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Recent Books with STEAM Connections

Preschool Fiction

- ***Albert the Muffin-Maker*** by Eleanor May (Kane Press) - Math.
- ***Building Our House*** by Jonathan Bean (Farrar Straus Giroux). - Engineering.
- ***Milo and Millie*** by Jedda Robaard (Candlewick) - Arts, Math.
- ***If You Were a Panda Bear*** by Florence Minor, illus. by Wendell Minor (Katherine Tegen Books) - Science.

Preschool Non-fiction

- ***Feathers: Not Just for Flying*** by Melissa Stewart, illus. by Sarah S. Brannen (Charlesbridge) - Science.
- ***Graham and Jet Get Wet: The Wonders of Weather*** by Janis Murray (Reedy Press) - Science.
- ***Ruby, Violet, Lime: Looking for Color*** by Jane Brocket (Millbrook Press) - Arts.
- ***Which Is Round? Which Is Bigger?*** by Mineko Mamada (Kids Can Press) - Math.

School-age Fiction

- ***Aviary Wonders Inc. Spring Catalog and Instruction Manual*** by Kate Samworth (Clarion) - Science, Arts.
- ***Escape from Mr. Lemoncello's Library*** by Chris Grabenstein (Random House) - Technology, Arts, Math.
- ***Rosie Revere, Engineer*** by Andrea Beaty (Abrams Books for Young Readers) - Engineering, Math.
- ***The Water Castle*** by Megan Frazer Blakemore (Walker Childrens) - Science.

School-age Non-fiction

- ***Behold the Beautiful Dung Beetle*** by Cheryl Bardoe, illus. by Alan Marks (Charlesbridge) - Science.
- ***Stone Giant: Michelangelo's David and How It Came to Be*** by Jane Sutcliffe, illus. by John Shelley (Charlesbridge) - Engineering, Arts.
- ***Super Scratch Programming Adventure!: Learn to Program by Making Cool Games*** by The LEAD Project (No Starch Press) - Technology, Math.
- ***Wild About Bears*** by Jeannie Brett (Charlesbridge) - Science.

Sample Flyer Highlighting Databases or Apps

Read, Talk, Write, Sing, & Play Together... with Apps!

Children learn best when they do fun activities with grownups who care about them. Explore these apps on your tablet and engage in reading, talking, writing, singing, and playing together!

Read

Go Away, Big Green Monster! by Night & Day Studios - Read this classic story by Ed Emberley together and watch as a monster appears out of nowhere and then goes away again. You don't scare me!

Talk

Peek-a-Zoo: Toddler Peekaboo at the Zoo by treebetty - Take a virtual visit to the zoo and guess what animals you can find in their habitats. Make sure to name the animals and make their sounds!

Write

My A-Z by Night & Day Studios - Have fun learning and practicing the letters of the alphabet by creating your own digital alphabet book. Take pictures of letters you see around you or of things that start with every letter of the alphabet.

Sing

Felt Board—Mother Goose on the Loose by Software Smoothie - Learn and sing classic nursery rhymes like Little Miss Muffet and Hickory Dickory Dock. You can play with the felt characters, too.

Play

Sock Puppets by Smith Micro Software - Create your own puppet shows by choosing your sock characters and recording your voice. The sillier the puppet show, the better!

Sample Outline of Preschool Science Program

Basic Format of a Preschool Science Program (30-45 minutes)

Introduction & Name Game (5 minutes) - Welcome children and caregivers to the program. Play a name game and introduce the science concept of the day.

Story Sharing (5-10 minutes) - Read one or more stories that connect to the science concept of the day.

Retelling the Story / Exploring the Concept (5 minutes) - Retell the story together without the book; e.g., use a flannel board, stick puppets, or props. Emphasize and discuss the science concept during the retelling. Make sure to explain new vocabulary, including having children repeat important new words.

Hands-on Activities (10-25 minutes) - Children and caregivers engage in a variety of hands-on activities (3-5 activities set up in stations is optimal). Activities are self-paced and instructions are on each activity table, allowing caregivers to interact with their children. The program provider can move freely about the stations asking questions, modeling inquiry, and engaging with attendees.

Closing (1 minute) - Thank everyone for coming. Direct attention to materials to extend concept learning at home, including fiction and non-fiction books available for checkout as well as optional handout with take-home activity instructions.

Shadow Science Program Outline

Introduction & Name Game - Greet each child as they enter and hand them a block with masking tape with their name written on it. For a name game, call the name of each child one at a time; the child can place their block in a building area. Each child adds their own block, resulting in a collaborative building activity. Introduce the day's topic: shadows.

