

Notes from Leah

Learning Centers

- photos of centers and questions are available on www.alicechristie.org

Instructional Strategies Modeled During the Workshop

- Cowbell to get students' attention after hands-on activities
- Picture puzzles
- Online stopwatch
- Helper collecting/helping so that teacher can continue teaching
- Bubbl.us brainstorming mindmap- to lead a discussion
- To take a screenshot
 - On Apple: *Shift command 4*
 - On PC: Print screen
- Have the kids make their own bags of supplies--saves teacher lots of time
- Gallery walk
- Quick pace
- Movement throughout the day
- Create and use Google Forms to get responses from students
- Divide the labor – have students help set up and clean up
- Building a classroom culture--play sound, which alerts you to go to a STEM center or take a particular action
- Increase levels of categorization (make activities more challenging as the students gain skills in any area)
- Give students choices of different types of graph paper
- Exit Ticket
 - What did you learn today?
 - What questions do you still have?
 - How will you find the answers to those questions?
- Continually debrief and reflect
- Publish your students work, widely-- as often as you possibly can
- Contextualize learning--have many layers
- Provide opportunities for student choice and voice
- Choice of Tool or Choice of Content – but NOT both simultaneously
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The **single most important** thing you can do to change your classroom from a teacher centered classroom to a STEM classroom is to **Change the Nature of Your Questions**

Print Resources

- QR codes
- GPS devices
- Mobile apps on Apple devices or Android: pg 79-118
- Measurement tool Apps pgs 91-94
- Other resources for teachers to enhance your STEM skills, free professional development, courses pg 131-134

Online Resources (Graph paper, videos from workshop, online appendices)

- <http://www.alicechristie.org/BER-STEM/1617/>
- Little Bits Electronic Building Blocks <http://littlebits.cc/>
- Hour of Code *this week*: code.org
- Word Clouds
 - <http://wordle.net> (<http://www.wordle.net/create> to form word clouds--Don't use wordle.com or org--they are rip offs!
 - <http://www.tagxedo.com/>
 - <https://www.taggle.co/>
 - <http://www.soda.co.uk/work/moov/> coding/animation software
 -

STEM closet/storage space

- Donations from parents
- Let's collect recyclable materials day--tp rolls, packaging materials, egg cartons...
- dumps/recycling center
- Boston Children's museum???
- <http://www.bostonchildrensmuseum.org/>

Materials in STEM/STEAM Environments

- Get crappy paper from Walmart--wrapping paper instead of more expensive craft paper
- Materials that are easy to attain, store, use
- Materials that are versatile, age appropriate, fun, colorful, manipulative, and able to be repurposed

Questions in STEM/STEAM Environments

- Open ended, concise questions--bold key words
- Different types of questions, different types of reasoning...

Different Kinds of Questions--closed, open and probing

- Ask *probing*, *divergent* and *elaborative* questions as much as possible
- See Probing Question rubric (on website)

Have Question Board in your room

Content area centers

- should be tied to standards
- help students to achieve an academic goal
- Cross curricula
- Open ended

Pick a topic--example: earthquakes--what are different ways a student can demonstrate their understanding of earthquakes--brainstorm how many different ways to do this?

Mini STEM Pod Centers

- Time management
- Flexible thinking--form a new question using the same materials
- Think differently and expansively

Comparing Project vs Problem Based

Project Based

- Integrate different parts of the curriculum
- Structured
- Both used as assessment
- Teacher has a vision of what the end-product will be
- You can turn every project into a problem to be solved
- Humanities projects
- Once you're done, you're done

Avoid project based, step by step, where there's a desired outcome--leave it more open ended, students have choices, freedom of creativity and different ways to solve the problem

Problem Based

- Open ended
- Always a solution to a question, but project isn't necessarily so
- Science and STEM problems
- Ongoing
- Other questions come up from students
 - Kids come up with the questions---relevance

STEAM

- ARTs active, kinesthetic, music
- More humanities included when you say STEAM
- Empathy
- Audience is considered
- More integrated and getting all teachers involved in building a STEAM environment:
- Language Arts, SS, PE
- More visual: performance, sculpture, dance
- ART--creation
- Appeals to all different modalities
- Ex: if you are building a bridge, you can pay attention also to the beauty of the bridge...
- Combo of engineering and art--another way of integrating
- A different way of recording information
- Adds another entry point for children who aren't so inclined to be into engineering, math...
- Always give your students a purpose for watching a video or an assignment

STEM

- Creation
- Design is inherent in Engineering, which is sort of Artsy, but not all the ARTS...
- Use the Engineering Design Process
 - Ask
 - Imagine
 - Plan
 - Create
 - Improve

New Job Description for Teachers: Build confident and creative problem solvers

Building Creative Confidence

- Model making mistakes
- Acknowledge all student work and point out something positive
- Don't dictate or judge what it should be
- Have students affirm each other's work
- Celebrate failure--check in with the student first
- *Failure jar in the classroom--talking about people who fail in the real world--cotton balls in jar, celebrate failure when jar is full
- Encourage freedom to create autonomously
- Exploration

Engage Me Video: 3 Words That Describe the Kids and 1 word for classroom environment

Key Ideas from Video

Alice liked:

"I wrote a story and my teacher read it"

"I posted it online and 3,000 people read it"

How Can You Use Wordle in Your Classroom

- KWL charts
- Survey and polls
- Discussion
- Introducing vocabulary words
- Assessment-- socrative
- Preview
- Word Bank--for spelling...
- Brainstorming Topics for Writing
- Discussing issues in the classroom anonymously
- Building vocabulary words
- Reading reflection
- Character traits
- Extract and differentiate major and minor ideas
- Grab all pages on a topic-pop it into wordle to see the main ideas
- Kids eventually do the wordle--each student assigned a week

We are educating students for jobs that don't yet exist, using technologies that have not yet invented, to solve problems we didn't know are problems.

Butterfly Class--A motivating STEM lesson

<p>Non-Tech</p> <ul style="list-style-type: none"> • Read a book • Students asked questions • Butterfly art • Observations--butterfly and in garden • Discussion • sharing • Reflection • brainstorming 	<p>Tech</p> <ul style="list-style-type: none"> • Active Board • iPads • Camera: Still • Camera: Video • iMovie • Voice over • Drawing program • Movie credits
<p>Teacher Roles--visible</p> <ul style="list-style-type: none"> • Read aloud • Explained • Asked good questions • Provided closure at end • Led discussion • Generated excitement with tone of voice • Engaged students 	<p>Invisible Roles of Teacher</p> <ul style="list-style-type: none"> • Gathering materials • Environmental piece • Care of the garden • Care of digital devices • Learning tech herself in order to implement and teach • Wrote a grant to get iPads • Writing and planning activities and guiding questions • Classroom management • Assigned roles of students--differentiated learning

Is the term STEM Lesson an oxymoron?

- Think of STEM as a process, a way of thinking, an environment or an approach to teaching and learning...
- Maybe a better way to get parent, teacher and student buy-in
- STEM is an integral part of the every-day school routine

“Lesson”—stand-alone piece with all of the little parts

STEM--overall you want to be sure to include these skills and processes.

STEM--centric environment video: What's different?

- Learning through discovery
- Real world applications all day long
- Integration
- Science Driven with all other content areas involved
- Learn by doing
- Includes partners/community groups