THE MANHATTAN PROJECT:

STEM Learning with a Twist!

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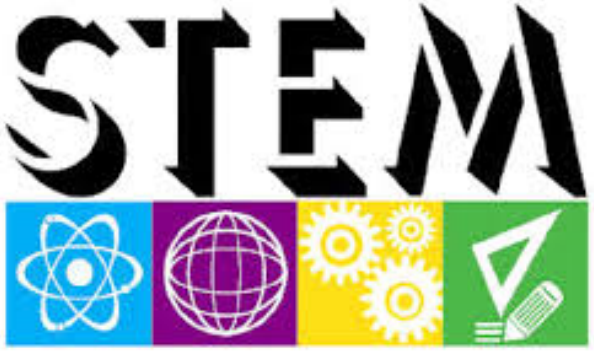
CENTER FOR ADVANCED PROFESSIONAL STUDIES

This presentation is available at

www.teachertek.net



SCIENCE · TECHNOLOGY
ENGINEERING · MATH

Activity

Collaborative Partnership between Manhattan, KS USD 383 and
Blue Valley Center for Advanced Professional Studies CAPS
March 2015

caps™

CENTER FOR ADVANCED PROFESSIONAL STUDIES

STEM graphic http://chemistrybyscott.org/CHS_STEM_page.htm

In the beginning…

Conversation at a Conference

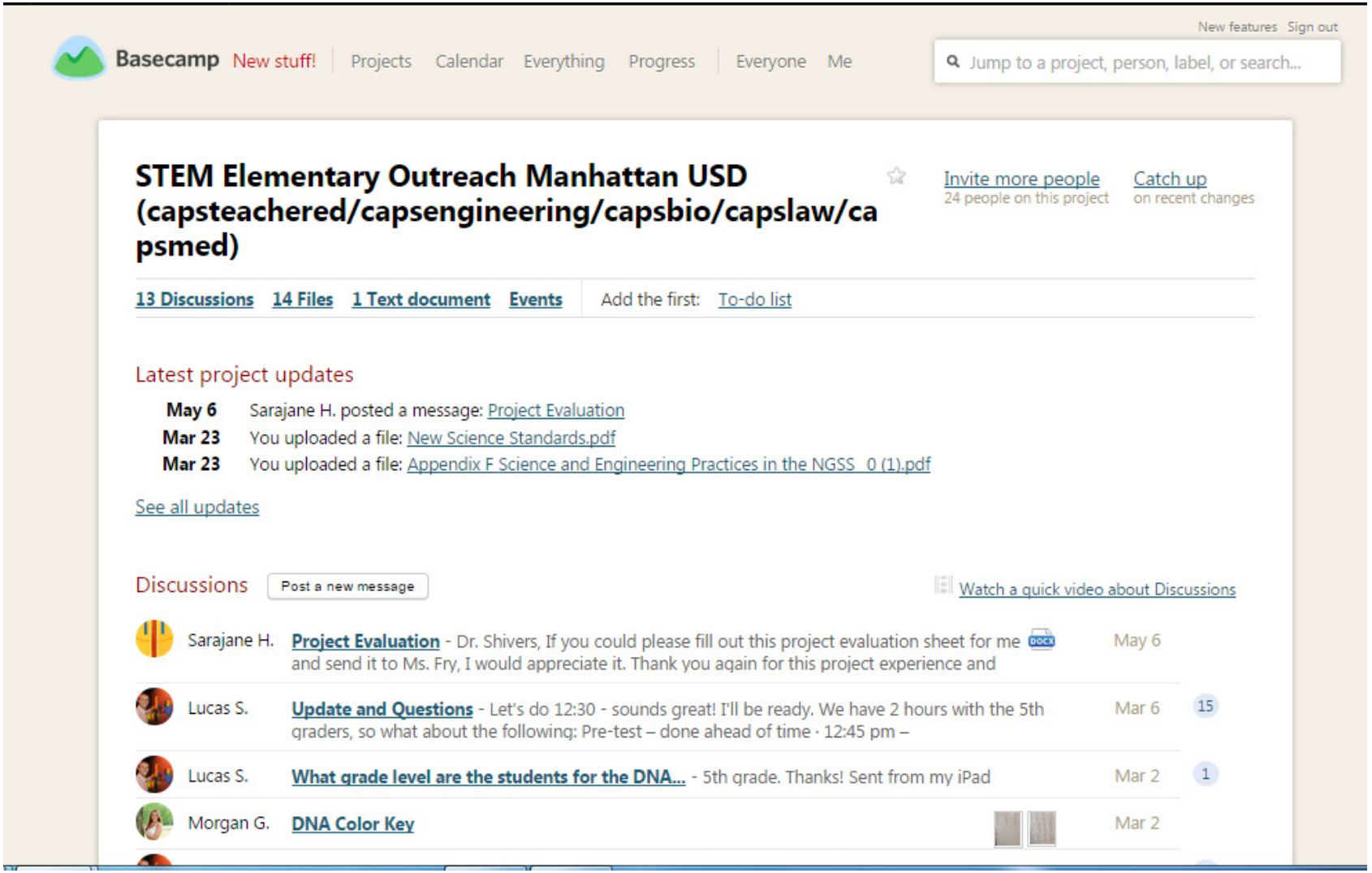

Skype call
to discuss possibilities

Meeting with students in the CAPS Teacher Education program

- P.M. students-time of day determined for lesson to take place
- All students had a chance to participate
- Lead selected
- BaseCamp account set up and included the appropriate parties

BaseCamp

project management site



Setting up the Project

- Students brainstormed and researched
- Presented lessons to Dr. Shivers
- Discussed lesson effectiveness
- Decided to do something on DNA
- Determined professional areas to include
  Medicine, Engineering, Global Foods
- Added others to BASECAMP as needed

STEM Elementary Outreach Manhattan USD (capsteachered/capsengineering/capsbio/capslaw/capsmed)

Discussions on BASECAMP

Show discussions sorted by **newest** and filter by title...