Story Sharing - Read *The Dark, Dark Night* by M. Christina Butler. Talk about how the animals' shadows combine to look like a monster. Read *What Makes a Shadow?* by Clyde Robert Bulla. Ask questions about the illustrations to reinforce concept learning.

Retelling the Story / Exploring the Concept - Retell the story of animals seeing their shadows. Discuss where children have seen shadows before, and see if you have shadows in the program space. Explore whether a shadow can be disconnect from its owner.

Hands-on Activities - Four activity stations, which children and caregivers can do at their own pace; some may spend just a few minutes at each station, and others may engage with the activities for a longer amount of time.

1. **Shadow Size** - Provide basic shapes (triangle, circle, square, rectangle) on card stock or other heavy paper. Point a projector or other large light source at a wall and encourage children to use the shapes to make shadows on the wall. Explore how to make the shadows appear larger or smaller. Ask questions about why shadow size seems to work in this way.

2. **Tell a Shadow Story** - Provide die-cut animal shapes, popsicle sticks, and tape for children to make stick puppets. Point a projector or other large light source at a wall and encourage children to use their stick puppets to make shadow puppets. Provide a brief story outline or song lyrics to correspond with the animal shapes (e.g., "Five Little Ducks" for duck shapes, etc.) and assist children to tell their stories using shadow puppets.

3. **Experiment with Light and Objects** - Provide flashlights, a large box that can serve as a dark space, and a variety of objects (solid and opaque, solid and sheer, and semi-solid). Encourage children to hold each object inside the box and then point a flashlight at the object. Explore the types of shadows that are created through this process. Discuss which objects block the light and which objects the light passes through. Guess what will happen when a flashlight is pointed at other objects.

4. **Matching Shadows** - Create a set of matching cards in which children will match an object (e.g., a car) with its shadow or silhouette. A set of matching cards with a winter theme is available at **http://www.allkidsnetwork.com/activities/games/shadow-matching-game.asp**.

Closing - Thank everyone for coming. Direct attention to library books on display: stories involving shadows, non-fiction titles on how light and shadows work, and non-fiction science activity guides. Make available a handout with instructions for two take-home activities about shadows: 1) observing the shadow of a object outside at different times of day; and 2) using a light, a flat wall, paper, and a writing utensil to draw silhouettes of family and friends.

Sample Outline of School-Age Arts and Math Program

Art Market School-Age Program (45-60 minutes)

Introduction (1 minute) - Welcome children to the program.

Discussion of Money Math Concepts (10 minutes) - Ask children about any money that they might have. How do they earn it? How do they decide what to spend it on? Do they save it, how, and why? Using the responses of the group as a starting point, introduce the ideas of budgeting how to spend one's money in order to accomplish a goal. Discuss saving, planning, and ultimately spending money.

Explanation of the Art Market Premise (5 minutes) - Each child receives an envelope with the equivalent of $30 in in pretend cash—a ten, two fives, and ten ones. Children will use this money to purchase the art supplies they would like to use to make any craft creations they please. They will not receive additional money, so they will need to plan ahead and budget their money in order to use it most effectively. Discuss strategies for making the most of one's money, such as purchasing items only as they are needed (instead of all at once, with the possibility of surplus) and pitching in with a friend or table mate to purchase together, and then share, a more expensive craft tool.

Craft Creation Time (30-45 minutes) - Craft supplies are set out in advance of the program and labeled with a price. "Starter" supplies—sheets of paper, cardboard picture frames, etc.—are $2 each. Random craft supplies, such as chenille sticks, pom poms, brads, etc., are 3 for $1. Reusable tools like scissors, crayons, tape in dispensers, and glue are $5 each. Children bring their pretend cash and desired craft supplies to the cashier's station, which is run by the program provider. Children count out the money owed for their craft supplies and the change they should receive, which involves basic addition and subtraction. Children work on their crafts for as long as they need, and they may come purchase supplies as many times as they want while they still have money. Leftover funds can be taken home to be used as bookmarks.

Closing (1 minute) - Observe the wide variety of craft creations that resulted from the activity. Thank everyone for coming.

Sample Outline of School-Age Science Program

Basic Format of a School-Age Science Program (45-60 minutes)

Introduction (1 minute) - Welcome children to the program. Introduce the science topic of the day.

Concept Learning (10 minutes) - Provide background information for children to understand the science concepts at work in the science topic of the day. Utilize a variety of resources, including print materials, images, and videos. Demonstrations are also excellent.

