talent.

http://www.nagc.org/sites/default/files/standards/K-12%20programming%20standards.pdf

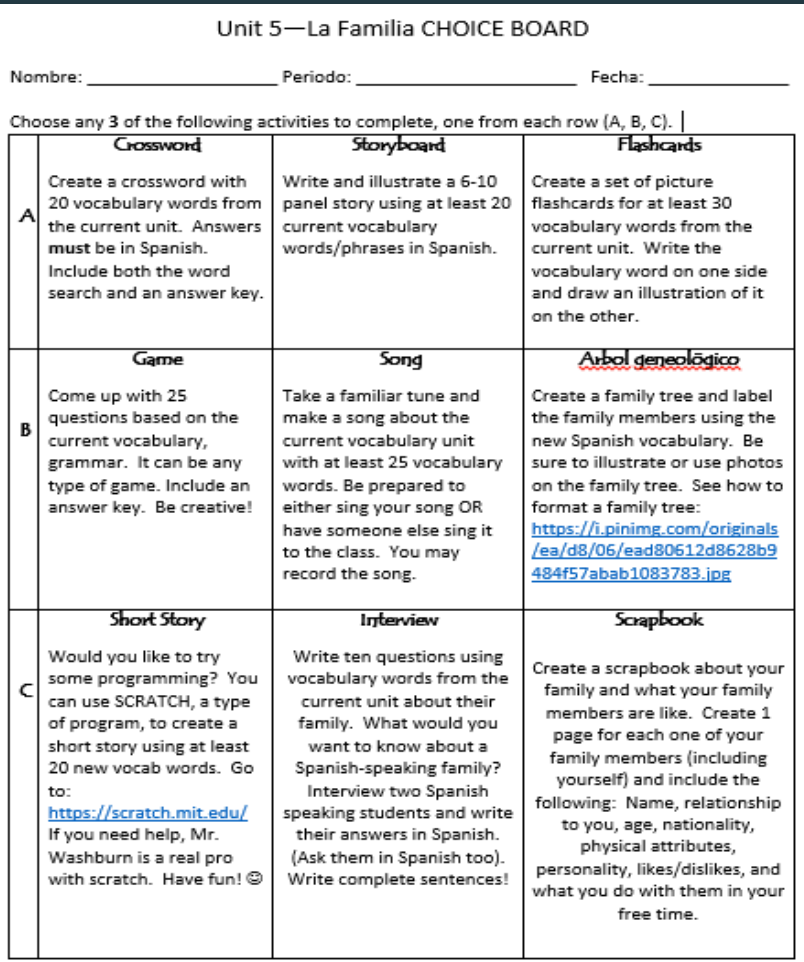
Choice Board

For Spanish class, students were given a Choice Board and had the option to create a short story And present it through SCRATCH.

Student Examples:

https://scratch.mit.edu/projects/199612479/

https://scratch.mit.edu/projects/199563879/



Unit 5—La Familia CHOICE BOARD

Nombre: _____ Periodo: _____ Fecha: _____

Choose any **3** of the following activities to complete, one from each row (A, B, C).

A	**Crossword** Create a crossword with 20 vocabulary words from the current unit. Answers **must** be in Spanish. Include both the word search and an answer key.	**Storyboard** Write and illustrate a 6-10 panel story using at least 20 current vocabulary words/phrases in Spanish.	**Flashcards** Create a set of picture flashcards for at least 30 vocabulary words from the current unit. Write the vocabulary word on one side and draw an illustration of it on the other.
B	**Game** Come up with 25 questions based on the current vocabulary, grammar. It can be any type of game. Include an answer key. Be creative!	**Song** Take a familiar tune and make a song about the current vocabulary unit with at least 25 vocabulary words. Be prepared to either sing your song OR have someone else sing it to the class. You may record the song.	**Arbol geneológico** Create a family tree and label the family members using the new Spanish vocabulary. Be sure to illustrate or use photos on the family tree. See how to format a family tree: https://i.pinimg.com/originals/ea/d8/06/ead80612d8628b9484f57abab1083783.jpg
C	**Short Story** Would you like to try some programming? You can use SCRATCH, a type of program, to create a short story using at least 20 new vocab words. Go to: https://scratch.mit.edu/ If you need help, Mr. Washburn is a real pro with scratch. Have fun! ☺	**Interview** Write ten questions using vocabulary words from the current unit about their family. What would you want to know about a Spanish-speaking family? Interview two Spanish speaking students and write their answers in Spanish. (Ask them in Spanish too). Write complete sentences!	**Scrapbook** Create a scrapbook about your family and what your family members are like. Create 1 page for each one of your family members (including yourself) and include the following: Name, relationship to you, age, nationality, physical attributes, personality, likes/dislikes, and what you do with them in your free time.