Sarajane H.	**Project Evaluation** - Dr. Shivers, If you could please fill out this project evaluation sheet for me and send it to Ms. Fry, I would appreciate it. Thank	May 6		Archive
Lucas S.	**Update and Questions** - Let's do 12:30 - sounds great! I'll be ready. We have 2 hours with the 5th graders, so what about the following: Pre-test – done ahead of	Mar 6	15	Archive
Lucas S.	**What grade level are the students for the DNA...** - 5th grade. Thanks! Sent from my iPad	Mar 2	1	Archive
Morgan G.	**DNA Color Key**	M		Archive
Lucas S.	**Process** - Sounds great. Yes, let's stick with the DNA-focus and expand with a strong medical career focus in bio-tech or medicine. I think teachers will jump - I'll	Feb 25	5	Archive
Morgan G.	**Materials for DNA project** - We have the lesson plan structured out, but are working on how to put it into the engineering process. Attached is the	Feb 11	2	Archive
Sarajane H.	**Dates to begin lessons** - We were curious if beginning to present the lesson between March 30th- April 3rd would be a good week for you and the teachers?	Feb 9		Archive
Lucas S.	**Update** - Thanks for the updates. I really like the DNA focus. Can you share more on the egg drop lesson? We have several already doing this type of project - so	Feb 3	2	Archive
Keith M.	**Engineering Design Process PPT and Design Briefs** - I added some powerpoints and design briefs to the files. Have a look and see if we are on the right track.	Jan 26		Archive
Lucas S.	**Update** - Thanks! Do you feel like you'd be ready for teaching the lesson the second week of April? Any topics you've narrowed down? Thanks!	Jan 21	1	Archive
Lucas S.	**First Steps** - http://community.ksde.org/LinkClick.aspx?fileticket=MCOLp_kHGNU%3d&tabid=5785&mid=14106 Link to the KCCRS	Jan 14	4	Archive
Tammy F.	**Second Semester start...** - I talked to Dr. Shivers, and we will begin work on this project at the start of second semester. Please allow time in your project schedules	Nov 25, 2014		Archive
Lucas S.	**Thanks!** - Hello Everyone - Thanks for charting the waters to explore a new opportunity. Let me know how to best support you all. Blessings.	Nov 6, 2014		Archive

Files Shared

Haney, Sarajane - Project Client Evaluation.docx

Added by Sarajane H. on May 6 · 746 KB

Label...

Appendix F Science and Engineering Practices in the NGSS _0 (1).pdf

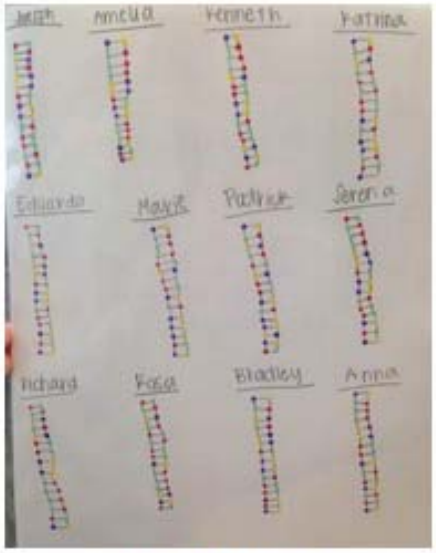
Added by Tammy F. on Mar 23 · 615 KB

Label...

New Science Standards.pdf

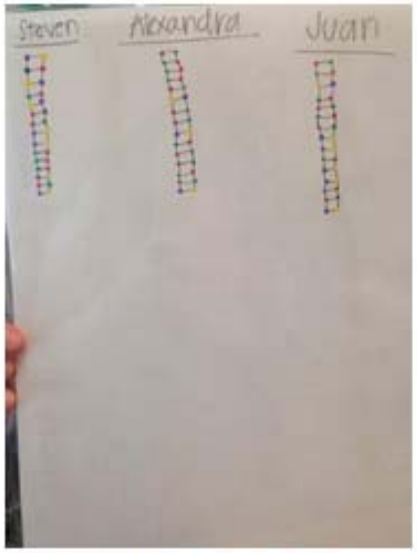
Added by Tammy F. on Mar 23 · 12 MB

Label...



IMG_7918.JPG

Added by Morgan G. on Mar 2 · 290 KB



IMG_7919.JPG

Added by Morgan G. on Mar 2 · 214 KB

gumdrop color	DNA base
purple	A
yellow	C
green	G
red	T

phenotype		genotype
Eyes:	blue	AGG
	green	AGC
	brown	TGG
	hazel	TGC
Hair:	brown	GCC
	black	GTG
	blonde	GCT
	red	GTC
Dominant hand:	right	TAA
	left	TTA
Height:	short	GAA
	medium	GGG
	tall	GTT
Nose shape:	round	ATA
	long	GTA
	pointy	CAT

dna.pdf

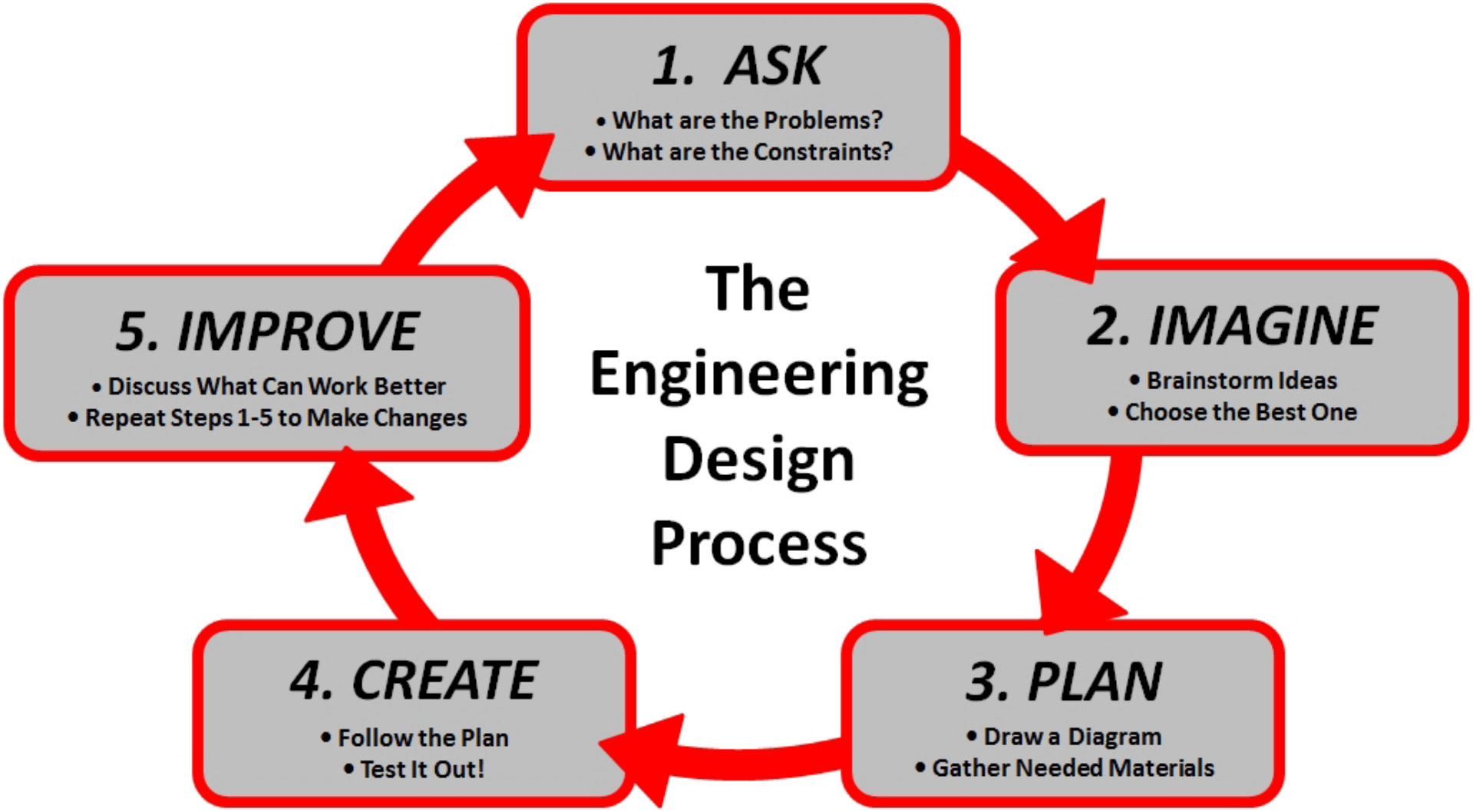
Added by Abby S. on Mar 2 · 102 KB

Learning Objectives

- The students will...

