INCORPORATING STEAM INTO SCHOOL LIBRARIES

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PRESENTATION ROADMAP

• Introduction to STEAM in libraries
• Elementary STEAM Projects
• Middle School STEAM Projects
• High School STEAM Projects
• District-Wide Initiatives
LIBRARIES AND STEAM: A PERFECT PAIRING!

- Libraries house books and a wealth of technology resources.
- Librarians are trained in inquiry skills (AASL Standards for the 21st-Century Learner, Empire State Information Fluency Continuum).
- Libraries are a flexible space in which students can explore STEAM concepts (either within the traditional school day or during after school time).
- Many school libraries house or support makerspaces.
- Literature can be paired with STEAM concepts within a school library.
- Librarians have the ability to collaborate with teachers of various subjects and grade levels.


**ARCADE ELEMENTARY**

**K-2**

- Five week unit during library classes.
- First week is spent introducing students to the devices through videos and real life examples.
- Students are split into groups and stay with the same group for a four week rotation between centers. Students remain in the same center for the entire class time.
- Devices are available again during the final weeks of the school year during library class time.
- Devices are available for teacher check out.
Students have 1:1 Windows tablets.
“Library Fun Days” throughout the school year during library class time.
Devices are available throughout the library as well as websites on their tablets.
Students can do whichever activity they want and they have the right to change their minds.
Devices are available for teacher check out.
ARCADE ELEMENTARY

2-4 HOUR OF CODE

• After school during Computer Science Education Week.
• Students have choices!
• Hour of Code website, Bee-bots, Cubelets, iPad cart with Kodable app and new this year, Littlebits.
• STEAM initiatives are supported through library class experiments and hands-on challenges.
• STEAM concepts are explored through weekly small group enrichment classes.
• Library collection development is aligned with STEAM initiatives.
• Teachers have access to STEAM kits to loan from library.
AGRICULTURE AND OXIDATION

• Students learned about the growing process of apples through a storybook read-aloud.

• To learn about the oxidation process, students placed pieces of apples in various liquids (water, oil, vinegar, lemon juice). Students then made predictions about what they believed would happen.

• Using beginner aspects of the scientific method, students observed then recorded which liquid stops oxidation process in fruits.
POLLUTION AND SOLUTIONS

• Students learned about different types of pollution through non-fiction Earth Day texts.
• To learn more about water pollution, students watched a video clip about oil spills.
• Students performed a mock oil spill experiment:
  – Cooking oil placed in bowl with water.
  – Students used various materials to clean oil.
  – Students used predicting, observing, and recording skills to show results.
ENRICHMENT: HANDS-ON CHALLENGES

• To promote critical thinking, creativity, and problem solving skills, students are given various hands-on challenges.
• Students must work in group to come up with a solution and product.
• Students present their product.
• Class tests and evaluates product.
**K-4: HOUR OF CODE/CODING UNIT**

- Every student in K-4 participated in hour of code in December.
- Following hour of code, students explored coding concepts through a 4-6 week unit.
- Unit resources:
  - Robot turtles game
  - Beebots
  - Code.org
  - Roamer Jrs.
  - Kodable app
  - Ozobots
BOOKS SUPPORT STEAM!

• Maker Books
  – Origami
  – Crafting
  – Cooking

• Science Books
  – Experiments
  – Informational text

• Picture Books
  – Rosie Revere Engineer
  – The Most Magnificent Thing
  – Iggy Peck Architect
  – In Mary's Garden
WE WANT YOU... TO CHECK OUT A STEAM KIT!

• Roamer Jrs.
• Magnetism
• Robotikit: Solar Robot
• Beebots
• Hummingbird kit
• Robohand
• Freshwater filtration
• Littlebits circuit kit
• Human body
• Snap circuits

• Bridge building
• Structure building
• Vehicle building
• Force and gravity
• Buoyancy
• Earthquakes
• Ozobots (borrowed from BOCES)
STEAM initiatives are supported through classroom projects across subjects and grade levels.

After school Maker Club, Science Olympiad, and FIRST Lego League teams support STEAM outside of the classroom.
SPECIAL EDUCATION: BOATS AND BUOYANCY PROJECT

• Using nonfiction books and the World Book Kids databases, students gathered information about boats.

• Students then focused on learning more about a specific boat and created a model of their boat.
SPECIAL EDUCATION: FISH TANK INQUIRY

• Students brainstormed what they wanted to know in the classroom and brought their questions to the library for research assistance.

• Students used real world skills of:
  – Budgeting
  – Researching, including asking an expert
  – Using a search engine
  – How to compare prices to find the better bargain
Using tech tools such as blogs and padlet, students participated in the Global Read Aloud by sharing their projects and reflections with schools from around the world.
SPECIAL EDUCATION: THE MITTEN AND MATH

• Paired *The Mitten* by Jan Brett with math skills.
• Students used estimation and counting to use pom poms and mittens for a math activity.
SPANISH 8: TECHNOLOGICAL TOUR

• Using Aurasma, an Augmented Reality app, students took a “virtual walking tour” of areas of technological advancements in Spanish-speaking places.
Students were divided into groups. Each group was responsible for assembling all buildings in a paper neighborhood.