Don’t I need to understand coding first?

Quote from teacher:

To be honest, I did not know much about coding until we gave our coding assignment last semester. I learned some coding in a summer course years ago, but watching my students put it into practice in the classroom has taught me how it can be applied to science education.

Jonathan

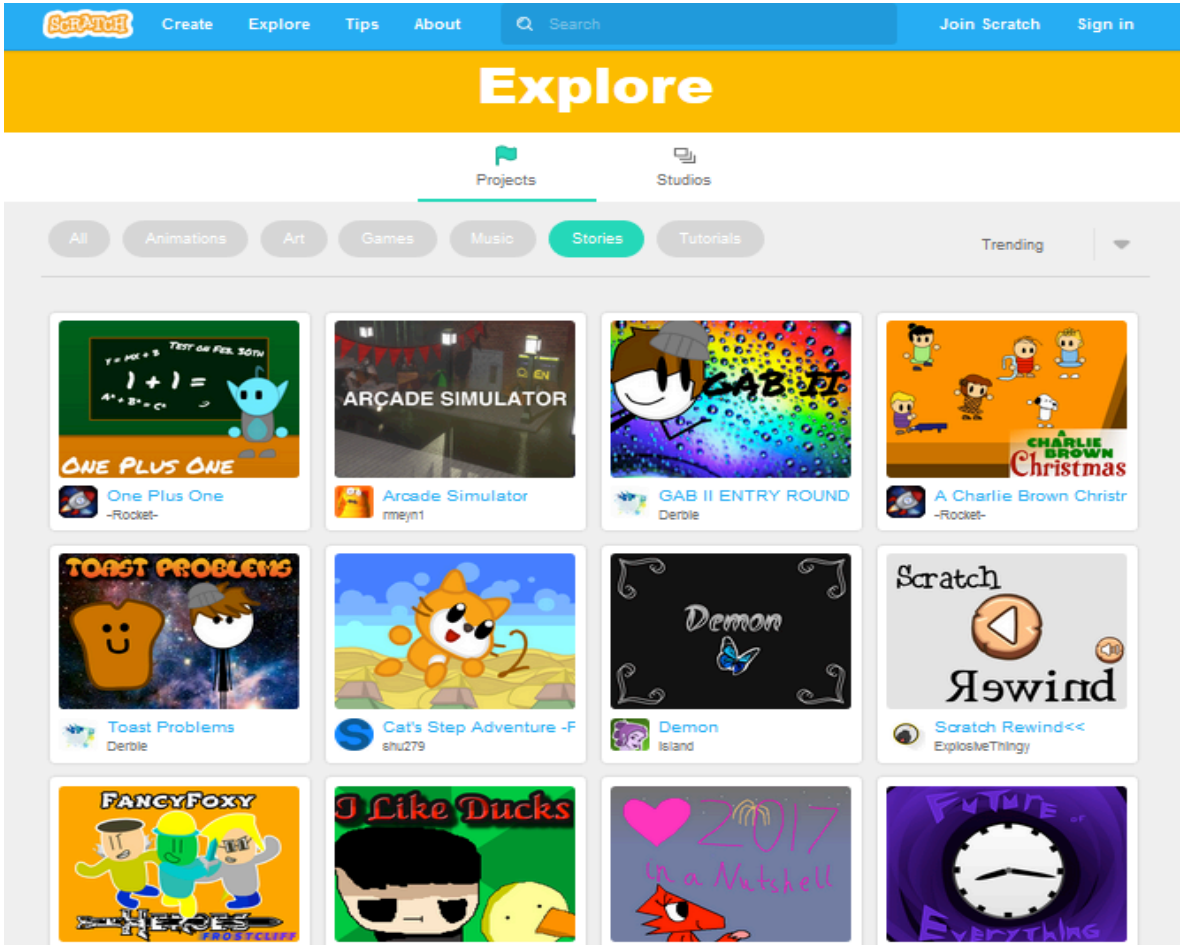
Teacher experiences

Dave, a health teacher without much computer savvy, created an assignment for his students to use one of their health units as the theme for a Scratch game or story. Dave had zero coding experience and gave the students zero technical support. They helped each other and got help outside of class as they needed it. They loved the assignment and the results were great and a lot of fun.