Hands-On Creation / Experimentation (25-35 minutes) - Pose a science challenge for the children to work on for the bulk of the program. Provide instructions, a variety of supplies, and plenty of space for children to experiment with the challenge. The program provider should move through the program area to ask questions to reinforce learning, provide encouragement, and lend assistance as necessary.

Testing and Observing Creations (10-15 minutes) - Children put their creations to the test. Each child tests their creation one at a time as all program participants observe. Emphasis is not on the "best" creation, but instead upon what factors may affect how a creation works. Discussion includes concepts and vocabulary for the earlier learning portion of the program. The program leader may pose questions about similarities and differences between creations and how they perform, or may encourage thinking about how to adjust creations to reach different results.

Closing (1 minute) - Thank everyone for coming. Direct attention to materials to extend concept learning at home, including fiction and non-fiction books available for checkout as well as optional additional materials to replicate the challenge at home.

Airplane Science Program Outline

Introduction - Greet children as they enter. Introduce the day's topic, airplanes, and have informal discussions about who has been on an airplane, etc., until ready to begin the program.

Concept Learning - Learn some of the basic science behind how airplanes work. Describe the forces acting on an airplane in flight using a non-fiction book or a diagram from How Stuff Works (http://science.howstuffworks.com/transport/flight/modern/airplanes1.htm). Explain Bernoulli's Principle and its affect on airplane flight;

demonstrate how Bernoulli's Principle works by keeping a ping pong ball aloft with a hair dryer.

Hands-On Creation / Experimentation - Challenge children to create the best-flying paper airplanes they can. Provide printed instructions for a variety of different paper airplane styles, which can be found in a book like *How to Make Paper Airplanes* by B.B. Adams. Additional paper airplane designs and printable instructions may be found online. Provide different weights of paper for children to experiment as they seek the best design for their paper airplanes. Provide scissors, tape, and any other supplies that may be necessary for experimentation as well. The program provider should move around the program space during the creation period to ask children questions about their designs; encourage children to test and try to improve their designs; and provide assistance as needed.

Testing and Observing Creations - Use masking tape on the floor of the program space to measure out a test flight zone; tape at one-foot intervals is excellent. One at a time, each child may stand at the test flight starting line and fly their paper airplanes. Each plane's flight distance is recorded, along with its design style, on a white board or piece of paper. As more and more test flights have taken place, ask children to make hypotheses about how certain styles of paper airplanes might perform. If time allows, enable children to make modifications to their designs and test them again; observe the new results. Talk about what designs were most effective, which were least effective, and reasons why different flight performance may have resulted.

Closing - Thank everyone for coming. Direct attention to library books on display: picture and chapter books involving flight, biographies of aviators, non-fiction titles on how airplanes work, and non-fiction science activity books. Attendees can take home printed instructions for paper airplane designs and different weights of paper to try building additional airplanes at home.

STEAM Resources for the Public Library

Blogs for STEAM Program Plans

- *Abby the Librarian* by Abby Johnson - http://www.abbythelibrarian.com
- *It's a Library Bonanza* by Kelsey Cole - http://librarybonanza.com
- *Library Makers* by Carissa Christner - http://librarymakers.blogspot.com
- *Read Sing Play* by Kendra Jones - http://klmpeace.wordpress.com
- *The Show Me Librarian* by Amy Koester - http://showmelibrarian.blogspot.com

Blogs for STEAM Activities

- *Little eLit* by Cen Campbell et. al. - http://littleelit.com
- *PreKinders* by Karen Cox - http://www.prekinders.com
- *Teach Preschool* by Deborah J. Stewart - http://www.teachpreschool.org

Websites for STEAM Ideas

- *Bedtime Math* - http://bedtimemath.org
- *Fun Science* from National Geographic Kids - http://kids.nationalgeographic.com/kids/activities/funscience/
- *Mixing in Math* - http://mixinginmath.terc.edu
- *Pinterest* - http://www.pinterest.com
- *Science Sparks* - http://www.science-sparks.com
- *Steve Spangler Science* - http://www.stevespanglerscience.com
- *Wonderopolis* - http://wonderopolis.org

Websites for STEAM Explanations

- *How Stuff Works* - http://www.howstuffworks.com
- *The Story Behind the Science* - http://www.storybehindthescience.org
- *Understanding Science* from UC Berkeley - http://undsci.berkeley.edu/article/intro_01

Grants for STEAM Programs and Services

- **Friends of the Library**
- *Institute of Museum and Library Services (IMLS)* grants - http://www.imls.gov/about/stem.aspx
- *Library Services and Technology Act (LSTA)* funds - http://www.ala.org/advocacy/advleg/federallegislation/lsta
- *STEM Grants* - http://stemgrants.com