Students then used their French vocabulary to provide directions to and from different locations within the neighborhood.

Individually, students used Nearpod for a vocabulary assessment and project reflection.
Student groups learned the basics of computer coding with BeeBots.

They learned how to program the BeeBot to reach specific destinations on the mat.

For a greater degree of difficulty, grouped programmed complete sentences into the BeeBot.

For assessment, students reviewed the Habits of Mind used during the project.
Using Kodable and BeeBots, students received hands-on experience with coding.

Students then used their tablets to view videos about various STEM careers.

Individually, students filled out a reflection sheet based on their coding experiences and the 21st Century Skills used during the activity.
SCIENCE 6: PLANET INQUIRY PROJECT

- Student groups brainstormed research questions of interest to them personally.
- Groups sorted and selected the questions to be used for their research.
- Books, databases, and websites were used to gather information.
- Groups prepared and executed lessons for their classmates (complete with homework!)
AFTER SCHOOL MAKER CLUB

- Libraries are a natural choice for maker activities. Instead of simply finding information, library users are a social community of learners.
- After school Maker Club provides an inclusive atmosphere for all students.
- Hour of Code, robotics/coding, Legos, and crafts are popular projects.
- Student-led sessions or guest speakers come in on select Thursdays.
PIONEER HIGH SCHOOL

- STEAM topics are highlighted in collection development
- STEAM initiatives are supported through classroom projects
- Maker resources are available for faculty and student use in the library support STEAM outside of the classroom.
STEAM & COLLECTION DEVELOPMENT

• Through strategic STEAM collection development, numerous books on the sciences, technology, engineering, art, and math have been added to the collection for student and staff use.
STEAM & RESEARCH

• English 10: Environmental Issues
  – Students used books, databases, and websites to locate information on a variety of environmental issues including invasive species, energy, and climate change.

• English 10: Health and Wellness
  – Students used books, databases, and websites to locate information on numerous health and wellness issues, such as GMOs in food, the use of bovine growth hormones, and the benefits of exercise.

• Health: Diseases and diets
  – Librarian preselected and pulled reliable resources for students to use while researching.

• AP Biology: Hereditary diseases
  – Individual reference sessions with students to use the science databases and resources available in the library.
PROBLEM SOLVING MATH: HOUR OF CODE WITH CUBELETS

• Using cubelets, students from Problem Solving worked together during Hour of Code week.

• Students received learning adventures that they had to complete using the cubelets.

• Examples of the learning adventures:
  • Create a lighthouse
  • Draw a circle
  • Create a vehicle that does not run into walls
  • Create a vehicle that only moves when it's own light shines on it
MUSIC: CO-TEACHING & INCORPORATING TECHNOLOGY

BEFORE COLLABORATION
- This project included writing a paper after watching pieces of films to see how music impacts the mood and reflects the theme.
- The teacher wanted a more engaging project.

AFTER COLLABORATION
- The project introduced technology (Windows Live Movie Maker, Mixcraft)
MUSIC: CO-TEACHING & INCORPORATING TECH

• Task One: Students were tasked with finding videos from Internet Archive and creating music that matched the mood of the clip.

• Task Two: Once students had successfully completed task one, they had to create music that changed the mood of the clip.

• Task Three: Students researched poetry and then wrote their own poem and created music to match the intended mood and theme of their poems.

• Tools and Tech:
  – Internet Archive
  – Windows Live Movie Maker
  – Mixcraft

• Goals
  – Students will have a better understanding of the impact of music
STEAM & MAKER RESOURCES

Available in the library:

**Technology**
- Makey Makeys
- Cubelets
- GPS units
- Hummingbird Kit
- VR goggles

**Crafting**
- Silhouette Cameo
- Felt and sewing materials
- Modeling clay
- Duct tape
- Origami (old book pages)
- Flower arrangement supplies
DISTRICT WIDE INITIATIVES: FAMILY READING NIGHT

- The theme for Pioneer’s fifth annual Family Reading Night was *Make Time for Reading*.
- All activities centered upon literacy and STEAM/maker activities.
- The Buffalo Museum of Science presented four hands-on science stations for attendees.
DISTRICT-WIDE INITIATIVES: SEYMOUR SIMON AUTHOR VISIT

• Students in grade preK-7 enjoyed a visit from Seymour Simon, author of nearly 300 nonfiction books for children.

• Prior to Mr. Simon’s visit, students spent time in the library exploring the science concepts presented in his books.
THANK YOU!

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