A Schoolwide Approach to Design

Supporting STEAM/STEM Initiatives through Planning and Instruction
Hello!

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Access Presentation at bit.ly/PBthinking
An Introduction to Design

Stanford d.school Design Thinking Process

- **Empathize**
  - Personas
  - Role objectives
  - Decisions
  - Challenges
  - Pain Points
- **Define**
- **Ideate**
  - Interviews
  - Shadowing
  - Seek to understand
  - Non-judgmental
  - Share ideas
  - All ideas worthy
  - Diverge/Converge
  - "Yes and" thinking
  - Prioritize
- **Prototype**
  - Mockups
  - Storyboards
  - Keep it simple
  - Fail fast
  - Iterate quickly
- **Test**
  - Understand impediments
  - What works?
  - Role play
  - Iterate quickly

https://dschool.stanford.edu/
Empathize

Design Thinking is a design methodology that provides a solution-based approach to solving problems. It’s extremely useful in tackling complex problems that are ill-defined or unknown, by understanding the human needs involved, by re-framing the problem in human-centric ways, by creating many ideas in brainstorming sessions, and by adopting a hands-on approach in prototyping and testing. Understanding these five stages of Design Thinking will empower anyone to apply the Design Thinking methods in order to solve complex problems that occur around us — in our companies, in our countries, and even on the scale of our planet.

Design Thinking model proposed by the Hasso-Plattner Institute of Design at Stanford (d.school) Definition from the Interaction Design Foundation
Design Thinking

Create Change
Innovate
Solve Problems
Empathize

6. Professional Learning: Instructional Practices

There is no STEAM or arts integration related professional development currently planned and none has been offered in the last year.

Teachers, instructional coaches, and administrators attended at least one STEAM or arts integration professional learning event.

Teachers, instructional coaches, and administrators have on-going STEAM and arts integration specific professional learning and there is evidence of its implementation in classroom instruction.

Required

Documentation of STEAM specific professional learning for all teachers, instructional coaches, and administrators that incorporates the following:

- Project/problem/place-based learning
- Interdisciplinary instruction
- Investigative research-based practices
- Collaborative planning practices
- 21st Century thinking skills and school-wide use of process-based thinking (Example: Engineering Design Process, Design Thinking, etc.)
- Arts Integration

10. STEAM Curriculum: Project/Problem-Based Learning

Students are not engaged in solving authentic, real-world problems.

Students are engaged in solving authentic, real-world problems, but they are not tied to the local community.

Long-term projects/problems are implemented throughout the school year that are standards-based, interdisciplinary, and engage students with real-world problems in their community. Students utilize arts and design skills as tools to solve problems, articulate solutions, and to positively impact their local community.

Required

- Students can articulate the relationship between math, science, and arts concepts in their interdisciplinary projects.
- Written summary of grade level specific, interdisciplinary, problem/project-based learning opportunities that have occurred throughout the school year (curriculum map, timeline, calendar, etc.).
- Documentation of how project and problem-based learning connects to Georgia Standards of Excellence.

Students have documentation of long-term project-based learning in their STEAM journals. This documentation includes the use of a school-wide process-based thinking

Student work created in collaboration with a business/community/post-secondary partner. Partners provide coaching and feedback throughout the project.

14. STEAM Journals

Students do not use written journals to document interdisciplinary learning.

STEAM journals are being used in some, but not all grade levels or are not used consistently.

Students document long-term project-based learning, day-to-day interdisciplinary learning, and investigative research in STEAM journals. Digital portfolios may document student products; however, written journals are in place to demonstrate written student reflections and project ownership. Evidence of fine arts concepts and standards is present in journals.

Required

- Students utilize school-identified problem-solving process (i.e. Engineering Design Process, Design Thinking, or school-created version) and Claim, Evidence, Reasoning framework. This is guided by teacher to ensure standards mastery.
- Submission of at least two examples of student journal use driven by the school’s problem-solving process or CER.
- Documentation of how teachers plan for student journal usage during weekly collaboration.

http://www.stemgeorgia.org/certification/
Define
Define
Prototyping and Getting Feedback
TIMA'S DESIGN PROCESS

CREATIVITY

SERVICE

EMPATHY

COLLABORATION

ASK

IMAGINE

PREPARE

CREATE

TRY

REACT

SHARE
Planning: Rapid Prototyping

Ask: What are the basic needs of plants?

Imagine: How can you design a solution to ensure a plant has all of its needs?