- Learn that traits are observable characteristics that are passed from parent to child.
- Learn that an individual's overall combination of traits makes him or her unique.
- Discover that DNA is a set of instructions that specifies the traits of an organism.
- Discover that law professionals use science and DNA to solve crime
- Discover that engineering/chemical engineering professionals alter DNA to genetically modify food
- Discover that Bio-medical professionals can use DNA to predict genetic diseases
- Use the engineering design process to complete a model that provides a visual aide for DNA makeup
- Demonstrate their knowledge on DNA outside of the collaborative group
- Explain certain DNA sequencing codes for different characteristics
- Investigate basic gene sequences to determine the genotype and phenotype of an individual
- Learn to work virtually with someone outside of the classroom
- Learn to work in a collaborative environment
- Replicate a DNA model using common objects
- Recognize common terminology in the study of DNA
- Demonstrate understanding of DNA sequences
- Synthesize their understanding of DNA sequencing in writing

Engineering Design Process



+Engineering Design Process

ASK

- Learn that traits are observable characteristics that are passed from parent to child
- Learn that an individual's overall combination of traits makes him or her unique

IMAGINE

- Discover that DNA is a set of instructions that specifies the traits of an organism
- Discover that law professionals use science and DNA to solve crime
- Discover that engineering/chemical engineering professionals alter DNA to genetically modify food
- Discover that Bio-medical professionals can use DNA to predict genetic diseases

PLAN

- Investigate basic gene sequences to determine the genotype and phenotype of an individual
- Learn to work virtually with someone outside of the classroom
- Learn to work in a collaborative environment

CREATE

- Replicate a DNA model using common objects
- Use the engineering design process to complete a model that provides a visual aide for DNA makeup
- Explain that certain DNA sequencing codes for different characteristics
- Demonstrate understanding of DNA sequences

IMPROVE

- Recognize common terminology in the study of DNA
- Synthesize their understanding of DNA sequencing in writing
- Demonstrate their knowledge on DNA outside of the collaborative group

+Kansas Science Standards

ASK
Learn that traits are observable characteristics that are passed from parent to child
Learn that an individual's overall combination of traits makes him or her unique

IMAGINE
Discover that DNA is a set of instructions that specifies the traits of an organism
Discover that law professionals use science and DNA to solve crime
Discover that engineering/chemical engineering professionals alter DNA to genetically modify food
Discover that Bio-medical professionals can use DNA to predict genetic diseases
At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)

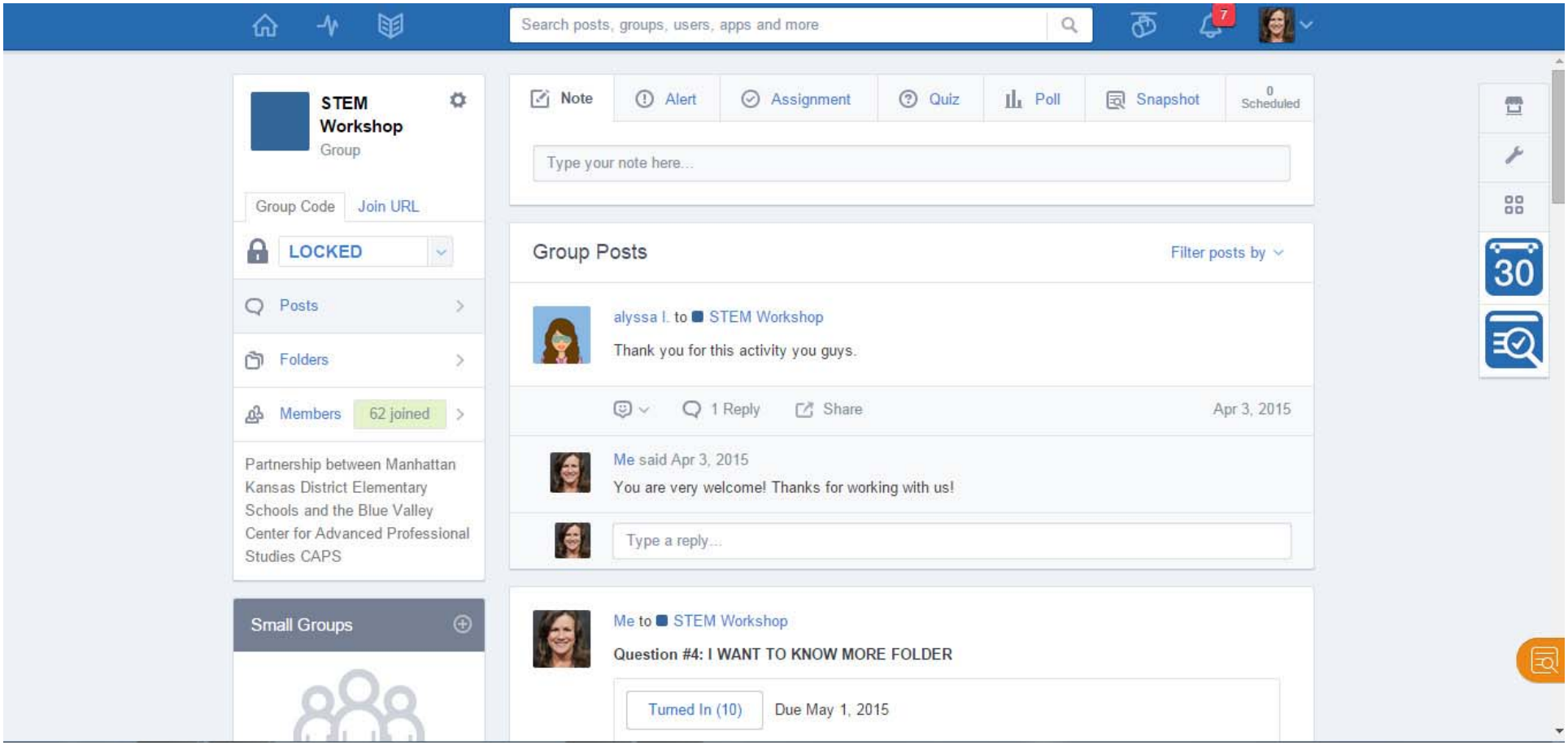
PLAN
Investigate basic gene sequences to determine the genotype and phenotype of an individual
Learn to work virtually with someone outside of the classroom
Learn to work in a collaborative environment
Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost. (3-5-ETS1-1)
Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)

CREATE
Replicate a DNA model using common objects
Use the engineering design process to complete a model that provides a visual aide for DNA makeup
Explain that certain DNA sequencing codes for different characteristics
Demonstrate understanding of DNA sequences
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

IMPROVE
Recognize common terminology in the study of DNA
Synthesize their understanding of DNA sequencing in writing
Demonstrate their knowledge on DNA outside of the collaborative group
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design problem. (3-5-ETS1-2)

How will we measure Learning?

