

STEM NOTES - DR. ALICE CHRISTIE

Instructional Strategies Modeled by Dr. Christie

- Use an online stopwatch
- Bubbl.us is used for interactive brainstorming
- Use a bell!
- Use Wordle
 - Create a Wordle using student responses to see most popular answers from Google Forms
 - Immediate comprehension check, provides a visual, gives students a voice they can take ownership of
 - Can be used to increase inquiry
- Ways to use Wordle:
 - Responses to video clips, everyone is engaged
 - Pre-assessments
 - -“All About Me” Bio
 - Vocabulary Words
 - Concept Clouds/Brainstorming
 - Main Idea/Supporting Details
 - Articles: What Stands Out?
 - Adjectives
 - Literary Reflection
 - Characterization
 - Gifts
 - Icebreaker
 - Fact/Opinion
- Change the pace every 15 minutes
- Honor and learn from mistakes
- Give multiple opportunities for meaningful movement within the classroom

The single most important thing you can do is change your classroom from a traditional teacher-centered classroom to a STEM environment is to change the nature of your questions.

What's the difference between project-based and problem-based learning?

- Project based is teacher-directed, there are steps toward a goal
 - The scenario can be introduced by the teacher or students
- Teacher directed vs. teacher facilitated
- Project-based usually involves more explicit instruction
- Project-based has a specific outcome directed by the teacher, problem-based can have multiple outcomes
- Let students come up with problems to solve

Rigor and Relevance: Improve rigor, activities should be relevant and meaningful to their lives

What is included in the ARTS?

- Music
- Dance/Movement/Choreography
- Video/Film
- Painting/Drawing
- Acting
- Design
- Photography
- Creating
- Language Arts
- Manipulatives
- Sculpture
- Architecture/Building
- Different Mediums
- Woodworking
- Geometry

Religious schools is often added R to STEAM > STREAM

Creativity and Confidence

- Give up control
- Create a safe environment
- Look for good points even in total disaster situations
- Acknowledge all students for doing something well, even if it's not the original goal

Our important job is to help students publicize work!

-Create a website that highlights student work, let students blog

STEM Materials

- Have students come up with ideas for storing materials, which materials need to be preserved, which can be reused
- Paying for STEM furniture: DonorsChoose
- Materials can be repurposed for various activities at each grade level

Use Cornell graph paper with students - used by engineers

Large Centers

- Materials: Ribbons, tape, pens, pencils (everyday, cheap items)
- Questions: Open-ended, evidence-based, making predictions, detailed, open to interpretation, original, required creative answers
- Process: Use of touch, collaborate, encourage to share ideas, timed activity maintains focus on task at hand, testing/retesting, varying difficulty, fun, community-building

- Leave centers out for about a week at a time
- At the end of each day, create a new question to encourage deeper thinking

How do Centers Develop Content Knowledge?

- Focus on skills outside of specific content areas (critical thinking, communication, collaboration, technology, inquiry, problem-solving, learning)
- Engage students in your content area using those skills
- We need to know where to get the material, how to evaluate the materials...rote memorization is not a 21st century skill (except multiplication tables)

Full Immersion Schools: San Diego High Tech High School, San Diego High Tech Middle School

Video: Use “Moovl” for coding and design (<http://www.soda.co.uk/work/moovl>)

How can we build confident and creative problem solvers?

- Let them fail in a safe environment, get beyond fear of failure
- Change the nature of your questions
- Try not to interject
- Provide opportunities to collaborate
- Model that you can learn from mistakes
- Ask open-ended questions
- Challenge students, keep high standards
- Teach them to never give up
- Every child can think more deeply and give more effort regardless of ability
- Provide opportunities for every child to succeed

Administrators need to set the tone for the school regarding STEM implementation

Engineering Design Process:

- Ask: What's the problem?
- Imagine: Brainstorm and choose a solution
- Plan: Draw it, make a materials list
- Create: Make it, try it out
- Improve: Change, make it better

Questioning:

Inquiry Pod: Inquiry is guided by great questions; model questioning and responses to improve quality of student inquiry

Some closed questions are appropriate, you need a definitive answer

Focus on open-ended questions

Probing questions facilitates meaningful discussion

QUESTIONS:

How do you explain what students are getting out of STEM education?

-Inform parents of the broad picture involved in STEM skills

How do you address parent questions about what student is supposed to do?

-Provide 5 examples of what a project COULD look like

How can you get your district to unblock Internet resources?

-Show examples of resources kids have used at home as part of your lessons/assignments

How many activities are available per center?

- $\frac{1}{4}$ of the students working on a center, $\frac{3}{4}$ working on something else

Do all components of STEAM need to be included in a given activity?

-Not realistic to incorporate all areas in each activity, focus on integrating the broader skills into the content area