Reflect/Prepare: Take stills of plants. Plan how to supply the plant with basic needs.

Create: A physical model of your solution (e.g., clay, play dough) or any medium (e.g., written book on pages, app, or another medium (e.g., movie), still motion, test device with real plant).

Share: Post your final product on a gallery wall. Who has the most growth and compare devices. 

Adapt:
Planning: Rapid Prototyping

**S5E1.** Obtain, evaluate, and communicate information to identify surface features on the Earth caused by constructive and/or destructive processes.

**ELAGSE 5I5** Compare and contrast the overall structure (e.g., chronology, comparison, cause/effect, problem/solution) of events, ideas, concepts, or information in two or more texts.

**ELAGSE 5I9** Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

**ELAGSE5W2** Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
Planning

TIMA DESIGN PROCESS

Ask/Define/Build Empathy
How can we model changes to the Earth’s surface? How do you communicate an understanding that the Earth is continually changing?

Introduction to Earth’s Surface Features and Forces
- How are sand dunes formed? Students are introduced to unit vocabulary including constructive and destructive forces, weather, erosions and deposition (song).
  - Students will:
    - Investigate the sand dunes (8th street beach) and form a hypothesis as to how they were formed.
    - Students will share their hypotheses using detailed explanations that contain the unit vocabulary via a Google Classroom discussion. Students will respond to classmates’ claims by disputing or agreeing, and including additional evidence.
    - Students will plan a model that will test their hypotheses. We will visit the beach again in order for them to build their models and test their hypotheses.
    - Students video their models and explain what is taking place. They reflect on whether their claim was correct.
    - Videos are shared in class along with a class discussion to determine the actual formation of sand dunes.

Teacher Guided Research:
- Overview of landforms:
  https://docs.google.com/presentation/d/1VTz7ZyVqTVWszEWdMeY/2IB5kD1AMB_SQUAw0s7AYE/edit?usp=sharing
- After viewing the slideshow and answering guiding questions with a partner each student will pick a topic (force or landform) for independent research.
- RUBRIC:
  https://docs.google.com/document/d/1OGP7ys6LRXSmklo9JgWT_1N_Vw6nzJQznDqmQ/edit

Student Research: Ask guiding research questions. Record research and inspiration in STEAM journal.
- Get inspired. Research art inspired by your landform/force.
- Define your topic.
- Where? Locations of landforms on Earth and location of force events. Use Google Earth.
- How? How are the landforms created/processes occurring?
- Draw a diagram.
- Create a flowchart.
Planning

Imagine
- How can I create a piece of music that evokes the tone and mood of the creation or destruction of landforms? What sounds, melodies, rhythms, instruments, and tempos do I need to include in my piece of music to illustrate the process of constructive or destructive forces?
- How can I create a piece of interpretative art (abstract/modern/impressionist) that evokes the colors, movement, tone, mood, and overall aesthetic of the creation or destruction of the landforms they chose. What art styles, mediums, and mentors do I use as inspiration, in addition to the photographs and pieces of art that others have taken of the landform or force I chose?

Prepare/Create/Try/Reflect
- Students create their song in GarageBand and complete the cycle. Creating, trying it out, reflecting on their own and with peers and starting the cycle over until they have a piece that they are happy with.
- Students will create interpretive art and reflect on their work as well as that of their peers. They will in the moment.

Share: Present Info-graphics, Art, and Music that goes with the landform or force they study in a Gallery Showcase happening in the evening at TIMA.

Our art teacher provided a lesson and graphic organizer to assist the kids with this step.

Reflection from team meeting—adding a math component.
STEAM Journal Checklist

Music of the Earth STEAM Journal Checklist

Ask
How can I represent the changing Earth through music and art?
- Have you chosen your topic (your force or landform)?
- Have you answered the research questions?
  - What? (define your force or landform)
  - Where? (pick one specific landform or event)
  - When? (time frame for your landform’s creation or event)
  - How? (how was your landform created? how did your event happen?)
- Flow Chart representing how your landform was created or the the event happened
  - Includes a timeline

Imagine/Prepare
- Use your flow chart and writing to create a Change over Time graph that will act as a planning template for your song.
- Don’t forget to include the timeline so that you can decide how long each part of the song will be.

Add words to describe the mood or emotions you would like the listener to feel at different points in the song.