Instructions for activities & resources posted EDMODO



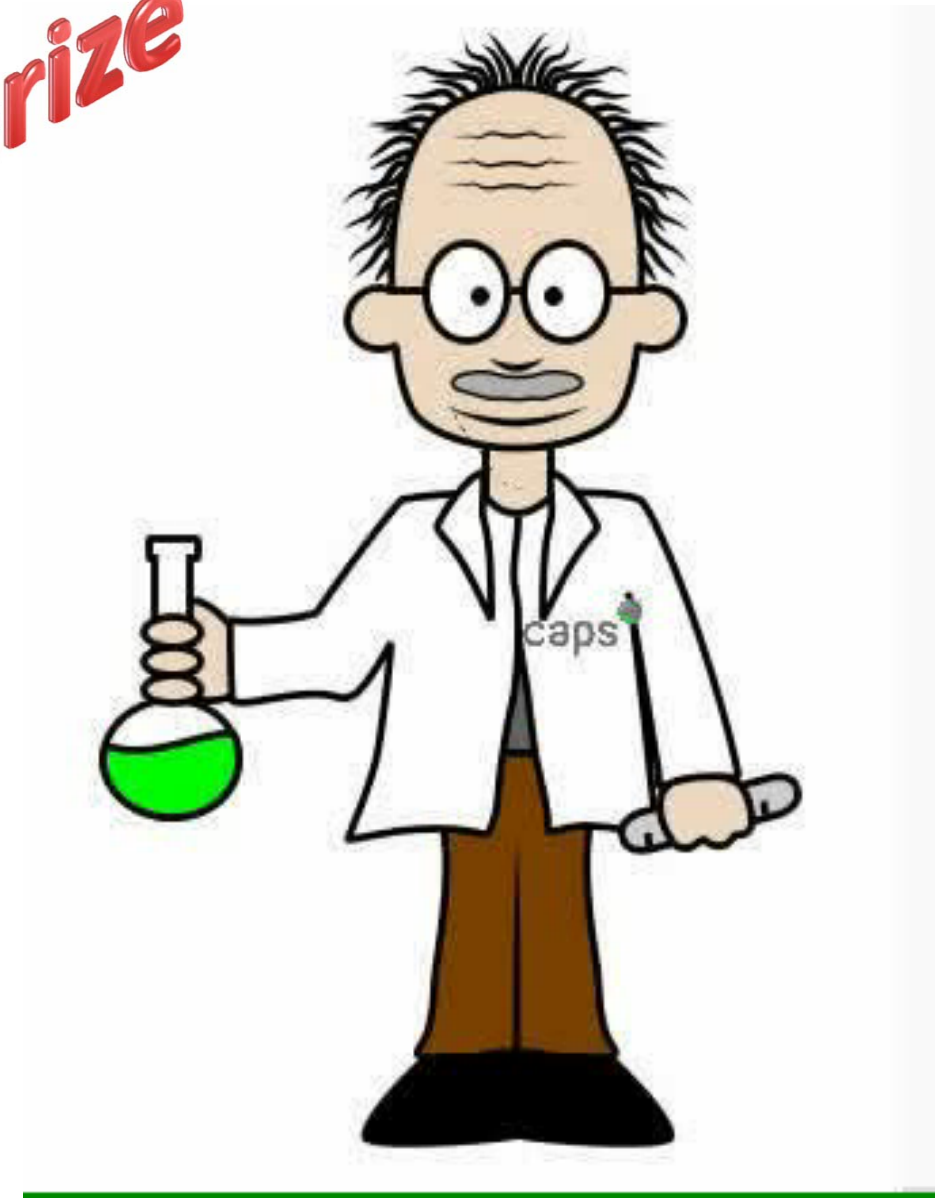
EDMODO site


End ESC
Park P
Look SPACE
Einstein

Double Robot

Lesson Powerpoint was broadcast so that Blue Valley CAPS students' and Manhattan 5th graders' views were synchronized!

Blabberize



Today, we're going to explore DNA, but before we begin, we'd like for you to know us better!