Teacher experiences

Jonathan and Heidi team teach biology. Neither really know much about coding. After a unit on Meiosis, they assigned the students to use Scratch to create a way to share the information they leaved about meiosis. This was one way to assess their learning.

Scratch



https://scratch.mit.edu/

Examples - Dave's student work (Health Class)

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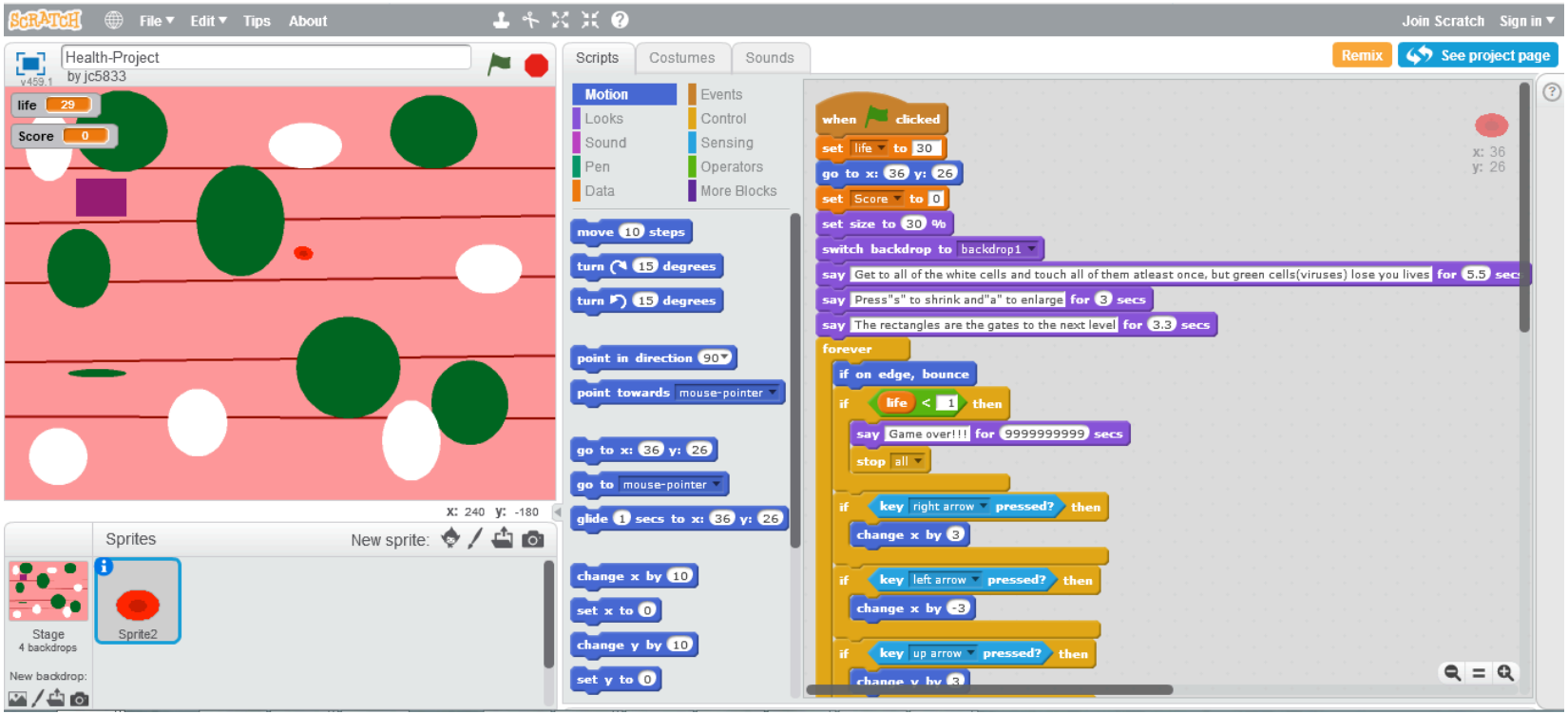
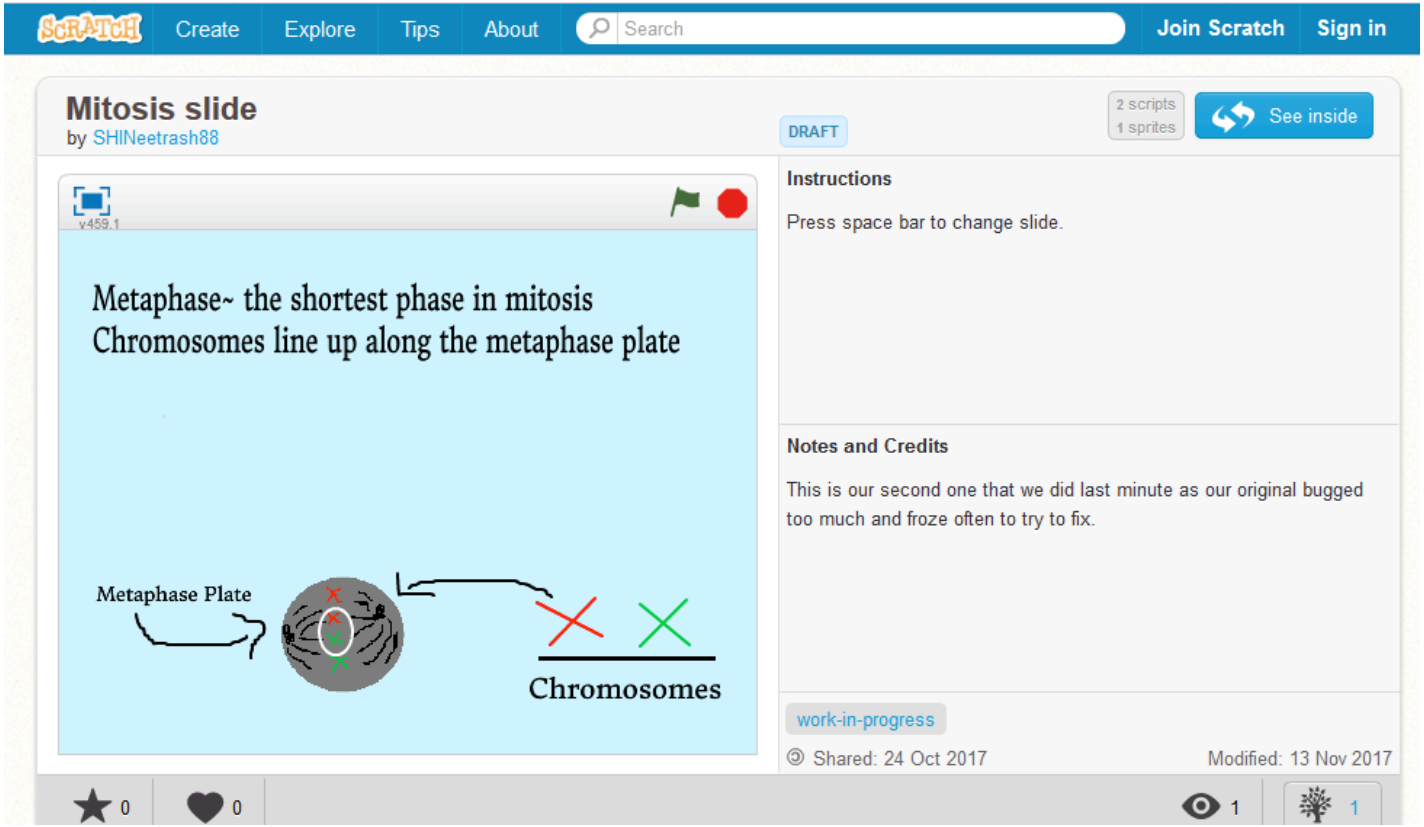
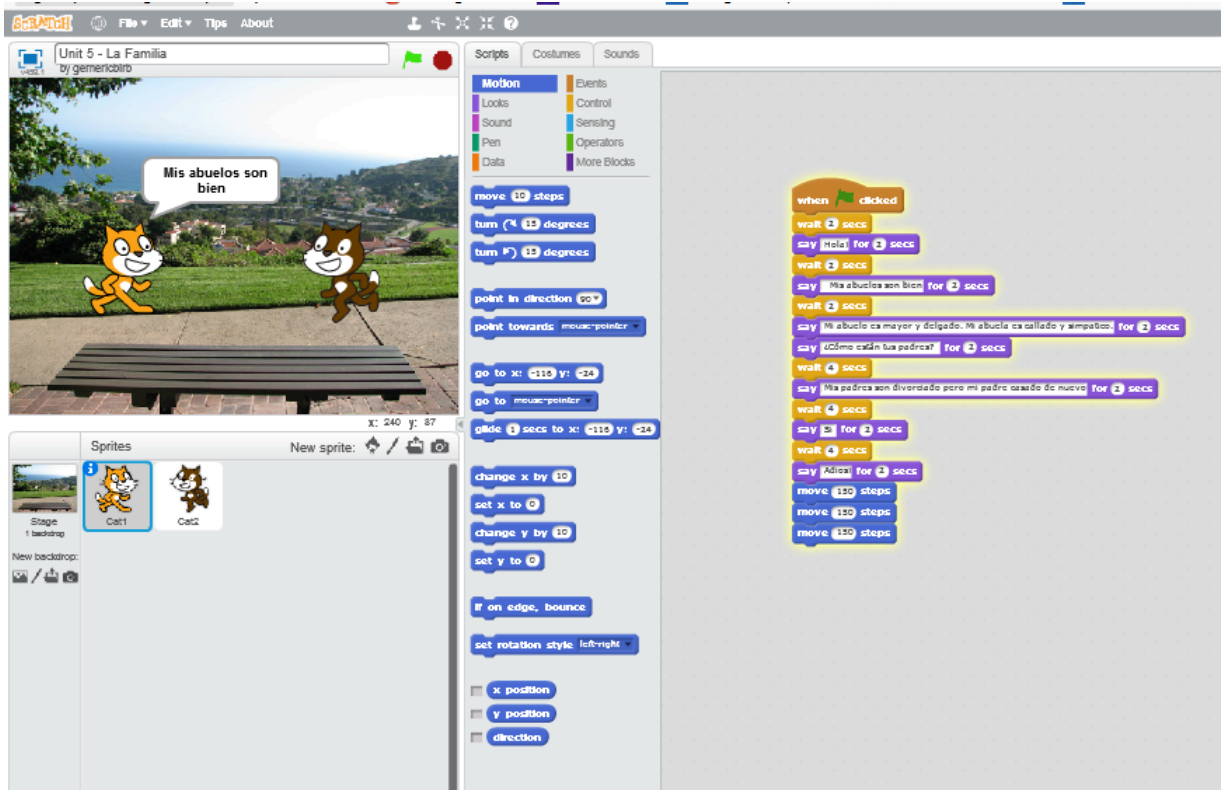
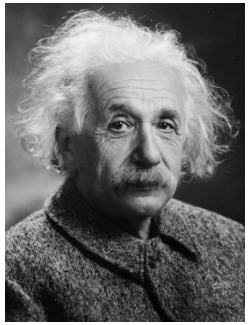


Examples-Heidi & Jonathan's student work



Example-Spanish Class





The important thing is not to stop questioning. Curiosity has its own reason for existing. One cannot help but be in awe when he contemplates the mysteries of eternity, of life, of the marvelous structure of reality. It is enough if one tries merely to comprehend a little of this mystery every day. Never lose a holy curiosity.

Albert Einstein

Resources

- Code.org
- Scratch (great for beginners)
- Tynker (website/phone app)
- Pocket Code (phone app)
- Khan Academy (coding tutorials)
- Codeacademy (coding tutorials)
- Trinket (more advanced)
- Glowscript (more advanced)
- Bootstrap/Pyret (Math curriculum)
- Minecraft (great for modeling)
- Arduino (microprocessor)
- Lego Robotics
- Sphero (programmable rolling spheres)
- Cubelets (programmable moving cubes)
- Excel (computational models)
- MIT AppInventor (Android phones)

Contact Information

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