- Include a plan for your art piece. Be sure to think about all of the elements and principles of design.
Working Through the Design Process

Using a Kanban Board

- Teachers can easily see where students are at, and who needs help
- Can be used for goal setting
- Students can use it to find peers for reflection
Promoting Reflection

I have grown up in nature doing fascinating things such as venturing into the woods at my grandparents' house and going on salt and freshwater fishing adventures. One of the things I love most is definitely the ocean, specifically the summer waves of the amazing Tybee Island, GA. I want to know what else is out there, there were thousands of miles to explore and rejoice in our beautiful world. Floods, a common catastrophe occurring occasionally on Tybee Island. This is something I find intriguing and interesting.

My song, “Flood” consists of many instruments including the bass, symbolizing how water starts to rise up. Then I added the bass drum, to symbolize how the flood gets stronger and more dangerous. After that I made the drums way more fast and intense to symbolize destruction of the land and homes, and I also added string ensemble to represent sadness and worry of the evacuated people, so next I added a hard rock guitar to symbolize the worst of this horrible time, lastly I added the bass again to symbolize the recovering from this.

My painting entitled, “Raging Flood” has a variety of colors and textures. In my painting I added wavy textures and colors including whites, blacks, light blues, dark blues, royal blue, teal and gray. I did this to symbolize floods around the world, specifically the Great Flood of 1993. The Great Flood of 1993 was a rough, terrible event, so because this event was very rough, I painted an abstract style painting to represent this terrible roughness of this huge flood. In my piece I purposely stroked most of my paint in two directions to inflict empathy towards the people who suffered it.
Student Work

What Happens During A Tsunami?

Volcanoes

So you want to see the steps of a volcano well let us? What you don't know what a volcano is well let me tell you what a volcano is! A volcano is a Mountain full of lava and then blows up on the top of the volcano and then all of the lava goes slowly or faster when it comes down the volcano. What is lava well lava is under your ground under all the rock and dirt and all other materials is the core of our earth and around the core of the earth is lava or also known as magma. Volcanoes can be constructive or destructive because volcanoes can make and destroy land, Forest, and anything around it.

Next the tectonic plates will curve the earth's surface to form the structure of the volcano. Then magma goes though the structure of the volcano and as pressure builds up the magma rises closer to the surface. Then the volcano erupts, usually after thousands of years. Lastly, after the lava cools down it creates new land or it blows off the top of the volcano.

One of the most famous volcanoes is Mount Saint Helens and is pictured above. Mount St. Helens is located in Washington state. It last erupted it on my birthday July 10, 2008.

Bibliography


The Great Flood of 1951

Water might not seem that dangerous, but when it’s traveling 573,000 cubic feet per second and is 30.56 feet tall, it’s very, very dangerous. When a little town called Heys, Kansas got 11 inches of rain, it submerged the town in 4 feet deep water and began the Great Flood of 1951.

When the creek overflowed, it went on a rampage and set a new high score for highest crest in the United States. As the water picked up speed, it covered the land and carried away debris. The Great Flood of 1951 was so dangerous that before dying out, it took the lives of 17 U.S. citizens and displaced another 358,000 shorter. It was the second biggest flood in terms of discharge with 573,000 cubic feet per second. The flood covered up Kansas, Nebraska, Missouri, Iowa, Illinois, Indiana, and Kentucky flood basins. Flood levels had not been that high since 1844. On July 13, 1,074,000 acres in Kansas were flooded.

Bibliography

"Flood of 1951." <https://www.kansa噫.ks.us/


of_1951/17181>
Reflecting on the Unit

Geek Out Project Website

Your GOAL: Design and create a website using Google Sites that has a home page, and at least 2 other pages.

I am so glad you have chosen to design and create your own website. I really enjoyed the process, and I know you will too. Exploring your passions and sharing those passions with others is very rewarding and FUN!

We all work at different paces, so I have provided all the resources you need to help you with this project in advance. Everything can be found on this website!
## Unit Planning Template

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<th>Dates:</th>
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<td>Community Partnerships:</td>
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STEAM Journals

Ask
Imagine
Prepare
Create
Try and Reflect
Share
Culture

Defining Success and Brainstorming Areas of Improvement
Use the design process...

- to create your own problem solving process
- to structure and support PBLs
- as a framework for STEAM/STEM Journals
- to plan for instruction
- to support growth for colleagues and teachers
Links and Resources

TIMA Planning Template
Kindergarten PBL Example
Stanford d.school
Music of the Earth Project Plan
Music of the Earth STEAM Journal Checklist
Geek Out Project Website
Questions