Sarajane

Senior

Blue Valley Southwest High School

Going to attend KU

Amanda

Senior

Blue Valley High School

Going to attend KU

Morgan

Senior

Blue Valley High School

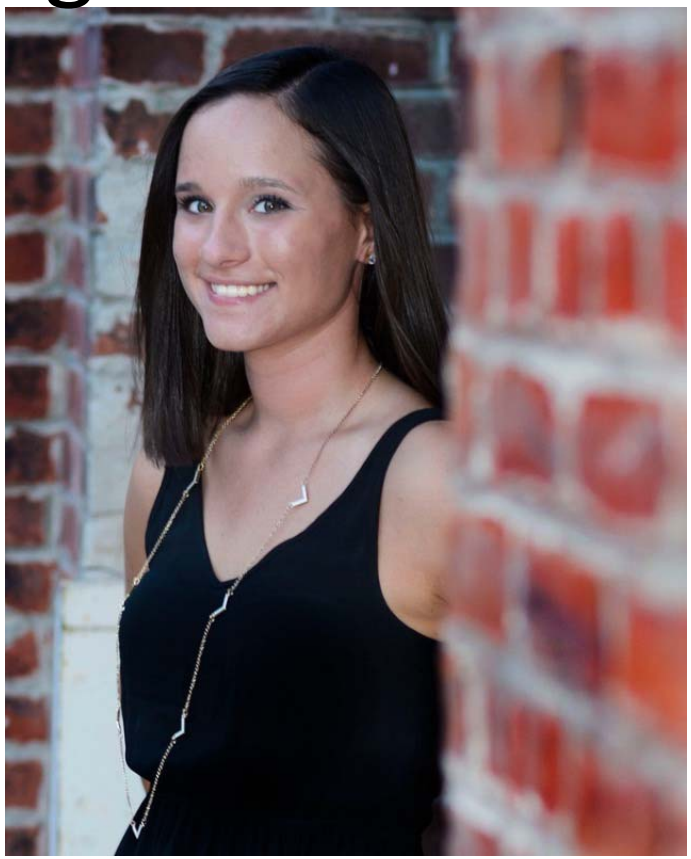
Going to attend Iowa State

Abby

Senior

Blue Valley West High School

Going to attend K-State



Lindsay

Senior

Blue Valley West High School

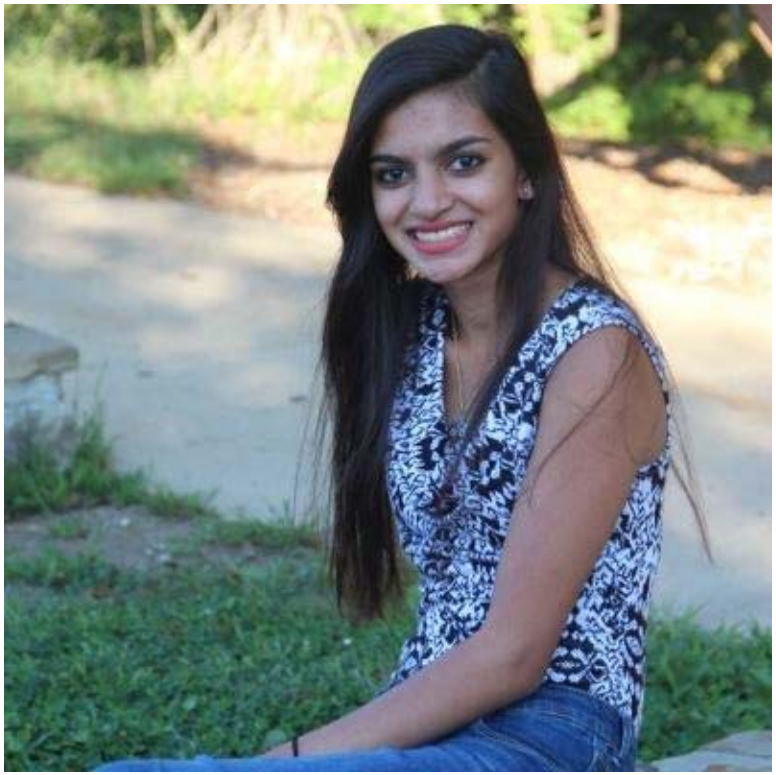
Going to attend K-State

Priya

Senior

Blue Valley North High School

Going to attend KU

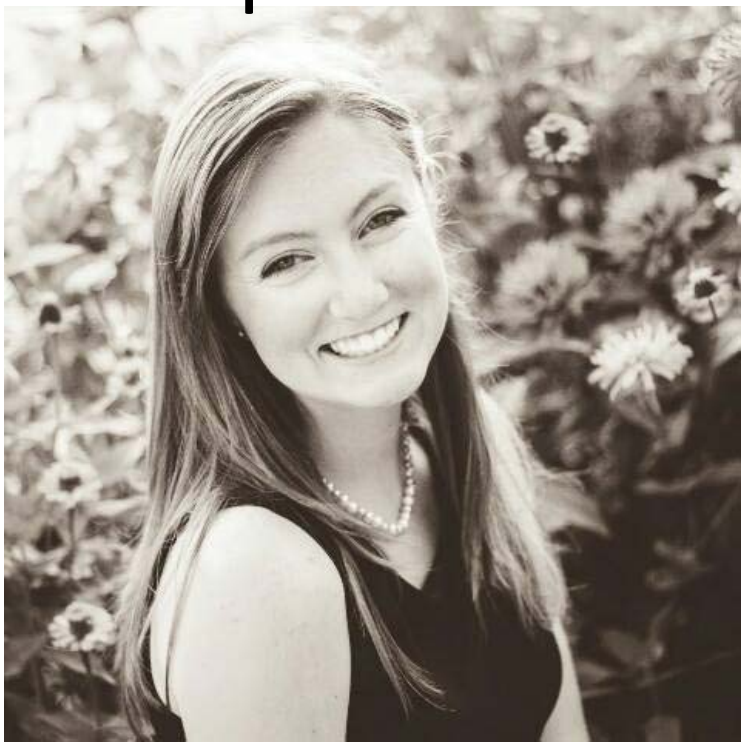


Claire

Senior

Blue Valley Northwest High School

Going to attend Johnson County JuCo and Emporia State



Connor

Senior

Blue Valley Northwest High School

Going to attend K-State, Missouri, or

Lauren

Senior

Blue Valley North High School

Going to attend Rose-Hulman Institute of Technology or Franklin W. Olin College of Engineering

Zac

Senior

Blue Valley Northwest High School

Going to attend K-State

Alec

Senior

Blue Valley Northwest High School

Going to attend K-State

And also special thanks to

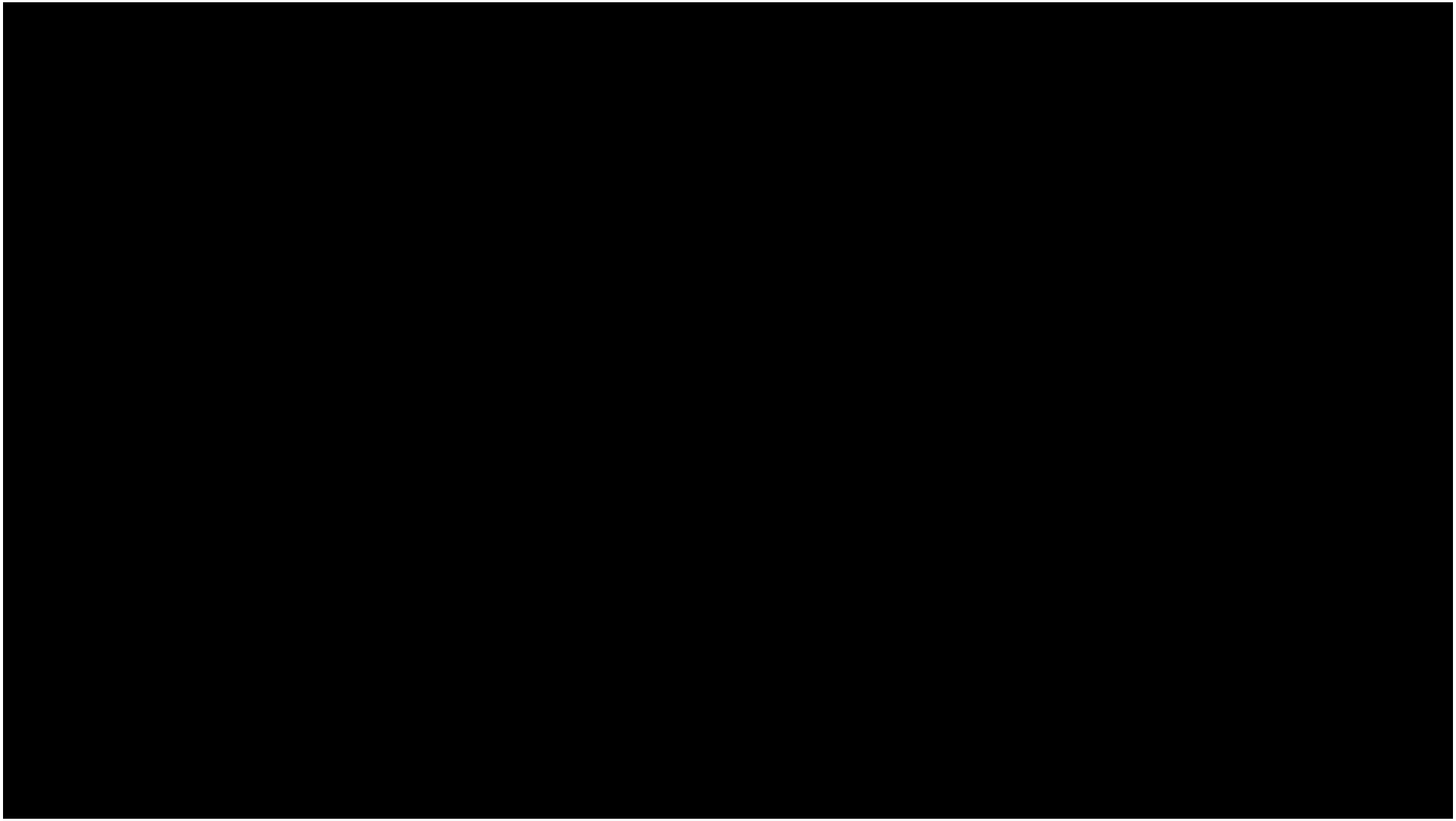
Courtney & **Abby**

CAPS Global Food Industries Class

for helping with research and information!

