STEM FOR ALL

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IN YOUR MIND, WHAT DOES A STEM CLASSROOM LOOK LIKE?

IS THIS WHAT YOU IMAGINED?

WHAT ABOUT THIS?

STEM CLASSROOMS DON'T NEED TO BE SCIENCE, TECHNOLOGY, ENGINEERING, OR MATH CLASSROOMS!

- Any classroom can easily be transformed into a STEM classroom. These classrooms should be:
  - Collaborative and student driven
    - The teacher should not be at the center
    - Students need to be given space to discover and grow
  - Flexible and Mobile
    - Students should not be in desks in straight rows all day
    - The space should lend itself to easy collaboration

ANOTHER GREAT WAY TO INCORPORATE STEM IN ALL SUBJECTS: PROJECT BASED LEARNING(PBL)

- Project Based Learning involves:
  - Identifying a real world problem
  - Developing a solution to the real world problem
  - Using 21st Century tools and skills
  - Presenting the solution
- PBL helps students learn important 21st century skills such as problem solving and communication

HOW DO I CREATE A PBL PROJECT?

- First, you may want to start small within your discipline and then work towards other disciplines you would like to incorporate
  - This requires a lot of planning together as teacher teams. One way to simplify this if you are lacking shared planning time is utilizing shared documents such as Google docs.
- It is important to identify what key knowledge and skills you want your students to learn from the project

CREATE A DRIVING QUESTION

- The driving question should drive where the project goes. This is the real world problem that your students are trying to solve.
- Driving questions should be open ended with no one correct answer.
- In my project, there were three questions, each for a different grade level:
  - 6th grade: "What inventions would have helped ancient civilizations survive and thrive?"
  - 7th grade: "What inventions would have helped during the Civil War?"
  - 8th grade: "What invention would help a Louisiana industry be more sustainable?" or "What invention would help eliminate issues during natural disasters in Louisiana?"

SUSTAINED INQUIRY

- Project Based Learning does not take place over the course of one class period or one day. It requires students to research and dig deep into problems over time.
- PBL should not be turned on and off, instead think of it as a dimmer switch. Students should be asking questions and researching on their own throughout the process.

AUTHENTICITY

- PBL should involve real world problems, context, and tools. Topics should interest students and have impact on their lives.
- Another way to bring in authenticity is to involve real world experts and community members in the field students are studying.

STUDENT VOICE AND CHOICE

- One of the most important components of PBL is student voice and choice. Students should have a choice in:
  - The topic they are researching under the driving question
  - The final product and presentation
  - Who they will collaborate with
  - How they will use their time

REFLECTION, CRITIQUE, AND REVISION

- There should be built in opportunities for students to reflect on their learning and their project design
- Some ways to reflect, critique, and revise may be:
  - Journaling
  - Gallery walks
  - Help from "experts"
- An excellent video to have students thing about giving constructive criticism is Austin's Butterfly

PUBLIC PRODUCT

- Students must present their final product to the public. This may be their classmates, grade level, school, or whole community. This gives the students ownership in their learning and helps them to take more pride in their work and final products.
- We've invited our school community to project nights to view and give feedback to students' final projects.

HOW TO PLAN A PROJECT

- Just as students must collaborate through PBL, so must teachers
- Google Drive or other shared drives are excellent ways to share work among teachers
- Once you have a driving question, plan out a calendar:
  - The calendar should be broken into about 2-4 chunks or checkpoints for students

SAMPLE GENERAL PROJECT OUTLINE

- Students will research a specific topic within their grade level social studies content.
- After researching these topics, students will formulate questions and problems that they thought about as they were researching.
- Students will discuss solutions to the issues they've found in their research with their group members.
- Groups will invent a physical prototype as a solution to their problem. The original prototype will be made of common materials (toilet paper tubes, construction paper, pipe cleaners...etc.). They will also need to provide a written explanation about their prototype and how it solves the problem.
- Adult volunteers and peers will do a gallery walk and critique each project.
- A field trip to the Louisiana Arts and Science Museum will occur on February 13. The students will learn more about engineering there.
- Students will revise their prototypes based on critiques. The final version will be created using 3D printing software and then 3D printed.
- Students will also create a project board that basically outlines the steps they took, their research, and their rationale. Their prototype and final product will be in front of their project boards.
- Students will be filmed presenting their projects for final judging. Winners will be announced at project night where all projects will be on display.

STEM SHIFTS

- It is not easy to dive into STEM learning as a school or district, but small shifts can be made to start preparing students for the world they will be entering after high school.
- These small shifts can start with you!!

QUESTIONS?

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