ABOUT CAPS

Blue Valley Center for Advanced Professional Studies



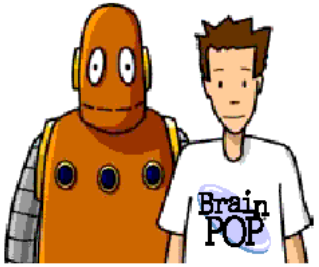
Goals for Today

- Learn about DNA
- Create a model
- Review Engineering Design Process
- Think about DNA and careers
- See how you could learn more about DNA later…

Edmodo

- www.edmodo.com
- Student account
- Code for STEM WORKSHOP group: 9623at

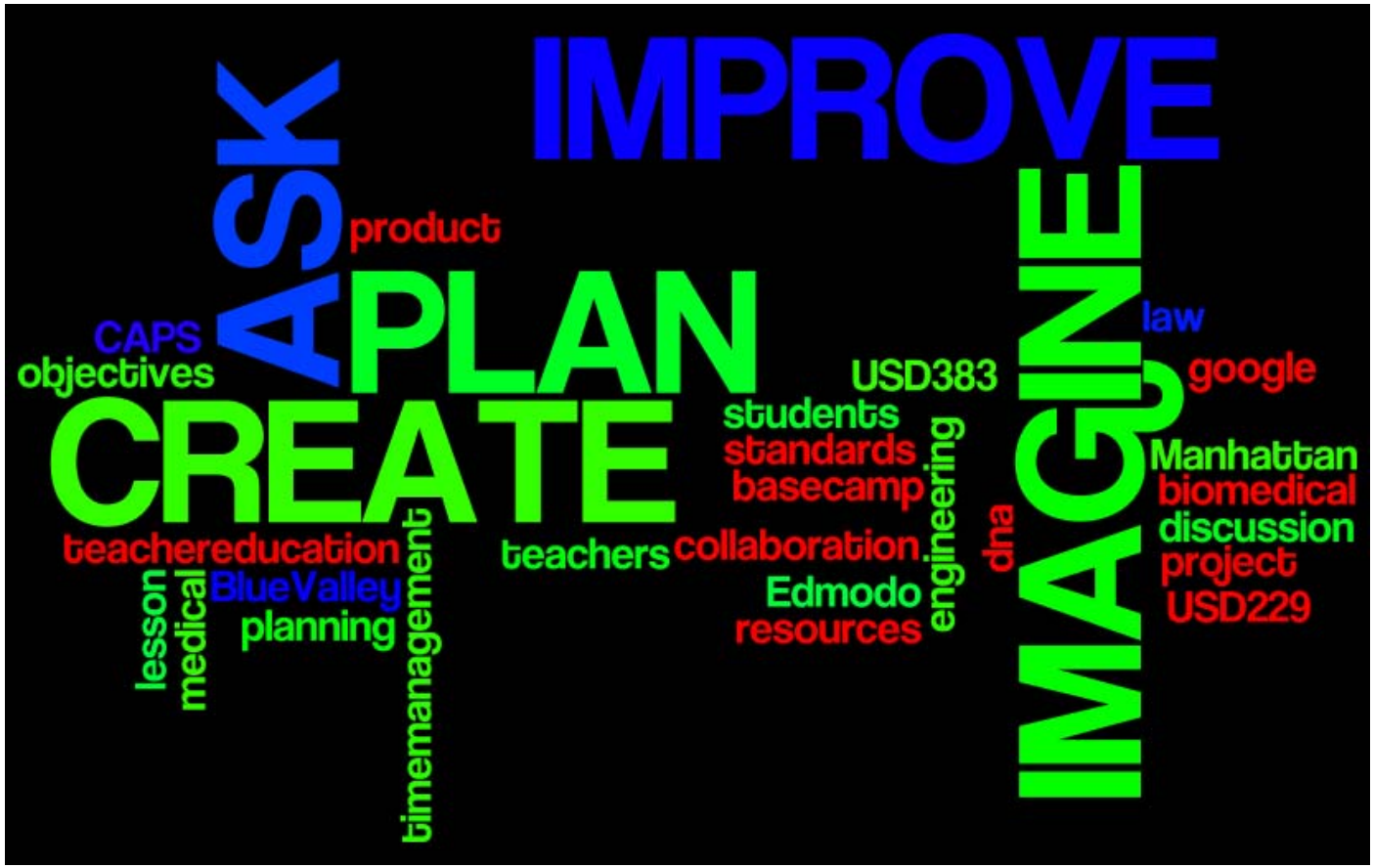
Let's take a look…



DNA

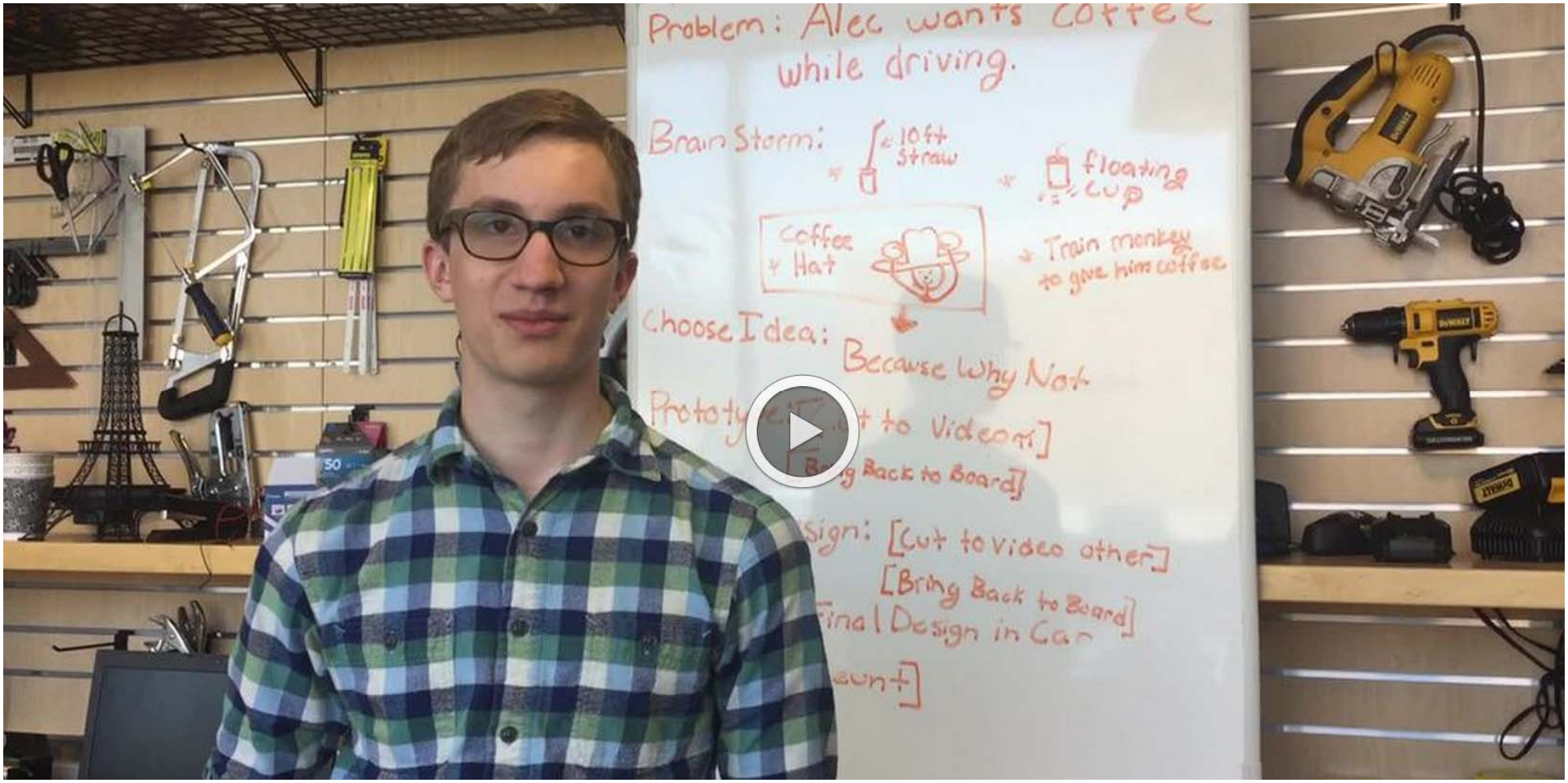
https://www.brainpop.com/science/cellularlifeandgenetics/dna/

Using the Engineering Design Process

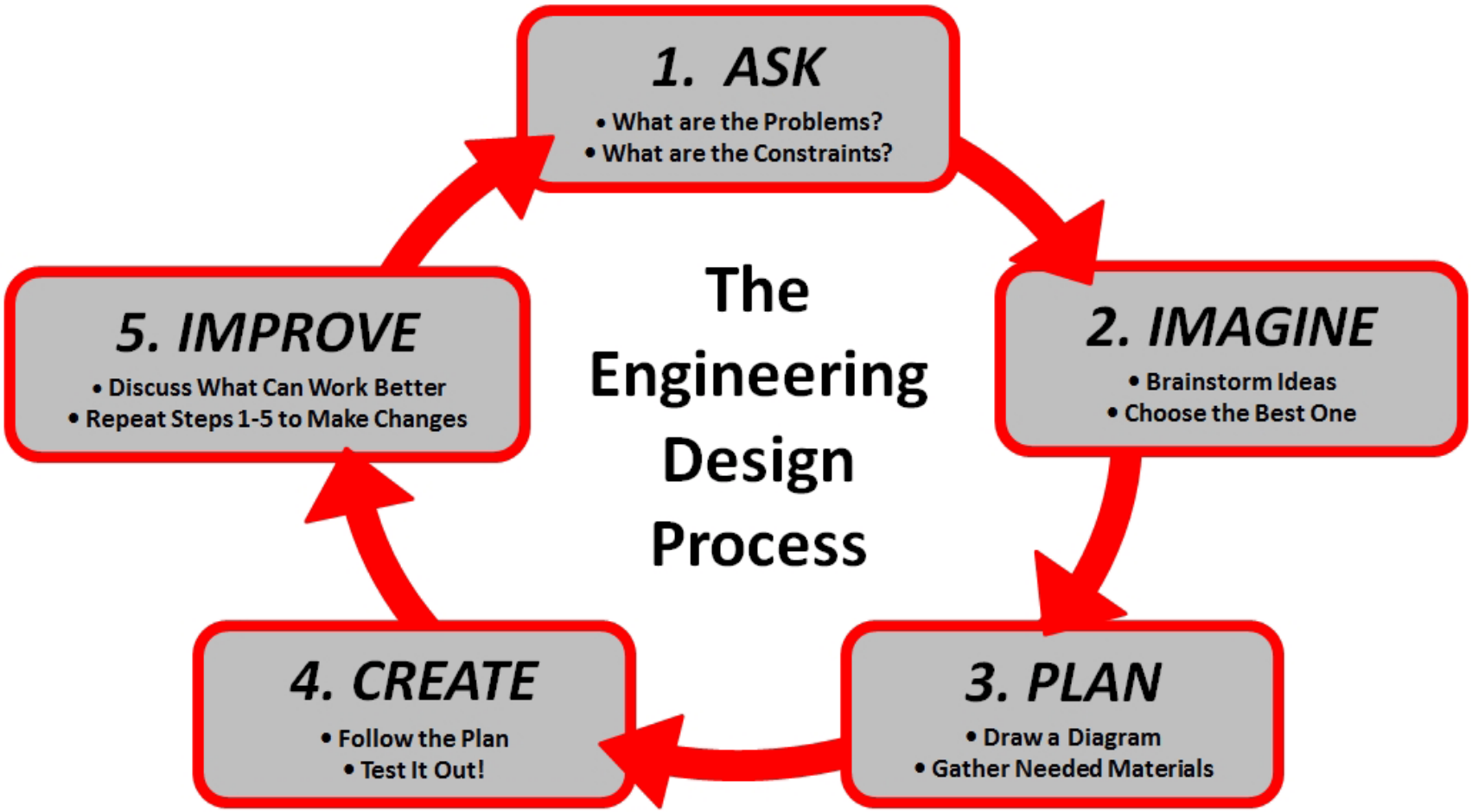


The Engineering Design Process is used for Effective Product Development

CAPS Engineering students had fun demonstrating the PROCESS



https://www.dropbox.com/s/2tpdiyfu7rpguf0/EngineeringProcess.mov?oref=e&n=208699767


1. ASK
• What are the Problems?
• What are the Constraints?
2. IMAGINE
• Brainstorm Ideas
• Choose the Best One
3. PLAN
• Draw a Diagram
• Gather Needed Materials
4. CREATE
• Follow the Plan
• Test It Out!
5. IMPROVE
• Discuss What Can Work Better
• Repeat Steps 1-5 to Make Changes
The Engineering Design Process

Steps 1 and 2

- Look at the list of names that is in your bag of supplies. As a group, choose ONE person…
- **Question 1 on Edmodo ASSIGNMENTS**
- **Click "TURN IN" and then answer the following…**

  What are the differences between the people listed? Why is this important?
- One answer per group
- List your group members' names with your answer
- Then, CLICK "**TURN IN ASSIGNMENT**"

5 minutes to answer

Step 3

Groups of 4

- **LEAD** (instruction reader)
- **CODE CHECKER** (quality control)
- **BUILDER 1**
- **BUILDER 2**

Supplies

- Clay in four colors
- Toothpicks
- Instructions (3 pages)

Create...

Step 4

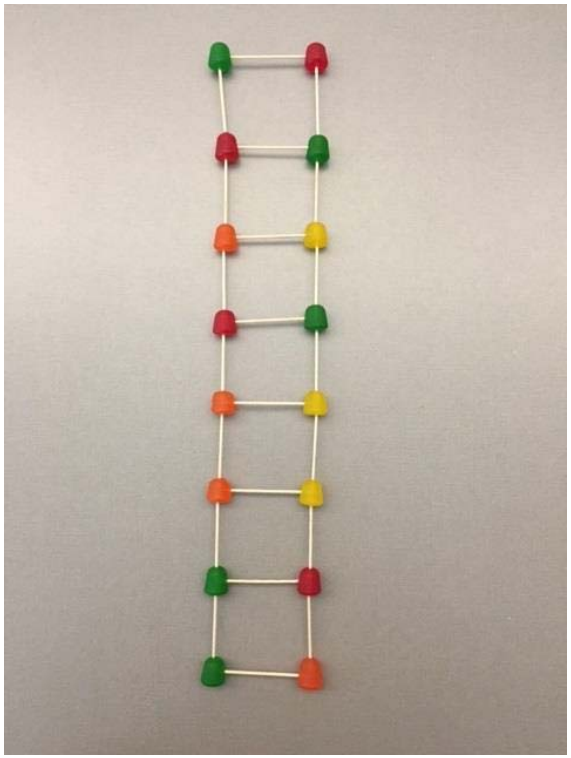
Now we're going to make our own DNA Model

Let's get started…

First, let's go over the instructions that are in your group's bag of supplies.

Now finish the strand by creating the DNA code for your chosen person's remaining characteristics! You will include eye color, hair color, right- or left-handedness, height, and nose size!

When complete, it should look something like this → …but with the colors that match the traits of your group's chosen person…



You have 30 minutes to complete your person's DNA Chain

Get ready…

Get set…

GO

Step 5

IMPROVE…

CODE CHECKER SHOULD CHECK COLORS AND THE MAKEUP OF THE DNA CHAIN

If you have an ipad, take a picture of your DNA chain and add it to Edmodo

- On Edmodo, go to the Assignment "**PICTURES OF YOUR GROUP'S DNA STRAND**"
- Click on "**TURN IN**"
- List your group members' names and then tell us which person's (from the list) traits your DNA strand demonstrates.
- Click on the FILE icon and upload your picture!
- Then, click "**TURN IN ASSIGNMENT**"

BILL NYE on DNA

https://www.youtube.com/watch?v=V9BZ3zx8b8I

On Edmodo, go to Assignments and answer two questions:

Question 2--**Why do you now think it would be important to know about DNA?**

Click on "**TURN IN**"

List your group members' names and answer the question.

Then, click on "TURN IN ASSIGNMENT"

Question 3--**Based on what you just learned from the lesson and from creating your DNA chain, how do you think DNA could be used in different jobs or professions?**

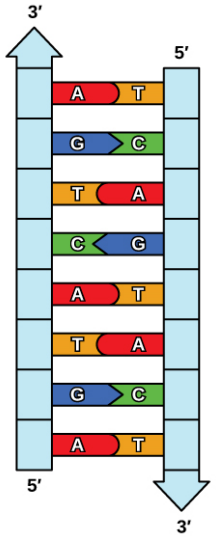
Click on "**TURN IN**"

List your group members' names and answer the question.

Then, click on "TURN IN ASSIGNMENT"

You have 10 minutes to answer these 2 questions

Let's take a look at some professions and how they use DNA



LAW

- Identify criminals and solve crimes
- Prove that some criminals are actually innocent.
- Forensic analysis of biological samples to get a DNA profile of a person
- Accurate evidence!

Priya
CAPS Law & **CAPS Teacher Education**

Fingerprint Activity

http://pbskids.org/zoom/activities/sci/fingerprints.html

- **SUPPLIES**- scratch paper, scotch tape, pencil
- Rub the pencil on the paper
- Rub your thumb on the pencil marking
- Place your thumb on the tape to see your thumbprint

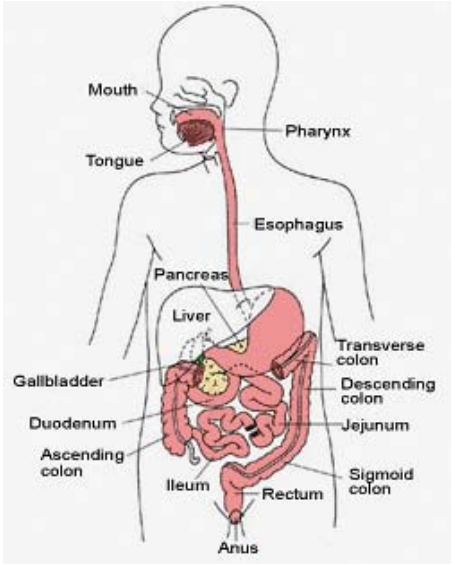
Just for fun later…

- In the "I Want To Know More" folder on Edmodo, see types of fingerprints and see what they might tell you about your personality!

You have 20 minutes to complete this activity

Medicine & Bio-Engineering

- Predicting chances of getting diseases
- Researching cures for diseases
- Studying traits passed on from parents
- Researching cloning and other ways to re-create DNA patterns in humans and animals



Connor
CAPS Foundations of Medicine
Claire
CAPS Veterinary Medicine &
CAPS Teacher Education

Food Industry

- GMO (Genetically Modified Organisms)
- Traditional breeding (Cross breeding plants to adapt them to new surroundings)
- - Drought tolerance (Make plants stronger)
- - Productivity (Grow more and bigger crops)
- - Insect repellent (Giving plants ammunition to fight insects)
- - Vitamins (to increase nutrition in plants, ex. golden rice)

Courtney & Abby
CAPS Global Food Industries

We hope you enjoyed the lesson on DNA…

Look in the "I want to know more…" folder on our Edmodo group for ways to keep learning about DNA after our lesson…

To give us feedback, please go to the QUIZ

"STEM Workshop Lesson EVALUATION"

on Edmodo and click on "TAKE QUIZ"

You have 10 minutes to complete the survey

Day 4

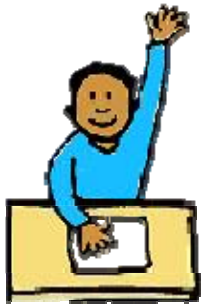
Thank you students!

Have a GREAT time learning more about DNA!

For Teachers:

Standards, Objectives, and Information on the Engineering Design Process

can be found
in the “Lesson Resources” folder
in our Edmodo Group



A view into the project…

http://youtu.be/ua890C06n6E

Contacts

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@tammyfry

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